

Impact Evaluation of the Land Record Management Information System in the Punjab Province, Pakistan

Inayat Ullah (National University of Sciences & Technology)

Saqib Hussain (KDI School of Public Policy and Management)

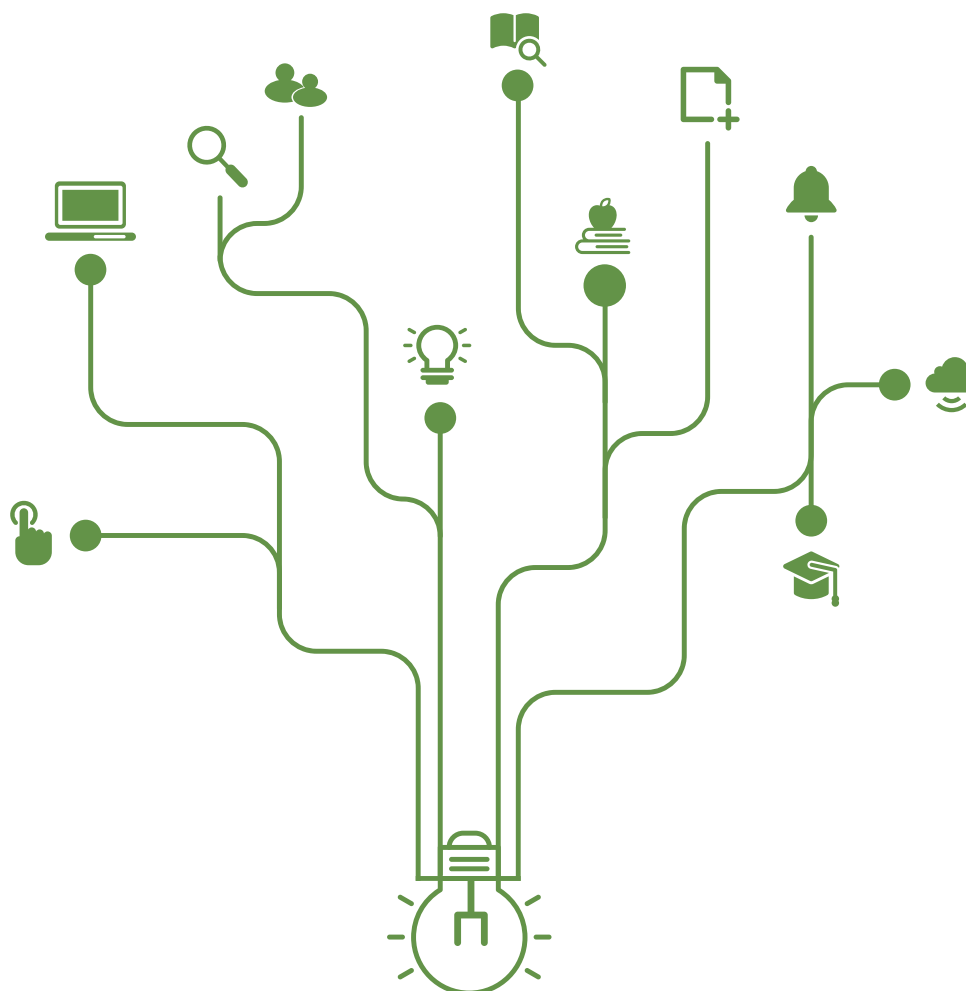
Wafa Akhoubzi (KDI School of Public Policy and Management)

Saddam Hussain (COMSATS University Islamabad)

Muhammad Riaz Khan (COMSATS University Islamabad)

Sana Jamil (COMSATS University Islamabad)

Aqsa Parveen (COMSATS University Islamabad)



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*Inayat Ullah¹, Saqib Hussain², Wafa Akhoubzi³, Saddam Hussain⁴, Muhammad Riaz Khan⁵,
Sana Jamil⁶, Aqsa Parveen⁷*

Working Paper

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¹ Principal Investigator of this research and Assistant Professor, Dept. of Govt & Public Policy, National University of Sciences & Technology (NUST), Pakistan (inayat@s3h.nust.edu.pk)

² KDI School of Public Policy and Management, Republic of Korea (saqibhussain@kdis.ac.kr)

³ KDI School of Public Policy and Management, Republic of Korea (w.akhoubzi@gmail.com)

⁴ Department of Management Sciences, COMSATS University Islamabad, Attock Campus (dr.saddam@ciit-attock.edu.pk)

⁵ Department of Management Sciences, COMSATS University Islamabad, Attock Campus (riaz@ciit-attock.edu.pk)

⁶ Department of Management Sciences, COMSATS University Islamabad, Attock Campus (sanajamil332@gmail.com)

⁷ Department of Management Sciences, COMSATS University Islamabad, Attock Campus (aqsa1009@gmail.com)

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ABSTRACT

Complexity in administration and limited accessibility to land records have been long-standing issues in developing countries. In Pakistan, except for the province of Punjab where land-record has been computerized in 2017, the land record is largely administered through traditional land registers and cadastral maps in paper formats requiring a laborious work of administrators called “Patwaris” at the grass-root level. As an important step towards e-governance, the Punjab provincial government established a Land Record Management Information System (PLRMIS) in 2013 that simplified the procedure of land registration and transfer through digitization of land records. We evaluated the impact of the PLRMIS on dispute resolution efforts in the Punjab province through the Joint Research Project of the KDI School of Public Policy, South Korea in collaboration with the Department of Management Sciences, COMSATS University Islamabad (CUI), Attock Campus, Pakistan. We adopted a quasi-experimental approach to scientifically examine the impact of PLRMIS on land-related dispute resolution and identify key issues associated with governance of this large-scale program through a field survey. Our empirical findings provide suggestive evidence of the direct effects of the program on the number of disputes registered in Alternate Dispute Resolution (ADR) centres across Punjab. Our results show that on average, an ADR Centre located in the early treated district is likely to receive 40 cases more than ADR centres located in early controlled districts. We also adopt a two-stage least square approach where the program effect is instrumented to estimate effect on the number of successfully resolved disputes. Our results are robust despite controlling for covariates and entity-specific variation as well as time-trend.

Our primary data collected through field surveys from four major stakeholders support the idea of increasing access to land records and related information through PLRMIS despite challenges in the implementation and operations of the program. We find significant variation in the level of use, understanding of citizens regarding access of the system and the extent to which clients are served with the PLRMIS. Very importantly, we observe that majority of those people who have conducted a land related transactions and having conflicts in those transactions, resort to the PLRMIS online facilities located in each tehsil of the districts. Our field surveys also identified key areas of the PLRMIS that need attention of government officials in order to sustainably continue this flagship program already in place across Punjab.

Key Words: *Digital Governance, Land Administration, Dispute Resolution, Quasi-Experiment*

JEL Classification: G38, Q15, J52, B23

1. INTRODUCTION

1.1. Overview and Background

The history of land administration and revenue generation in the Indian Sub-continent can be traced back to the 13th and 14th centuries when the first Indian Sultan, Ala Uddin Khilji started the registration and administering of the land record (Ali, 2013). Successive rulers initiated and maintained the land record tradition throughout their reigns and extracted land revenue such as Sher Shah Suri of the 16th century who introduced fixed crop rates that significantly improved the measurement of land records (Thakur, Dutta, Khadanga, & Venkatesh, 2005). Akbar, the most powerful emperor of the Mughal Empire in the 17th century, brought substantial reforms in the land administration such as determining different classes of lands and revenue estates (Ali, 2013). The Mughal Empire was followed by British rule during which the land administration system was enhanced to raise more land revenues (Marshall, 1975). Because of the complication in the uniform implementation of laws across the sub-continent, the British government introduced and modified state-specific regulations over nearly 90 years (Thakur et al., 2005). The “Punjab Land Alienation Act 1900” that prohibited land transfer ownership from agriculture to non-agriculture class was an important intervention by the British rule in India (Cheema, Khwaja, & Qadir, 2006). Although minor amendments took place over the years, the major land-related laws of the British government such as “The Transfer of Property Act of 1882” and “The Punjab Tenancy Act of 1887”, continued to exist after the independence of Pakistan and India in 1947. For example, the “Land Revenue Act of 1887” was amended with “The Punjab Land Revenue Act of 1967”. The overall land administration system in Pakistan is carried out within the framework of the British Era’s laws and regulations (UN-HABITAT, 2012). Annex 1 shows a detailed timeline and land-related legislation in Pakistan for 140 years.

1.2. Governance and Development Gap

Land in the Punjab province of Pakistan is known for its fertility, agricultural diversity, and its contribution to the rural economy of the country. However, ownership and administration issues associated with land have been causing significant constraints for both government and the general public in realizing its real value. These issues include inequalities in land distribution, tenure insecurity and difficulties associated with registration and transfer system of land (Ali, 2013; Marshall, 1975; Thakur et al., 2005). The century’s old inefficient and manual land record system has increased the land transaction cost (both formal and informal) and land-related disputes in rural and urban areas (Cheema et al., 2006). As a result, the land

market has become contracted while land prices are often unpredictable and more than the discounted value of the potential agricultural earnings from it. The low mobility of land contributes to perpetuating the highly unequal distribution of land and related livelihood opportunities across the province.

In the past, land reforms were largely carried out to secure property rights (Conning & Deb, 2007). These reforms include land entitling (Zhang, Cheng, Cheng, & Wu, 2020), land administration (Conning & Deb, 2007; Enemark, 2009; Gignoux, Macours, & Wren-Lewis, 2013), imposed redistributive reforms (Adams & Howell, 2001; Conning & Deb, 2007), negotiated or market-led reforms (Gauster & Isakson, 2007) and reforms through restitution (Conning & Deb, 2007; Gignoux et al., 2013). Some of them were successful and others resulted in unintended outcomes (Besley, 1995; Deininger, 2003; Feder & Nishio, 1999). Many of the national and international organizations and governments have played a crucial role in such reforms. For instance, the world bank solely committed billions of dollars in different parts of the development world (Bank, 2005; Holstein, 1996; USAID, 2010). The core components of these reforms include economic, political, credit supply, environment and sustainable development (Conning & Deb, 2007; De Soto, 2000; North, 1990). Failure in land reforms often happens when there are unknown community arrangements, poor implementation, and a lack of accountability (Conning & Deb, 2007; Dupont, Grabosky, & Shearing, 2003; Lauria-Santiago, 1999; Scott, 1999). But the risk can be minimized by efficient monitoring, accountability, participation, and feedback along with pilot studies before scaling up to costly program intervention (Bank, 2005; Conning & Deb, 2007). A strong feedback mechanism is a key to the effective monitoring, evaluation, and accountability in reforms packages ensuring intended outcomes. For this purpose, different types of impact evaluation studies are carried by qualified researchers to identify the various reasons and to recognize the outcomes associated with the reforms package that contribute to evidence-based policy making.

Digitization of records is an important catalyst to the land reforms. Recently, there have been successful attempts to transform the governance mechanism through e-governance where information technology is used to enhance access to, and delivery of, government services to benefit citizens, businesses and government from local level to national and international levels (Arfeen & Khan, 2012). The introduction of PLRMIS in the Punjab province of Pakistan is one such example of transforming governance mechanisms that is intended to enhance productivity and reduce conflicts arising from conventional record administration.

2. PROBLEMS WITH LAND ADMINISTRATION SYSTEM

The importance of having well-defined and strongly protected land-ownership has been widely recognized among economists and policymakers (Falkinger & Grossmann, 2013; Papageorgiou & Turnbull, 2005; Lippit, 2018; Blocher, 2006; Derby & Francis, 2002). Land has been studied in economic theories in various dimensions including ownership rights, transaction costs in land administration, tenure security, land titling and access to credit through collateral lands. The pre-program land legislations that came from the Land Revenue Act (Act, 1967) and the Registration Act (Act, 1908), did not sufficiently entitle the landowner with the ownership right certified by the State. The ownership rights and other related documents associated with land records were merely presumed to be accurate. However, it is evident from several court rulings that this presumptive status of rights had led to many disputes among landowners and concerned parties and the government due to the contestable nature of the land record and insufficient documentation. Many studies have pointed to the dispersed and duplicative nature of land record in Pakistan causing uncertainties in the land administration and impeding economic development besides threatening the poor and vulnerable communities' rights protection (Qazi, 2006). We therefore assert that transformation of the land record through digitization may be affecting positively the dispute resolution efforts and hence the number of land-related disputes.

The concept of transaction cost was first coined by Nobel laureate Ronald Harry Coase followed by substantial contributions of economists including Oliver Williamson and others (Cheung, 1978; Demsetz, 1968; Hill, 1985; North, 1990, 1992; Williamson, 1987, 2010). Traditionally, transaction cost is defined as the total costs of making a transaction, including the cost of planning, deciding, changing plans, resolving disputes, and after-sales (Williamson, 1981). According to the De Vries, Georgiadou, & Lewis (2003), land-related transaction cost involves all land-related costs including registering or transfer of land, agents' commission, bond registration fee, transfer and stamp duties except cost associated with sale/purchase of land. A large body of literature argues that e-Government can be a cause of reducing transaction cost and more foreign direct investment (Gani & Sharma, 2003; Gholami, Tom Lee, & Heshmati, 2006; Ojha, Palvia, & Gupta, 2008). E-governance services are provided to its beneficiaries through different models. For instance, the Government to Citizens (G2C) model makes citizens' satisfaction level with the government more effective and develops strong relationships between them. One of the G2C services includes e-registration which

enhances transparency and reduces paper-based work including registration and transfer of property as well as stamp duty which is related to the transaction cost (Pathak & Kaur, 2014).

Another important area of land related problems is tenure and security. Land tenure refers to the rules and norms that govern how, when and where people access and use land. Tenure security refers to the people's ability to manage and control land, use it, dispose of its produce, and engage in transactions, including transfers (International Fund for Agricultural Development, 2015). Besides, the UN-Habitat defines land tenure security as an effective right of protection given by the government against forcible evictions (Boudreaux & Sacks, 2009). The undigitized land administration system is solely for tax collection in which tenure security relies on legal, administrative, and social factors (Ali, Tuladhar, Zevenbergen, & Bhatti, 2014). However, besides revenue records, land tenure security is assured by the social capital, official documents, single power status and community relations that adds to the authenticity claim of the land, which ultimately leads to tenure security (Ali et al., 2014; Qazi, 2005). World bank in its Land Management Projects (LMP) has used reduction in land related disputes as an indicator to represent level of tenure security (Ali et al., 2014). An increase in land related investment is used as an indicator to represent tenure security of that society. Other indicators of land tenure security include equal access of stakeholders, reduction in land disputes, increased access to formal credits and increase in land values (Ali et al., 2014; Mitchell, Clarke, & Baxter, 2008). All these indicators can be used to access the tenure security in the existing land administration system (Ali et al., 2014). Therefore, digitization not only assert tenure security to have some positive impact from the land disputes reduction but also presume an indirect impact on formal credits access and land values

Land is among the main sources of collateral for obtaining credit from formal (financial institutions such as banks) and informal credit providers (ADB, 2019; Ali et al., 2014). The significant role of such informal credits and institutions is emphasized by many development economists (Deininger & Goyal, 2012; Greif, 1993; North, 1981). Land being one of the important assets for the households in all countries has a significant influence on economic outcomes. Secure terrestrial rights can reduce individual spending on rights protection along with reduction in expropriation risks, thereby enhancing investment incentives. That ultimately facilitates market operations by expanding the use of land as a collateral in fiscal markets. But the undigitized land record system has poor and unsatisfactory access to land records that results in poor performance in land markets and as well as difficulty to access to formal credit (Ali et al., 2014). Land record digitization and access influences credit accessing

process by an easy and fast access to land records along with reduction in bank charges. Therefore, uniform access to land information and land offices plays a vital role to easily access and get their data to apply for credit and in land investments (Ali et al., 2014). Hence, digitization affects tenure security and fast access to records that ultimately have a positive impact on the access to formal credits.

One of the main reasons for increasing disputes in rural areas is the ambiguity in land records that is often exploited by the relatively upper class of the society rendering the poor landowners deprived of their ownership rights (Faruqee & Carey, 1997; Mahmood & Cheema, 2004). The researchers' idea is that if the ambiguity or loopholes in the land records are resolved, then, it reduces the probability of conflict that originates primarily from such an ambiguity. On the other hand, ongoing digitization might be relatively more useful for landlords (who own a large size) compared with small size landowners or farmers. In developing countries such as Pakistan, land-related cases in civil courts are delayed because of a less effective land record system. These cases involve poor land record management including land record fraudulent cases, inaccurate land-boundary allocation, and multiple parties' registration on the same land. Because of these issues, it is difficult to find accurate evidence of land rights. In Pakistan's civil courts, most of the cases are filed due to the wrong entries of land recording rights. To overcome this, computerization of land records is helpful, and everyone will be aware of the entries of land record rights. The ultimate consequence is the reduction in the fraudulent cases of land records (Mukiibi, 2014).

Given the PLRMIS, the centralized system of land record throughout the province that digitized all land related transactions, is likely to reduce the transaction cost associated with lands. According to the project documents, one of the key purposes of the program was to provide land record access to the general public with low cost and to provide tenure security which ultimately leads to the less transaction cost. A key sentence from the project document is quoted below:

"Inequalities of land distribution, tenure insecurity and difficulties associated with the land administration and registration system are closely interrelated and continue to impose significant constraints on both rural and urban populations, particularly the poor. Land transactions are relatively expensive, and disputes about accuracy of land rights are caused, among others, by the inefficient and dispersed land records system. As a result, land markets are thin and land prices are more than the discounted value of potential agricultural earnings from land. The low mobility of land contributes to perpetuating the highly unequal distribution of land and, thus, livelihood opportunities" (World Bank – Project Information Document, 2005 pp. 1)."

In view of the literature discussed above, we develop a theory of change in the following section that elaborates the mechanism of potential effect of PLRMIS on a number of outcome variables.

3. DESCRIPTION OF THE PROJECT

The Punjab province occupies a total area of 205,345 km² and is the most populated province of Pakistan with over 80 million inhabitants (55% of the Pakistan's total population). Most of the Punjab's population is distributed across the rural areas where agriculture is the dominant sector of economy.

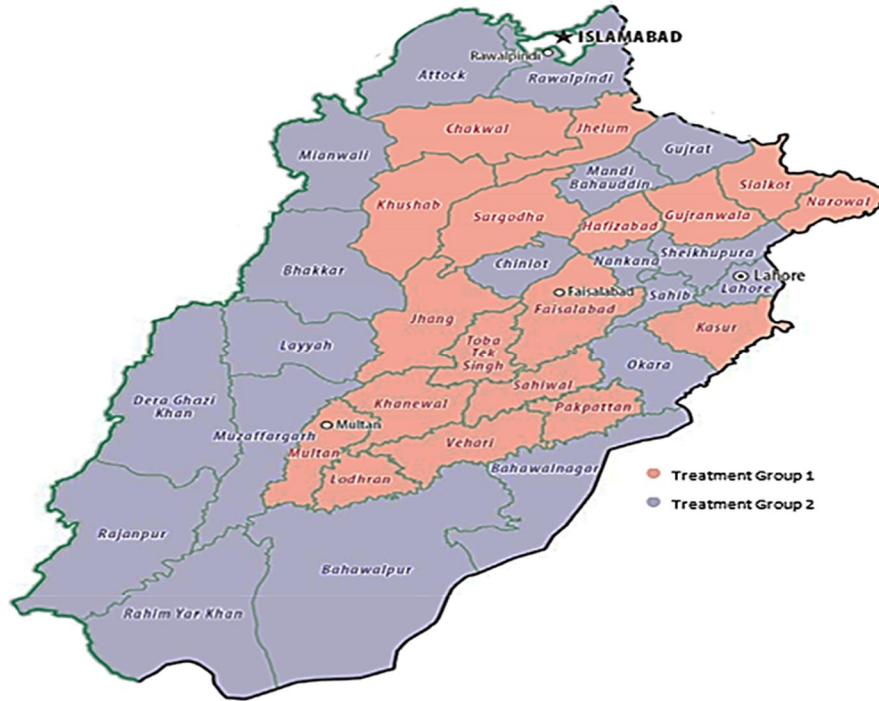
Considering the importance of improving land administration, the functioning of land market, and linking it to the broader areas of governance and administration, the Punjab provincial government in collaboration with the World Bank (WB), introduced the Land Record Management Information System (PLRMIS) through establishing the Punjab Land Record Authority. This system aimed to facilitate public access to land and bring transparency into the land records. Initially the program was implemented in eighteen⁸ districts of the province (henceforth collectively called Treatment Group 1), while in the 2nd phase expanded to the entire province⁹ (henceforth called Treatment Group 2). Figure 1 shows the distribution of districts that exposed to treatment in two phases. Following are the key features of the PLRMIS:

- Automated Issuance of Land Ownership Documents ("*Fard*") in 23,183 out of the total 25,709 revenue states (Rural and Semi-Urban) covering 90% of the land in Punjab. The system has improved service delivery standards by issuing "*Fard*" in 30 Minutes and Mutation in 50 Minutes.
- Establishment of the 151 state-of-the-art Land Record Centers integrated with 45 Sub-registrar offices across Punjab. This has increased collateral value of land due to improved authentication.
- Online availability of land record 24/7 at the website and efficient procedure of land registration.
- Creation of 4000 direct and 10,000 indirect jobs in the province.

⁸ Districts in the Treatment Group 1 include, Jhlem, Chakwal, Khushab, Sargodha, Jhang Toba Tek Singh, Khanewal Multan, Lodhran, Vehari, Pakpattan, Sahiwal, Faisalabad, Kasur, Hafizabad, Gujranwala, Sialkot and Narowal.

⁹ The remaining eighteen districts that exposed to the 2nd phase of the program include Rawalpindi, Attock, Mianwali, Bhakkar, Layyah, Deraa Ghazi Khan, Muzaffargarh, Rajanpur, Rahim Yar Khan, Bahawalpur, Bahawalnagar, Okara, Nankana Sahib, Lahore, Sheikhpura, Chiniot, Mandi Baha Uddin and Gujrat

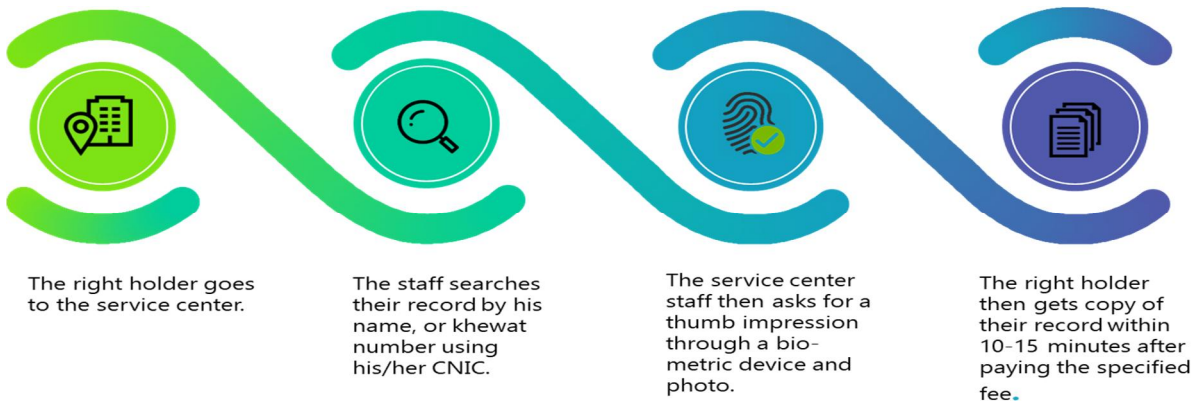
Figure 1: Distribution of Early Treatment and Control Districts in Punjab



3.1. How does the PLRMIS Work?

The PLRMIS Project was designed by the Project Management Unit using the experiences of the pilot projects in districts of Kasur, Lahore, Rahim-Yar Khan and Gujrat and also utilizing the experience from other countries. This system is fully operational in all districts of Punjab since 2017. It allows the right holder to search, obtain and register the land he/she owns using simple procedures. For instance, the right holder has to go to the service center where the staff will search their record by his/her name, father/husband name or *khewat* number using his/her Computerized National Identity Card (CNIC). The service center staff then asks for the thumb impression through a bio-metric device and a photo. The right holder then gets copy of their record within 10-15 minutes after paying the specified fee. Figure 2 shows the process of PLRMIS operating procedures.

Figure 2: PLRMIS Standard Operating Procedure



3.2. Objectives of the PLRMIS and Target Population

- To reduce number of procedure (steps) to complete a property registration (Efficient Land Registration)
- To reduce the total (transaction) cost incurred on property registration (Cost Reduction)
- To increase the level of tenure security of land-right holders

3.3. Theory of Change

The *PLRMIS* is believed to have influenced the stakeholders through institutional, social, and behavioral mechanisms. Institutional mechanism involves the transformation of methods that are followed and written in the standard operating procedures for a task. In the context of *PLRMIS*, various institutional changes have occurred during and after the implementation of *PLRMIS*. These include the web-based software development-a crucial output of the project-, establishment of the Arazi Record Centers (ARCs) and the business processing and re-engineering of the land record management system. Information technology development such as software development enhances the institutional performance of an individual as well as organization (Horton & Mackay, 2003). Under the *PLRMIS*, a well-standardized monitoring dashboard is established that enables top-level management to track each activity at all levels. Additionally, the dashboard works as a guide for staff following standard operating procedures of all four levels of management record system. The establishment of ARCs enable the issuance of “Fards”-a basic land record document- that expedite the process of land related transactions. ARCs further achieve four objectives including client satisfaction, saving of time, reducing cost of a transaction and improvement in land tenure security. Finally, the legal and policy framework of *PLRMIS* enhances the institutional capability to work smoothly according to the defined outputs of the project. One of the key objectives of the program is to enhance public services delivery. Unlike the conventional system, under the *PLRMIS*, women have access to land records easily and can perform land transactions with convenience.

On the behavioral side of the program’s influence, various trainings and capacity building steps were taken to create a positive attitude among the key stakeholders-employees of the land department-. These measures gained support for the project by decreasing the fears about job security and explaining to the participants about new roles under the new system. Initially, Land Record Staff at the Tehsil level (called “Patwaris”) resisted the program by holding strikes and refusing to work. After extensive negotiations, the program included incentives for employees and capacity building such as construction of new field offices

furnished with IT facilities, transportation allowance and allocation of 2% of land revenues to revenue officers.

Social awareness is an essential part for any project because the general public responds lately especially people who live in rural areas. Under the new program, several public awareness campaigns were launched that encouraged the general public to actively benefit from the digitized record management systems. Major awareness measures included conducting of 36 workshops with 5,663 internal key stakeholders namely officers of the district administration (District Collectors, Additional District Collectors, Assistant Commissioners) and Revenue functionaries (Tehsildars, Girdawars/Qanungos, Patwaris) between December 2011 and February 2014. Moreover, 250 representatives of the Punjab Bar Association and Field Revenue Staff were consulted about effective implementation of the program.

Based on the mechanisms of change of the program, we generate the following questions for evaluating the impact of the PLRMIS:

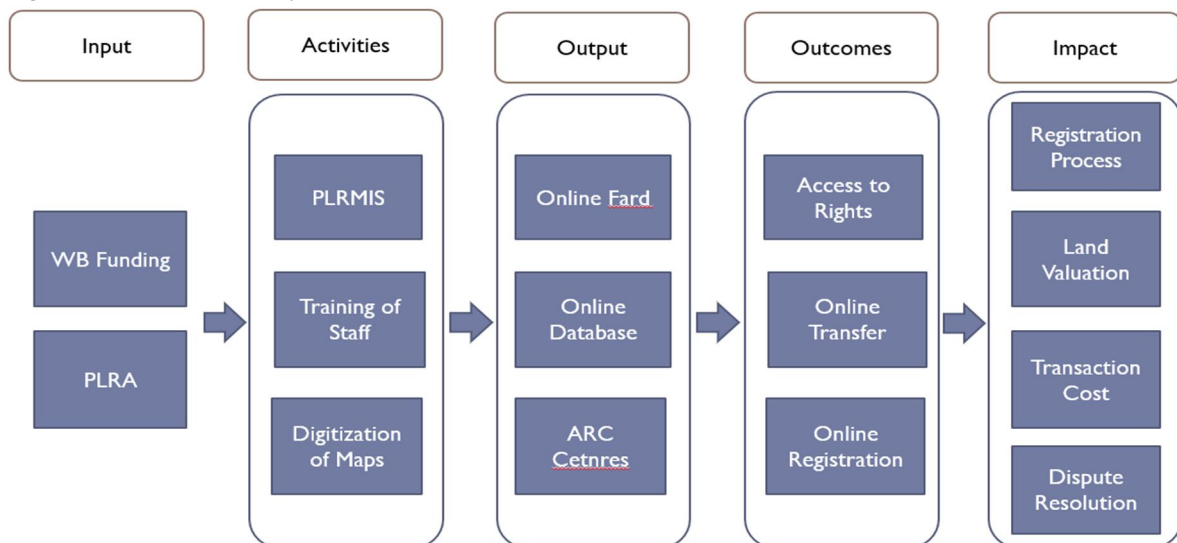
3.3.1. Evaluation Questions

- ▶ Did early treated districts benefit from the program in terms land related disputes?
- ▶ Do people differ in how they benefit from the program across different areas?
- ▶ What specific governance dimensions the PLRMIS has impacted and how?
- ▶ What are the main challenges and loopholes in the operations of the PLRMIS?

3.4. Result Chain

Based on the detail analysis of the PLRMIS program and implementation mechanisms, we hypothesized the effect to go through key components identified in the result chain in Figure 3.

Figure 3: Result Chain of the PLRMIS (Researchers' work)



4. EVALUATION METHODS

4.1. Systematic Review of IE Methods in e-Governance and Land Reforms

We conducted a systematic literature review of impact evaluation methods in the context of government administration and land related reforms around the world. Following Webster and Watson (2002), we carried out a detailed search of existing literature from published material including books, journal articles (quantitative and qualitative), chapters and impact evaluation published reports. The reviewed data covered materials from 1990 to 2020 related to impact evaluation of e-government reforms and interventions in land-related administration. Schwarz, Mehta, Johnson, and Chin (2007) also suggest using well-illustrated literature review to account for enough quantity and quality of relevant material reasonably supported by existing theories. Besides contribution to theoretical development, surveying existing literature on evaluation methods is highly important for future methods adopted in similar context (Webster & Watson, 2002). We did so to develop the most effective and valid research design for impact evaluation in the context of PLRMIS.

Initially, we have searched in top impact evaluation journals with a specific focus on e-governance, land reforms or land administration systems. Secondly, official documents published by either the central governments or local governments related to the land record reforms around the developing world was surveyed. Thirdly, the scope of the studies was extended to land-related reforms in developing countries through e-governance (e.g. Ali, Tuladhar, & Zevenbergen, 2010; Qazi, 2006; Shabbir, Shahid, Atif, & Niaz, 2020; Zahoor, 2018 etc.). The World Bank literature was also carefully reviewed including Gertler, Martinez, Premand, Rawlings, and Vermeersch (2016) and World Bank Reports on implementation and ICT interventions in land administration.

The main keywords used in search bars (inclusion criteria) are given in Table 1. These keywords were used to search in ISI Web of Science to find the relevant literature. Discipline inclusion criteria is given in Table 2 The search was followed by careful survey of other search engines such as Research-Gate, Google Scholar and the World Bank Reports for the relevant literature with the same keywords. To scan the relevant publications and material, a snowball sampling process was followed that enabled the researchers to dig into the wider stock of literature.

Table 1: Inclusion Criteria of the Key Words

Keyword 1	Keyword 2	Keyword 3
Land	Court*	Program Record
Property	Case*	Administration
Agriculture	Politic*	Revenue
Land Reform*	Lease	Ownership
Land Own*	Legal*	Reform*
	Transfer*	Management
	Survey	Admin*
	Excise	Authorit*
	Patwar*	Document*
		MIS

Table 2: Inclusion Criteria of Disciplines

Public Administration	Economics
Communication	Information Science Library Science
Computer Science Theory Methods	Law
Business Finance	Agricultural Economics Policy
Computer Science Software Engineering	Computer Science Interdisciplinary Applications
Education Educational Research	Development Studies
Political Science	Geography Physical
Social Issues	Management
Social Sciences Interdisciplinary	Computer Science Artificial Intelligence
Area Studies	Computer Science Information Systems
Automation Control Systems	Business
Social Work	Social Sciences Mathematical Methods

Our literature search found more 60 empirical and non-empirical papers that particularly focused on impact evaluation of interventions in land-related reforms in developing countries. In the following sub-section, we provide a summary of each method and identify potential challenges in data collection for impact evaluation. We finally conclude methods that can potentially offer stronger and reliable results for impact evaluation of e-Governance initiatives in developing countries. Our methodological design and empirical strategy are based on our understanding of the strengths and weaknesses of these methods.

4.1.1. Qualitative Assessment of e-Governance Interventions

Qualitative methodology is defined as “any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification” (Strauss and Corbin, 1999). The basic purpose of qualitative research is to explore the phenomena (Denzin & Ryan, 2007). In qualitative methodology, there are multiple ways of data collection such as interviews, focus groups discussion, observation, and textual and visual analysis. However, two major types of data collection in qualitative research are in-depth interviews and focus

group discussion (Gill, Treasure & Chadwick, 2008). There are mainly three classification of interviews such as structure, semi-structured and unstructured interviews (Jean Lee, 1992). Literature indicates that some studies on land administration and land reform adopted qualitative methodology for data collection for investigating the impact of land reform (Galiani, & Schargrodsy, 2010; Arfeen, & Khan, 2012).

A number of challenges can be found in conducting qualitative assessment in impact evaluation of land reforms. For example, Arfeen & Khan (2012) conducted interviews from officials to evaluate the impact of e-governance project in Baluchistan province, Pakistan and highlighted that data was collected from a minimum number of participants indicating the limitation of generalizability of result to the whole population. In other words, similar studies are suffering from the challenge of external validity. In similar context, Levy (2006) for instance criticized the qualitative data collection approach because data was collected from a limited sample of population which cannot be generalized. In another similar study, systematic evaluation study was carried out to evaluate the land administration system in which data was collected by conducting interviews from experts (Shibeshi, Fuchs, & Mansberger, 2015). This study underscored the constraints of biasness of data because of unstructured data collection method. Similarly, Berg (2001) argue that qualitative methodology suffers from subjective biases because data collection procedure is usually based on individual opinion or views. In general, Qualitative methodology is only effective for evaluating the intervention which is based on small scope but not so effective for large scale intervention.

To overcome these limitations of biases that have originated because of subjectivity, semi-structured interviews are considered an effective way for getting relevant, reliable, and comparable qualitative data (Hunter & Schmidt, 2004). In addition, to this, using a mixed method approach on a large-scale data might add value into the quality of results in impact evaluation (Mohr, 1999).

4.1.2. Mixed Methods Approach to IE of e-Governance Interventions

Mixed method approach is one of the emerging methodologies for rigorous analysis and finding of research by using both quantitative and qualitative method (Arora, & Stoner, 2009). Mixed method approach refers to a study in which researchers collect, investigate, and synthesize using both quantitative and qualitative data and method (Tashakkori and Creswell, 2007). Researchers in an impact evaluation study of land reform program examined the

impact of land registration process and land consolidation process by using a mixed method approach indicated the effectiveness of mixed methodology in obtaining reliable results (Jean de Dieu Dushimimana, & Johan Zaaiman, 2018). In a different impact evaluation study, researchers investigated the impact of e-Governance on reducing corruption by using both quantitative and qualitative approach but (Pathak et al., 2007)

Some of the major challenges of mixed method approach are highlighted by Johnson & Onwuegbuzie (2004). For instance, mixed method approach is complex, expensive, difficult and time consuming. Brannen (2005) states that scholars utilize this approach for pragmatic motives, which ultimately leads to risk that their research is not embedded in theory of their discipline. Furthermore, studies also point to problems associated with dissemination stage by conducting mixed method approach. That means that using mixed methods it may be difficult to present numbers and words coherently on the same page.

4.1.3. Multivariate Regressions in IE of e-Governance Interventions

Multivariate Linear Regression refers to a technique in which a single regression method is used for multiple outcomes (Berndt, & Savin, 1977). Deininger & Goyal (2012) adopted these techniques for investigating the impact of land title on credit access. Similarly, various researchers used multivariate linear regression analysis technique to examine the people's knowledge about digitalization of land record. Furthermore, another study explores the impact of land registration on tenure security, agriculture production and credit access by utilizing this technique (Migot-Adholla & Place, 1998).

One of the limitations of multivariate linear regression techniques is that result of these methodologies cannot be generalized when data collected from limited sample (Schafer & Olsen, 1998). This methodology is not so effective when the type of data is cross-sectional (Migot-Adholla & Place, 1998). The main issue with estimating equation is often endogeneity that comes from omitted variable bias and auto-correlation (Roberts and Whited, 2013). These limitations can be overcome if data collected from a reasonable sample represents the true population by using a random approach (Migot-Adholla & Place, 1998). Along with this, instead of using cross sectional data, panel data or time series data should be used for increasing robustness of result (Mensah, & Mi, 2018).

4.1.4. Quantitative Approach to IE of e-Governance Interventions

Quantitative approach can be further divided into different methods. These include natural and quasi-natural experiments and randomized control trials. Natural Experiments are

recently taking more attentions in impact evaluation studies in social sciences and public policy studies (Craig, Katikireddi, Leyland, & Popham, 2017). In natural experiments, a researcher exploits the introduction of a program in a particular geographic area where a group of population becomes beneficiaries while other may not be benefited from the program due to multiple administrative or distributional reasons. Natural experiments are basically an observational study in which researcher does not manipulate the condition of treated or control group. Unlike randomized trial, natural experiments have a control group which is not created intentionally, rather naturally exists that is used as a counterfactual to determine what would have happened to the treatment group without intervention (Leatherdale, 2019). In such cases, nature and other exogenous factors describe treatment status rather than the researchers own distribution. In natural experiments, pretreatment characteristics of both treated groups and control groups usually show similarities that can be used to take the assumption of common trend between the two groups. Control group's validity is evaluated by assessing the exogenous forces determining treatment status on potential outcomes. A natural experiment was conducted to examine the impact of land titling interventions i.e., exogenous property right allocation on poverty reduction, housing investment and child education of treated group as compared to control group in Buenos Aires, Argentina (Galiani & Schargrotsky,2010; Leatherdale, 2019).

Despite recent popularity however, there are some limitations of natural experiments. For instance, natural experiments are based on observations that separate treatment and control group without the control of researcher. Another major limitation in natural experiment is unmeasured confounding issues (Galiani & Schargrotsky, 2010; Dunning, 2008). Furthermore, pure natural experiments do not exist in reality as the researcher has to find a comparable group as control group. Natural experiment is a quasi-experimental approach that use nonrandom assignment which lead to multiple issues that threatens the validity such as attrition, non-compliance, and heterogeneity of key variables at the baseline which may affect the outcomes of the impact evaluation (Leatherdale, 2019). A number of other studies refer to natural experiment exposure to potential biases and internal validity issues. The issues of confounding variables can be resolved by using instrumental variable or other alternative methods such as synthetic control methods (Dunning, 2008). It can also be resolved by combination of analysis and data (Craig, Katikireddi, & Popham, 2017). Confounding issues can also be tackled by controlling the effect of other variables.

4.2. Methodology

Given the two-phase implementation of the PLRMIS across the Punjab province, we first adopt a quasi-experimental approach that involves mean differences, fixed effect regression design and instrumental variable approach to evaluate the effect of the land record digitization on the land related disputes. For the quantitative analysis, we find a comparable control group (set of districts) that have not been affected by the program precisely due phase-in implementation (see Figure 1). Given the phase-in implementation of the PLRMIS program in Punjab, we find districts within Punjab province that were initially exposed to the program as the treatment group 1 while the remaining districts are considered as the control group for the first phase of the program.

In addition to quasi-experimental design, we used field surveys to obtain primary data that include description of variation in the use of PLRMIS by a cross-section of individuals, interviews with stakeholders from the field and observation of the research staff during visits to land record facilities. In the following sections, we discuss the data and variables used in this research.

4.2.1. Data and Description of Variables

Our data comes from two main sources; secondary source that includes records from surveys of weekly maintained registers of the ADR offices under the provincial judiciary in the Punjab province and primary data through field surveys, interviews with key stakeholders and participants observations.

- **The Alternate Dispute Resolution Centers' Data**

Pakistan is a highly litigious society where the overburdened judiciary copes with a large number of litigants. In 2017, around 1.3 million cases were pending in the lower courts of Punjab while only 2400 judges were appointed. On average, each judge had to decide on 540 cases at a given time. This coincides with the problems in accessing the land-related record that is key to resolving conflicts. To reduce burden on the judiciary, the government of Punjab established ADR Centres across the province in all the 36 districts with 72 dedicated judges to help parties achieve an amicable solution to their disputes. Concerned parties just have to obtain consent from the provincial court before they register their case for ADR Centre proceedings. The judges in these centres are already trained by the Punjab Judicial Academy to help parties settle their disputes.

We obtained weekly panel data on a number of variables from the weekly records of the ADRs offices within the jurisdiction of each district that included the number of disputes registered, number of disputes resolved successfully and number of cases in which dispute resolution failed. This weekly data includes key information about the number of dispute-references received, references mediated successfully, references for which mediations failed, criminal cases, civil cases and rent related cases across all districts from the Punjab Province from June 2017 till December 31, 2020. *Table 3* shows the summary statistics of the ADR data.

Figure 4: ADR Centres



Table 3: Basic Summary Statistics: Alternate Dispute Resolution (ADR) Centers' Data

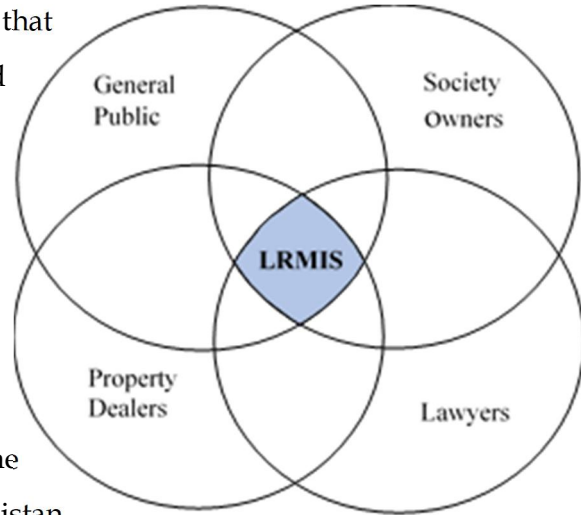
Variables	N	Mean	Std. Dev.	Min	Max
Number of Total Disputes Registered	2394	435.701	461.87	2	3808
Criminal Cases	2356	121.466	189.842	0	1288
Land-Related /Civil Cases	2356	147.157	241.876	0	1660
Family-Cases	2356	159.529	157.692	0	943
Guardian Cases	2354	9.654	12.569	0	56
Rent-related Cases	2356	2.748	6.1	0	35
Appeals Cases	2356	12.811	23.678	0	134
Other Cases	2355	33.862	103.9	0	792
Mediation Outcome of ADR Office					
Cases of Mediation Failure	2394	63.437	62.746	0	377
Cases of Mediation Success	2394	242.909	198.108	0	1190
Previous Pendency Cases	2394	.119	1.532	0	41
Police Stations	2394	18.711	7.892	8	41
Police Posts	2268	6.278	5.487	1	30
Mauzas	2394	682	344.327	120	1579
Total Area (km ²)	2394	5551.29	4330.406	590.67	24830
Total Population	2394	2034109.6	954871.16	832980	5429547
Population Density	2331	491.595	306.152	90	1188.67
Literacy (% of total)	2394	42.6	12.614	20.7	70.4
Urban Literacy	2394	58.631	12.724	23.03	77.2
Rural Literacy	2394	37.079	13.035	13.9	63.9

Table 3 shows the basic summary of weekly data collected from Alternate Dispute Resolution Centers' records in all 38 districts across the Punjab Province. These centres are established in 2016 within the jurisdiction of provincial high courts and its subsidiary districts and sessional courts. Each Centre is represented by a setting judge who is called Mediator. Cases submitted to ADR offices are further classified into seven sub-types that include, criminal, land-related/civil, family-related, guardianship, rent-related, appeals and other cases. Data on the number of cases in which mediation was successful and failed were obtained from the same records. These data are considered as an outcome of ADR-facility established in each district of Punjab Province. Data on the other variables including police stations, mauzas, total area and population density comes from Punjab Development Statistics.

4.2.2. Field Survey Primary Data

Figure 5: Description of Stakeholders

We designed questionnaires for field survey that were used as instruments for quantitative and qualitative data collection. We followed the experimental design in choosing the sub-sets of geographic units based on the variables of interest to us. In selecting the responding units, we followed the patterns of standards surveys in Pakistan that have been well recognized nationally and internationally. These include the Annual Status of Education Report (ASER)- Pakistan



Survey and Pakistan Bureau of Statistics (BPS). These surveys have already an established mechanism of selecting responding units throughout the four provinces in Pakistan. Our field surveys were completed in five districts where four major stakeholders were surveyed through semi-structured questionnaires attached in Annex3. Coverage and descriptive statistics of the field survey from the general public is shown in section 5.

Land related disputes and conflicts fall into various categories depending on different parties in conflict. These categories are divided into seven different types including dispute in land size, price, record, administration, possession and inheritance. The classification of land-related disputes is generally done based on the type of property e.g. all types of properties, state-owned, private, and common property etc. (Wehrmann, 2008). The main objective of PLRMIS is to expedite the land-related processes in courts, registrations, and transfers centres. In this research study, three types of land-related disputes are addressed including all types of property, private, and common property. Stakeholders of these types of properties are classified through ZOPA (Zone of Possible Agreement) model. The ZOPA can be defined as the intersection between the sets representing the different configurations of interests of the involved parties and can be represented by a Euler-Venn diagram (Caputo, 2012). Land and land-related disputes can be a common concern among many stakeholders. Therefore, we have developed separate questionnaires for all four main stakeholders of PLRMIS. These stakeholders include the general public, lawyers, society owners, and property dealers. Our research team traced the users of PLRMIS in the PLRA office during working hours throughout the week, and data was collected on semi-structured questionnaire. Similarly, those lawyers

who worked in the surveyed districts were traced for obtaining information on civil and land-related dispute cases. These cases are separate from the ADR cases¹⁰. A separate questionnaire was developed for data collection from lawyers. Data was also collected from housing society owners as they acquire a huge size of land from multiple sellers, and they face different types of conflict while purchasing land. Lastly, data was also collected from property dealers whose daily transactions are based on land purchase, sale, and other land related rental activities. As Figure 5 shows that all four stakeholders have some common concern which is related to the use of PLRMIS. Questionnaires shown in Annex3 have common questions related to the usage, process, and performance of PLRMIS.

4.2.3. Empirical Strategy and Model

The researcher's idea is that if the ambiguity or loopholes in the land records are resolved, then, it reduces the probability of conflict that originates primarily from such an ambiguity. Figure 3 shows the results chain of the program that identifies the functional relationship of the program components with the dispute resolutions in the treatment province. To test this hypothesis, we adopt multiple empirical methods from simplest to more complex models as described below:

- **Mean Comparison and Kernel Density Plots**

We compare the means of outcome variables between the early treated districts and early controlled districts to see any significance difference. This is the simplest method that one can adopt to assess program effect. However, given that we might have several confounding variables that potentially affect the outcome variables, mean comparison may be subject to many concerns. We also supplement our mean comparison results through kernel density plots that allows us to visualize the differences between early treated districts and early controlled districts in terms of outcome variables. Density Plots are used to visualize the distribution of data over a continuous interval or period using kernel smoothing to plot values, allowing for smoother distributions by smoothing out the noise. To conduct mean comparison, we use t-test to come up with statistical significance of the difference.

¹⁰ ADR cases refer to the cases that resolved outside of the court to expedite the system of justice. In ADR cases there is a significant number of land cases are involved. Researchers have addressed and analyzed those cases through the secondary data collected from the Lahore High Court website.

- **Fixed Effect Diff-in-Diff Model [Panel Data]**

Following is the main specification for estimating our ADR outcome variables.

Program’s Effect Estimation for Phase 1:

$$Y_{ijt} = \beta_0 + \beta_1 Treatment_{ijt} + \beta_2 X_{ijt} + \gamma_i + \delta_j + \tau_t + U_{ijt} \quad (1)$$

Where

Y_{ijt} represents the outcome variable in ADR-Centre i in district j of Punjab in week t
 $Treatment_{ijt}=1$ if the surveyed ADR Centre i belongs to district j where PLRMIS was implemented in 2013 (district is exposed to PLRMIS 1st Phase)

$Treatment_{ijt}=0$ Otherwise (The district belongs to the early control group)

X_{ijt} = Variables that control for socio-economic characteristics including Population density (people/km²), gross literacy rate, number of police posts in the area, and

$\gamma_i (i = 1 \dots n)$ = The unknown intercept for each ADR Centre (Mediators’-specific fixed effects).

$\delta_j (j = 1 \dots n)$ = The unknown intercept for each district in the Punjab province (n district-specific fixed effects).

$\tau_t (t = 1 \dots n)$ = Time trend t is time period in weeks.

u_{ijt} = Error term clustered at district level.

Our empirical strategy rests on the following key assumptions.

➤ **Strict Exogeneity of the Intervention**

In the first stage of PLRMIS implementation, half (e.g. 18) districts of Punjab were targeted but at Kanungoi (sub-tehsil) level. Implementation at the very basic level was very difficult due to limited time and budget. According to the World Bank’s completion report on PLRMIS, “the original geographical focus on 18 districts at the Kanungoi (sub-tehsil) level was too costly and complex and the establishment of the ARCs at the higher Tehsil level in 36 districts as reflected in the additional financing, was more rational and feasible” (World Bank, 2017 pp5). Therefore, the expansion was purely dependent on the budget and feasibility rather than the socioeconomic factors of the selected districts. Thus, the late treated districts are considered the best control group in this case. Our fixed effect DID design aims to difference out unmeasured confounders using techniques that eliminate biases from group- or time-invariant factors. For this, we assume that the timing of treatment exposures in the DID design is statistically independent of the potential outcome distributions, conditional on the group- and time-fixed effects. There is no such intervention as PLRMIS or any other system in the control districts during the period in which early treated districts were

under-treatment. The fixed effect regression model in panel data is the most suitable way to overcome time and group unobservable characteristics that can be correlated with the outcome of interest.

➤ **The Common Trend Assumption**

Before the introduction of the PLRMIS system, the difference in terms of land-related disputes after controlling for district fixed-effects was observed to be insignificant. We test this assumption using alternative secondary data in which we run fixed effect regression on variables such as crime rate, number of police stations, land utilization areas etc. We adopt a fixed effect Difference-in-Difference model to check the difference between the early treated and early controlled districts in the pre-program time period e.g. 2013. Our results show the parallel trend to be existing between the two groups signifying the validity of this important assumption. Existing research also points to the commonality on key aspects in our design. Despite variation between urban and rural areas, land disputes, registration of land, transaction cost, land use & development, land tenure and land market values follow a similar pattern in Punjab, Sindh, KPK and Balochistan. Many studies (CPIN, 2020; Gazdar, 2009; Khalid & Begum, 2020; LandLinks, 2020; MOCC, 2020; NDMA, 2020; Niazi, 2003; USAID, 2010) have pointed to this commonality in Pakistan. We also underscore the fact that Pakistan has a parallel court structure in all provinces, and the formal court system has powers to hear and resolve the land-related dispute cases. Land related disputes are the most common cases in the courts of Pakistan. According to one estimate, over a million land related cases are pending countrywide covering all four provinces, i.e., Punjab, Sindh, KPK and Baluchistan. Major causes of land disputes include inaccurate or fraudulent land records, erroneous boundary descriptions that create overlapping claims, and multiple registrations to the same land by different parties (Ali & Nasir, 2010; Dowall & Ellis, 2009; USAID, 2008).

- **Instrumental Variable Approach**

Despite our strength of using panel data fixed-effect regression, we still worry about the causality of PLRMIS program on the success of dispute resolution efforts in the Punjab province. Causality is difficult to determine because of the confounding variables and possibility of predicting later treatment in the early controlled region. Completeness of program implementation is questioned due to possibility of regions within districts where the PLRMIS is not fully accessible for number of reasons. The geographic distribution coupled with the inefficiencies of public officials in delivery of ARC services that largely depend on socio-economic characteristics of the districts could be another reason for variation in results. We, therefore, adopt alternate model in which we utilize the observed significant difference between the early treated districts and early controlled districts attributable to program as an instrument and predict the indirect effect of the program on the number of disputes resolved successfully. Our instrumental variable is presented in Figure 6 and specification is given in two stages as below:

First Stage:

$$ADR_{ijt} = \beta_0 + \beta_1 Treatment_{ijt} + \beta_2 X_{ijt} + \gamma_i + \delta_j + \tau_t + U_{ijt} \quad (2)$$

Where

ADR_{ijt} is the number of received cases to ADR centres in the category of criminal and civil disputes which are assumed to be endogenous. Treatment is the binary variable indicating early treated districts while other covariates are same as explained in our fixed effect model.

Second Stage

$$Y_{ijt} = \theta_1 \widehat{ADR}_{ijt} + \theta_2 X_{ijt} + \gamma_i + \delta_j + \tau_t + \varepsilon_{ijt} \quad (3)$$

Where

θ_1 is the coefficient of interest indicating the indirect effect of program on the outcome variable Y in ADR-Centre i in district j of Punjab in week t .

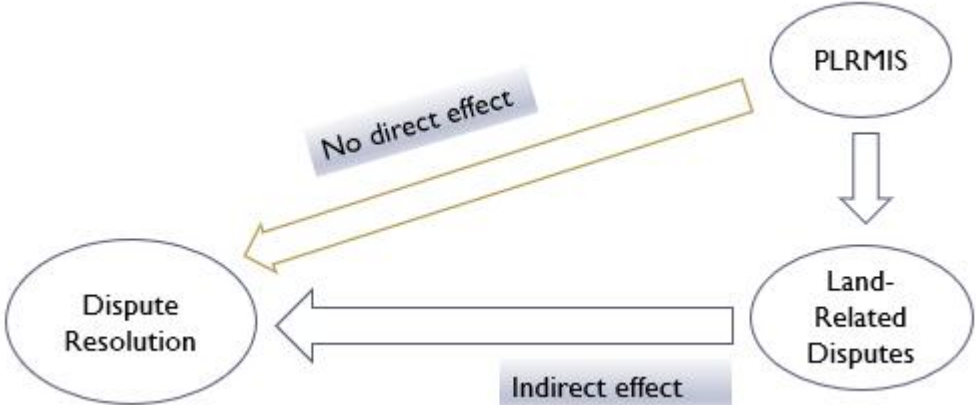
Key Assumptions

- **Instrument Relevance:** Treatment is correlated with the endogenous regressor ADR: $COV(Treatment, ADR) \neq 0$ [after controlling for covariates]. That means

that PLRMIS has strongly increased the number of dispute cases filed in ADR centres through increased access to land-related information. Public sector interventions that offer more digitized and transparent mechanism always increase access to information. Hence the PLRMIS increased access to information for concerned stakeholders such as the public, courts, and land administrative bodies. The increased access to information includes land records, ownership details, transaction details, and registrations of lands throughout Punjab initially the number of land-related disputes registered. Eventually, those disputes/conflicts have been resolved by ADR centres which were reported in courts.

- **Instrument Exogeneity:** Treatment is uncorrelated with the error term e.g. $COV(\text{Treatment}, U) = 0$, no direct effect on Y except through ADR [after controlling for covariates]. This means that PLRMIS has no direct effect on the number of successful mediation cases other than through land related disputes (endogenous variable). We test this assumption through running the same fixed effect regression in Annex 2 table 2. We find that after controlling for district fixed effect and time trend, the outcome variable (e.g Successful Mediation Cases) in the early treated group of districts is not statistically different than early controlled group.

Figure 6: Instrumental Variable Approach



5. FINDINGS

We present our findings in two parts: ADR Data results and field surveys results.

5.1. ADR Data Results

We obtained weekly records of provincial court’s Alternate Dispute Resolution Centers that include the number of dispute references received, successful mediation references, failed mediation references, criminal cases, civil cases, rent related cases, family, and guardian cases across all districts from the Punjab province from June 2017 to December 2018. One limitation with this data is that it does not allow us to obtain evidence on the pre-program difference of the treatment and control groups. We apply different post-test techniques using alternate methods to conduct a retrospective analysis of the mean difference between early treated districts in Punjab and the early control districts. Significant differences in terms of the number of weekly cases received were observed between the early treated group of districts and early controlled group showing a significant effect of the PLRMIS’ early introduction. Capitalizing on the weekly panel data on districts and ADR centres distribution, we conduct a fixed effect regression analysis that reduces the possibility of any district specific bias or time-trend between the two groups. Additionally, we utilize the significant impact of the program’s early introduction on the early treated districts as an instrument to test the indirect effect of the program’s introduction on the number of dispute cases that were resolved successfully. These results are presented in the following sections.

5.1.1. Mean Comparison Test

Table 4: Mean Difference between Early Treated and Early Control Districts (t-test)

Variables	Early Treated Group		Early Control Group		Mean Difference(t-test)			
	N	Mean	N	Mean	Diff	S.E	t-value	p-value
Number of Total Disputes Registered	1134	576.85	1260	308.659	268.21	(18.09)	14.8***	0
Criminal Cases	1134	163.90	1260	83.267	80.64	(7.657)	10.55***	0
Land-Related /Civil Cases	1116	226.13	1240	76.079	150.05	(9.491)	15.8***	0
Family-Cases	1134	182.84	1260	138.544	44.30	(6.444)	6.9***	0
Guardian Cases	1134	9.34	1260	9.936	-.597	(.519)	-1.15	.251
Rent-related Cases	1134	2.722	1260	2.772	-.052	(.252)	-.2	.839
Appeals Cases	1134	16.945	1260	9.09	7.85	(.964)	8.15***	0
Other Cases	1134	50.367	1260	19.021	31.34	(4.24)	7.4***	0
Mediation Outcome of ADR Office								
Number of Mediation Failure	1134	73.071	1260	68.57	4.493	(4.528)	1.0	.322
Number of Mediation Success	1134	252.77	1260	247.01	5.77	(12.087)	0.5	.633
Previous Pendency Cases	1134	16.677	1260	8.945	7.731	(.951)	8.15***	0
Number of Police Stations	1134	18.389	1260	19	-.611	(.323)	-1.9	.059

Number of Mauzas	1134	703.945	1260	662.25	41.694	(14.072)	2.95***	.003
Population Density (People/km2)	1071	521.588	1260	466.101	55.488	(12.675)	4.4***	0
Literacy Rate (% of Total)	1134	46.411	1260	39.171	7.24	(.495)	14.65***	0

Table 4 shows the mean differences of key variables related to disputes between 18 early treated districts and 20 early control districts in the Punjab Province, Pakistan. The last four columns represent the coefficients of mean difference, standard errors, t-statistics, and p-values. Statistical significance at the 1, 5, 10% levels are indicated by ***, **, and *, respectively

Our mean comparison results (Table 4) show a significant difference between early treated and early controlled districts in terms of total number of received disputes cases, criminal disputes, land-related disputes, and family-related disputes. The t-test, which measures the difference in means and takes into account the standard error for each variable shows that the group of districts treated in 2013 are performing higher in terms of these variables, compared to districts that were exposed to the program in 2016. This difference is statistically significant with a 1% significance level. There could be several reasons behind the increase in the treated group. Firstly, before the introduction of PLRMIS, citizens did not have facilities to check their records online, and there was no intention of checking records. However, by the introduction of PLRMIS, citizens have shown a positive response towards the system as they are able to check their land record online through downloading the app and using it. The number of filed disputes can be increased when people get to know about their land ownerships. The occurred dispute is subject to resolution once it is recorded by the courts or ADR centers. Furthermore, results show, a possible decrease in disputes in the long term.

Figure 7: Kernel Density Plots: Total Cases Received [ADR Data]

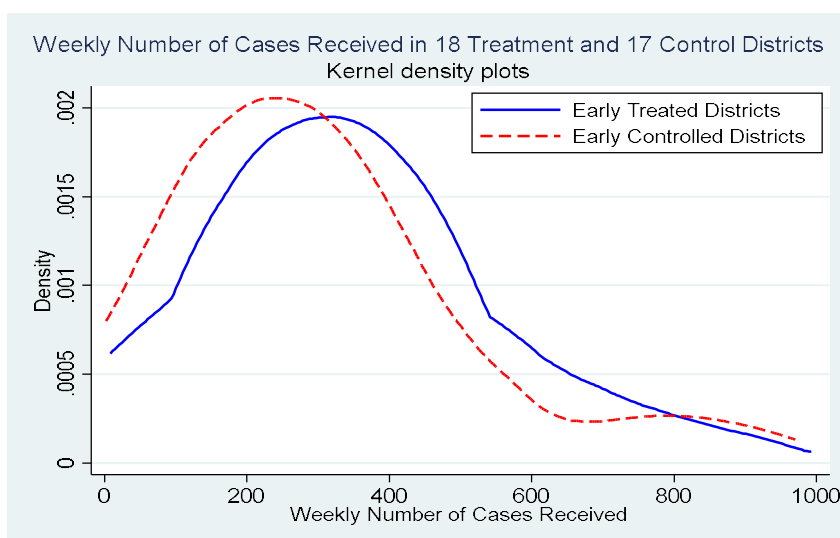
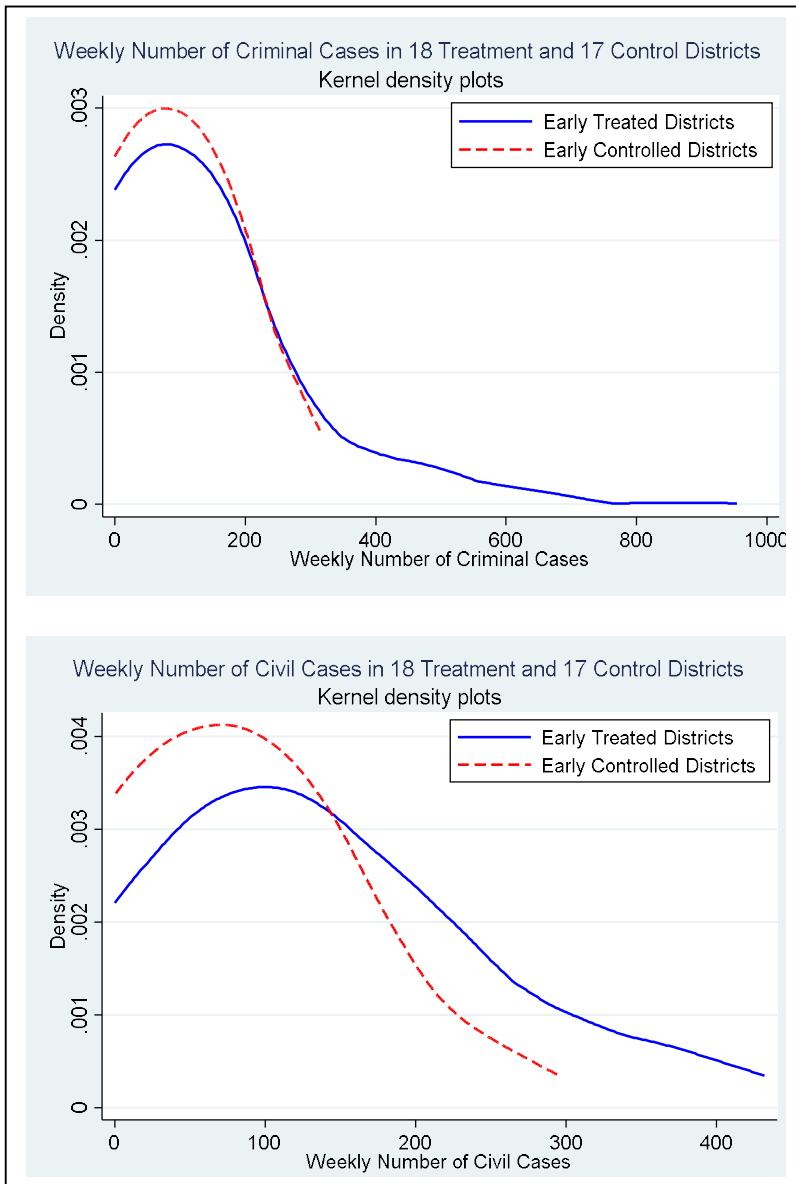


Figure 8: Kernel Density Plots: Criminal and Civil Cases [ADR Data]

The kernel density plots highlight the shifts in the early treated districts. Our results show no significant difference between the two groups in terms of rent-related and guardian-related cases. These types of cases are less likely to be affected by the increase in the access to information of land-related records. The difference between the two groups in terms of the outcome of ADR e.g. success or failure of dispute cases is statistically not significant. We suspect this outcome variable to be depending on PLRMIS in the sense, that many disputes are attributable to the ambiguity of the land-related records.



The direct effect of the program may not be explainable because the number of successful or failed cases depends on the total number of received cases. We also believe that this simple mean difference is subject to many concerns including the possibility of confounding variables that simultaneously affect both groups, and hence cancel out the potential effect attributable to the program.

5.1.2. Fixed Effect Results

Our next approach is to use fixed effect regression model to delineate any differences peculiar to individual districts or any potential time trend over time. Our fixed effect estimates are shown in Table 5.

Table 5: Program Effect on ADR Disputes: Fixed Effect Regression Results

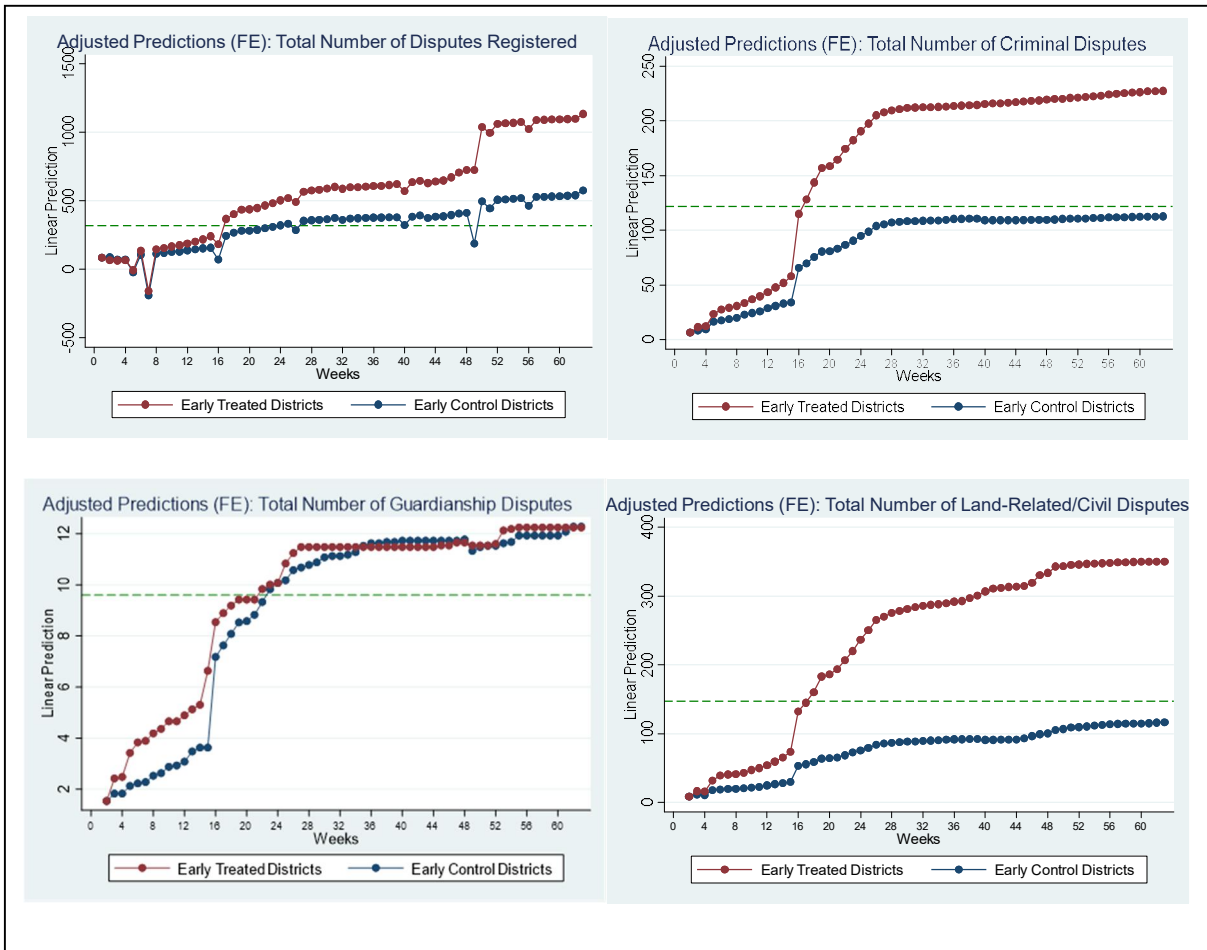
	(1)	(2)	(3)	(4)	(5)	(6)
	Criminal Disputes	Land-Related Disputes/Civil	Family Disputes	Guardianship Disputes	Rent Cases	Other Disputes
PLMIS	22.904*** (4.503)	40.189*** (3.165)	25.375*** (7)	1.127** (.545)	.549*** (.194)	-2.051* (1.09)
Population Density	-.01 (.006)	-.034*** (.004)	-.101*** (.01)	.018*** (.001)	.003*** (0)	-.003* (.002)
Literacy Rate	.669*** (.168)	.506*** (.118)	1.131*** (.261)	-.246*** (.02)	.086*** (.007)	-.13*** (.041)
Police Stations	1.993*** (.396)	-1.76*** (.279)	.283 (.616)	.297*** (.048)	.047*** (.017)	.051 (.096)
Mouzas Distribution	.013** (.006)	.003 (.004)	-.023** (.01)	.002** (.001)	.003*** (0)	-.003* (.001)
District FE	YES	YES	YES	YES	YES	YES
Time (Week) FE	YES	YES	YES	YES	YES	YES
Mediator Judge FE	YES	YES	YES	YES	YES	YES
Observations	2331	2294	2331	2331	2331	2331
R-squared	.776	.792	.786	.832	.828	.784

Note: We run a fixed effect regression model on each type of disputes weekly registered with Alternate Dispute Resolution (ADR) Offices in all districts of the Punjab Province. In all regressions, the dependent variables are the number of disputes registered while district and week fixed effects are applied. Early Treatment is a dummy variable that equals 1 if the set of districts were exposed to the first phase of PLRMIS program, 0 if otherwise. *Cluster Standard errors at district level are in parentheses* *** $p < .01$, ** $p < .05$, * $p < .1$

As shown in Table 5 (equation (1)), the coefficient of treatment dummy PLRMIS is statistically significant for all types of the received dispute cases by ADR. We additionally control population density, number of police stations, literacy rate and mauza's distribution in each column to partial out the observed effects of these variables. As shown in equation (1), in all our regressions, we apply district fixed effect, mediator judge fixed effect and time trend to account for entity specific effect and time-trend. After controlling for all covariates, the early treated districts in the Punjab province are likely to receive a greater number of criminal, civil/land-related, family, guardianship and rent related disputes. On average, an ADR Centre located in the early treated district is likely to receive 40 cases more than ADR centres located in early controlled districts. This is statistically significant with 1 % significance level.

The coefficient for criminal cases, and family cases is 23 and 25 respectively signifying a trend in the early treated districts compared to early controlled districts.

Figure 9: Adjusted Linear Predictions (Fixed Effect Model-ADR Data)



We also show this effect in Figure 9 through adjusted linear predictions to visualize the fixed-effect estimates. The coefficient for other disputes is negative and statistically significant. One reason for this negative sign is the possibility of the existence of unrelated disputes to land administration. Details of these other disputes are not provided by ADR offices as these are composed of miscellaneous cases. The coefficients for our control variables are in line with theory which shows potential variation in the number disputes of all types due to population density and literacy rate. The sign of these variables indicates the assumption under which we attribute the program effect. For instance, in areas where the population density is high, the number of land-related disputes is likely to be smaller compared to areas where population density is low. Population density variable considers the total size of the district and divides it by its population, and hence, it is negatively correlated with the number of disputes. For literacy rate, our results are surprisingly positive and significant. It is reasonable to assume that higher literacy rate areas should decrease the number of disputes rather than

increase it. While there could be other possible reasons, consequently, areas that have higher literacy rate are likely to have more awareness about the use of online facilities and whereas the PLRMIS requires the general public to be literate enough to be facilitated by the system, hence, our results show that literacy rate has increased the number of disputes. People have responded positively to the digitization of land-records and hence, a higher number of disputes registration in ADR centres indicate increased usage of the digitized record.

5.1.3. Two-stage Least Square Estimates

Because of the indirect effect of the PLRMIS on the number of successful dispute resolution cases, we attempt to utilize the program effect through fixed effect as an instrument. In section 4, we have already discussed the validity of our instrument and assumptions we hold while running two stage least square (2SLS) model. Results of our two stage least square model are presented in Table 6. The number of criminal disputes and land-related disputes are considered as endogenous variables while the program difference between early treated and early controlled districts (e.g PLRMIS) is used as an instrument. The first stage results shown in panel A are similar to what we observed in our fixed effect model earlier. The 2nd stage results are shown in the last two columns where the outcome variable is the number of successfully resolved disputes. The 2nd stage coefficient for criminal cases and land related cases are statistically significant, however the magnitude of both appears low. While controlling all observed characteristics and applying fixed effect, we used IV package in STATA, that allows controlling entity specific characteristics, and time trend in running two stage regressions. What we obtain from 2SLS estimate is the local average treatment effect (e.g LATE for ADR-Criminal Disputes= $.883/22.90=.0385$, Land Related Disputes= $0.575/40.18=.0143$). We interpret these results as conditional on treatment effect on endogenous variables and hence, the coefficient in 2nd stage is more causal in this case.

Technically, an increase in the number of criminal disputes at ADR offices attributable to PLRMIS is likely to increase the number of resolved disputes by 0.038 percentage points. The same effect for the land-related disputes is 0.014 percentage points. In this context, our indirect LATE effect is informative about subjects “who benefit from the treatment” (Angrist & Krueger, 2001). In all our regressions, we adopt a more conservative approach by using standard errors clustered at district level.

Whether this effect is economically significant is subject to further investigation. We additionally test the strength of our first stage by reporting the F-Test , Wald Test and the LM-Statistics which support the validity of first assumption.

Table 6: PLRMIS Indirect Effect on the Dispute Resolution Success

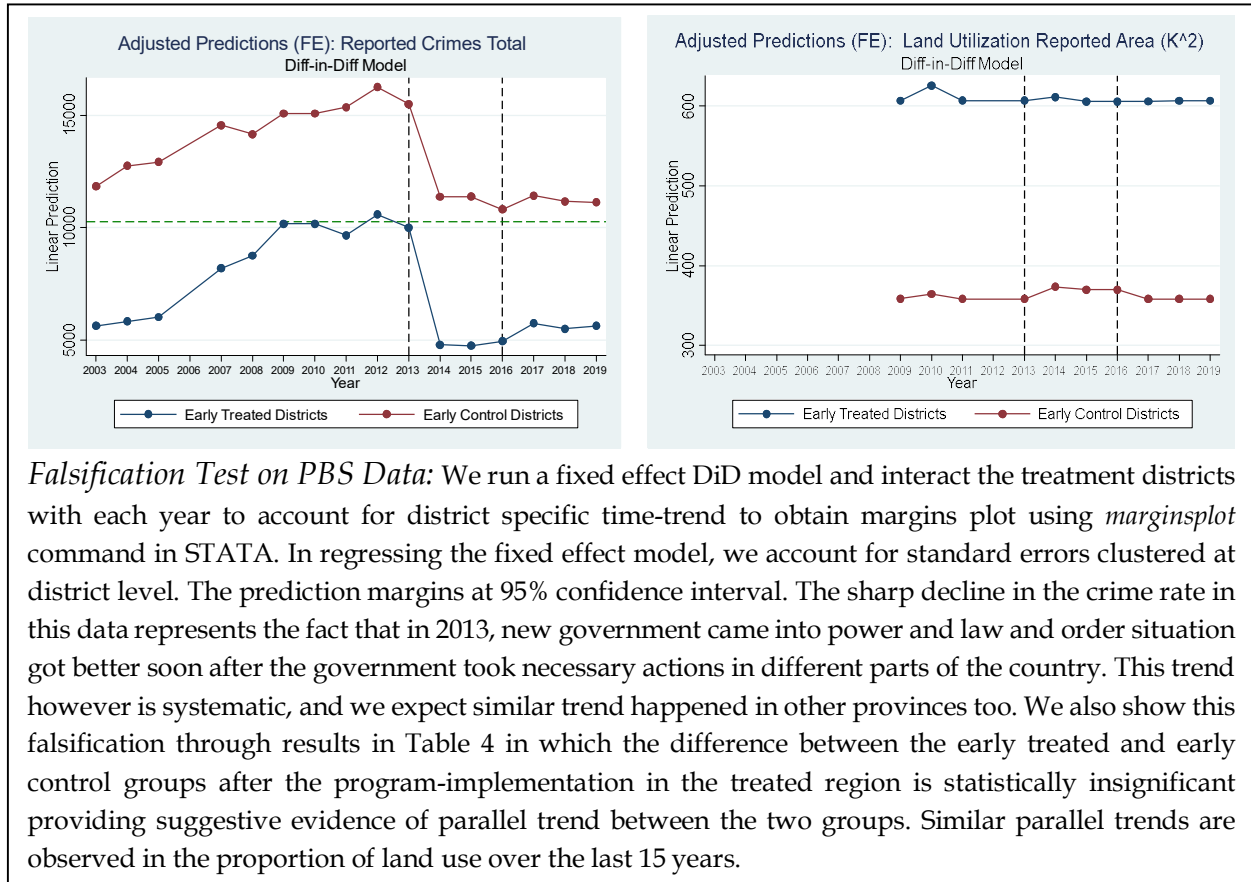
	Criminal Disputes (Endogenous)	Land-Related Disputes (Endogenous)	Disputes Resolved	Disputes Resolved
Panel A: First Stage				
PLRMIS	22.904*** (4.503)	40.189*** (3.165)		
Panel B: 2nd Stage				
Criminal Cases			.883*** (.17)	
Land-related Disputes				.575*** (.054)
Controls	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Week FE	YES	YES	YES	YES
Mediating Judge FE	YES	YES	YES	YES
Observations			2331	2294
R-squared			.182	.52
F-Test	42.50	140.70		
Wald test	94.00	94.59		
LM-Statistics	92.89	93.38		

Notes: Table 6 uses weekly data obtained from ADR offices located in each district of the Punjab province and merge that with the PDS data on control variables. Outcome variable in the last two columns is the number of disputes successfully resolved by ADR mediator. Number of criminal disputes and land-related disputes are endogenous variables estimated in the first stage. Control includes, population density, literacy rate, number of police states and mouza's distribution. Cluster Standard errors at district level are shown in parentheses *** p<.01, ** p<.05, * p<.1 .

5.1.4. Falsification Tests

In Table 7, we show results of the difference-in-difference fixed effect model on the secondary data we have obtained from Punjab Development Statistics reports. We check the pre-2013 trend between the early treated districts and early controlled districts in terms of reported crimes, total land utilized, cultivated and non-cultivated land size. The coefficient of our interaction term is statistically not significant signifying no difference between the two groups, hence supports our assumption that before 2013, the two groups of districts had a parallel trend.

Figure 10: Falsification Test on PBS Data - Reported Crimes and Reported Area KM 2



Falsification Test on PBS Data: We run a fixed effect DiD model and interact the treatment districts with each year to account for district specific time-trend to obtain margins plot using *marginsplot* command in STATA. In regressing the fixed effect model, we account for standard errors clustered at district level. The prediction margins at 95% confidence interval. The sharp decline in the crime rate in this data represents the fact that in 2013, new government came into power and law and order situation got better soon after the government took necessary actions in different parts of the country. This trend however is systematic, and we expect similar trend happened in other provinces too. We also show this falsification through results in Table 4 in which the difference between the early treated and early control groups after the program-implementation in the treated region is statistically insignificant providing suggestive evidence of parallel trend between the two groups. Similar parallel trends are observed in the proportion of land use over the last 15 years.

Table 7: Falsification Test on Secondary Data [Punjab Development Statistics]

	Crime		Land Use	
	No. of Reported Crimes	Total Land (10 km ²)	Cultivated (10 km ²)	Uncultivated (10 km ²)
Treatment*Post (2013)	-679.2 (1,842)	-10.61 (13.99)	-4.611 (11.81)	-6.00 (7.293)
District FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	567	360	360	360
Number of Districts	36	36	36	36

Note: Cluster standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Results of Primary Data

5.2.1. Cross-Sectional Survey of the General Public

Table 8 shows detailed summary of the demographic, socio-economic and dispute related information of respondents who participated in the survey of PLRA local offices in 17 tehsils of five districts in Punjab province. The total number of respondents of this study was 301. A major part of respondents belonged to the village areas where PLRMIS was implemented. Survey results show that on average 90% of people who participated, belonged to the area that has coverage of PLRMIS. The mean age of respondents was forty-five while majority of respondents were male due to the fact that rural Pakistan is a male dominant culture. 31% of respondents were computer literate while the average education level of the participants was the ninth grade. Since most respondents belonged to the PLRMIS covered area they had information of PLRMIS and its role. Out of 301 respondents, 299 responded to the question about their ownerships of lands and around 94% of them owned land in that area. A major part of the properties owned by respondents were the agricultural land and then residential land i.e., 197 people owned agricultural land and 119 own residential land. As the beneficiaries of PLRMIS are diverse, the land ownership has high standard deviation because some people owned a huge size of land while many other owned a small part of land. Lastly, out of 301 respondents, 86% have visited PLRA office at least once.

Panel B in Table 8 shows the summary statistics of land related transactions. The results show that nearly 66% of total respondents were having completed any kind of land related transaction. Out of 199 people who completed any transaction, 33% (65) experienced a dispute in their transactions. The ratio of people who filed case in courts is extremely limited as shown in the Table 8. This might be because of the fact that courts take a long time in the resolution of cases. People who made any transaction, out of them, 78% used the PLRA facility in their transaction. Very importantly, out of those 155 (78%), nearly half (53%) responded that PLRA has reduced the transaction time, 51% responded that the PLRA has reduced their cost (formal & informal) while as many as 62% responded that the PLRA has reduced the ambiguity for them in land record and transaction. Out of 199 respondents who made any land related transaction, 80 (40%) respondents faced conflict in the personal record or land related record. A total of 61% respondents who made transaction also used the PLRA facility. There are few other variables like type of dispute, counterparty in dispute and year of transaction but we have not reported in the summary statistics table due to extremely low number of responses.

Table 8: Field Survey Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min	Max
<i>Panel A: General Socio-Economic Characteristics</i>					
PLRMIS Coverage	301	0.89	0.313	0	1
Age	300	45.193	14.32	18	86
Gender	301	0.983	0.128	0	1
Computer Literate	301	0.309	0.463	0	1
Education Level	298	9.027	3.941	0	16
Knowledge of PLRA	300	0.9	0.301	0	1
Mobile/Internet User	300	0.57	0.496	0	1
Living Here (Years)	301	42.269	16.82	0	80
Property Own	299	0.94	0.238	0	1
Commercial Ownership	11	1	0	1	1
Residential Ownership	119	1	0	1	1
Agricultural Ownership	197	1	0	1	1
Size of Land (Marla = 272 Sq Ft)	232	588.21	975.891	1.5	8000
Visited PLRA Office	301	0.86	0.347	0	1
<i>Panel B: Transaction and Disputes</i>					
Transaction of Land	301	0.661	0.474	0	1
Land Dispute	199	0.327	0.47	0	1
Case Filed in Court	65	0.169	0.378	0	1
Time in Court Decision	11	21.727	20.283	1	70
PLRA Facility Used	199	0.779	0.416	0	1
Reduction in Time of Process	83	1	0	1	1
Reduction in Cost of Process	80	1	0	1	1
Reduction in Ambiguity	97	1	0	1	1
Conflict in Land Transaction	199	0.407	0.493	0	1
Attempt to use PLRA	199	0.608	0.489	0	1
<i>Panel C: Attempt to Transaction</i>					
Attempt of Land Transaction	301	0.289	0.454	0	1
Dispute in Attempt of Transaction	87	0.494	0.503	0	1
Case Filed in Court during Attempt	6	0.667	0.516	0	1
Time in Resolution of Case during Attempt	3	48	31.749	24	84
PLRA Facility Used during Attempt	87	0.908	0.291	0	1

Note: Table 8 shows descriptive statistics of the data collected through field survey in five districts of the Punjab Province, namely Attock, Mianwali, Khushab, Sargodha and Chiniot.

Lastly, Panel C shows descriptive statistics related to respondents who attempted to make any land related transaction and they failed, or their transaction was still in process. A total of 29% people attempted for transaction and out of them 49% experienced a dispute in their

transaction out of them a very few numbers of people filed cases in court. Almost 90% of those who attempted transactions also used PLRA facility during the attempt of transaction.

5.2.2. Interviews and Observations of the Key Stakeholders

The project research team visited fifteen Tehsils of four major districts namely Mianwali, Khushab, Sargodha and Chiniot besides the pilot test district Attock and Rawalpindi. During the field survey, our research team conducted interviews with key stakeholders and observed the actual implementation and operations of the PLRMIS during working days. They also sought perception of stakeholders namely, general public, property dealers and officials of the PLRMIS department. The team explored the ground realities and performance of newly developed e-governing system in different parts of these districts. The observation of the research team during the visits to these offices were properly recorded and transcribed. The key findings from team's observations and interaction with stakeholders are presented below:

- **Infrastructure Maintenance and Development**

It was observed that on average, the PLRA offices are providing their services to more than fifty Mozas per office, while 100 to 150 tokens were issued on daily basis. In other words, each PLRA local office on average serves between 100 to 150 people. Despite the efficiency in processing through computer system, a number of facilities were observed to be lacking in PLRA offices such as limited number of staff and insufficient workspace including waiting area, service counters etc., that often create hustle during the working hours. One participant in the study responded in the following way:

“To expedite the process of services including token issuance to general public, the staff of PLRA and office of PLRA in Tehsil must be increased. The area of building is very limited and old. This was constructed eight years ago and currently according to the demand of general public the infrastructure is insufficient.”

Due to large number of visitors to these centres, the existing waiting areas and other facilitation services were unsatisfactory. It was also observed that most of the times the actual reason for more delay in service was errors in clients' record which take time to resolve. Moreover, the building infrastructure in various offices was insufficient to satisfy the needs of general public.

- **Litigation Process**

During the interviews with various lawyers and ARCs officials, it was found that the courts issue inappropriate “*stay-orders*”¹¹ on the lands which restricts them to build, sell, purchase, and use the land until the case is disposed off. One of the ARCs’ officials viewed the prolonged litigation process of courts as an obstacle in the services of ARCs:

“These stay-orders are often issued based on one party's application against another due to any conflict and dispute prior to the investigation. The courts mostly issue a general stay-order without mentioning any specific restriction details, which causes the general blockage of land. In the general blockage of land, the suffering party cannot get the Fard (Land Document) for any reasons such as loan or guarantee for any imprisoned member etc. Moreover, these stays on the land cannot be lift-up until the settlement of case in court and in Pakistan the land related cases in courts takes decade for resolution.”

However, the PLRA officers are bound to obey the order of courts despite these errors cause dissatisfaction among the general public leading to negative perception about the performance of PLRA or PLRMIS.

- **Interoperability**

In the Patwar (manual land record) system, when a person sells a piece of land, the Patwari breaks the Khasra (identification) number into two parts by writing 1 and 2 after that Khasra number. For instance, if someone having Khasra (identification) number 23-542 and when they sell part of a land, the new numbers will be 23-542/1 and 23-542/2. When it comes to recording of land-related transactions in the PLRMIS, breaking the Khasra number is a time-consuming process due to approval from the head office. To overcome this, the PLRMIS staff in this case make both parties combined owners of the land. The issue of the identification of land becomes more complex and hence it’s difficult to identify which piece of land is owned by which party through PLRMIS. An official’s response to our research team was:

“The identification of the exact location of land and actual measurement in field is dependent on Patwari since the fieldwork is not allowed for ARC staff. Moreover, without the verification of land the transaction is not possible. There are so many

¹¹ Stay-orders are a type of court decision that restrict the other party to use the property or proceed with any transaction until the final decision of the court is announced.

mistakes in the land record especially in the details of owner. One small mistake in identity card number individual creates huge trouble for him. Therefore, the land record must be connected with NADRA record for validity of record."

On the other hand, the PLRMIS staff is not allowed to visit the field for verification of lands during sale and purchase. The fieldwork about the demarcations of land is still done by the patwaris. Therefore, the record of land demarcations and size at the online database is not being efficiently updated. As per the law, a land category can be changed from one person to another according to its usage. For instance, if a controlled shed for breeding chicken or a brick production plant has been installed on agricultural land, then the land category must be changed from agricultural to commercial. When a land category changes, the tax rates, and all other associated rates get changed. In addition to that, government officials such as Tehsildar and Patwari, update valuation tables of land every year in collaboration with concerned authorities. These valuation tables are made according to the registered category of land. For instance, if the location of agricultural land is beside the road, the valuation table cannot segregate the land from the overall land. In many cases, the general public has started business on the agricultural land near the public road. However, in the government record, it is registered as agricultural land due to which government faces tax loss.

Another associated problem with the operations of PLRMIS system is the verification of individual clients through the National Database and Registration Authority (NADRA). The PLRMIS record is not fully linked with the NADRA record. Therefore, many individuals who come for any transaction such as inheritance, transfer, registration, sale/purchase etc., must apply for the correction of record with NADRA before proceeding with PLRMIS system. Moreover, there was a difference in the recording procedure of the land size. For example, Patwaris record the smallest unit of land as Marla (272² Foot), but the smallest unit in PLRMIS is 1 Foot. This contradiction creates many conflicts among three stakeholders i.e., individual (owners of land), PLRA staff, and Patwaris. In addition to that, many cases were observed where an individual was claiming large piece of land due to a higher land unit in earlier Patwari system, but the PLRMIS record show a smaller piece of land. These are technical problems that may be associated with the number of dispute registration with the ADR centres.

- **Cost Structures, E-Literacy and Accessibility of the System**

There are three types of fees that clients are required to deposit in banks for different type of transactions. In some cases, an individual has to pay all three types of fees. The registration for

token fee can be deposited within the office of PLRA since every PLRA office has a sub-branch of BOP (Bank of Punjab). However, the tax fee is required to be deposited in NBP (National Bank of Pakistan) after getting a fee voucher from FBR (Federal Board of Revenue). FBR has only one office in each district. So, the individual who has to pay tax fee must visit district FBR office. Moreover, the BOR (Board of Revenue) fee is required to be deposited in the main branch of BOP in each tehsil. The fee deposition process in three separate places is disturbing for the general public and in most cases the issuance of Fard takes one whole week. Upon interaction with different clients visiting PLRA offices, we identified that whereas only one token is sufficient for all transactions, due to unawareness of general public, multiple tokens are often generated which cost them high. The officials of the PLMIS also viewed the fee structure to be ambiguous and suggest its further improvement. One PLRA official suggested:

“Most of the people have bad experience with the fee deposition in different sites, for example, the fee of national bank (FBR Fee) must be deposited to the National Bank district branch, so everyone has to visit there during the process of transaction but before submission at National Bank individual have to visit office of FBR (District Office) and take the fee voucher. Secondly, the fee of District Council must be deposited to the Bank of Punjab (Tehsil / District Branch). Therefore, single counter service must be initiated, and it is possible because the token fee can be deposited within the premises of ARC building, similarly, other fee (NBP and BOP) must be deposited here within the building.”

The target people of PLRMIS are those who belong to villages and the implementation of PLRMIS is limited to the villages of Punjab that accounted for above 90% of total surveyed individuals. Most of the public who visits for the first time to the PLRA office are not aware of the system and process due to lack of formal education and literacy. Another official shared his experience in the following way:

“Most of the general public are illiterate in villages and due to illiteracy, they cannot use the PLRMIS system. In fact, they are unaware of services of PLRA and sometimes this kind of unawareness leads to corruption and bribery.”

This coincides with the PLRA’s inability to offer general awareness and training program and familiarize the general public about different features of the PLRMIS system.

- **Relationship of Job Security with Transparency of the System**

Given the low education and literacy trend in rural Punjab, general public has no clear understanding of the process and procedures of PLRMIS. Therefore, the Assistant Director of Land Record (ADLR) in Arazi Record Center (ARC) has powers to transfer and register the general public's land on behalf of the client. However, whereas the ADLR is a contractual employee, it is likely that he/she manipulates the record leading to potential corruption and misuse of authority in the land related transfers. It was also observed during the interviews with ADLR officials that the contractual nature of their jobs makes them uncertain about their permanent stay in the department and hence they simultaneously look for alternate jobs. In Pakistan, contract employment has a number of drawbacks. For instance, a one-month pre-notice is sufficient for resignation but not sufficient for clearance and extracting fraudulent activities in the land record administration.

To overcome any misuse of authority, the PLRMIS required biometric verification at the time of land-related transactions such as sales or purchases. Upon interaction with clients and officials of the ARCs, it was learnt that video evidence of all individuals who are selling or buying the land must be recorded. The video recording should be recorded at the time of “*Bayan*” (Verbal Statement of Sale/Purchase/Transfer of Land). In addition to that, the statement should include the particulars of the transaction, including size, location, amount, other party names and date and time etc.

- **Workforce and Technical Issues**

Land Record Management Information System is being operated by the Punjab Land Record Authority which works under the shadow of Punjab Board of Revenue. PLRA is a governmental authority that has job structure similar to the pure government departments. The ADLR and SCI (Service Center In-charge) manage all operations of an ARC (Arazi Record Center). The ADLR at each ARC office are inducted through PPSC (Punjab Public Service Commission) which has a competitive exam usually conducted for permanent employees. However, the SCI were hired through the *Walk-in* Interviews given the need for immediate implementation of the program. In this context, both officers hired in the same capacity but having different responsibilities. Sometimes there can be a conflict between both officers because no one is defined superior. Despite the fact that PLRA is a pure governmental authority, no service structure has been clearly defined. The PLRA lags behind in developing the service

structure of employees which ultimately demotivates the staff that resultantly resort to switch to other jobs.

During the Patwari system, prior to the implementation of PLRMIS, there was one Patwari appointed on average for three Mozas (villages) who was authorized to transfer, register, and identify lands in assigned Mozas. However, in the PLRMIS system, a limited number of staff deals with 90% of computerized Tehsil Mozas. The staff is insufficient that lead to the sufferings of the general public in the form of delays in their transactions. Also, given the distance to PLRA centres in far flung rural areas, it becomes hard for clients to commute to the centres. Comparing this with the traditional Patwari system, the public had more access to meet Patwari in their convenient time and did not need to travel a lot. In one local office, the official responded:

“We are total nine people working here including ADLR and SCI. Except ADLR and SCI, one person is reserved for que management, one for documents scanning and one for cash counter. We have only three live counters for services which are insufficient to serve general public who was used to serve by thirty-five Patwaris before implementation of PLRMIS.”

With regard to the skills of PLRA staff, they are well capable having enough IT skills to manage PLRMIS. However, the system has been developed in the Urdu language that uses complicated and uncommon terms for various types of land-related transactions. Therefore, due to the staff's different type of educational background mostly information technology, they cannot understand uncommon jargons using in the system. During the lawyers' interviews, it was observed that various lawyers and judges sometimes cannot understand jargons and differences between similar terms such as *SHAMLAAT* and *BEH-SHAMLAAT* and many more. It is therefore challenging for the staff of PLRA to fully understand the system which results in the conflicts among public as well as negative image of PLRA.

The timely availability of the ADLR, the authorizing person, is another major issue faced by the public. In district Khushab, it was observed that the ADLR of tehsil Nurpur was having an additional charge of tehsil Quaidabad due to which he has to serve the first three days at tehsil Nurpur and last three days at Quaidabad. Unavailability of ADLR on first three days in one tehsil and last three days at another tehsil results in delay in transfer and registration process.

- **Improper Authority and Allocation of Rights**

PLRA officers work scope is restricted to their office only and they have no right and authority to visit the field for identification of land, verification, and mapping of land etc. In this case, the PLRA office hugely depends on Patwari of that Mouza to identify and verify land. This kind of process creates a negative perception among the general public about the credibility of PLRA staff. PLRA with the collaboration of BOR has set up satellite centers in various tehsils and districts for facilitation of the general public, however, these centers work under Tehsildars and Patwaris, the conventional authorities of the land administration system.

- **Limited Scope of PLRMIS**

Even though the PLRA office has access to view NADRA's record to verify an individual's identity and his/her credentials, the PLRMIS is not connected with the NADRA record. Upon discussion with PLRA officials, it was found that there is need of linking client's record through computerized national identity cards to automatically update the PLRMIS record with the NADRA record. This link can avoid many delays in many processes and land-related transactions.

6. DISCUSSION

Developing an e-government system is influenced by the internal and external environments. It does not only depend on the resources available, but also relates to the political will of the government to develop and continuously monitor its operations. Studies indicate that the overall external environment (economy, democracy, education, internet usage, and peer pressure) affect e-government development programs directly or indirectly (Zheng & Manoharan, 2015). Technical matters contribute to the quality of e-government facilities when they are used. During our pilot survey, many challenges related to the implementation of PLRMIS were identified from respondents. Some of these challenges are directly related with the PLRA facilities in the areas, others are indirectly affecting the effectiveness of the programs. While ambiguity in the cost of Fard generation by different ARC centres is one problem that was frequently identified by citizens, others pointed towards issues associated with outsourcing of the Fard issuance process to the National Database and Registration Authority (NADRA)- a centralized department of government, - that makes it confusing for ordinary citizens as to where to approach in order for getting Fard. Although smaller in size, some areas within the district are still not digitized e.g., lands record and mapping are not digitized yet. Lack of education and computer literacy was a common problem identified by citizens in

the field survey. These problems are commonly found while implementing large scale land-related reforms in developing countries. According to one study, perception on easiness of use, compatibility, and trustworthiness are significant indicators of citizens' intention in using e-government services (Aritonang, 2017). Citizens' intention increases if citizens perceive the service as easy to use, intuitive, and easy to navigate. They will be more willing to use online services if the services are congruent with the way they like to interact with others. Compatibility is the most significant motivating factor which increases citizens' intention.

Our empirical results show a contrasting difference between the two groups of districts where the program was implemented with a three-year difference. This difference is attributable to PLRMIS due to its implementation in 18 districts in 2013 and remaining 19 districts in 2016. We check alternative possibilities of any systematic difference between the early treated districts and early controlled districts through secondary data. Our falsification tests support the homogeneity of the two sets of districts over many socio-economic variables. One important question that arises is whether we should causally attribute the PLRMIS to increase the number registered cases? Our main assumption is that previously maintained land-records were less accessible to the general public. The number of disputes associated with lands were often less, because the general public did not have more information about their property and its precise locations. While the introduction of PLRMIS has increased access to information, something we also find in our field survey, we assume that after reducing information asymmetry, the general public is more likely to raise their disputes to the ADR and consequently ADR is more likely to succeed in resolving disputes. Concerning the insignificant effect on rent-related cases, various cases persist including the rent-related cases, that have their proper rules and regulations that do not involve ownership, boundary, possession, and land-related disputes. While the agent in the rent related agreement might not be exposed to a land dispute, a case scenario of a counterpart (family member, or other related parties) which has the principal status may be subject of the dispute around the rented land. Therefore, this type of disputes between two parties on rented property, or land may be recorded in a civil case. If any of the parties win the case, it is considered as a principal-agent relation with the renter. the guardian cases include the case which is related to the couple's possession. These cases are not related to the size, or price of the land, but to the guardianship status conflict.

The ultimate purpose of e-governance interventions is to serve public with efficient and effective manners. The utilization of electronic land management system improves the whole

management system of land record (IRMT, 2008). However, the e-governance system has to be developed in several phases with a continuous monitoring and evaluation system. According to Creuzer & Kjellson (2005), most of the electronic initiatives fail due to various reasons that include, the strategic challenges such as strategic thinking & leadership, technological infrastructure, human infrastructure, institutional infrastructure, and data system infrastructure. Also, to what extent a program is adapted by the local people including the institutions has a greater impact on the success of land administration system (IRMT, 2008). McKinnon & Reinnika (2000), illustrated that in developing countries the focus of e-governing system is more inclined towards the techno-centric instead of the client -centric which ultimately results in the failure. Moreover, according to a World Bank (2006) report, developing countries should worry about their focus on the users of e-governing system rather than the focus on technology. Also, the insufficient supply of experienced and skilled workers in e-governing system results in the failure of the program and without well-skilled human resource, the electronic land management system cannot deliver satisfactory services to the general public. Our field survey in five districts of Punjab revealed these challenges in a much striking way. For instance, in most of the PLRA offices, the major concern of the stakeholders was the limitations faced in the infrastructure including the service structure of employees of the program. What we imply from the interviews of respondents is the lack of interest of current government in making an already successful program a greater success. A feedback mechanism that leads to timely and sufficiently effective response by government in correcting identified issues is lacking in the context of Punjab. Whether it is the service structure, the cost factor or the number of professionals hired, apathy on the part of provincial government can lead to significant consequences for the sustainability of the Program.

7. CONCLUSION

The introduction of PLRMIS has sizable impact on the number of disputes references submitted to the ADR Centres in the Punjab province. We explain this effect in two ways, direct and indirect effect. The direct effect is observable on the gross number of disputes references through mean-difference and panel fixed-effect regression models that causally attribute effect through separating a set of districts that were early exposed to the program in 2013 from a set of districts that were exposed later to the program e.g., 2016. On average, an ADR Centre located in the early treated district is likely to receive 40 cases more than ADR centres located in early controlled districts. This is statistically significant with 1 % significance level. However, we do not associate the number of successful disputes solution cases directly

to the digitization of the land record information system. The reason is the lack of any direct evidence of the impact of PLRMIS on the ADR mediation process. Mediation process does use the information obtained through land administration department, however, unless the number of registered cases e.g., civil cases and criminal cases are increased, any increase in the successful cases is not reasonable. We argue that successful cases of ADR would increase only if any increase in the civil/land-related disputes or criminal disputes was observed. We test this possibility through the 2SLS approach where the program effect in the first stage was instrumented to estimate effect in the number of successfully resolved disputes. Our results are robust despite controlling for covariates and entity-specific variation as well as time trend. We supplement our quantitative evidence with the evidence from the field survey conducted in five districts of Punjab province. We find significant variation in the level of use, understanding of citizens regarding access of the system and the extent to which clients are served with the PLRMIS. Very importantly, we observe that majority of those people who have conducted a land related transactions and having conflicts in those transactions, resort to the PLRMIS online facilities located in each tehsil of the districts. Our field surveys also identified key areas of the PLRMIS that need attention of government officials in order to sustainably utilize this flagship program already in place across Punjab. These areas include, infrastructure maintenance and development, litigation process, interoperability of the PLRMIS, cost structure, e-literacy of the general public, job security of the PLRMIS employees, misuse of authority and other technical issues.

The introduction of PLRMIS in the Punjab province of Pakistan is one such example of transforming governance mechanisms that is intended to enhance productivity and reduce conflicts arising from conventional record administration. The ADR data provides suggestive evidence of the significantly positive impact on the resolution of disputes emanating from lands or associated problems. Our empirical results are supported by field survey that include perception of a cross-section from the general public, officials of PLRMIS and other key stakeholders. In the general equilibrium context, digitalization leads to transparency by allowing easy access to land record information that helps the country avoid the cost of conflicts. In the long run, this contributes to the economic development of the country.

8. POLICY IMPLICATIONS

- More transparent and efficient land management system can lead to better resolution of land-related disputes and therefore contribute to economic development.

- The economic benefits of the e-governance interventions can be enhanced by integrating one program with different dimensions including judicial, regulatory and taxation departments.
- A feedback mechanism that leads to timely and sufficiently effective response by government in correcting identified issues is a must for the sustainability of e-governance programs.
- Ambiguity of authority, responsibility and service structure carry additional costs to the program sustainability.
- Implementation of reforms in land administration not only depends on the resources available, but also relates to the political will of the government to develop and continuously monitor its operations.

9. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Despite our effort to analyze the direct and indirect relationship of PLRMIS on the land-related dispute resolution in the Punjab province through primary and secondary data, following caveats and future research directions must be considered.

- The establishment of ADR was aimed at expediting the judicial process of prolonged cases in provincial courts that involved multiple parties. Although, majority of conflicts belong to civil and land-related issues, the ADR itself is not directly integrated with PLRMIS data and hence all references filed in ADR offices are dependent on interest of parties to resort to ADR decisions. This can potentially challenge the direct link of land-related cases with the PLRMIS. It will be more useful if ADR data is integrated with the PLRMIS data particularly in terms of land-related disputes. Future research might further segregate the ADR data and disentangle those specific disputes that emanate from identified lands from other civil cases. Statistics of land-related matters in formal courts should be included in future studies.
- Because of the project's high cost, a cost-benefit analysis of the program is strongly suggested. Future research might focus on the question of how the government can employ PLRMIS in crucial land use planning and policy making decisions considering the cost of its implementations.
- Other variables related to land reforms may be included, for instance, quality of land record in PLRMIS, how different stakeholders use PLRMIS and act in dispute resolution, tax increases or income of Board of Revenue (BOR).

- Due to a lack of time and the country's pandemic condition, we conducted a field survey in five districts in upper Punjab: Attock, Minawali, Khushab, Chiniot, and Sargodha. It is recommended that districts from central and lower Punjab be included in future research studies.
- Future research studies for program evaluation could include a comprehensive SWOT analysis in similar contexts.

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ANNEXURES

Annex 1: History of Land-related Legislation in the Punjab, Pakistan

1936	Punjab Copying Fees Act, 1936
1942	Bahawalpur Court of Wards Act, 1942
1949	Thal Development Act, 1949
1950	Punjab Protection and Restoration of Tenancy Rights Act, 1950
1952	Punjab Abolition of Jagirs Act, 1952
1957	Punjab Board of Revenue Act, 1957
1958	The Punjab National Calamities Act, 1958
1958	Punjab Agriculturalists' Loans Act, 1958
1959	West Pakistan Border Area Regulation, 1959
1959	Punjab Usurious Loans Ordinance, 1959
1959	Punjab Survey and Rectangulation of Land Ordinance, 1959
1959	Punjab Land Dispositions (Saving of Shamilat) Ordinance, 1959
1959	Punjab Hindu Womens' Rights to Agricultural Land Ordinance, 1959
1959	Border Area Regulation, 1959
1960	The Punjab Consolidation of Holdings Ordinance, 1960
1960	Punjab Relief of Indebtedness Ordinance, 1960
1962	Punjab Government Dues Recovery Ordinance, 1962
1963	Punjab Recovery of Cost (Copies of Essential Revenue Records) Ordinance, 1963
1966	Punjab Government Lands and Buildings (Recovery of Possession) Ordinance, 1966
1967	Punjab Land Revenue Act, 1967
1969	Punjab Tenancy (V & E) Ordinance, 1969
1972	Land Reforms Regulation, 1972
1975	Evacuee Property and Displaced Persons Laws (Repeal) Act, 1975
1976	The Cholistan Development Authority Act, 1976
1977	Land Reforms Act, 1977

1978	Punjab Thal (Increase in Value) Ordinance, 1978
1986	Jinnah Abadi Act, 1986
1991	Punjab Pre-Emption Act, 1991
1997	Punjab Agricultural Income Tax, 1997
1998	Punjab Land Revenue (Abolition) Act, 1998
2017	The Punjab Land Records Authority Act, 2017

Annex 2 Table 2: Impact of PLRMIS on the Number of Successful Dispute Mediation Cases: Reduced-form Fixed-Effect Regression Results

	Number of Successfully Mediated Dispute Cases			
	(1)	(2)	(3)	(4)
PLMIS	28.343 (23.469)	7.945 (25.492)	37.353 (24.21)	35.538 (22.343)
Criminal Cases	.202 (.127)			
Civil Cases (Land Related)		.468*** (.164)		
Family Cases			-.014 (.077)	
Guardian Cases				-1.864** (.811)
Pop Density	-.061 (.048)	-.08* (.044)	-.092 (.06)	-.074 (.06)
Mouza Distribution	-.006 (.047)	-.022 (.044)	-.017 (.054)	-.022 (.054)
Literacy Rate	.748 (.827)	1.031 (.825)	1.004 (.874)	.747 (.777)
District FE	YES	YES	YES	YES
Time (Week) FE	YES	YES	YES	YES
Mediator Judge FE	YES	YES	YES	YES
Observations	2331	2294	2331	2331
R-squared	.496	.53	.471	.496

Note: This table shows that the PLRMIS has no direct effect on the number of successfully resolved dispute cases except through endogenous variables. In other words, we prove that once controlled for endogenous variables, the coefficient of treatment variables is not statistically significant. To do so, we run a fixed effect regression model on the number of successful dispute resolution cases weekly registered with Alternate Dispute Resolution (ADR) Offices in all districts of the Punjab Province. In all regressions, the dependent variables is the number of disputes successfully resolved while district and week fixed effects are applied. Early Treatment is a dummy variable that equals 1 if the set of districts were exposed to the first phase of PLRMIS program, 0 if otherwise. *Cluster Standard errors at district level are in parentheses* *** $p < .01$, ** $p < .05$, * $p < .1$

Annex 3: Questionnaires



Impact Evaluation Research Project
KDI School of Public Policy and Management, South Korea
In collaboration with Department of Management Sciences,
COMSATS University Islamabad, Attock Campus



Date: DD ____ MM ____ YY ____

Questionnaire ID: _____

Name of Research Assistant: _____

Location: District _____ Tehsil _____

PLRMIS Coverage: Yes/No

Respondent Category: **General Public**

Project Description

This research is being conducted under the Joint Research Project of the KDI School of Public Policy and Management and Department of Management Sciences, COMSATS University Islamabad, Attock Campus titled “ *Impact Evaluation of the Land Record Management Information System in the Punjab Province, Pakistan*”. The aim of this project is to conduct an impact evaluation of the land record computerization program in the Punjab province of Pakistan.

In this regard, we seek your cooperation in provision of relevant data/information for our research through responding to the following questions. All collected data/information will be kept strictly confidential and shall only be used for the purpose of research under the above-mentioned project.

A. Demographic Information

1. Age (Years) _____
2. Gender _____ M/F _____
3. Education _____ Under Matric/12 Years/14 Years/16 years/Above
4. Profession _____
5. Knowledge about PLRA Online Facility [Yes, No]
6. Computer/Internet Literate? [Yes, No]
7. Mobile Internet User? [Yes, No]

B. Land-related Information

1. For how many years you are living in this area? [Years in number]
2. Do you own any property in this location _____ Yes/NO
3. Type of property [Commercial, Residential, Agricultural, other _____]
4. What is the approximated size of land you own in this area [Units of Marla/Kanal]
5. Have you ever purchased/sold a piece of land in the last ten years [Yes, NO]
(If yes, answer the following sub-questions. If no, proceed to question 6.)
 - i. Which year did you completed transaction? _____
 - ii. Did you ever experienced dispute related to the ownership of land? [Yes/No]
 - iii. Did you ever used the PLRA, ARC online facility provided in this area?
 - iv. What role did you experience from the PLRA online facility
[reduce time, reduce cost, reduce ambiguity, other _____]
 - v. Did you ever experience conflict related land related transaction? [Yes, No]. if yes, answer the following.
 - vi. Did you attempt to use the PLRA online facility in this area? [Yes, No] if No, state any reason for why not using PLRA facility _____
 - vii. What do you think was the role of PLRA/ARC in resolving conflict ?

6. Have you ever attempted to buy/sell a piece of land in the last ten years? [Yes, No]
(if yes, answer the following questions)
 - i. Which year did you attempted transaction? _____
 - ii. Did you ever experienced dispute related to the ownership of land? [Yes/No]
 - iii. Did you ever used the PLRA, ARC online facility provided in this area?

- iv. Why were you not able to complete transaction/exchange of property?
[state reason _____]
- v. What do you think was the role of PLRA/ARC in resolving conflict?

C. Transaction-Specific Details

1. Where did you purchase/sale a piece of land?						
2. What is the type of land you purchase/sale?	<i>Commercial</i>	<i>Residential</i>	<i>Agriculture</i>	<i>Other</i>		
3. How many days did it take for you to purchase the land?	<i>1-3 days</i>	<i>4-6 days</i>	<i>7-9 days</i>	<i>10-12 days</i>	<i>13-15 days</i>	<i>More</i>
4. How much did it cost you to register the land?						
5. How much did it cost you to transfer the land (after purchase)?						

D. Perception about PLRMIS

1. Have you ever visited the PLRA online facility in this area? [Yes, No]. If yes, answer the following. If No, proceed to question 2.
 - i. What have you learnt about the role of PLRA Online facility in this area?

 - ii. Did you receive any training or awareness on how to use the online facility? [Yes, No].
2. Have you ever heard about the role of PLRA online facility in this area? [Yes, No]. if yes, answer the following
 - i. What _____ kind _____ of _____ role?

3. Would you like to receive any training on how to use the PLRA online facility [Yes, No]?
4. In your opinion, what could be the most important reasons in difficulties related to land related transactions?

5. Any other comment you would like to share with us related to the PLRA online facility provided by the Punjab Government.



Impact Evaluation Research Project
KDI School of Public Policy and Management, South Korea
 In collaboration with Department of Management Sciences,



Date: DD____MM____YY_____

Questionnaire ID: _____

Name of Research Assistant: _____

Location: District_____ Tehsil_____

PLRMIS Coverage: Yes/No

Respondent Category: **Prof Lawyers**

Project Description

This research is being conducted under the Joint Research Project of the KDI School of Public Policy and Management and Department of Management Sciences, COMSATS University Islamabad, Attock Campus titled “ *Impact Evaluation of the Land Record Management Information System in the Punjab Province, Pakistan*”. The aim of this project is to conduct an impact evaluation of the land record computerization program in the Punjab province of Pakistan.

In this regard, we seek your cooperation in provision of relevant data/information for our research through responding to the following questions. All collected data/information will be kept strictly confidential and shall only be used for the purpose of research under the above-mentioned project.

E. Demographic Information

1. Age (Years)_____ 2. Gender_____M/F_____
5. Professional Experience _____[Years]
6. Knowledge about PLRA Online Facility [Yes, No]
7. Computer/Internet Literate? [Yes,No] 7. Mobile Internet User? [Yes, No]

F. Profession-related Information

1. For how many years you are professionally engaged in this area? [Years in number]
2. Major categories of disputes you are dealing in?
3. What is the total number of land-related disputes per year registered with you per year? Provide details

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

4. What is the total number of inheritance related claims per year registered with you per year? Provide details

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

G. Perception of Lawyers about PLRMIS

1. Did you ever used the PLRA, ARC online facility provided in this area? [Yes/No]

(if yes, answer the questions 2 through 7, if No, answer question 8)

2. The PLRA Online facility in the area has reduced number of days it takes to transfer the purchased/sold property. [Check]

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

3. Before the introduction of PLRA online facility, how many days it used to take to get a piece of land registered ?

Type of land	Commercial	Residential	Agricultural	Other
Days				

4. After the introduction of PLRA online facility, how many days it takes to get a piece of land registered ? [Days]

Type of land	Commercial	Residential	Agricultural	Other
Days				

5. The PLRA online facility in the area facilitates the legal and administrative process of land registration.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

6. It is convenient to use the PLRA online facility including mobile app for land-related information.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

7. The PLRA online facility in the area has reduced the cost of land-related transactions.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
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8. In your opinion, why you were unable to access PLRA online facility in the area?

9. The PLRA online facility has reduced the probability of frauds/incidence of frauds.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
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10. In your opinion, what is the impact of digitization on land-related disputes in the area? [interview the response and record it below in Urdu]



Impact Evaluation Research Project
KDI School of Public Policy and Management, South Korea
 In collaboration with Department of Management Sciences,



Date: DD ____ MM ____ YY ____

Questionnaire ID: _____

Name of Research Assistant: _____

Location: District _____ Tehsil _____

PLRMIS Coverage: Yes/No

Respondent Category: **Property Dealers**

Project Description

This research is being conducted under the Joint Research Project of the KDI School of Public Policy and Management and Department of Management Sciences, COMSATS University Islamabad, Attock Campus titled “ *Impact Evaluation of the Land Record Management Information System in the Punjab Province, Pakistan*”. The aim of this project is to conduct an impact evaluation of the land record computerization program in the Punjab province of Pakistan.

In this regard, we seek your cooperation in provision of relevant data/information for our research through responding to the following questions. All collected data/information will be kept strictly confidential and shall only be used for the purpose of research under the above-mentioned project.

H. Demographic Information

1. Age (Years) _____ 2. Gender _____ M/F _____
7. Education _____ Under Matric/12 Years/14 Years/16 years/ Above
8. Profession _____ 5. Knowledge about PLRA Online Facility [Yes, No]
8. Computer/Internet Literate? [Yes,No] 7. Mobile Internet User? [Yes, No]

I. Business-related Information

1. For how many years you are engaged in property related business? [Years in number]
2. Type of property [Commercial, Residential, Agricultural, other]
3. What is the approximate number of land related transactions [buying/selling] you have successfully completed over the last 10 years?

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

J. Perception of Society Owners

1. Did you ever used the PLRA, ARC online facility provided in this area? [Yes/No]

(if yes, answer the questions 2 through 8, if No, answer question 9)

2. The PLRA Online facility in the area has reduced number of days it takes to transfer the purchased/sold property. [Check]

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
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3. Before the introduction of PLRA online facility, how many days it used to take to get a piece of land registered ?

Type of land	Commercial	Residential	Agricultural	Other
Days				

4. After the introduction of PLRA online facility, how many days it takes to get a piece of land registered ? [Days]

Type of land	Commercial	Residential	Agricultural	Other
Days				

5. The PLRA online facility in the area facilitates the legal and administrative process of land registration.

Strongly Agree	Somewhat Agree	Neutral idea	/No	Somewhat Disagree	Strongly Disagree
----------------	----------------	--------------	-----	-------------------	-------------------

6. It is convenient to use the PLRA online facility including mobile app for land-related information.

Strongly Agree	Somewhat Agree	Neutral idea	/No	Somewhat Disagree	Strongly Disagree
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7. The PLRA online facility in the area has reduced the cost of land-related transactions.

Strongly Agree	Somewhat Agree	Neutral idea	/No	Somewhat Disagree	Strongly Disagree
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8. Did you ever experienced dispute related to the ownership of land? [Yes/No] if yes, answer the following sub questions.

i. Did you attempt to use the PLRA online facility in this area? [Yes, No] if No, state any reason for why not using PLRA facility _____. If yes, answer the following question.

ii. What do you think was the role of PLRA/ARC in resolving conflict ?

9. In your opinion, why you were unable to access PLRA online facility in the area?

10. Provide us details about the average price per unit of land in your area of business.
[table-Market Price (Rs per Unit of Land)]

Type \ Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Commercial										
Residential										
Agricultural										
Other										

11. The PLRA online facility has reduced the probability of frauds/incidence of frauds.

Strongly Agree	Somewhat Agree	Neutral idea	/No	Somewhat Disagree	Strongly Disagree
----------------	----------------	--------------	-----	-------------------	-------------------

12. In your opinion, what is the impact of digitization on land-related businesses in the area?



Impact Evaluation Research Project
KDI School of Public Policy and Management, South Korea
 In collaboration with Department of Management Sciences,
COMSATS University Islamabad, Attock Campus



Date: DD____MM____YY_____

Questionnaire ID: _____

Name of Research Assistant: _____

Location: District_____ Tehsil_____

PLRMIS Coverage: Yes/No

Respondent Category: **Society Owners**

Project Description

This research is being conducted under the Joint Research Project of the KDI School of Public Policy and Management and Department of Management Sciences, COMSATS University Islamabad, Attock Campus titled “ *Impact Evaluation of the Land Record Management Information System in the Punjab Province, Pakistan*”. The aim of this project is to conduct an impact evaluation of the land record computerization program in the Punjab province of Pakistan.

In this regard, we seek your cooperation in provision of relevant data/information for our research through responding to the following questions. All collected data/information will be kept strictly confidential and shall only be used for the purpose of research under the above-mentioned project.

K. Demographic Information

1. Age (Years)_____ 2. Gender_____M/F_____
9. Education_____ Under Matric/12 Years/14 Years/16 years/ Above
10. Profession_____ 5. Knowledge about PLRA Online Facility [Yes, No]
9. Computer/Internet Literate? [Yes,No] 7. Mobile Internet User? [Yes, No]

L. Society-related Information

1. For how many years you are engaged in Land Society Business? [Years in number]
2. Type of property of the Society [Commercial, Residential, Agricultural, other]
3. What is the approximated size of land you own in this area [Units of Marla/Kanal]
4. What is the approximate size of land you have *bought* over the last ten years?
[Size in Kanal]
5. What is the approximate size of land you have *Sold* over the last ten years?
[Size in Kanal]
6. What is the approximate number of land related transactions [buying/selling] you have successfully completed over the last 10 years?

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

M. Perception of Society Owners

1. Did you ever used the PLRA, ARC online facility provided in this area? [Yes/No]

(if yes, answer the questions 2 through 8, if No, answer question 9)

2. The PLRA Online facility in the area has reduced number of days it takes to transfer the purchased/sold property. [Check]

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
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3. Before the introduction of PLRA online facility, how many days it used to take to get a piece of land registered ?

Type of land	Commercial	Residential	Agricultural	Other
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Days				
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4. After the introduction of PLRA online facility, how many days it takes to get a piece of land registered ? [Days]

Type of land	Commercial	Residential	Agricultural	Other
Days				

5. The PLRA online facility in the area facilitates the legal and administrative process of land registration.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

6. It is convenient to use the PLRA online facility including mobile app for land-related information.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

7. The PLRA online facility in the area has reduced the cost of land-related transactions.

Strongly Agree	Somewhat Agree	Neutral /No idea	Somewhat Disagree	Strongly Disagree
----------------	----------------	------------------	-------------------	-------------------

8. Did you ever experienced dispute related to the ownership of land? [Yes/No] if yes, answer the following sub questions.

- i. Did you attempt to use the PLRA online facility in this area? [Yes, No] if No, state any reason for why not using PLRA facility _____. If yes, answer the following question.
- ii. What do you think was the role of PLRA/ARC in resolving conflict ?

9. In your opinion, why you were unable to access PLRA online facility in the area?

10. Any other details you would like to share with us:
