Morocco Land Productivity Project: Evaluation Design Report

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LIST OF ACRONYMS

AfDB	African Development Bank
AD	*Ayants-droits* (rights holders)
ANCFCC	*Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie* (National Agency of Land Registry, Cadastre, and Cartography)
ANLCA	*l'Agence Nationale de Lutte Contre l'Analphabétisme*
CDG	*Caisse de dépot et de gestion* (deposit and management fund)
CEILD	Center of Expertise for Industrial Land Development
CESE	Conseil Economique Social et Environnemental
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station
CNSS	*Caisse Nationale de Sécurité Sociale* (National Social Security Fund)
EAI	*Espaces d'accueil industriels* (industrial areas)
EC	ethnic collective
EPZ	export processing zone
ERR	economic rate of return
ESP	environmental and social performance
FDI	foreign direct investment
FGD	focus group discussion
FONZID	*Fonds des Zones Industrielles Durables* (Sustainable Industrial Zones Fund)
GDP	gross domestic product
GIS	geographic information system
GoM	Government of Morocco
GSI	gender and social inclusion
ha	hectares
IRB	institutional review board
IZ	industrial zone
KII	key informant interview
LMIC	low- and middle-income countries

M&E	monitoring and evaluation
MCA-M	Millennium Challenge Account-Morocco
MCC	Millennium Challenge Corporation
MCG	matched comparison group
MDE	minimum detectable effect
MEF	*Ministère de l'Economie et des Finances* (Ministry of Economy and Finance)
MENA	Middle East and North Africa
MET	*Ministère de l'Equipement, du Transport de la Logistique et de l'Eau* (Ministry of Equipment, Transport and Logistics)
MHAI	*Ministère des Habous et des Affaires Islamiques* (Ministry of Habous and Islamic Affairs)
MI	*Ministère de l'Interieur* (Ministry of the Interior)
MICIEN	*Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique* (Ministry of Industry, Trade, Investment, and the Digital Economy)
MMM	*Métiers mondiaux du Maroc* (World Trades of Morocco)
MNC	Mediterrannean non-EU countries
NDBI	Normalized Difference Built-up Index
NDVI	Normalized Difference Vegetation Index
ONCA	*Office National du Conseil Agricole*
ONEE	*Office National de l'Electricité et de l'Eau potable* (National Office for Electricity and Potable Water)
ORMVA	*Office Régional de Mise en Valeur Agricole* (The Regional Office for Agricultural Development)
ORMVAG	*Office Régional de Mise en Valeur Agricole du Gharb* (The Regional Office for Agricultural Development of Gharb)
ORMVAH	*Office Régional de Mise en Valeur du Haouz* (The Regional Office for Agricultural Development of Haouz)
P2I	*Plateformes industrielles intégrées* (integrated industrial centers)
PAI	*Plan d'Accélération Industrielle* (Industrial Acceleration Plan)
PIL	*Parcs industriels locatifs* (rental industrial parks)

PNAZI	*Programme National d'Aménagement des Zones Industrielles* (National Program for the Development of Industrial Zones)
PNEI	*Pacte National pour l'Emergence Industrielle* (National Pact for Industrial Emergence)
PPP	public-private partnership
RADEEC	*Regie Autonome Intercommunale de Distribution d'Eau et d'Electricité de la Chaouia* (Autonomous Board of Distribution of Water and Electricity of the Chaouia)
RCT	randomized control trial
RNA	*Recensement National Agricole* (National Agricultural Registry)
RQ	research question
SEZ	special economic zone
SME	*Superficie minimum d'exploitation* (minimum surface area)
SPV	special purpose vehicle
SRD	spatial regression discontinuity
TA	technical assistance
TOR	terms of reference
UNCTAD	United Nations Conference on Trade and Development
USAID	United States Agency for International Development
VAT	value-added tax
VIIRS	Visible Infrared Imaging Radiometer Suite

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I. INTRODUCTION AND BACKGROUND

A. Background

In 2015, the African Development Bank (AfDB), the Government of Morocco (GoM), and the Millennium Challenge Corporation (MCC) jointly conducted an analysis to better understand the constraints to economic growth in Morocco as part of the development of MCC's second compact in Morocco (AfDB et al. 2015). The analysis found strong evidence of several major binding constraints related to land that discourage productive investment and limit productivity, thus hampering opportunities for economic growth. The strongest of these constraints relate to poor land governance, limited-use rights on rural collective land, and limited access and availability of industrial land.

Although land is an important input for Moroccan agriculture and industry, the complexity of legal and governance structures for land impedes the country's continued economic growth (AfDB et al. 2015). The GoM has not developed a comprehensive land sector strategy to date (World Bank Group 2017a), and the legal framework for land is outdated and inconsistent, including sometimes conflicting guidance from different, parallel legal systems. Although the GoM has made recent gains in adopting land policy strategies within individual ministries and increasing administrative efficiency for land governance (World Bank Group 2018), responsibilities remain dispersed across institutions, which often lack a framework for coordination.

Agriculture accounts for 36 percent of employment in Morocco overall (HCP 2017), and 52 of female employment (FAO 2015), but it makes up only 12 percent of gross domestic product (GDP) (World Bank 2019). Across all types of land just 4.4 percent of land is owned by women in Morocco, representing just 2.5 percent of agricultural land – among the lowest rates globally (FAO 2015). Agriculture's low share GDP reflects low productivity in the sector driven partly by low levels of investment on 15 million hectares (ha) of collective rural land administered by the state on behalf of 4,600 ethnic collectives (*collectifs ethniques*, ECs) and governed by customary practices (MCA-M 2018b). Under Moroccan law, collective members and their heirs[1] have use rights to collective land but do not hold private titles and are not legally permitted to buy, sell, or use land as collateral. In contrast, private (*melk*) land is governed by a parallel system of land laws and land parcels governed by different systems often exist side by side. The restricted set of rights for collective land has dampened agricultural productivity by preventing land from being used as collateral to access credit. It has also restricted land market transactions that could enhance productivity by increasing the scale of farming operations or shifting land to more productive farmers. Although a 1969 law[2] established the policy known as *melkisation* to convert rural collective land located in irrigation perimeters to private ownership (*melk* land), a lack of coordination and clearly defined roles among the agencies responsible for implementing the

[1] Inheritance of collective lands has historically been limited to a single heir, typically men (Adnane 2018).

[2] In 2019, in connection with the MCC Morocco Compact, the Government of Morocco passed several new laws governing collective lands (62.17, 63.17, and 64.17), which updated governance, transfer, and use rights. These new laws are described in further detail in Section III.2.

process has meant that very little land has been successfully converted from collective land to private ownership through this process (MCA-M 2018b).

Industrial outputs account for only about 15 percent of Morocco's GDP—a level that has remained relatively constant since the early 1980s (World Bank 2018). This situation is driven in part by a lack of land that meets firms' needs. Despite high vacancy rates in industrial zones, more than 40 percent of firms claim that land access is a major or severe obstacle, indicating a mismatch in the characteristics of available land and demand, and land speculation (World Bank 2009). Binding constraints that restrict the purchase or rental of viable land for industrial production include prohibitive land prices; limited credit accessibility; less than ideal locations and characteristics of available land; poor zone infrastructure, management, and maintenance; and prohibitive land regulations (World Bank 2007).

To address these challenges, MCC has partnered with the GoM to implement the Land Productivity Project under the Morocco Employability and Land Compact (Compact II) from June 2017 to June 2022. The Land Productivity Project was designed to address several key barriers in the land sector that limit the productivity of land for investment purposes. These barriers are to be overcome through national land policy reform, which includes updating and improving land laws, regulations, and administrative processes governing land, thus enabling rural and industrial land markets to better respond to investor demand. The project consists of three activities: (1) the Land Governance Activity; (2) the Rural Land Activity; and (3) the Industrial Land Activity.

B. Objectives of the report

MCC has contracted with Mathematica to evaluate the Land Productivity Project. This report describes the evaluation's design. Mathematica will conduct mixed-methods evaluations that examine whether the activities have resulted in the intended outcomes. The evaluation of the activities will use both quantitative and qualitative methods to assess impacts and implementation, as summarized in Table I.1. The Land Governance Activity, owing to implementation delays, will be the subject of a separate evaluation design report.

Table I.1. Evaluation overview

Activity	Approach
Rural Land	*Impact evaluation:* • Spatial regression discontinuity with matching methods *Mixed-methods performance evaluation:* • Implementation analysis • Trend analysis • Qualitative and descriptive analyses of outcomes
Industrial Land	*Mixed-methods performance evaluation:* • Implementation analysis • Trend analysis • Benchmarking analysis

For the Rural Land Activity, Mathematica proposes to conduct an impact evaluation using spatial regression discontinuity with matching as well as a mixed-method performance evaluation. For the Industrial Land Activity, Mathematica proposes to conduct a mixed-methods performance evaluation. Both evaluations will rely on quantitative and qualitative data sources as a key input.

In the chapters that follow, we provide context for the rural and industrial land evaluations, and describe their planned design in further detail. In Chapter II, we describe the Rural Land Activity and Industrial Land Activity, and give an overview of their program logic. In Chapter III, we review the existing literature on the impacts of land reform; land titling and formalization; and industrial zone financing, development, and operations. In Chapter IV, we outline the research questions the evaluation is designed to answer and provide an overview of the quantitative and qualitative evaluation designs and data sources that will enable us to answer these questions. In Chapters V and VI, we discuss the design for the Rural Land Activity and the Industrial Land Activity. We conclude in Chapter VII with a discussion of several evaluation administration-related issues, including institutional review board (IRB) requirements, the data anonymization process, our dissemination plan, evaluation team roles and responsibilities, and a timeline and budget for the remaining work.

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II. OVERVIEW OF THE COMPACT AND PROJECT

In this chapter, we provide context for the evaluation of the Land Productivity Project by describing the key project activities and the mechanisms through which they are expected to affect outcomes. We describe the ERR that MCC calculated to compare the expected benefits and costs of the project, which estimated the expected distribution of income gains in the areas that will receive the project investments.

A. Overview of the Morocco Employability and Land Compact II

On November 30, 2015, MCC and the GoM signed a $450 million compact agreement to support policy and institutional changes to improve Morocco's investment environment and create models for engagement with the private sector. The compact, which entered into force on June 30, 2017, comprises two projects: (1) the Education and Workforce Development Project, and (2) the Land Productivity Project.

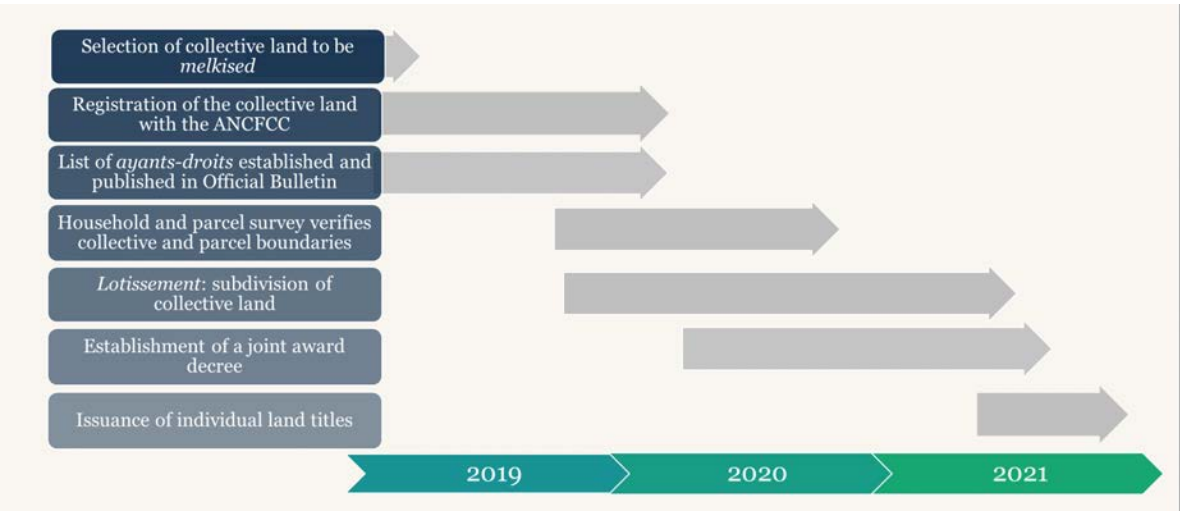
The **Land Productivity Project** is designed to address several key barriers in the land sector that limit the productivity of land for investment purposes through three activities: the **Land Governance Activity** ($10.5 million), which will support the development of a National Land Strategy to undertake comprehensive legal, regulatory, institutional and procedural reform; the **Rural Land Activity** ($33 million), which will deliver individual land titles to smallholder farmers on formerly collective land; and the **Industrial Land Activity** ($127 million), which will pilot a new market-driven public-private partnership (PPP) approach to industrial zone development. Next, we provide details on the Rural and Industrial Land Activities, which are the focus of this evaluation design report.

1. Overview of the Rural Land Activity

The Rural Land Activity will focus on delivering land titles to smallholder farmers by developing a more efficient and inclusive procedure for converting collective land into individual private ownership—a process called *melkisation*. *Melkisation* begins with a process of identifying and establishing collective boundaries (*établissement de l'assiette foncière*): (1) selecting collective land to be *melkised*, and (2) registering each collective with the *Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie* (ANCFCC). Next, the process of *melkisation* continues with the following: (3) listing rights holders (*ayants-droits*, AD) and publishing the list in the GoM's Official Bulletin, (4) conducting a household and parcel survey to verify collective and parcel boundaries, (5) conducting a subdivision operation (*lotissement*) and developing a technical dossier for the cadastral database, (6) establishing a joint award decree after getting approval from relevant government agencies, and (7) simultaneously inscribing the list of *ayants-droits* on the parent land title and assigning individual title deeds to *ayants-droits* and heirs to deceased *ayants-droits* according to the subdivision operation described in step (5) (MCA-M 2018a, 2018b). The optimized procedure and planned timeline of *melkisation* is depicted in Figure II.1 below.

Ultimately, the provision of private title through *melkisation* is expected to result in more land-related investments and greater agricultural productivity by increasing tenure security and improving access to credit for private smallholder farmers and their families.[3]

Figure II.1. Optimized *melkisation* procedure and timeline



Source: MCA-M (2018a, 2018b); MCA-M (2019).

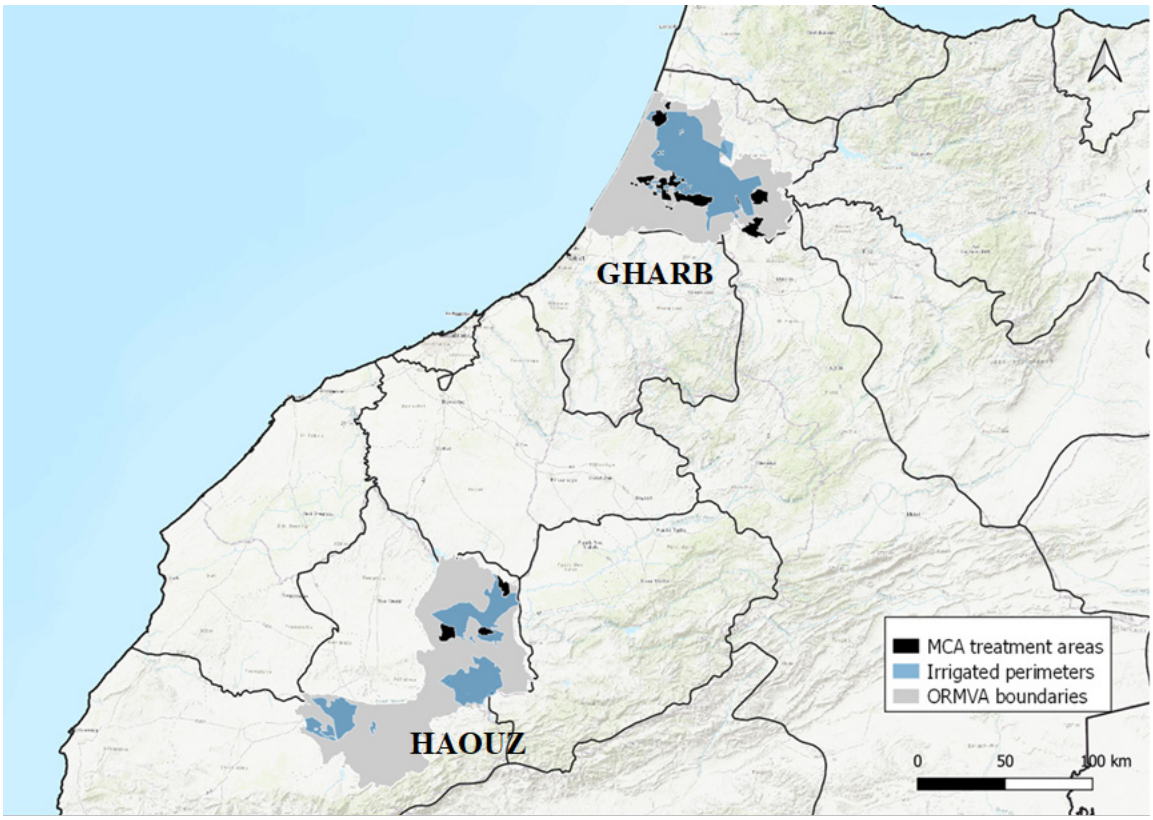
Note: By 2018, when the optimized *melkisation* procedure was adopted, many collectives had already completed some of the steps involved with *melkisation*. Many collectives already had registered titles with ANCFCC for the overall collective boundary and some of these had also established the lists of *ayant-droits*.

The Millennium Challenge Account-Morocco (MCA-M) will begin implementation of the optimized *melkisation* process with approximately 66,000 ha of land wholly or partially in the irrigated perimeters of the regions of Gharb and Haouz.[4] In Gharb, the optimized *melkisation* procedure will be implemented on a pilot basis in the provinces of Kénitra, Sidi Kacem, and Sidi Slimane for more than 30,700 rights holders across 57 ethnic collectives (Groupement NST 2019). Subsequently, in Haouz, 3 ethnic collectives in the province of El Kalâa des Sraghna will be *melkised* (the list of the number of rights holders has yet to be completed). See Figure II.2. for a map of project areas for the Rural Land Activity.

[3] MCA-M has established accompanying measures designed to support the Rural Land Activity. As of early 2020, MCA-M has agreements in place with ONCA *(L'Office National du Conseil Agricole*) and ANLCA (*l'Agence Nationale de Lutte Contre l'Analphabétisme*) and GCAM (*Groupe Credit Agricole du Maroc)*.

[4] The regions of Gharb and Haouz, and the irrigated perimeters we reference, are specially managed agricultural development zones under the Ministry of Agriculture. These zones include agricultural land served by major irrigation perimeters as well as agricultural land adjoining the perimeter. However, it is important to note that inclusion in the irrigated perimeter does not necessarily mean that parcels have access to surface water irrigation.

Figure II.2. Map of project regions for Rural Land Activity



MCA = Millennium Challenge Account; ORMVA = *Office Régional de Mise en Valeur Agricole* (The Regional Office for Agricultural Development).

2. Overview of the Industrial Land Activity

The Industrial Land Activity will introduce systemic changes to transform the way the GoM develops and manages industrial land, from a state- to a market-driven approach. MCC funding will support the following sub-activities:

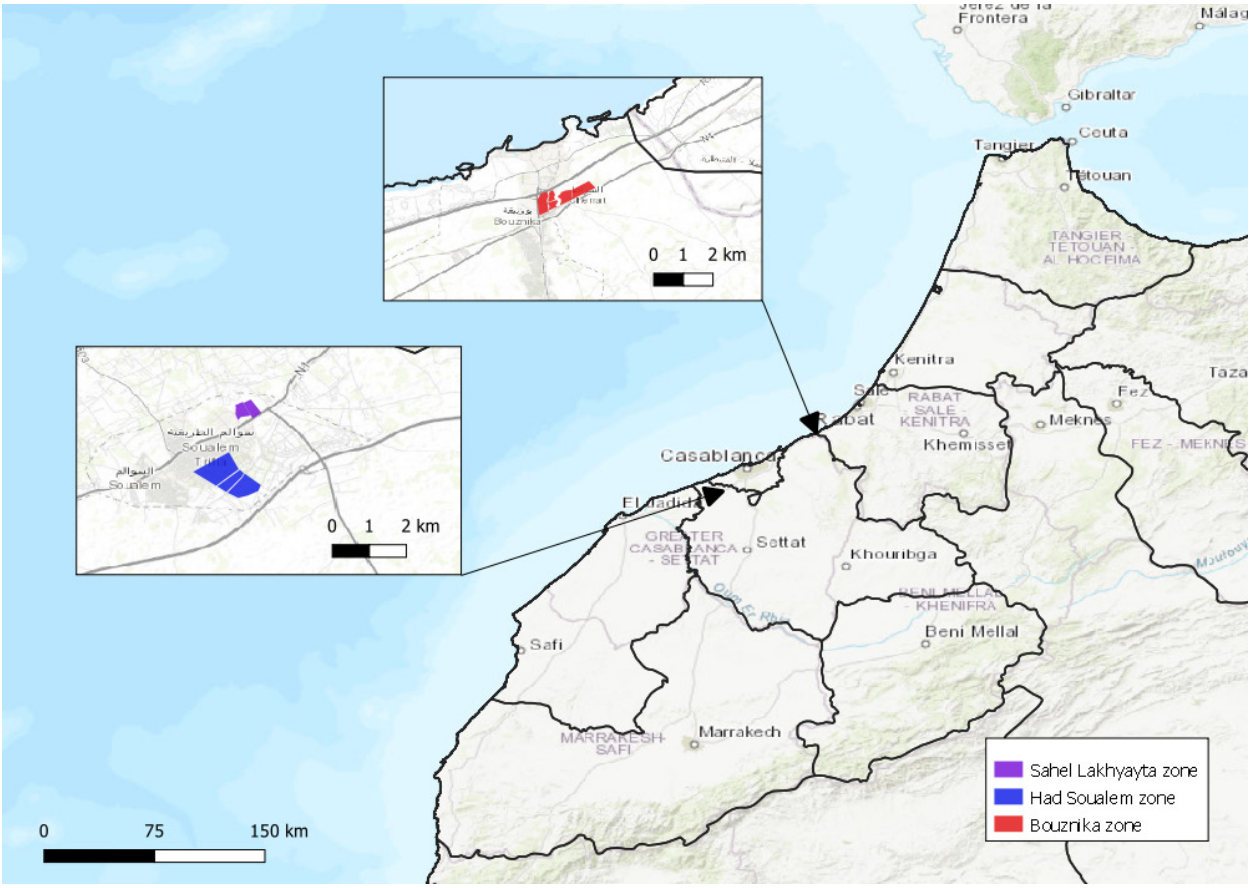
- **Creating a Center of Expertise for Industrial Land Development (CEILD):** MCA-M will provide technical assistance for creating the CEILD, which will lead the development and institutionalization of the new market-driven approach by acting as a center for technical expertise and knowledge management, and by promoting a new law for industrial zone (IZ) management.
- **Developing Industrial Demonstration Zones:** MCA-M will provide technical assistance and capacity building to the Ministry of Industry, Trade, Investment and the Digital Economy (*Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique*, MICIEN) to develop and pilot a new market-driven PPP approach to IZ development in three demonstration zones.
- **Establishing the Sustainable Industrial Zones Fund (FONZID):** MCC will give technical assistance and financing to the GoM for a grant facility that will provide financing to promote other innovative and sustainable governance models for existing or new IZs, in line

with the new market-driven approach. FONZID financing will focus on reinforcing capacity to improve management and governance of industrial zones; improving services for businesses and employees; and improving social and environmental performance, gender inclusion, health/security, and basic infrastructure.

The Industrial Land Activity is expected to increase the availability of industrial land and its responsiveness to evolving firm demands, increase occupancy rates at demonstration and non-demonstration sites, strengthen job growth and employment opportunities, and increase the attractiveness of and returns on private investment.

The Industrial Zone Demonstration sub-activity will be piloted in three IZs (see Figure II.3. below for a map of sub-activity project activities): two IZs to be revitalized and/or extended (Bouznika and Had Soualem) and one new IZ to be created (Sahel Lakhyayta). Bouznika IZ is located between Casablanca and Rabat, with an existing 31 ha operational zone and a proposed extension area of 28 ha. Site development will consist of (1) rehabilitating the existing IZ to upgrade infrastructure and incentivize the use of unused plots, and (2) expansion of the IZ. Had Soualem and Sahel Lakhyayta are both located southwest of Casablanca and 10 km from the coast. Had Soualem IZ has an existing operational zone of 68.5 ha with an extension area of 51 ha. The site development will include both rehabilitation and expansion. Sahel Lakhyayta IZ is currently on 250 ha of greenfield development, of which 50 ha will be developed through the compact.

Figure II.3. Map of project regions for Industrial Land Activity



In the PPP model, a combination of MCC and private funds will be used for infrastructure improvements (with viability gap financing as necessary), and the private partner would be contractually obligated (via a special purpose vehicle [SPV]) to put in place the remaining required infrastructure, key zone services, and a sustainable management structure. The SPV will employ negative incentives, including increased taxes and fees for landowners not using their land in violation of their contractual obligations, and positive incentives for landowners, such as offering the option to transfer land to a Joint Stock Company and earn dividends (MCC redacted Investment Memo).

B. Program logic

The three activities under the Land Productivity Project in the compact are all designed to increase the productivity and investment potential of land in Morocco, which was identified as a key binding constraint to economic growth in the constraints analysis. The activities are intended to improve access to and productive use of land by increasing private sector engagement and improving efficiency in land governance and land markets. MCA-M developed logic models for

each of the three activities; the program logic for the Rural Land and Industrial Land Activities are described briefly and presented in Figures II.4 and II.5 below (MCA-M 2017).[5]

The Rural Land Activity (Figure II.4 below) program logic is that the process of *melkisation* will increase the productivity and income of smallholder farmers. New titles will add to the existing pool of private land in the ORMVAG (*Office Régional de Mise en Valeur Agricole du Gharb*) and ORMVAH (*Office Régional de Mise en Valeur du Haouz*) regions, which will facilitate efficient land use through legal land transactions and improve access to credit by enabling farmers to use land as collateral. In addition, land titles are expected to increase productive investment on formerly collective land by increasing land tenure security.

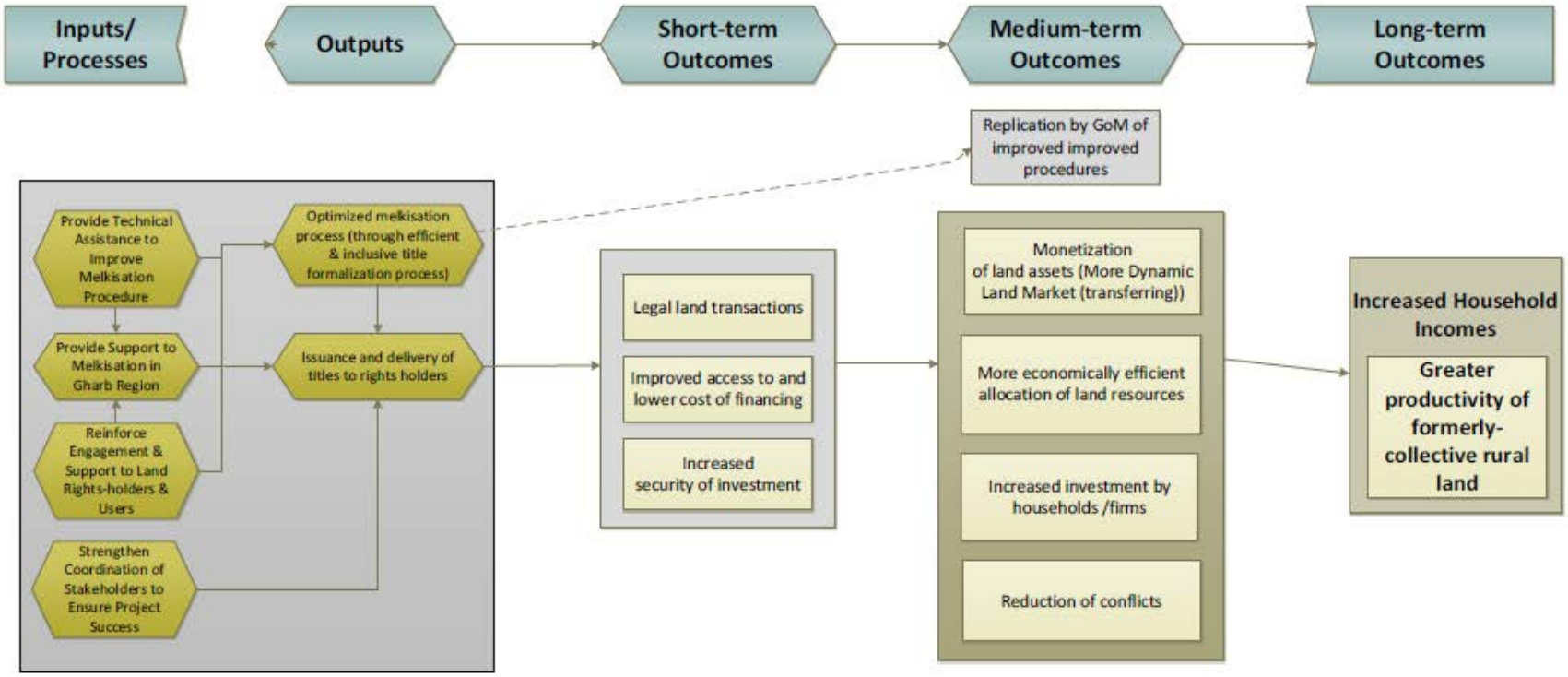
The program logic underlying the Industrial Land Activity (Figure II.5. below) is that reorienting the way the GoM brings industrial land to market—from a state- to a market-driven PPP approach—will increase private investment, employment, and returns on investment in IZs.

Several assumptions related to the linkages in these program logics must hold true for these theories of change to be achieved. The Evaluability Assessment (Litke-Farzaneh et al. 2019) includes a discussion of whether the assumptions outlined by MCA-M are realistic, and whether there is evidence that the proposed activities can lead to the suggested outcomes. We find that all activities make three fundamental assumptions that may not hold in practice: (1) MCC-funded assistance will successfully build the capacity of government entities; (2) government entities will successfully implement reforms and new programs despite an imperfect political landscape, government bureaucracy, and business climate; and (3) the magnitude of private investment, employment, and productivity created by the Rural and Industrial Land Activities will be sufficient to achieve scale in the overall land sector in a substantive way without successful implementation of the Land Governance Activity[6]. Additionally, for the Rural Land Activity, we find mixed empirical evidence that land titling leads to greater investment, and a crucial factor in the success of the activity will be addressing the practice of joint ownership of land, which may pose a serious risk to the program logic. The evaluation design described in this report will allow us to assess whether some of these assumptions are accurate.

[5] MCC and MCA-M were in the process of revising the logic models as of July 2020.

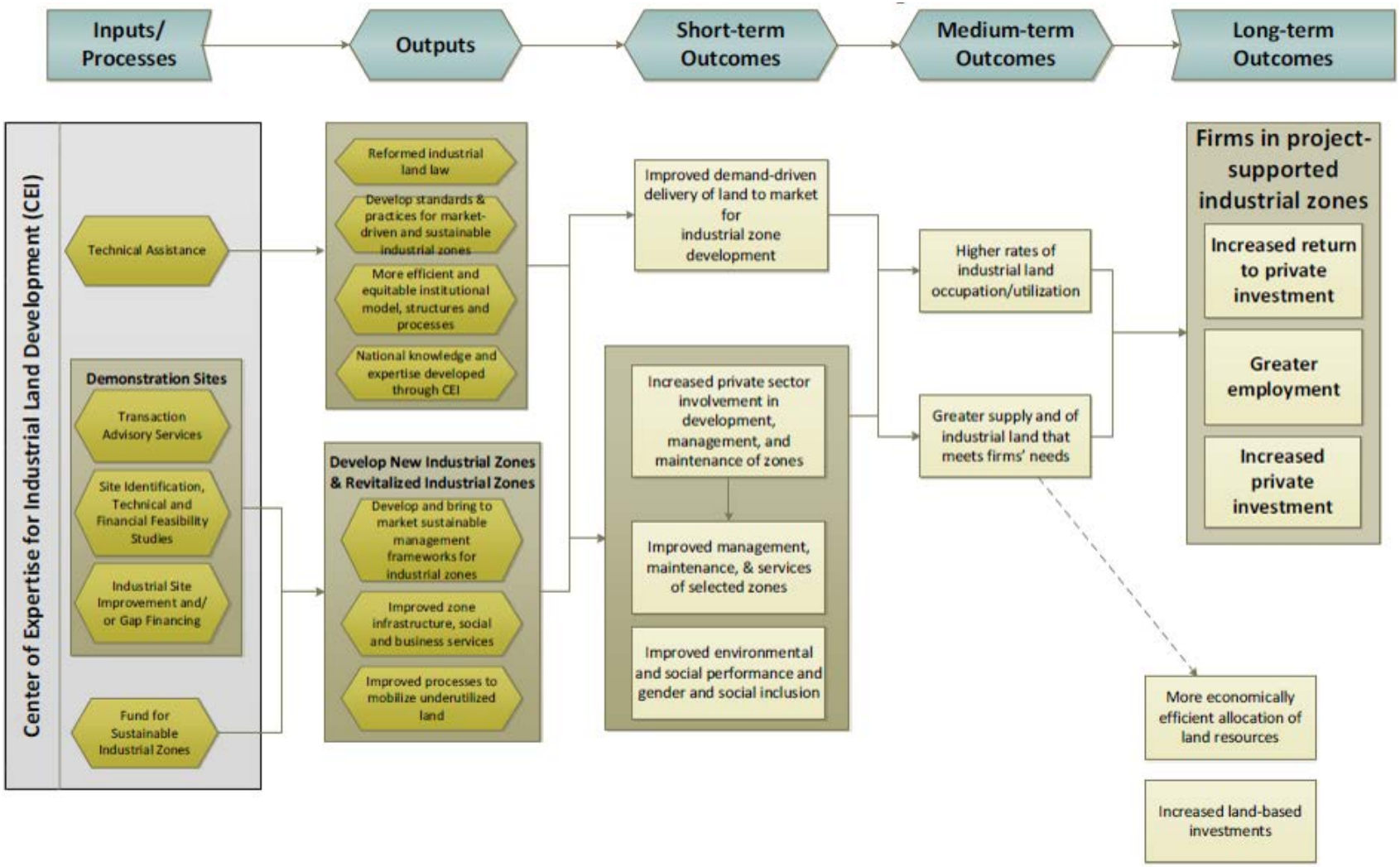
[6] The Rural and Industrial Land Activities include governance changes that are important for the success of each activity, independent of the Land Governance Activity. However, the Land Governance Activity may support improvements to land governance that are complementary to the Rural and Industrial Land Activity and lead to scale-up.

Figure II.4. Program logic: Rural Land Activity



Source: MCA-M 2017.

Figure II.5. Program logic: Industrial Land Activity



Source: MCA-M 2017.

III. LITERATURE REVIEW

A. Historical background on land governance in Morocco

1. Land governance

Land governance in Morocco is characterized by a pluralistic system of traditional and customary practices, Islamic law, French civil law, and Moroccan law. The modern land registration system was introduced during the colonial era in 1913 by the French Protectorate to provide a legal basis for colonial property. This system has persisted for over 100 years, yet only covers a fraction of national territory because not all land in Morocco is registered and most registered land is urban (World Bank 2008). Therefore, in many parts of the country, especially in rural areas, land transactions, inheritance practices, and ownership patterns are ruled by overlapping and sometimes inconsistent legal systems (USAID 2011; World Bank 2008).

Land in Morocco that is not privately held is governed by multiple local and national institutions, depending upon the type of land. State-owned public land is mainly under the *Ministère de l'Equipement, du Transport de la Logistique et de l'Eau* (MET), while state-owned private land is under the *Ministère de l'Economie et des Finances* (MEF). *Habous* lands, or lands governed by Islamic law, are under the oversight of the *Ministère des Habous et des Affaires Islamiques* (MHAI). Finally, collective land (also known as *Soulaliyate* land) and *Guich* land are under the *Ministère de l'Interieur* (MI) (AfDB et al. 2015; World Bank 2008). The GoM has not developed a comprehensive land sector strategy to date (World Bank Group 2017a). However, in 2016 the Inter-Ministerial Commission on Land Governance was established by law to ensure a high level of government support for any future land reforms. The commission provides a mechanism to vote on priority activities based on a set of approved criteria. It is expected that the commission will begin voting once the National Land Strategy is drafted in June 2020.

2. Rural land

In rural areas, the land tenure system in Morocco is characterized by the legal and administrative duality of traditional Islamic law decrees and the modern land registration system. There are several legal texts (*dahirs*, decrees, and inter-ministerial circulars) which have established and subsequently modified the rights related to collective lands – which account for nearly 15 million ha of land jointly owned by 4,600 ECs – and private (*melk*) lands (MCA-M 2018a).

The *Dahir* of August 12, 1913 established the legal right to property through land registration. However, severe restrictions were placed on property rights for collective land, and unregistered land was still often claimed through an Islamic law practice known as *moulkiya,* in which land claims are validated by testimony (World Bank 2008; CESE 2018).

The *Dahir* of April 27, 1919 and its successive legal modifications formally recognized a right of ECs to own collective lands through a collective title. Collective members and their heirs had use rights but did not hold private titles and were not legally permitted to buy, sell, or use collective land as collateral. The *dahir* also acknowledged EC rights to follow customary practices, for example allocating land to members based on family size. The *dahir* also established the

administrative organization of collective lands by the Directorate of Rural Affairs under the Ministry of the Interior. Collective lands are managed by an assembly of delegates (called *naïbs* or the *nouab*) who are representatives of the community (*Jmaâ*).

On July 25, 1969 the GoM issued a *dahir* that established *melkisation,* the process that allows for collective lands served by state irrigation infrastructure to be converted to private (*melk*) ownership. De facto transfers on irrigated land were permitted between members of the collective, and the collective as a whole could now decide to lease the land (Jkaoua 2011). Over time, collective land came under the control of individuals and families within the collective. Since the introduction of *melkisation,* very little land has been successfully converted to private ownership. *Melkisation* requires extensive coordination between the Ministry of the Interior, the ANCFCC, the Ministry of Agriculture, and the various provincial *Offices Régional de Mise en Valeur Agricole* (ORMVA). The process and responsibilities are unclear and prior efforts at *melkisation* have taken 10 to 15 years to complete (MCA-M 2018b). As of 2015, only about half of the collective lands that are eligible for *melkisation* under the 1969 *dahir* had published the list of rights holders (MCA-M 2015). In Gharb, the process of listing rights holders began in the 1970s for 36,000 ha of collective land, while subdivision (*lotissement*) operations began in the 1990s. However, the process remained stalled until land registration fees were eliminated and key institutions were convened as part of the development of the MCC Compact; the state of progress varies from one collective to another (MCA-M 2015; MCC Investment Memo; World Bank 2008).

While there is no legal prohibition against women buying and owning private *melk* land (including obtaining it through inheritance[7]), women in Morocco have historically faced barriers to accessing collective land. The laws referenced above do not explicitly recognize the rights of women as members of the collective, and strong adherence to customary practices has resulted in women's rights to collective land rarely being recognized in practice. The 1919 *dahir* effectively limited use rights on collective lands to males by specifying that their principal beneficiaries are heads of household. A 1957 ministerial circular further defined heads of household as "men having been married for at least six months and widows of collectivists with at least one child" (Berriane 2015). However, Article 8 in the 1969 *dahir* required that a single heir (typically male in practice) be designated to inherit the land of a deceased collective member, for collective land wholly or partially in irrigated perimeters (Adnane 2018).[8] While the 2004 Family Code strengthened female rights including inheritance rights, they do not apply to collective lands (USAID 2011, COHRE 2006).Women also face barriers in claiming use rights to unregistered collective land, as the *moulkiya* practice requires just 12 witnesses for men, compared to 24 for women (Adnane 2018). Previous *melkisation* of collective land – including in Gharb – has led to the exclusion of women and other vulnerable groups from the benefits received by the

[7] Moroccan inheritance law is based upon the Islamic *sharia* law, which, while ensuring that women receive a share of the inheritance, gives them a smaller share than male heirs.

[8] The single heir provision had rarely been respected in practice, because heirs either were not able to agree among themselves or could not access financing to compensate the other heirs. However, if the provision were strictly enforced, it would have blocked *melkisation* and disadvantaged women, who were unlikely to be chosen as the sole heir and to have access to the necessary financing to compensate the other heirs (US Embassy Cable 2019).

community, including inheritance and compensation for the sale and leasing of land. In well publicized cases, women who held an inheritance right were excluded from the list of rights holders crucial in determining who benefits from *melkisation* (Berriane 2015). This history of inequality has led to the nationwide grassroots *Soulaliyates* women's movement and related protests, which launched in 2007 in Gharb (where reserves of collective land are smaller and land transfers are particularly challenging) to secure land rights for tribal women who live on collective land in Morocco (Berriane 2017, US Embassy Cable 2019).

In connection with this MCC Morocco Compact, some progress has been made through a recent wave of laws passed in late 2019 concerning collective and *melk* lands (US Embassy Cable, 2019).[9] *Dahir* 62.17 amends the 1919 *dahir* on collective lands and explicitly states for the first time that men and women are entitled to benefit from the proceeds of collective lands (although it does not give women and men equal shares of these benefits).[10] This will give women the right to be included on lists of collective members and will allow them to receive a share of the compensation if collective lands are sold or leased. If these lands are eventually subjected to *melkisation*, then women would potentially be included in the lists in greater numbers. MCC provided support for the drafting of application texts, which were required for Law 62.17 to take effect.

Dahir 64.17 removed the single-heir provision (Article 8) in the 1969 *dahir* on *melkisation* of collective land in the irrigated perimeters, assuring that all heirs, male and female, will receive shares of the inheritance in accordance with existing inheritance laws. MCC's Compact is providing direct support to the GoM on the implementation of this legal change to assure that in practice the rights of female heirs are recognized and protected, notwithstanding customary pressures to cede property to male family members.

Melkisation is also complicated by joint ownership of land, which is widespread due to Islamic inheritance laws and customary practices. The World Bank reports that in 1996 properties with a title registered with ANCFCC had an average of seven co-owners (World Bank 2008). Another challenge is that the Agricultural Code stipulates a minimum surface area (*superficie minimum*

[9] The effectiveness of these recent legal changes will be assessed through this evaluation's performance evaluation, by measuring the number of female rights holders listed on the published *ayants-droit* lists and those that receive title.

[10] *Dahir* 62.17 is not fully effective until the implementing regulations (application texts) are adopted on certain topics.

d'exploitation or SME) for individually titled parcels of 5 ha within irrigated perimeters (outside of irrigated perimeters, the SME varies depending upon soil quality and other factors). As a result, farm plots that are smaller than the SME must be consolidated for the purpose of titling. The optimized *melkisation* procedure aims to lift some of these binding constraints, although joint ownership of land is common across both collective and *melk* land (USAID 2011) and is also evident regardless of the registration status of titles.[11]

The program logic of the Rural Land Activity stipulates that one of the key binding constraints to rural land productivity is tenure insecurity on collective lands. We could find no recent data perceptions of tenure security for rural collective land users in Morocco. A recently published comparative survey of property rights in 33 countries shows that in Morocco, tenure insecurity for primarily private landowners is generally low, and that people perceive more of a risk of land expropriation from property owners and their own family than they do from the government (Prindex 2019a). Just 21 percent of respondents in Morocco[12] reported feeling tenure insecure, compared to 8 and 10 percent in Rwanda and Vietnam (on the low end) and 44 and 40 percent in Burkina Faso and Jordan (on the high end). However, compared to more than half of the surveyed countries (including Islamic countries like Jordan, Tunisia, Indonesia, and Senegal), women in Morocco perceived greater tenure insecurity than men (Prindex 2019b). Widowed and divorced female respondents in particular showed much higher rates of tenure insecurity: for example, the share of women who reported being very worried about retaining their right to property in the event of divorce or the death of their spouse was 26 and 30 percentage points higher, respectively, than for men (Prindex 2019a, 2019b). However, the vast majority of respondents from this survey were private land owners, so results on their perceptions of tenure security may only be partly informative for rural, collectively held lands.

3. Industrial land

The supply of industrial land in Morocco is dominated by the public sector, which has developed the majority of existing IZs and has offered subsidized prices to encourage development. A small private market is fed by speculation driven by the difference between the subsidized and market prices of land. Investors buy state-subsidized land at low prices and to keep the land undeveloped for years until they can sell in a more competitive market (World Bank 2017a; World Bank 2007).

Evidence from Morocco shows that industrial land access is a constraint. Data from the 2013 World Bank Enterprise Survey showed that 24.3 percent of firms in the Grand/Casablanca area and 10.7 percent in the Rabat/Sale/Zemmour/Zaer area cited access to land as a major or severe obstacle (World Bank 2013). Poor access to land in Morocco is not driven by an overall lack of land for industrial development. Rather, binding constraints include the lack of viability of land

[11] A third *Dahir* (63.17) was also passed, which amends the 1916 *Dahir* to reduce the administrative procedure of registering collective lands from six to three months. This bill defines in particular the rules governing the procedure that communities need to follow to carry out these administrative procedures.

[12] For the study, enumerators conducted face-to-face or telephone interviews with a nationally representative sample of people eighteen years or older in each country, with a total sample of 1,500 respondents in Morocco and over 53,000 respondents overall.

for industrial production due to location, characteristics, or infrastructure; untenable land prices; and cumbersome land regulations (World Bank 2007). However, it is important to highlight that firms face more pressing obstacles in the business environment: only 2.2 percent of firms nationwide cite access to land as their biggest obstacle. Instead, firms cite corruption (20.6 percent), poorly educated workers (12.9 percent), the informal sector (12.4 percent), access to finance (9.8 percent), tax rates (8.8 percent), customs and trade regulations (7.2 percent), courts (4.6 percent), tax administration (3 percent), and transportation (2.8 percent) as more salient constraints (World Bank 2013).

Since the 1980s, Morocco has adopted several plans and sectoral strategies to promote industrial development and to catalyze export-oriented diversification. The National Program for the Development of Industrial Zones (PNAZI) led to the establishment of 65 IZs in the 1980s, 45 of which are currently being rehabilitated due to poor security and poor delivery of public services (Farhate et al. 2017). The Hassan II Fund was created in 2003 as one of the primary vehicles for investment subsidies. It offered state-owned industrial land at subsidized prices and targeted primarily multinational corporations (World Bank 2017b; Hahn and Vidican-Auktor 2018). The Emergence Plan in 2005 launched a strategy to develop new industrial parks, zones, and special economic zones (SEZ). In 2009, the National Pact for Industrial Emergence (PNEI) (2009 to 2015) created the new genre of integrated industrial centers (*plateformes industrielles intégrées,* or P2I) and put forth a strategy to develop six industries with high export potential (*métiers mondiaux du Maroc,* or MMM) by 2020: (1) automotive, (2) aerospace, (3) offshoring, (4) electronics, (5) food, and (6) textiles and leather. In 2014, the Industrial Acceleration Plan (PAI) (2014 to 2020) created a strategy as well as the Fund for Industrial Development (*Fonds de Développement Industriel*) to establish industrial ecosystems to integrate value chains and consolidate relationships between large firms and small and medium enterprises (Hahn and Vidican-Auktor 2018). Today, roughly 109 industrial areas of all types exist on an area of 8,659 ha in Morocco (*Cour des Comptes* 2018), although a large share have aged infrastructure or lack key services and amenities.

Currently, there are a variety of industrial areas (*espaces d'accueil industriels,* or EAI) in Morocco, all with the objective of improving the area's attractiveness to business and investment by offering services or incentives that are not available elsewhere. The most common type, which are the subject of MCC's current investment, are IZs, which have management structures that provide some level of basic infrastructure and services to an agglomeration of tenant firms, although not necessarily other fiscal incentives that are offered in other types of industrial areas.

A summary of the different types of industrial areas in Morocco is provided in Table III.1. While some de facto IZs in Morocco (such as the Moghoga IZ in Tangier) have developed organically by firms self-concentrating in one area without a development plan or prime contractor, official IZs are planned and organized (Sefrioui 1999).

Table III.1. Types of industrial areas in Morocco

Type of zone	Description
Industrial zones (IZ) (*Zones industrielles*)	These are spaces equipped and managed in accordance with urban planning laws and regulations that are intended for use by industrial firms. These spaces should be equipped with all the basic necessary infrastructure (that is, water, sanitation, electricity, telecommunications, lighting, roads, and so on) and equipment essential for firms to operate.
Industrial parks (*Parcs industriels*)	In addition to the basic amenities and equipment provided by IZs, these spaces offer security and services for investing firms, as well as high quality, ready-to-use buildings and accompanying equipment.
Zones of economic activity (*Zones d'activités économiques*)	These are subdivisions governed by a given territory (city or town) and arranged to accommodate small- and medium-sized industrial, craft, or professional enterprises. They are located near urban areas so that employees can easily access them. The area of these zones varies between 5 and 10 hectares. The areas are also equipped with the necessary infrastructure and have a management entity that oversees maintenance.
Integrated industrial centers (*Plateformes industrielles intégrées,* or P2I)	These are sector-specific industrial areas focused on advancing the global trades of Morocco *(métiers mondiaux du Maroc,* or MMM). P2Is are integrated clusters of firms that include industrial and commercial activity as well as training and research centers. P2Is provide a variety of basic; more advanced (administrative, telecom, logistics, catering); and sector-specific services and infrastructure.
Export processing zones (*Zones franches d'exportation*)	These are specific areas of customs territory that offer tax breaks and other fiscal incentives to promote and facilitate exports. Each zone is created and delimited by a decree that determines the nature and activities of the firms that may be established there.
Rental industrial parks (*Parcs industriels locatifs,* or PIL)	These are industrial areas that are available for lease. They were created to counteract land speculation and improve land valorization rates by setting up a management structure that works as a one-stop shop with a multitude of services.

Source: Rapport Annuel de la Cour des Comptes 2017–2018.

B. Review of literature on rural and industrial land reform

We conducted a traditional narrative or unstructured review of the literature. We first drew on key project documentation and the literature shared with us by MCC (including key studies from the MCC/IFAD land evidence review (Lisher et al. 2017)), as well as the foundational empirical literature on land interventions. We then used a snowballing approach of screening key references to identify additional relevant literature. We focused on rigorous causal evidence that speaks to key assumptions and linkages in the Land Productivity Project program logic. Overall, the empirical literature related to industrial land is more limited than for rural, and few rigorous studies have been conducted in the Middle-East and North Africa (MENA) region or in Morocco specifically.

1. Rural land

The optimized *melkisation* process aims to achieve objectives that are similar to other land titling programs, namely catalyzing farm investment, improving land tenure security, bolstering access to credit markets, and fostering competitive land markets. Motivated by the theory that customary tenure systems lock up land's asset potential (de Soto 2000), land titling programs have been commonly billed as an effective tool for reducing poverty. Although they have been implemented throughout the world, they have prompted scrutiny about whether their purported benefits have actually materialized given the costliness of such programs (see Deininger et al. 2008; Bezu and Holden 2014). A wave of research papers in the 1980s and 1990s were some of the first to empirically test for gains in credit access (Pinckney and Kimuyu 1994), productivity (Migot-Adholla et al. 1991), and investments (Feder and Onchan 1987; Pinckney and Kimuyu 1994). While many such papers had identified beneficial responses to formalization programs in Latin America and Asia, less evidence from African contexts was available. A leading explanation was that African tenure systems evolved in response to land pressures and economic developments, and therefore did not constrain investment in the absence of individual titling (Migot-Adholla et al. 1991). These earlier papers primarily employed cross-sectional, non-experimental research methods. However, more recent papers with increasingly credible research designs may explain whether the earlier results were methodological artifacts.

More recent empirical works have been reviewed in meta-analyses and systematic reviews (for example, Lawry et al. 2017; Higgins et al. 2018), with the objective of synthesizing key insights for policymakers on a range of land market interventions, including registration, formalized usage rights, and individual titling. Across the key outcomes of interest described earlier, a recurring theme is of a mixed evidence base, with outcomes improving in some contexts but registering no change in others. Higgins et al. (2018) reviews 59 rigorous counterfactual-based studies on land tenure security from low- and middle-income countries (LMIC). Lawry et al. (2017) review both quantitative and qualitative studies on property rights interventions in developing countries. For both systematic reviews, MENA and Morocco are not represented. A variety of factors have been cited as explanations for the divergent findings, including methodological flaws, inadequate exposure periods (Higgins et al. 2018), imprecise or simplistic conceptual definitions for outcomes such as investment or security (Place 2009; Arnot et al. 2011), and unobserved heterogeneity (Fenske 2011).

The transformational effects of land titling programs rest on the existence of market imperfections. From the lens of a private property rights regime, the absence of publicly accepted, demarcated rights creates market inefficiencies. This includes farmers not making investments in their land for fear of expropriation, making defensive investments to support rights claims instead of productive investments, engaging in continuous cultivation when fallowing would be more productive (Lund 1998, Goldstein and Udry 2008), and being denied the right to rent or sell land to higher-productivity farmers. Below we summarize some key findings on these issues from the recent literature.

a. Land conflicts, disputes, and tenure security

Land formalization programs often feature campaigns to adjudicate competing land claims. In the process of issuing a title, a council or legal body would hear any individuals who contest the claimant's rights. Resolving these disputes, which may arise from competing inheritance claims or from encroachments on neighboring land, before issuing titles should a priori foster greater levels of tenure security by removing a key source of legal challenges. However, the state is often the largest source of farmers' tenure insecurity. Higgins et al. (2018) noted that farmers from contexts with histories of state-driven land appropriation were less likely to trust the state and had lower levels of tenure security. Deininger and Castagnini (2004) examined whether a Ugandan land reform measure, the 1998 Land Act, which intended to reduce the likelihood of land-related conflict achieved those outcomes. They found evidence to the contrary, with plots under customary tenure less likely to be under dispute and disputed lands consequently less productive.

Other sources of uncertainty may persist, especially if the formalization lacks a clear framework from the start for how rights claims should be demonstrated (Benjaminsen et al. 2009). For example, hereditary claims may conflict with lessees' usage claims. While such disputes are conventionally understood as involving resource users, political authorities may also be in dispute over the scope of their jurisdiction (Lund 1998; Place 2009). Furthermore, if the handoff of land management responsibilities from customary to governmental authorities is either incomplete or viewed as incomplete by the affected parties, then rights claims respected under either system may be submitted. Missing from many cost-benefit calculations on the returns to land formalization is whether the dispute mechanisms under customary tenure are in fact more costly than under a private rights regime (Sjaastad and Bromley 1997). Recent evidence from Morocco suggests that tenure insecurity, to the extent that it exists, stems from conflict with other land owners or family disagreements rather than a perception that the government will expropriate land (Prindex 2019).

b. Land tenure security and investments

Once farmers perceive their land tenure status as secure against expropriation from the state or from family members and neighbors, the expected return for certain on-farm investments appear more attractive. In particular, farmers ought to invest more in immovable, unverifiable, long-term assets that under an insecure tenure regime risk being lost in the event that land is taken. Ethiopian farmers who perceived a risk of losing their land from future redistribution were 5 percentage points less likely to plant trees or build terraces (Deininger and Jin 2006). Two years after a land formalization pilot program in select Beninese villages, in which cornerstones were placed to demarcate boundaries and land disputes were settled, the treated households were more likely to grow cash crops and invest in trees (Goldstein et al. 2015). Sitko et al. (2014) recorded slight increases in irrigation, inorganic fertilizer application, and erosion control management among Zambian farms with titled land. However, Huntington and Shenoy (2019), who also focused on Zambian farmers, found that improvements in land tenure security through a land certification program did not translate into any material gains in on-farm investments in tree planting or fallowing. Although their exposure period of one to two years may have been too

brief for responses to materialize, they claimed their experimental research design yielded a correct null result. Observational studies, which comprise the vast majority of the literature aside from the few randomized controlled studies (RCT) such as Goldstein et al. (2015) and Huntington and Shenoy (2019), face confounds that can only be ruled out through an RCT. Because the assignment of title rights in practice is far from random (Besley and Ghatak 2010), observational studies may have identified false-positive results driven by selection bias of which areas or which farmers first gain title access. Observational studies may also be unable to rule out reverse causality, with farmers investing more in their land to strengthen their claims and increase their tenure security levels.

c. Access to credit

Gains in credit access may also catalyze investment and increase farm productivity. When land becomes a tradable asset, rights holders can collateralize their farm to secure loans. If the borrower defaults on the repayment, the lender can foreclose on the land. This arrangement incentivizes farmers to identify profitable projects to avoid risking their farm. In the absence of tradeable ownership rights or public information about all existing rights claims, lenders would not engage in transactions and borrowers would have less capital access. When loans are productive and not used for personal consumption, inputs or new technologies whose costs exceed the farmer's cash holdings can be financed. However, the evidence on the effects of land titling programs on increasing credit access is limited. Lawry et al. (2017) in their systematic review of 29 papers found no evidence of a credit channel that fostered productivity gains from tenure recognition. Higgins et al. (2018) found only three studies out of 59 which assessed impacts on credit access, and found mixed evidence. Lisher et al. (2019) suggest that these studies may find no evidence of credit impacts due to a failure to assess interlinkages among outcomes and review contextual factors (such as access to financial institutions and lending constraints). Ali et al. (2014) observed no increase in credit access among Rwandan farmers after the implementation of a land tenure regularization program. Do and Iyer (2008) found no difference in the borrowing behavior of Vietnamese households in provinces at later stages of titling progress compared to provinces in the early stages.

In their overall loan processing costs, lenders incur the cost of conducting due diligence on the borrower's creditworthiness and the outstanding claims made on the land. Reducing those costs by ensuring that land records are accurate and regularly updated could be one channel for increasing the credit supply (Deininger and Goyal 2012). Reducing lenders' transaction costs would not only translate to lower real interest rates for borrowers but also increase credit demand (Besley 1995).

Several theories for the absence of a credit channel in the context of African agriculture have been explored. If credit markets are thin to begin with, then shifts in the legal status of land are unlikely to catalyze substantial investment (Fenske 2011). Farmers at baseline may also not have been credit constrained in the first place. As a result, increasing the avenues of capital availability would not affect borrowing behavior. A lack of attractive investment opportunities, potentially due to market imperfections unrelated to land, may also deter any credit channel effects from land titling (Platteau 1996).

d. Land market activity

Land reform programs that allow for transferable titles and protect ownership rights may encourage new transactions that did not occur in the more restrictive rights regimes they replaced. Both land sales and rentals enable transfers of land to more productive land users, which reduces misallocation (or allocative inefficiency) associated with the existing land distribution. Taken to its extreme, the process of purchasing land by highly productive farmers, or agribusinesses, may lead to rapid increases in inequality. Based on their study of former Soviet Union economies, Ho and Spoor (2006) advocated for restricting sales and rentals to prevent large-scale land accumulation by a few owners.

Rental opportunities can reduce misallocation, but they require assurance that rented land will not face expropriation risk by the tenant (Deininger et. al. 2017). Such risks are especially pronounced in contexts where usage rights are exercised by public demonstration of continuous land use. By forgoing cultivation for rental income, those usage rights may be subject to expropriation risk from the lessee or others (Gottlieb and Grobovsek 2019). Such risks shrink rental markets, even when rentals are legal, and often lead to transactions only among parties with strong social ties. Because land squatting incurs reputational costs among social networks, family and friends are more likely to be trusted as reliable renters. However, when rentals are primarily among family and friends, highly productive potential renters may not be matched with landlords (Deininger et al. 2011). When land rentals or sales primarily or exclusively occur among members of the same community, land reform programs would be unnecessary because they would only publicly validate boundaries and land holdings that are already recognized (Deininger and Feder 2009). If reform measures improve aggregate productivity, the reform would have to be through a channel that links parties that otherwise would have insufficient trust to enter into a partnership. Macours et al. (2010) observed many underutilized plots in the Dominican Republic, where legal precedents provided squatting tenants with land or monetary compensation that discouraged landlords from engaging in rentals. The extent of misallocation that rental and sales markets can correct depends upon the pool of potential participants, with restricted pools being less effective.

2. Industrial land

Although this project focuses on IZs, the broader literature on the impact and effectiveness of industrial areas often refers generically to IZs and views the various types interchangeably (Farhate et al. 2017; Aggarwal 2007). In general, the literature considers IZs to provide a broad array of different types of incentives to firms, including the following (Cirera and Lakshman 2017) (although not all apply to the specific context of the Industrial Land activity):

- **Infrastructure incentives**, including streamlined government services such as customs services and business registration; enhanced production infrastructure, logistics, and transport; and subsidized prices for public utilities
- **Tax exemptions**, such as export taxes, import taxes on inputs, profit and property taxes, and value-added taxes (VAT)

- **Regulation exemptions**, such as from foreign exchange controls or profit repatriation, as well as suspension of certain labor, safety, and environmental laws

We found that much of the available literature on IZs simply describes the various configurations in which they operate, instead of statistically analyzing their impacts and identifying the factors leading to varying performance across zones. Many of the existing studies focus on SEZs or export processing zones (EPZs), which represent an upper bound of potential impact on certain outcomes due to their greater provision of fiscal and regulatory incentives. The evidence on the impacts of IZs is greatly hampered by the literature's overwhelming reliance on research designs that lack an appropriate control group (Boarnet 2001; Cirera and Lakshman 2017). This absence is acute for African countries, which have limited availability of data on IZ performance (Farole 2011). There are some IZ programs for which there is evidence of strong positive effects (that is, Chinese SEZs); however, these are often in the context of substantial exogenous factors such as strong fiscal policy reform, which limits external validity. Scholars have largely relied on case study analyses of individual zones, as in the World Bank's recent analyses (Farole and Akinci 2011; Farole 2011). What's more, the evidence that is available is often outdated. In their recent review of studies on the labor effects of EPZs in developing countries, the majority of papers that Cirera and Lakshman (2017) reviewed were already more than 15 years old—indicating a paucity of rigorous, contemporary evidence. Aggarwal (2007) also made this observation.

Below, we summarize our review of the literature on the effects of IZs on employment, private investment, and land allocation. For each of these outcomes, the literature presented mixed findings: some papers found positive effects, while others found no or negative effects. Taken as a whole, this suggests that contextual factors are important in driving outcomes and should be considered in order to maximize the productivity of an IZ.

a. Employment

Employment effects are one of the most well-developed areas of inquiry on zone impacts because of concerns about various dimensions of worker safety, unionization rights, and wage levels. Questions about the quality of the jobs, which is often proxied by wage earnings, are also tied to studies on whether zones expand the labor pool. A structural question for such analyses is determining what type of employment a zone worker would be engaged in absent the zone. Cling et al. (2005) claimed that women working in Madagascar's *Zone Franche* EPZs, where women accounted for 70 percent of all employees, would otherwise be employed in the informal sector. In their systematic review of 59 studies, Cirera and Lakshman (2017) also observed a zone wage premium relative to informal sector employment, but found weak support that EPZs had a positive effect on female labor force participation. Rand et al. (2019) found higher labor productivity among manufacturing firms located in IZs in Myanmar; however, employees did not receive higher wages or benefits, and there was not a larger share of women workers.

Whether IZs are net employment creators is an empirical question, because labor may simply be absorbed from elsewhere in the economy. Aggarwal (2007) noted that the literature that examined net new jobs was limited. In contexts where zones are export-oriented and existing firms focus on domestic supply, the case for job growth being additive is clear (Farole and

Akinci 2011; Aggarwal 2007). Morocco has a moderate overall unemployment rate (9 percent of the total labor force in 2018) and a high male youth unemployment rate (21.7 percent) compared to averages in the North Africa region of roughly 13 percent and 24.3 percent, respectively. The female youth unemployment rate, while also moderate, is lower in Morocco (22.7 percent) than the regional average of 45.3 percent (World Bank Data Bank 2019). This surplus of labor in the economy makes net employment creation more plausible.

b. Private investment

Empirical evidence that IZs stimulate private investment is sparse and primarily focused on SEZs and EPZs, which are designed to attract foreign direct investment (FDI) by enabling foreign investors to import and export unhindered by duties, exchange controls, or various taxes. A systematic review by Cirera and Lakshman (2014) found only two papers that assessed the addition of investment from EPZs, both with inconclusive results. Aggarwal (2007) found greater FDI inside EPZs in India but no evidence of the extent of additionality and the role of EPZs in attracting investment. In addition, Aggarwal (2010) found no evidence that SEZs in India led to a reallocation of investment from outside. The case study analysis conducted by Farole and Akinci (2011) found that while many EPZs succeeded in attracting investment in the short term, these effects had not been sustainable due to rising labor costs or the diminishing advantage of preferential trade. What's more, the impact of zones on FDI is highly contextual and difficult to measure given a lack of data, because many zones do not track foreign investment flows separately (FIAS 2008).

Because the MCC-funded Moroccan IZs do not offer fiscal or trade incentives, it is unlikely that they will attract a greater amount of FDI than the status quo. The potential of the IZs to attract domestic investment due to services and infrastructure incentives cannot be corroborated against empirical literature.

c. Land resource allocation

Overseeing a production sector of IZ tenancy requires an active role in the cycle of planning, developing, releasing, and acquiring land for future industrial development. The objective of the Industrial Land Activity in Morocco is to ameliorate several of these components of land resource allocation and management. The activity aims to increase the supply of viable land for industrial production by fostering a market demand-driven approach to industrial land development through the pilot PPP zones and FONZID grant funding, which will offer firms incentives to locate in IZs. This, in turn, is expected to improve the allocative efficiency of land in Morocco as firms relocate to and expand in IZs.

Whether the greater availability of land that is viable for industrial production will result in firm relocation or expansion lends itself more to economic models of empirical inquiry, rather than impact evaluations. Arauzo-Carod et al. (2010) conducted a review of recent econometric studies on the determinants of firm location and relocation. Although they did not specifically focus on the impact of IZs on firm location, they assessed related zone incentive mechanisms. The authors found that while taxation disincentivized foreign firm entry, the overall effect of taxation was ambiguous. They found that the evidence on the effect of incentive programs on attracting firms

was inconclusive. The authors also assessed the evidentiary base on the effect of such incentives on firm relocation and found it to be limited due to poor data availability. Hanson and Rohlin (2011) took advantage of a natural experiment to assess the effect of zones that offered tax incentives. They found that existing firms in the zones expanded, which prevented the entry of new firms.

C. Contribution of the Land Productivity Evaluation to the literature

The proposed impact evaluation of the Rural Land Activity will make three significant contributions to the existing literature on rural land reform. To the best of our knowledge, this will be the first empirical evaluation of any *melkisation* procedure. *Melkisation* involves the intermediate step of converting parent title deed into individual title deeds. It is ex ante unclear whether the likelihood of disputes under this arrangement would be greater or lower than in alternative contexts where title issue occurs at the individual level and does not involve other members of an EC. Furthermore, our study will collect data on the effectiveness of *melkisation* in reducing perceptions of land expropriation risk at the intra-household and intra-collective level (whereas the literature has focused primarily on government expropriation. Second, while there is a growing literature on using remote sensing for estimating the impacts of land titling programs, we are not aware of other empirical studies that have leveraged satellite data as a means of assessing the comparability between treated and untreated parcels in such an intervention, for the purposes of developing the survey sample. Third, there is substantially less evidence on the effects of titling programs in a part of North Africa with higher incomes, stronger state capacity, and distinct legal histories regarding land rights.

The proposed performance evaluation of the Industrial Land Activity will make several contributions to the literature. First, it will expand the literature on IZ performance, particularly in Morocco. The empirical literature on the impact and effectiveness of IZs in Morocco is very limited, despite the recent success of zones that focus on the automotive and aerospace industries. No case studies on such zones appear in the World Bank database collated from data by the United Nations Conference on Trade Development (UNCTAD) and analyzed in World Bank Group (2017b). The most geographically proximate efforts to assess IZs are those that examine zones across Africa. Second, the Industrial Land Activity evaluation will make a contribution to the limited quantitative evidence on the welfare effects of rehabilitated or revitalized IZs, given that a majority of existing papers focus on testing the effects of new IZs. Third, our evaluation will draw policy lessons on the challenge of enacting countrywide industrial land reform that requires the support of multiple agencies, because these activities are expected to have spillover effects outside of the pilot zones. We will leverage administrative data to explore these questions and examine zone performance from several angles (for example, by analyzing effects both at the level of the zone and as an aggregate of firm experiences), without collecting additional primary data.

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IV. EVALUATION APPROACH

In this chapter, we provide an overview of our evaluation design for the Land Productivity Project. In Section A, we link the evaluation's research questions (RQs) to the project's program logic. In Section B, we provide a brief overview of the evaluation strategy by presenting the major research themes, proposed evaluation design methods, and data sources.

A. Evaluation research questions

Mathematica's evaluation seeks to answer the project RQs posed by MCC to understand how the Land Productivity Project was implemented, whether and why the expected results were achieved, how benefits accrued across groups, whether the outcomes are sustainable, and lessons learned. In addition to the project RQs, our evaluation is organized around activity-specific RQs and their links to the program logic, provided in Table IV.1. Specifically, we are testing the causal links (the arrows) in each activity's logic (presented in Chapter II) to determine whether the project's inputs and processes lead to the desired outputs and whether these outputs are sustained, and whether this results in improved beneficiary outcomes[13] in the short, medium, and long term.

Table IV.1. Activity-specific RQs and links to program logic

Question	Connection to logic model
Project-wide questions	
RQ1: Were the activities implemented as planned?	Inputs/processes (implementation)
RQ2: What were the implementation challenges and successes?	Inputs/processes (implementation)
RQ3: Has the project resulted in the short-, medium-, and long-term outcomes outlined in the program logic?	Short-, medium-, and long-term outcomes
RQ4: Has the project resulted in reduced time for property transactions?	Compact outputs and short-term outcomes
RQ5: What is the project's impact on land tenure security and land-related disputes?	Short- and medium-term outcomes
RQ6: Are the new land systems and procedures likely to be sustainable? Why or why not?	Medium- and long-term outcomes (sustainability)
RQ7: How and why do the project's benefits and costs accrue differently to different groups?	Short-, medium-, and long-term outcomes
RQ8: What lessons can be applied to future economic models for land projects?	n.a.[b]

[13] Although MCC initially defined the beneficiary population for the Rural Land Activity as the *ayants-droits* and their households, MCC is also interested in the effect of *melkisation* on youth, renters and other populations that may be affected. We plan to only survey ADs and their households as part of the quantitative approach, but we will ask the respondents about the other groups they directly interact and transact with as part of the survey. We will also gather information on these other groups as part of the qualitative data collection. The groups and topics are discussed in more detail in Section V.

Question	Connection to logic model
Land Governance Activity[a]	
RQ9: Has the national land strategy been fully developed and have the priority actions been fully implemented? In particular, have reforms to address key governance and productivity constraints been identified, adopted, and implemented in practice?	Compact activities and outputs
RQ10: How do the reforms contribute to improved land governance (particularly institutional coordination, simplification and transparency of procedures to access land, efficiency of the permitting process, access to land); land administration; and land management?	Compact outputs and short-term outcomes
RQ11: Have reforms led to greater land productivity in Morocco, particularly in rural and industrial contexts?	Long-term outcomes
RQ12: Have reforms increased the effectiveness, efficiency, transparency, and equity of land markets, particularly in rural and industrial contexts? What are the remaining constraints from the residential, industrial, gender, and environmental and social performance lens?	Short-, medium-, and long-term outcomes
RQ13: To the extent the project has supported implementation of priority measures identified in the National Strategy, are there differences in the effect of the reforms in MCC intervention sites compared to the national level?	n.a.[b]
Rural Land Activity	
RQ14: What are the social and economic effects of *melkisation*? Have formal land titles led to changes in perception of tenure, investment in land, access to credit, or changes in productive use of land? Are there any gender or intra-household differences in effects?	Short- and medium-term outcomes
RQ15: What is the activity's impact on household income and agricultural productivity?	Long-term outcomes
RQ16: What is the impact of the activity on participants' access to credit, including the impact on the cost or terms of financing such as public subsidies? If there is no impact, what are the other binding constraints to access to finance?	Short-term outcomes
Industrial Land Activity[c]	
RQ17: How has the activity contributed to changes in the development, management, and maintenance of IZs? Has private sector involvement in these areas increased and, if so, to what effect?	Compact outputs and long-term outcomes
RQ18: What is the total private investment in the development of the three pilot demonstration IZs under PPPs?	Long-term outcomes
RQ19: What is the number of hectares of previously undeveloped land that has been put into use in the existing IZs targeted by the project, both in terms of gross area and area used by enterprises?	Medium-term outcomes
RQ20: How many jobs were created in the zones covered by the compact (including the demonstration zones and zones supported under FONZID), measured as the number of full-time employees added after the project?	Long-term outcomes
RQ21: How have levels of investment and productive use of land changed in the demonstration zones compared to other zones in Morocco?	Long-term outcomes
RQ22: How has the delivery of land to market changed in the IZs targeted by the project? On the supply and quality of land in IZs? On occupancy and utilization rates of land in IZs?	Short- and medium-term outcomes

[a]We present research questions related to the Land Governance Activity here for completeness, though our approach to answering these questions will be elaborated in a separate design report.

[b]No direct connection to the MCA-M logic model.

[c]The phrasing of the industrial research questions in this report varies slightly from their original format in the request for quotations. Table A.1 in Appendix 1 compares the original phrasing with the revised phrasing and provides the rationale for any changes that were made.

FONZID = *Fonds des Zones Industrielles Durables*; IZ = industrial zone; MCA-M = Millennium Challenge Account–Morocco; n.a. = not applicable; PPP = public-private partnership; RQ = research question.

B. Evaluation design overview

MCC asked Mathematica to conduct an evaluation of the program's implementation, sustainability, and effects on gender and social inclusion (GSI), [14] as well as to provide evidence on the impact and outcomes of the Land Productivity Project. In Table IV.2, we present a high-level summary of our proposed evaluation approach, methods, and data sources.

We will conduct an implementation analysis for both the Rural and Industrial Land Activities, to understand whether the activities were implemented as planned and to assess facilitators of and obstacles to implementation (RQ1 and RQ2). The implementation analysis will include an analysis of key documents and quantitative administrative data, as well as qualitative data analysis of key informant interviews (KIIs) and focus group discussions (FGDs).

Table IV.2. Summary of evaluation designs: Rural Land and Industrial Land Activities

Approach	Method	Data sources
Rural Land Activity		
Impact evaluation (RQ3, 5, 14, 15, 16)	• Spatial regression discontinuity with matching	• Farmer surveys • Parcel surveys • Daytime satellite imagery (Sentinel-2)
Mixed-methods performance evaluation (RQ1, 2, 4, 6, 7)	• Implementation analysis • Quantitative trend analysis • Qualitative and descriptive analyses of outcomes	• KIIs and FGDs • ANCFCC land administrative data • Farmer surveys
Industrial Land Activity	•	•
Mixed-methods performance evaluation (RQ1, 2, 17, 18, 19, 20, 21, 22)	• Implementation analysis • Quantitative trend analysis • Benchmarking analysis • Qualitative and descriptive analyses of outcomes	• KIIs, investment contracts • CNSS • Daytime satellite imagery (Sentinel-1 and 2) • Night time lights satellite imagery (VIIRS)

ANCFCC = Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie; CNSS = La Caisse Nationale de Sécurité Sociale; FGD = focus group discussion; KII = key informant interview; RQ = research question; VIIRS = Visible Infrared Imaging Radiometer Suite.

For the Rural Land Activity, we will conduct an impact evaluation using a spatial regression discontinuity design combined with matching methods. We will conduct farmer and parcel

[14] All MCC investments are expected to comply with MCC's Gender Policy and MCC's Environmental Guidelines and the International Finance Corporation (IFC) Performance Standards.

surveys to evaluate the impact of the optimized *melkisation* procedure on a variety of outcomes (RQ5 and RQ14 to RQ16). In addition, we will analyze remote sensing data to understand impacts on productive use of land and land productivity (RQ14 and RQ15). Qualitative analysis will provide a greater understanding of impacts on perceptions of tenure security and intra-household decision making about land use and production (RQ5 and RQ14).

We will conduct a mixed-methods performance evaluation of both activities, which will entail quantitative and qualitative analysis. Quantitative trends analysis will enable us to identify the magnitude of change over time for outcomes of interest relative to baseline values. For the Rural Land Activity, this will involve tracking changes in the length of time to complete property transactions of titled *melk* parcels (once *melkisation* is complete) (RQ4) by using land administrative data. For the Industrial Land Activity, this will entail tracking job creation, investment levels, and land use in IZs over time (RQ19 to RQ21). When data for other zones (or firms in other zones) are available, we will additionally employ a benchmarking analysis to compare changes in these outcomes over time, relative to other zones. An analysis of remote sensing data will supplement the analysis of land use (RQ19). For outcomes with sufficient pre-compact data, we will pursue an interrupted time-series approach that will allow us to estimate whether the timing of the activity's start coincides with a trend break. Descriptive quantitative analysis will allow us to answer additional questions for the Industrial Land Activity evaluation on private sector involvement (RQ17 and RQ18). To answer questions related to the sustainability of the project (RQ6), we will conduct sustainability analyses for both activities through KIIs, FGDs, and budget outlays.[15]

To answer specific questions related to dimensions of GSI (RQ7 and RQ14) across evaluations and to assess gender-disaggregated impacts for key outcomes related to all research questions, Mathematica will adhere to MCC's Gender Policy, Gender Integration Guidelines, and Policy for Monitoring and Evaluation when developing a sampling approach and data collection instruments and when analyzing data (MCC 2011a and 2011b, MCC 2017). Our analysis will enable us to provide a deeper contextual understanding of any differences in effects related to gender or social groups.

To assess whether its investments are sound, MCC uses economic rate of return (ERR) models to calculate the cost-effectiveness of its projects. The ERR is a summary statistic that captures the overall merits of an investment. Conceptually, it is the discount rate at which the project's benefits equal its costs. The higher the ERR, the greater the benefits of the project relative to its costs. As part of each the evaluation design, we discuss how the evaluation findings will be used to update the benefits and costs in the ERRs for Rural and Industrial Land Activities.

Finally, we will synthesize findings from the various analyses to address lessons learned (RQ8).

[15] Environmental impacts are not part of the scope of work in Mathematica's contract. However, we will review the Environmental and Social Impact Assessment (ESIA) developed by the program implementer, and any monitoring data around environmental impact collected by MCA-M, which will provide additional context for our performance evaluation.

V. RURAL LAND ACTIVITY EVALUATION DESIGN

This chapter describes our proposed evaluation design for the Rural Land Activity. Section A summarizes the overall design and our proposed approach for addressing the activity's evaluation questions. Section B elaborates on the quantitative impact evaluation design. Section C provides an overview of the mixed-methods performance evaluation design. Section D describes how we will update the ERR to assess the cost-effectiveness of the Rural Land Activity. Finally, Section E addresses potential risks to the evaluation, and proposed mitigation strategies.

A. Research questions and evaluation approaches

We propose a quantitative impact evaluation in addition to a performance evaluation that uses both qualitative data and quantitative administrative data. The impact evaluation will use a regression discontinuity design complemented by matching to generate impact estimates of *melkisation* on farmers who own collective land.

We will use a spatial regression discontinuity design to provide rigorous estimates of the causal impact of the *melkisation* program on key outcomes for farmers, such as access to credit, productivity, and investment. We will do this by collecting remote sensing data, longitudinal survey and crop production data from male and female farmers who own collective land inside the collectives that are participating in the program and from farmers who own collective land nearby but who do not participate in the program. We will conduct farmer surveys that include a spouse module and parcel roster, as well as crop cuts, in order to measure key outcomes at baseline, interim, and end line. We will compare outcomes between control and treatment groups to establish impact estimates of the program. This approach has strong appeal because under certain assumptions (discussed in more detail below) parcels near the treatment boundary can be thought of as randomly assigned to either the treatment or control groups, thereby controlling for unobservable variation that also affects the outcomes of interest.

To complement the impact evaluation, we will conduct a mixed-methods performance evaluation that unpacks how the provision of land titles through *melkisation* leads to greater investment, productivity, or incomes. The performance evaluation will include a trend analysis that uses administrative data as well as qualitative analysis to uncover plausible mechanisms and channels that might explain why we see changes in investment, credit access, or land transactions as a result of land titling. Our qualitative data analysis will include key informant interviews, and focus group discussions with farmers, women's groups, and renter/tenant farmers. Finally, we will conduct an implementation analysis to understand when and why deviations from MCC and MCA-M's original plans occurred. Table V.1 illustrates our approach to answering the research questions for the Rural Land Activity, as well as key outcomes.

Table V.1. Approach to answering research questions for the Rural Land Activity

Research question (RQ)	Proposed approach	Data source	Key outcomes
RQ1: Were the activities implemented as planned?	• Qualitative performance evaluation	• KIIs • Document review	• Adherence to original project design • Factors contributing to changes in activities
RQ2: What were the implementation challenges and successes?	• Qualitative performance evaluation	• KIIs • Document review	• Facilitators and barriers to project success • Coordination among stakeholders
RQ4: Has the project resulted in reduced time for property transactions?	• Performance evaluation (qualitative analysis and quantitative trend analysis)	• Farmer FGDs and KIIs • ANCFCC administrative data	• Average time for property transactions
RQ5: What is the project's impact on land tenure security and land-related disputes?	• Impact evaluation and performance evaluation (qualitative analysis and quantitative trend analysis)	• Farmer surveys including spouse module • Farmer FGDs and KIIs • Renter and tenant farmer FGDs • ANCFCC administrative data	• Perception of tenure security • Number and frequency of conflicts • Mediation of conflicts
RQ6: Are the new land systems and procedures likely to be sustainable? Why or why not?	• Performance evaluation (qualitative analysis and quantitative trend analysis)	• KIIs • Document review • ANCFCC administrative data	• Number and frequency of land transactions • Replication of *melkisation* procedure elsewhere

Research question (RQ)	Proposed approach	Data source	Key outcomes
RQ7: How and why do the project's benefits and costs accrue differently to different groups?	• Performance evaluation (quantitative and qualitative analysis)	• Farmer surveys including spouse module • Farmer FGDs and KIIs • Women's FGDs (including spouses of ADs, widows of ADs, and heirs of deceased ADs) • Renter and tenant farmer FGDs • FGDs with non-AD landholders (informal buyers, non-rightsholder users, etc.)	• Disaggregated costs and benefits by sex, parcel size, income
RQ12: Have reforms increased the effectiveness, efficiency, transparency, and equity of land markets, particularly in rural and industrial contexts? What are the remaining constraints from the residential, industrial, gender, and environmental and social performance lens?	• Performance evaluation (qualitative analysis)	• KIIs • Document review • ANCFCC administrative data • Farmer FGDs and KIIs • Women's FGDs • Renter and tenant farmer FGDs • FGDs with non-AD landholders	• Average time for property transactions • Number and frequency of land transactions • Participation of women in land transactions • Equity in participation and consultation during melkisation process across different stakeholder groups • Perceptions and social norms around female land access, ownership • Perceptions of and understanding of legal amendments related to rural land

Research question (RQ)	Proposed approach	Data source	Key outcomes
RQ14: What are the social and economic effects of *melkisation*? Have formal land titles led to changes in perception of tenure, investment in land, access to credit, or changes in productive use of land? Are there any gender or intra-household differences in effects?	• Impact evaluation and performance evaluation (qualitative analysis and quantitative trend analysis)	• ANCFCC administrative data • Farmer surveys including parcel rosters • Crop cuts • Farmer FGDs and KIIs • Daytime satellite imagery (Sentinel-2) • Women's FGDs	• Average expenditures on agricultural inputs per hectare • Perception of tenure security • Access to credit • Attempts to get credit • Productive use of land (yields) • Crop choice and input use • Satellite-derived land cover maps (e.g., MODIS) • Sales, rentals, and mortgages of land • Perceptions and social norms around female land access, ownership
RQ15: What is the Activity's impact on household income and agricultural productivity?	• Impact evaluation	• Farmer surveys including parcel roster • Crop cuts • Daytime satellite imagery (Sentinel-2)	• Agricultural profit (income) • Average agricultural income per hectare • Average annual crop yield per hectare
RQ16: What is the impact of the Activity on participants' access to credit, including impact on the cost or terms of financing, including public subsidies? If no impact, what are the other binding constraints to access to finance?	• Impact evaluation and performance evaluation (qualitative analysis and trends analysis)	• ANCFCC administrative data • Farmer surveys including spouse module • Farmer FGDs and KIIs • Women's FGDs • Renter and tenant farmer FGDs • FGDs with non-AD landholders • Bank/microcredit institution administrative data and KIIs, if possible	• Access to credit • Use of land as collateral • Value of outstanding loans • Bank lending practices, collateral requirements, penalties

ANCFCC = Agence Nationale de la Conservation Foncière du Cadastre et de la Cartographie; FGD = focus group discussion; KII = key informant interview.

B. Impact evaluation

In this section, we discuss our approach to the rigorous impact evaluation of the *melkisation* program. We begin by explaining the intuition behind a spatial regression discontinuity design coupled with matching methods, including a discussion of how spatial data paired with data from the GoM's *Recensement National Agricole* (RNA) can be used to develop a design that is both sufficiently powered and able to estimate the impact of the program.

1. Evaluation design

A spatial regression discontinuity (SRD) design will identify the impacts of the *melkisation* program by exploiting spatial variation in program eligibility that depends upon a parcel's or household's location (for an overview of regression discontinuity, see for example Hahn et al. (2001) and Lee and Lemieux (2010); for an overview of spatial regression discontinuity see Keele and Titiunik (2014); for examples of impact evaluations using spatial regression discontinuity, see Card and Krueger (1994) and Jones et al. (2019)). By comparing farmers or parcels inside the border of a collective that undergoes *melkisation* with those that are just outside, we can control for local, unobservable variation that might affect the outcomes of interest as well as any observable differences that are measured through survey data or other data sources. To do so, we will define a buffer or bandwidth on either side of the treatment boundary—thereby, collapsing the spatial data into a measure of distance to the treatment boundary—and then compare treatment and control observations within that bandwidth.

The group of farmers or parcels just outside the treatment boundary will represent a counterfactual scenario for what would have happened had farmers who owned parcels inside the treatment boundary not received titles. A simple comparison of outcomes between the treatment and control groups after the intervention will then provide a causal impact of the program. Implementing a regression discontinuity design relies on being able to identify observations relative to the boundary that determines treatment. We would therefore need to gather data from a sample of collective parcels on either side of the treatment areas. This first requires that there is collective land near to the treated collectives and, second, that the parcels can be shown to be similar in pre-treatment periods on either side of the boundary.

We will also explore whether a matching can be used to improve our SRD approach (for an overview of matching methods, see Rosenbaum and Rubin (1983), Heckman et al. (1998), Stuart (2010), and King and Nielsen (2019). This would be achieved by matching treatment and control units within the SRD bandwidth, which would ensure that the treated parcels are, on average, equivalent to untreated parcels along observable characteristics. We would match treatment and control units along a set of key outcomes (covariates) using the RNA data, and baseline data collected from the farmer survey. Outcomes on which we would consider matching include crop choice, irrigation status, household size, parcel size, and soil classes and conditions. Although this should not affect the internal validity of the impact evaluation estimates, it would improve the precision of our estimates. Our recommended design relies extensively on data collected by the Ministry of Agriculture as part of the 2014–2015 RNA. The data consist of geo-coded parcel boundaries for parcels that are held under collective land. Figures V.1 and V.2 show the

geographic distribution of collective parcels in Gharb and Haouz as of 2015, as well as the extent of the irrigated perimeter (shown in grey) and the boundary of the area of collectives that have been proposed for *melkisation* (shown in black). The parcels of land that have been selected for a treatment group (shown in red) fall within 1.5 kilometers inside of the treatment boundary, and the parcels in the control group (shown in blue) fall within 1.5 kilometer outside of the treatment boundary, illustrating how we could use an SRD design using the treatment boundary as the cutoff and distance to the treatment boundary as the running variable. Should we also implement a matching approach, control and treatment parcels within these 1.5 km thresholds would be matched by using data from the RNA data set and baseline farmer survey (as illustrated in Figure V.3 below)

Figure V.1. Map of Gharb treatment and control parcels

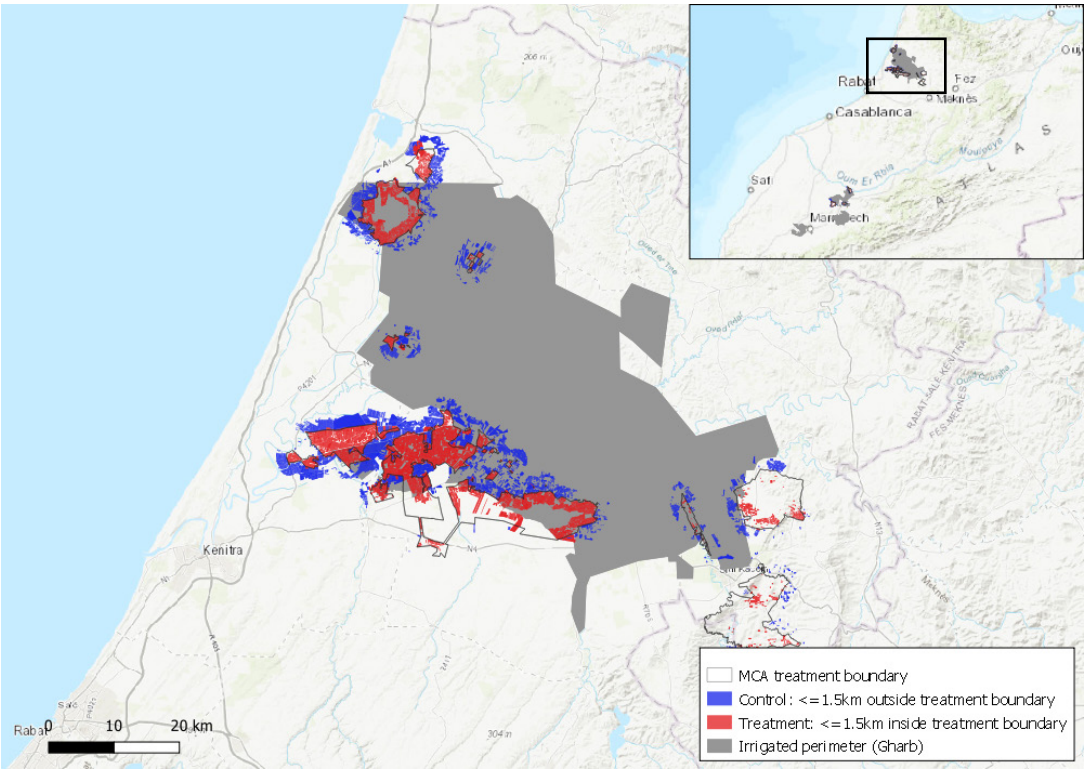


Figure V.2. Map of Haouz treatment and control parcels

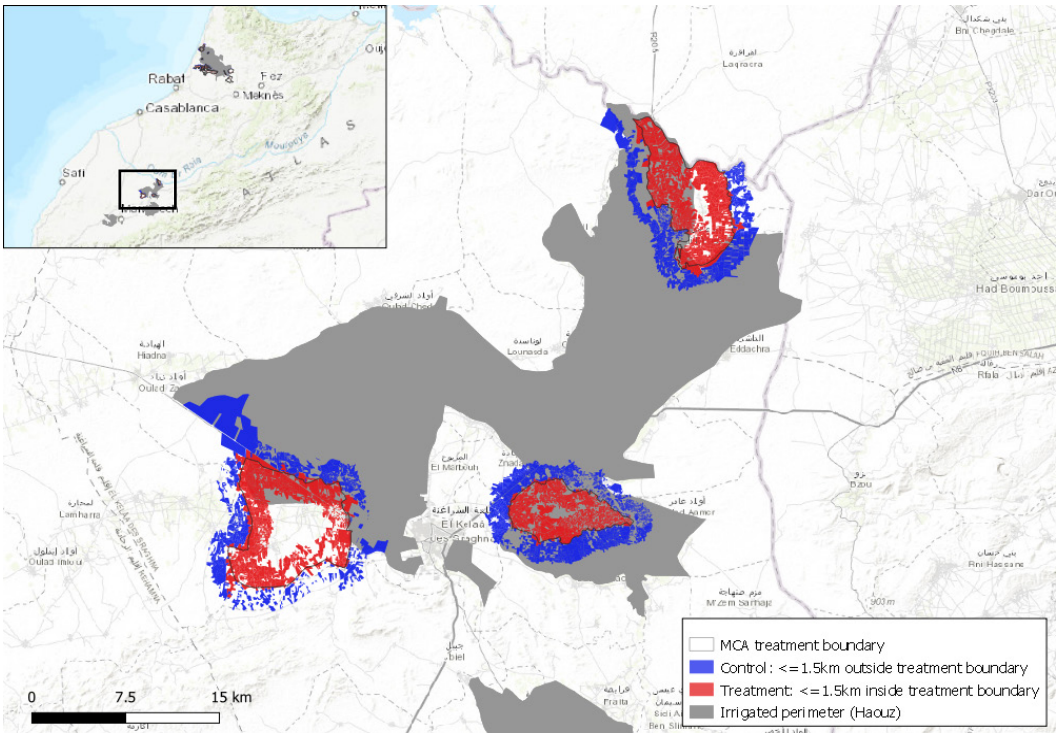
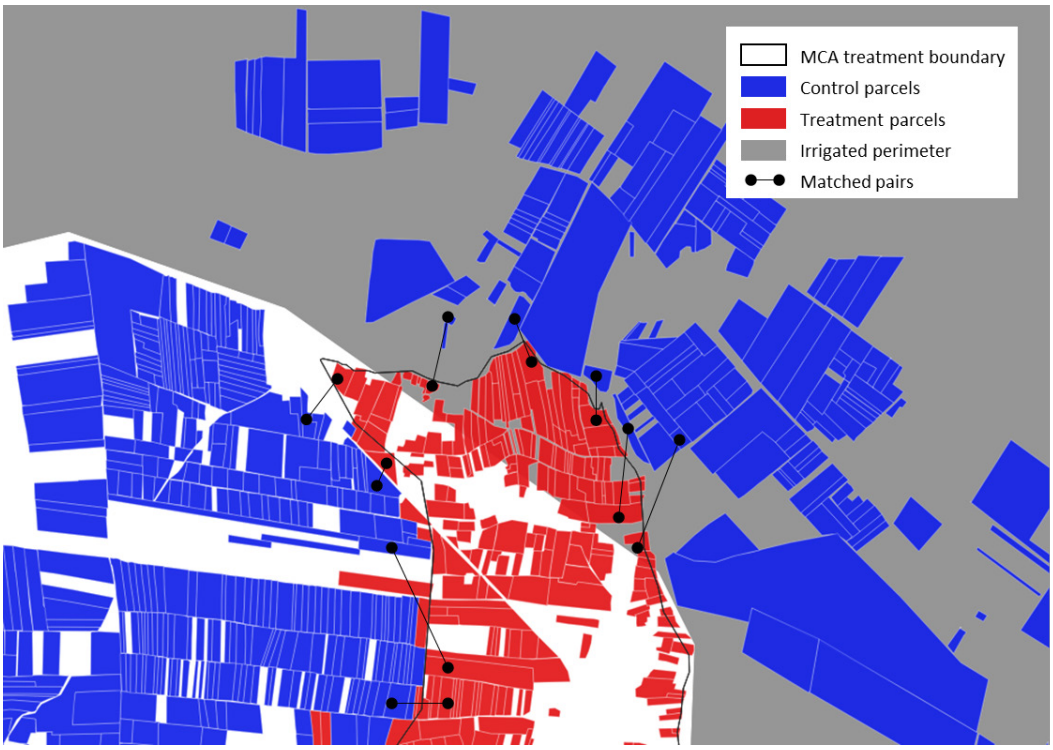


Figure V.3. Illustration of combined approach to matching and spatial regression discontinuity



2. Analysis plan

Impacts of the *melkisation* program will be estimated by using a regression analysis that includes an indicator for whether the parcel is located within a collective that underwent *melkisation*. The estimation equation would also control for baseline characteristics. By restricting the analysis to parcels that are near each other, we would control for spatially correlated variables that also would affect our outcomes of interest, such as soil quality, precipitation, or market access. This approach is a valid way to identify a counterfactual as long as the spatial variation that determines program eligibility does not also perfectly correlate with other important determinants of the outcomes of interest. Because *melkisation* occurs at the collective level, it is particularly important to demonstrate that shared characteristics of the collective, such as the quality of local leadership, do not also affect the outcomes of interest. By using baseline data, we can test the key assumption that neighboring comparison collectives are, on average, similar before the collectives undergo *melkisation*. To do this, we would use the impact regressions to test for zero impact in pre-intervention outcome measures.

We propose to estimate treatment effects by using the following equation:

$$\mathrm{Y} = \alpha + \tau\mathrm{T} + \mathrm{f}(\mathrm{D}) + \mathrm{T} * \mathrm{g}(\mathrm{D}) + \epsilon,$$

$$\begin{array}{ll} \text{where} & \mathrm{C} - \mathrm{h} < \mathrm{D} < \mathrm{C} + \mathrm{h}, \\ \text{and} & \mathrm{T} = 1 \text{ if } \mathrm{D} < \mathrm{c}. \end{array}$$

T is an indicator for treatment, *D* is a measure of distance to the edge of the treatment boundary and *f*() and *g*() are nonparametric functions. *C* is defined as the cutoff value, which defines treatment for values of $D < C$ and control $D > C$. We set *D* to be negative for all treated parcels and *D* to be positive for all control parcels. The analysis is bounded by a bandwidth, *h*, such that the sample for analysis only includes parcels with a distance inside the bandwidth, $c - h < D < c + h$. *g*() and *f*() are functions that model the relationship between distance to the boundary and the outcome of interest on either side of the treatment boundary. The treatment effect estimate is the average difference between treatment and control parcels, once this has been accounted for.

As we work with MCA-M to finalize the sample selection, we will explore the possibility of conducting matching within our study bandwidth to improve the precision of our estimates. This will be particularly important to ensure that we are estimating treatment effects that explicitly control for whether or not a parcel is inside the irrigation perimeter. But it can also be used to ensure that we have better balance along observable characteristics. We propose to estimate impacts separately for Haouz and Gharb because of the very different climate and growing conditions across the two regions.

3. Outcomes and their anticipated time frame for realization

Our analysis will focus on identifying impacts on the short- and long-term outcomes identified in the program logic and evaluation research questions. By collecting data from the same farmers via surveys conducted before and after *melkisation,* we will estimate impacts on a number of key outcome domains. We will link administrative data from the national land registry (ANCFCC) to

our analysis as well as use geographic information on the location of parcels and plots to incorporate remote sensing. We will build computational models that link information collected by satellites, using Sentinel-2 and any higher-resolution satellite imagery that MCC has access to, with farmer surveys and crop cuts, in order to predict crop yields and crop type for plots outside the survey sample. We will additionally conduct a qualitative analysis prior to designing our quantitative survey instruments, to provide greater context on certain outcomes such as land tenure security, legal knowledge, and crop choice. Table V.2 below provides an overview of the proposed outcome measures and domains, exposure period, and sample unit. We provide more context on the proposed outcome measures below. For all key outcomes, we will disaggregate impacts by sex.

Table V.2. Proposed outcome measures and domains, exposure period, and sample unit

Outcome domain	Outcome measures	Exposure period	Sample unit	Data source
Access to credit	Applied for loan(s) Number of loans approved Size of loan(s) Terms of loan(s) (cost of borrowing) Purpose of loan(s)Collateral used for loan(s), including land	One to five years after receiving land title	Household	Farmer survey
Agricultural investments and practices	Durable investment—for example, in machinery or irrigation equipment Long-term, immovable investment—for example, tree crops Short-term investment in fertilizer, organic farming methods Crop choice	One to five years after receiving land title	Parcel and household	Farmer survey FGDs KIIs
Agricultural productivity	Yield (output per hectare) Income (income per hectare) Crop cover	One to five years after receiving land title	Parcel	Farmer survey Crop cutting Remote sensing
Land markets	Land purchased/sold (# of transactions; ha) Land rented in/out (# of transactions, ha) Price per ha (sale) Price per ha (lease) Operational size of farm (ha)	One to five years after receiving land title	Parcel and household	Farmer survey ANCFCC administrative data FGDs KIIs
Tenure security and legal knowledge	Subjective perceptions of tenure security Ownership structure, decision making among joint owners Number of land owners on title Legal knowledge Land conflicts and redressal	One year after receiving title (for tenure perceptions and legal knowledge); One to five years after receiving land title for other outcomes	Household	Farmer survey KIIs FGDs ANCFCC administrative data

FGD = focus group discussion; KII = key informant interview.

Credit access. By using data from the farmer survey, we expect to track over time information on households' use of credit, demand for credit, and any unmet demand (due to constraints such as a lack of collateral). We will assess household credit usage through a roster of active loans that includes the size of the loan, repayment period, purpose of loan, and any collateral that was required to guarantee the loan. We will also ask farmers to provide information on any loans that they applied for but that they were denied or not qualified for. Finally, we will ask about available collateral and the reasons farmers have or have not used the collateral to apply for a loan. We will track this information over the course of the evaluation to assess first whether unmet demand for credit exists and, subsequently, how the price of borrowing changes when land can be used as collateral and whether there is any increase in borrowing for agricultural production. In addition, we will request administrative data from the major banks in Gharb/Haouz (i.e. Islamic Bank, Credit Agricole, Banque Populaire) and any key microfinance lenders, and build in KIIs with these stakeholders as well, to gather institutional information on their lending practices/collateral requirements, penalties, etc.

Agricultural production. One of the long-term objectives of *melkisation* is improving agricultural production. We propose to measure yields over the course of the evaluation by using a variety of methods which will ensure accurate measurements. In particular, we propose conducting crop cuts as a complement to the farmer surveys to establish reliable crop yields estimates. To conduct the crop cuts, survey teams trained in local agronomic practices would lay down fixed-size measurement squares on a sample of plots where crops of interest are grown. When the cultivator is ready to harvest, the survey team harvests and weighs the total crop output from inside the measurement square. Information on the harvest weight is combined with the measurement square's size to estimate the plot's average yield. Crop cut results can be combined with self-reported data provided by farmers and data collected through remote sensing (see, for example, recent work by Lobell et al. 2018), to develop regression models that would predict yields both in non-survey years and for plots outside our survey sample. We propose to use Google Earth Engine to compute vegetation indices like the normalized difference vegetation index (NDVI) (Groten 1992, Maselli et al. 2012) and the green chlorophyll vegetation index (GCVI) (Burke and Lobell 2017) from Sentinel-2 imagery to proxy for agricultural production. In conjunction with yield data collected from either crop cuts or self-reports from household surveys, we will identify how the indices should be processed to increase yield prediction accuracy against ground-truthed data. We will initially consider using season-wide median and maximum index values at the pixel-level, and then explore if alternative formulations of the raw satellite data can lead to improved model performance.

In addition to measuring yields, we want to understand the types of investments being made by farmers that would lead to observed impacts. As such, we propose collecting information on durable assets (such as tractors and motorized pumps); operational investments; input intensity (for example, levels of fertilizer and pesticide application); and investments in immovable assets. The last category includes investments such as tree crops and long-term investments in soil fertility, for example from fallowing land, and is particularly important in the event that tenure security improves after *melkisation*. In settings with low tenure security, farmers may avoid making investments that cannot be liquidated or for which they will not be compensated, in the event that they lose the land. We will work with MCA-M and MCC as part of the qualitative

analysis to identify common types of investments that farmers make and whether they serve productive or defensive purposes.

Land markets. We expect to gather information from the farmer survey and from ANCFCC administrative data on land transactions after *melkisation*. Transferrable land titles will permit collective land owners to acquire land from neighbors to increase the scale of their operation or sell or lease land. We expect to see changes both in the price of land, which we understand may be informally sold or leased under the collective system, and in the quantity of land formally bought and sold after *melkisation*. We will also track changes in the operational size of farms that have undergone *melkisation* to assess whether enabling farmers to sell or lease land has increased the supply of land available. We may also find that after *melkisation* farmers sell or lease their land to other operators, including those from outside the collective who were previously unable to legally acquire land or to developers to be rezoned for other uses.[16] In the event that farmers in our baseline survey sell or lease their parcel to a new operator, we will consider the possibility of gathering data on parcels operated by the new operator. This would allow us to assess whether land transactions are leading to increases in productivity by allocating land to its most productive use. We also expect that if the optimized *melkisation* procedure has successfully enabled more women to participate in the process, we would see an increase in women's purchase, sale, and acquisition of land. We will disaggregate impacts by sex to determine whether this has occurred. We will use satellite data to estimate agricultural productivity over time, regardless of land transactions, and will exploit time-series variation to identify when land has shifted from agriculture to other uses.

Tenure security and legal knowledge. We expect to gather information on tenure security from land owners as part of the farmer surveys conducted before and after *melkisation*. We will rely primarily on subjective qualitative assessments from the household survey and spouse module as well as focus group discussions, which we plan to complement with other indicators that might proxy for tenure insecurity. As part of data collection instrument development, we will try to identify the key dimensions or sources of tenure insecurity (for example, risk of encroachment from neighbors, family conflict, and expropriation risk) so that we can provide a nuanced measure of tenure security that reflects the reality on the ground. Based on early discussions with MCC and MCA-M we understand that there is little perceived tenure insecurity arising from expropriation risk, but that complex ownership structures related to joint ownership of land amongst extended families can sometimes lead to problems. As such, we will try to measure objective indicators that may reflect tenure insecurity, such as the number of parcel owners (*indivision*); household experiences with land conflict; and the types of decisions farm owners feel free to make (for example, relating to land transactions or crop sales).

4. Power calculations and sample sizes

Generally, a regression discontinuity design requires a larger sample size than an RCT with the same minimum detectible effect (MDE) due to adjustments that need to be made to account for

[16] For example, urbanization is prevalent especially near Kenitra, where newly titled *melk* land could be rezoned for urban use and sold to developers. In such cases we would drop the parcel from the sample, but survey the initial owner at follow-up to determine how the sale affected household welfare.

the design effect of an RD (Cattaneo et al. 2019). This is also true when implementing a spatial regression discontinuity design where a unit's location relative to a treatment area is collapsed from a two dimensional measure in space to a measure of distance to the treatment boundary. The key consideration that determines the magnitude of the design effect for any RD design is the distribution of the sample around the cutoff point. In the case of our project, this is the boundary of the treatment area. Using data from the RNA, we will be able to estimate sample size requirements for conducting an SRD based on the known locations of parcels relative to the treatment boundary. With this data we can also establish the optimal distance bandwidth from which to select our sample. We will use a set of tools developed specifically for estimating sample size requirements for power calculations (Cattaneo et al. 2019) to establish the required sample size given the distribution of parcels as well as the optimal sampling bandwidth (that is, the distance to the treatment boundary) required to estimate the specified MDE. Table V.3 below reports sample sizes that would be required to conduct SRD estimates with a specified MDE for some of the key binary outcomes of interest. We reported a range of MDE to illustrate the trade-offs between sample size and statistical power in the context of running a regression discontinuity design. We calculated sample sizes separately for Gharb and Haouz. Table V.3 also reports the optimal sampling bandwidth that would be used on either side of the treatment boundary. Because of the larger sample sizes required to undertake an SRD design, we are also powered to detect impacts by using alternate identification strategies, such as a matched comparison group (MCG) design that uses difference-in-differences estimation.

In order to take GSI into consideration in our sampling strategy, we hoped to oversample female farm operators and stratify our sample on gender. However, the RNA dataset that was provided to us did not include a variable on respondent gender. As a result, in order to calculate estimates on female farmers alone, we would need to inflate our sample to a much larger sample size, or seek MCC's assistance in obtaining this missing variable. This further rests on the assumption that women-run farm plots at baseline would remain women-run in 2020, when the next census takes place.

Table V.3 shows that if all treatment parcels undergo *melkisation* and no control parcels participate, a sample of 650 treated and 650 untreated parcels in both Haouz and Gharb, totaling 2,600 parcels, would be powered to detect, for example, a 3 percentage point increase in credit access on a 1 percent base (in Haouz) or a 10 percentage point increase in mechanized harvesting on a 35 percent base in Gharb. In order to guard against potential noncompliance—for example, if a collective that is meant to undergo *melkisation* does not participate—we recommend increasing the sample to 800 treatment and 800 control parcels per project area, which would allow equivalent power for up to 10 percent noncompliance. These sample sizes would also allow us to adapt our approach to something less rigorous, such an MCG design, and still detect the same MDE.

Using the specified bandwidth of 1.5km on either side of the treatment boundary, we illustrate in Figure V.3 below that the proposed treatment and control groups are broadly similar along key characteristics including whether farmers have access to credit, use fertilizer, have irrigated versus rainfed plots, and grow grains or olives, which are important crop groups in the project

area. The differences that we do see between the two groups could be corrected by matching parcels from the treatment group with similar parcels from the control group.

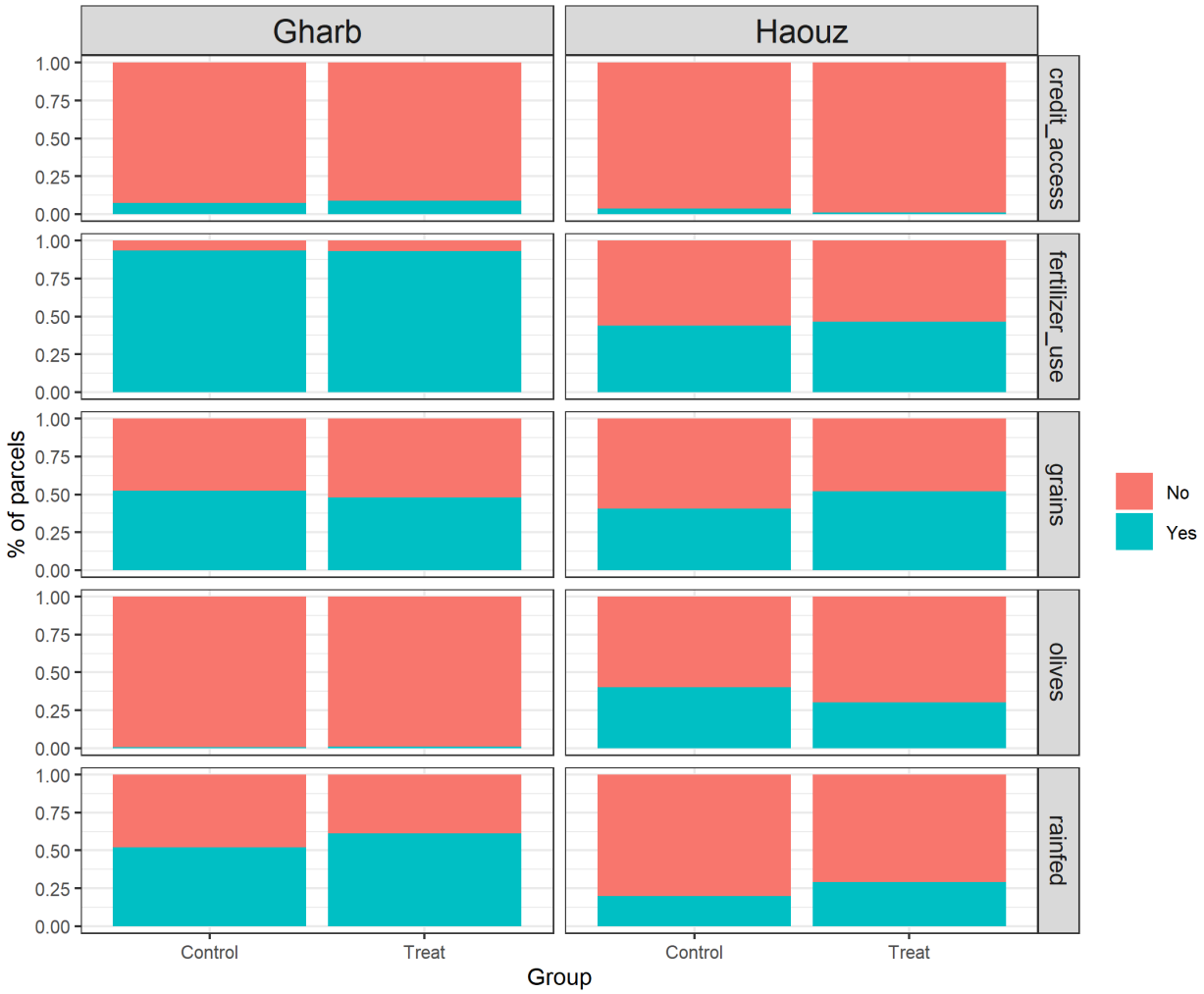
Table V.3. Estimated sample size requirements for SRD analysis

Outcome	RNA mean value (treated)	Treatment sample size	Control sample size	Sampling bandwidth (m)	MDE
Haouz Province					
Parcel uses fertilizer	0.454	291	291	1,536	0.249
Parcel uses fertilizer	0.454	451	451	1,536	0.2
Parcel uses fertilizer	0.454	802	802	1,536	0.15
Owner has access to credit	0.011	44	44	1,556	0.1
Owner has access to credit	0.011	175	175	1,556	0.05
Owner has access to credit	0.011	484	484	1,556	0.03
Owner has access to credit	0.011	1,088	1,088	1,556	0.02
Mechanized harvest	0.132	182	182	1,307	0.1
Mechanized harvest	0.132	727	727	1,307	0.05
Mechanized harvest	0.132	2,908	2,908	1,307	0.025
Gharb Province					
Parcel uses fertilizer	0.941	*Not calculated given high baseline values.*			
Owner has access to credit	0.102	136	136	983	0.1
Owner has access to credit	0.102	541	541	983	0.05
Owner has access to credit	0.102	3,377	3,377	983	0.02
Mechanized harvest	0.349	210	210	1,231	0.248
Mechanized harvest	0.349	573	573	1,231	0.15
Mechanized harvest	0.349	1,289	1,289	1,231	0.1

Source: The *Recensement National Agricole* (RNA) collected parcel and household data from all farms during the 2014–2015 growing season. The data for these power calculations used a randomly selected half of the full data set, which covered approximately 250,000 collective parcels.

Note: Calculated by using the rdsampsi command in Stata, assuming equal treatment and control group sizes. Power 80 percent, alpha 0.05 percent. Standard errors clustered at the level of the Douar (village). The model controls for whether parcel is located in the irrigation perimeter. We show RNA mean values for the treated group because the data for non-treated parcels come from a much large geographic area.

Figure V.4. Difference between treatment and control parcels for illustrative variables



5. Data sources and data collection

Table V.4 below provides an overview of the timing and sampling for quantitative data collection for the Rural Land Activity impact evaluation. Our primary source of data will be longitudinal farmer surveys designed to measure key outcomes of interest that are required to answer the evaluation research questions. The farmer surveys will include information on demographic and household characteristics, incomes, agricultural assets, land holdings, credit access, land ownership structure (joint ownership with family members), and perceptions of tenure and legal knowledge. We also propose to include a plot roster for collecting parcel-level information on agricultural practices, input use, crop choices, and land market transactions. As part of the parcel survey, we propose performing crop cuts on a subsample of plots growing major crops, to assess the accuracy of farmers' self-reported yields.[17] We will also explore the

[17] Gourlay et al. (2017) found that farmers in Uganda overreported yields relative to the indicative yields from amounts harvested through crop cuts. Reporting errors are relatively larger on small plots.

feasibility of including a separate survey for the spouse of the household head to collect information on joint decision making between spouses with respect to land use practices, land transactions and inheritance. This survey would also be used to measure perceptions of tenure security for women.

Finally, we will collect remote sensing data from the Sentinel-2 constellation of satellites, which will be linked to self-reported estimates of yield from the farmer survey, as well as more accurate yield estimates from crop cuts. Following methods discussed in Lobell et al. (2018), we will estimate crop productivity models to track on-farm yields between survey rounds as well as for plots in Haouz and Gharb that were not included in survey collection. Consequently, the use of remote sensing data allows for more complete analysis of the effects of *melkisation* and will improve confidence in the accuracy of the parameter values used in updating the ERR.

Table V.4. Quantitative sampling and data collection for the impact evaluation

Data sources	Sample size	Timing	Relevant instruments/modules
Farmer surveys	3,200 households	• Three rounds of data collection: baseline (2020); interim, or one year after end of *melkisation* (2022); and end line (2027)	• Household characteristics • Perception of land tenure security and legal knowledge • Land conflict and redressal • Intra-household decision-making regarding land use • Credit access and loans module • Agricultural assets • Parcel roster, including crop choice, application of inputs, land use and status, and self-reported yield estimates
Spouse module (conducted in conjunction with the farmer survey)	3,200 households[1]	• Three rounds of data collection: baseline (2020); interim, or one year after end of *melkisation* (2022); and end line (2027)	• Perception of land tenure security and legal knowledge • Land conflict and redressal • Intra-household decision-making regarding land use
Crop cutting survey	1600 crop cuts (800 households)	• Two rounds of data collection: baseline (2021) and interim (2022)[2]	• Crop yield estimates
Remote sensing data (Sentinel-2)	All parcels	• Continuous (five-day revisit interval)	• Vegetation indices • Crop productivity models

Table notes:

[1] Spouse modules will be conducted in conjunction with the farmer survey and plot roster, so the sample of spouses will be determined during the baseline survey.

[2] Interim crop cuts will take place in 2022 in order to coincide with the self-reported yield estimates from the farmer survey conducted in 2022.

In order to capture short-term and long-term effects of *melkisation,* we propose conducting three rounds of data collection: a baseline survey and two subsequent rounds of follow-up. *Melkisation* is being conducted in three waves and titles may be issued up to one year earlier for the first wave compared to the third wave. As such, we will analyze impacts by length of exposure. The

latest projections (as of March 2020) for the first wave of title delivery for certain collectives in Haouz, Sidi Kacem and Sidi Slimane is August 2020. We will conduct baseline qualitative and quantitative data collection in Q4 2020, and crop cuts in Q2-Q3 2021. The interim data collection (both quantitative and qualitative) would occur within a year of the farmers receiving their land titles in both Gharb and Haouz, tentatively in Q4 2022. This will enable us to document early stage impacts of the *melkisation* procedure on perceptions of land tenure security and access to credit. Finally, we will conduct end line qualitative and quantitative data collection in 2027. Allowing for a few years of exposure following the issuance of titles will enable us to explore long-term impacts, including increases in agricultural income and productivity, as well as intra-household decision making around land allocation and use. We will collect administrative data and programmatic documents throughout the compact. We will adapt the final data collection plans as implementation evolves so that we allow for sufficient exposure times to observe crucial short- and medium-term outcomes.

C. Mixed-methods performance evaluation

Several of the research questions for the Land Productivity Project (see Chapter IV, Table IV.1) cannot be answered with a quantitative impact evaluation because they are not suitable for counterfactual analysis. To answer these questions, we propose a mixed-methods performance evaluation that combines quantitative trends analysis and qualitative data analysis as well as an implementation analysis (described in the next section).

1. Evaluation design

To answer the first two project-wide research questions (outlined in Chapter IV, Table IV.1) regarding whether project activities were implemented as planned and what the challenges and successes to project implementation were, we will carry out an **implementation analysis**. We will focus on identifying barriers to and facilitators of implementation and documenting lessons learned, with a view to informing other investments in policy reform and institutional strengthening. Because the Land Productivity Project encompasses multiple activities and sub-activities designed to create complementary benefits, our implementation analysis will also explore the extent to which activities were coordinated and interacted with each other, as well as how the sequence of activities helped (or hindered) the achievement of expected results. The implementation analysis will also properly contextualize the outcome analyses to reflect only those activities that actually were implemented.

To carry out our implementation analysis, we will first carefully review the logic model for each activity and sub-activity to develop a flowchart or process map that shows the order and interconnection of tasks within and across sub-activities. We will draw on information from project plans, regulatory documents (for sub-activities that require passage of reforms), and project reports to construct the process maps. We will vet these process maps with key implementers and project stakeholders. For each process map, we will assess the degree to which each step was implemented, identify any reasons for changes in implementation, and determine the key facilitators of or barriers to progress.

We will also conduct a **quantitative trend analysis** (or analysis of descriptive statistics, depending upon data availability) to track changes in key outcomes of the Rural Land Activity by using quantitative land administrative data from ANCFCC and possibly administrative data on lending practices from banks and microcredit institutions. This will enable us to answer whether the project contributed in reduced time for property transactions (RQ4) or greater credit access (RQ14) and will provide greater context for the impact evaluation.

Our **qualitative analysis** will provide deeper context for the quantitative impact evaluation, by uncovering the reasons why particular outcomes and conditions are for the primary beneficiaries (owner-operators of collective lands, their spouses, and heirs in cases where the original rightsholder is deceased), and for other key stakeholders (renters, tenant farmers and non-rightsholder users including informal buyers and non-published rightsholders of collective land[18]). In particular, qualitative data will provide us with a deeper understanding of beneficiary perceptions of land tenure security, knowledge of the process of *melkisation* and related legal rights, and other potential constraints preventing smallholder farmers from making investments in their land. Qualitative analysis will also allow us to answer questions related to the intended equity impacts of the optimized *melkisation* procedure along dimensions of GSI (RQ7). In addition, qualitative data collected from MCA-M, various government agencies, and local collective leaders will provide insights into the *melkisation* processes, challenges, delays, and conflict resolution, as well as perceptions of interministerial communication, coordination, and involvement (RQ1 and RQ2).

2. Data sources and data collection

For our quantitative trend analysis, we will work with MCA-Morocco and ANCFCC to access sources of land administrative data and determine whether it is possible to create and track over time an indicator of the number of new parcels registered through *melkisation*. Land held under private title should be registered with ANCFCC after *melkisation,* and any subsequent transactions should also be registered. If feasible, we will create aggregate measures of transaction volume by type (inheritance, sale, transfer, and mortgage) and assess whether encumbrances are registered against the land, which would provide evidence over the long term that land is used as collateral with formal lending institutions. We will compare our findings from this analysis with findings emerging from the farmer survey data. In other settings, the cost of registering transactions discourages people from formally registering inheritance and sale of land, thus undermining the long-term sustainability of land administration systems. This risk can be particularly relevant for farmland in irrigation zones, where farmers informally subdivide land below the legal minimum SME (of five hectares) to provide land for heirs.

We have conducted an initial review of key documents to inform our qualitative data collection approach, including stakeholder engagement plans for *melkisation,* the conditions assessment, and the optimized procedure for *melkisation*. The key areas of focus from this document review

[18] MCC investments are subject to IFC Performance Standards, including Performance Standard 5 on Land Acquisition and Involuntary Resettlement, which emphasizes the importance of minimizing impact on displaced persons – including those who had acquired land illegally – through mitigation measures such as fair compensation.

included the steps involved in the new *melkisation* procedure; the groups consulted during the process (including, vulnerable groups and women); and existing progress in the GoM *melkisation* process. Working with our local research consultant, Mathematica will take the lead in obtaining documents and other administrative data. This includes reports from the ANCFCC on the delivery of land registration and tenure documents, as well as land transactions.

Our qualitative work will rely on document review, KIIs, and FGDs. Table V.5 details the stakeholders with whom we plan on conducting KIIs and FGDs, along with the key areas of focus that will guide the qualitative data collection. The choice of qualitative method reflects the type of information we are seeking from each source. For example, the interactive nature of FGDs will allow us to obtain multiple perspectives and experiences. KIIs will be used when we are trying to obtain in-depth information from people who are particularly knowledgeable about certain aspects of the project. These interviews will also be used to corroborate information from FGDs or to gather additional information from leaders of various government agencies. We will conduct observations along with site visits to gain a more in-depth understanding of the settings and circumstances of the interventions. We describe our sampling approach in more detail in the following section.

In preparation for the FGDs and KIIs, Mathematica will develop tailored data collection protocols that cover similar themes across participant types—which will facilitate triangulation of findings during analysis. Evaluation team members will travel to Morocco for pre-testing or pilot testing of the protocols, training, and oversight for the data collection. Mathematica and the local data collector will conduct interviews jointly for those that can be done in French; the local data collector will conduct local language interviews. The local data collection firm will transcribe the interviews and translate them into French when necessary. We will consult with MCA-M and local government agencies on the appropriate language, including consulting the *Livret de Reference sur les Elements de Langage* for enumerators to use in the field (for example, there is sensitivity around referring to land "distribution" given historical sensitivities to use of the word during the reign of Hassan II) (MCC 2019). The local data collection firm will also clean the data, which will include reviewing transcripts for fidelity to the recordings, adding definitions of acronyms and jargon, and adding notes for context.

After the transcripts are cleaned, they will be transmitted to Mathematica for coding, during which we will identify themes that emerge from the data for each research question. We will use a simple theoretical framework as presented in Ritchie and Spencer (2002) for this task, by organizing stakeholder input into logic model categories (program design versus implementation versus results) as well as program components. Coding and analysis will be conducted using NVivo, a proven data analysis software that helps identify themes across many diverse respondent groups and data collection methods. Given that responses from all participant types will be coded during this step, triangulation will be key at this stage. Once the data have been coded for the second time, we will write summaries of the themes and highlight our findings. Finally, we will integrate the findings from all data sources into a detailed final report, which will include pervasive perspectives as well as contrary opinions and cases. Our coding and analysis processes will enable us to develop a key set of qualitative findings across respondent

groups, which should provide a comprehensive picture of the implementation of each sub-activity and the outcomes.

Table V.5. Summary of qualitative data collection approach

Data or respondents	Number of KIIs or FGDs and timing	Area of focus
Key informant interviews (KIIs)		
ANCFCC	• Up to 2 (baseline) • Up to 2 (interim) • Up to 2 (endline)	• Insights into land administration processes • Steps and challenges in the process of land registration • Frequency of and time required for land transactions • Perceptions of interministerial communication and coordination
Ministry of Agriculture	• 1 (baseline) • 1 (interim) • 1 (endline)	• Perceptions of interministerial communication and coordination
Ministry of Interior (*Direction des Affaires Rurales*)	• Up to 2 (baseline) • Up to 2 (interim) • Up to 2 (endline)	• Insights into *melkisation* processes, challenges, delays, conflicts, etc. • Perceptions of interministerial communication and coordination
ORMVAG and ORMVAH	• 2 (baseline) • 2 (interim) • 2 (endline)	• Insights into *melkisation* processes, challenges, delays, conflicts, etc. • Perceptions of interministerial communication, coordination, and involvement
Local collective leaders and *nouabs*	• 10 (baseline) • 10 (interim) • 10 (endline)	• Process of (and risks related to) land allocation, tenure security, administration, conflict resolution prior to and after *melkisation* • Challenges with developing list of *ayants-droits*, SME, *lotissement*
Banks and lenders[19]	• Up to 4 (baseline) • Up to 4 (interim) • Up to 4 (endline)	• Willingness to accept land as collateral for loans
ONCA (*L'Office National du Conseil Agricole*) and ANLCA (*l'Agence Nationale de Lutte Contre l'Analphabétisme*)	• 2 (baseline) • 2 (interim) • 2 (endline)	• Contribution of accompanying measures to project objectives
Implementer responsible for *melkisation*	• 1 (baseline) • 1 (interim)	• Insights into *melkisation* processes, challenges, delays, conflicts, etc. • Consultants' roles in achieving outcomes • Challenges with developing list of *ayants-droits*, process of *lotissement*, establishment of titles
MCA-M and MCC	• 2 (baseline) • 2 (interim) • 2 (endline)	• Deviations in implementation from original plans • Consultants' roles in achieving outcomes • Perceptions of interministerial communication and coordination

[19] We propose to include the *Groupe Credit Agricole du Maroc (*GCAM*)* as one of the banks and lenders we propose to interview. MCA-M has established an agreement with GCAM to support the success of the *melkisation* program through accompanying measures.

Data or respondents	Number of KIIs or FGDs and timing	Area of focus
Focus group discussions (FGDs)		
Farmers (rightsholders and collective members)	• 12 (baseline) • 6 (interim) • 12 (endline)	• Participation and consultation during *melkisation* process • Tenure security and land conflict before and after *melkisation* • Credit access before and after *melkisation* • Knowledge of legal rights process of *melkisation* • Participation in land sale and rental markets, and motivations • Changes to agricultural practices, input use, labor, and mechanized equipment • Intra-household decision making
Women (wives and heirs of rightsholders and collective members)	• 8 (baseline) • 4 (interim) • 8 (endline)	• Participation and consultation during *melkisation* process • Perceptions and social norms around female land access, ownership • Perceptions of and understanding of recent amendments to 1969 law governing rights of heirs (and other relevant *dahirs* and inter-ministerial circulars which impact GSI). • Tenure security and land conflict before and after *melkisation* • Perceptions and social norms around credit access for women • Intra-household decision making
Renters and tenant farmers	• 4 (baseline) • 2 (interim) • 4 (endline)	• Participation in land sale and rental markets, and motivations • Tenure security and land conflict before and after *melkisation* • Land use and agricultural practices
Non-rightsholder users (informal buyers, non-published rightsholders)	• 4 (baseline) • 2 (interim) • 4 (endline)	• Participation in land sale and rental markets, and motivations • Tenure security and land conflict before and after *melkisation* • Land use and agricultural practices
Large landholders	• 4 (baseline) • 2 (interim) • 4 (endline)	• Participation and consultation during *melkisation* process • Perceptions and social norms around youth land access, inheritance
Small landholders	• 4 (baseline) • 2 (interim) • 4 (endline)	• Tenure security and land conflict before and after *melkisation* • Credit access before and after *melkisation* • Participation in land sale and rental markets, and motivations
Recent loan recipients	• 4 (baseline) • 2 (interim) • 4 (endline)	• Credit access before and after *melkisation* • Participation in land sale and rental markets, and motivations

3. Qualitative sampling approach

We will identify our criteria for selecting participants before fielding the study. Certain key informants will be selected purposively, based on their role or experience. For example, we will attempt to interview the staff member who is most knowledgeable regarding each aspect of the implementation, but we will also strive to avoid burdening any one agency. Other participants will be randomly selected in an effort to reduce bias. For collective farmers, we will gather lists of sample frame members in the most comprehensive and unbiased manner possible and randomly select participants from the lists. In addition, we will use selection criteria to ensure balance and variation based on factors such as geography, demographic characteristics, gender,

and so on. The composition of the focus groups will take a number of elements into consideration, including participants' demographics, experiences with the project, and geographic characteristics. The local data collection firm will handle participant selection, in conjunction with Mathematica.

We have chosen sample sizes based on site visits to a minimum of six treatment[20] collectives (three in Gharb and three in Haouz) and six control collectives (three in Gharb and three in Haouz), corresponding to a minimum of six interviews with collective leaders and *nouabs* (although we will consider visiting additional collectives to reach a sufficient saturation point). These interviews will also enable us gain buy-in from local leaders for focus groups with various relatively homogenous groups of collective farmers, women's groups, youth, and renters or tenant farmers in each collective. Our chosen sample sizes for the focus groups are provided in Table V.6 below. We made these decisions based on research that shows these sample sizes will result in saturation (Namey et al. 2016), which is the point when further data produce little or no new information. This is therefore the most efficient use of resources to maximize learning. We will use smaller sample sizes when we expect the variety of responses to be limited and the respondents to provide great depth of information.

Table V.6. Rural Land Activity FGD sample sizes

		# Collectives		Subtotal	Grand total per round
		Gharb	Haouz		
Farmers	Treatment	3	3	6	12
	Control	3	3	6	
Women	Treatment	2	2	4	8
	Control	2	2	4	
Renters, sharecroppers, and tenant farmers	Treatment	1	1	2	4
	Control	1	1	2	
Large landholders	Treatment	1	1	2	4
	Control	1	1	2	
Small landholders	Treatment	1	1	2	4
	Control	1	1	2	
Informal non-AD buyers	Treatment	1	1	2	4
	Control	1	1	2	
Recent loan recipients	Treatment	1	1	2	4
	Control	1	1	2	
					40

[20] We will ensure that our sample includes collectives that established the list of *ayant droits* after the adoption of the optimized *melkisation* process in order to understand the effectiveness of the process in ensuring the inclusion of women on the list. However, many of the collectives in the project established AD lists prior to the 2018 adoption of the optimized procedure – in some cases years before.

D. Economic rate of return analysis

As described above, MCC's investment in the Land Productivity Project is expected to benefit smallholder farm owners of converted collective (*melk*) lands, and their families. Prior to Compact signing, MCC estimated an initial ERR of 23.0 percent for the region of Gharb , by modeling the costs and benefits associated with converting 46,000 hectares of collective land to *melk* land and providing titles for that land (MCC redacted Investment Memo).[21] As part of MCC's approval of extending the Rural Land Activity to 66,000 ha, MCA contracted an independent economist to calculate the ERR of the project for the Haouz region. This ERR was estimated at 38.0 percent and a net present value (NPV) of USD 124.68 million (Hassani 2019).[22] Because the purpose of the Rural Land Activity is to increase productivity on rural land by converting collective land to private ownership, the expected project outcome for formerly collective *melk* land is estimated by the agricultural productivity of private smallholder farmers; the counterfactual (status quo) is estimated by the productivity of collective land users. The ERR compares the difference in agricultural productivity levels between these two groups. Agricultural productivity for each group is calculated using an input/output method, in which the cost of inputs (for example, seed, fertilizer, livestock feed) are netted out from the output revenue generated (for example, revenue from crops and livestock sold).

Mathematica provided an initial assessment of MCC's estimated ERR for Gharb in the Evaluability Assessment (Litke-Farzaneh et al. 2019). As part of the baseline evaluation report, we will provide an assessment of the updated ERR for Haouz, and as part of the endline evaluation report, we will compute the ex-post ERR using updated estimates of benefits and costs of the Rural Land Activity. Table V.7 below outlines how we will update specific parameters of the ERR through our evaluation.

Table V.7. Rural Land Activity ERR parameters and measurement

ERR parameter	Measurement
Timing of title issuance	Using data on implementation, we will update the timing of costs incurred for titling and the date when titles are ultimately issued.
Number of hectares converted from collective land to *melk* land	Using data on implementation, we will update the overall number of hectares successfully converted from collective land to *melk* land.
Timing and scale of investment following *melkisation*	The evaluation will use an impact evaluation to identify the effect of the program on changes in investment over time. This evaluation can be used to update assumptions about (1) the timing of investments and (2) the overall level of investment relative to the without-project case.

[21] At the time when MCC computed the initial ERR to which Mathematica had access, the Rural Land Activity had not yet been extended to 66,000 ha. As part of MCC's approval of extending the Rural Land Activity to 66,000 ha, MCA contracted an independent economist to update the ERR. These updated figures will be reflected in the Baseline Evaluation Report.

[22] While the project will cover 43 ethnic communities in Haouz, representing an area of 104,023 ha, the ERR was calculated using data from three collectives (Tassaout, Ain Igli, and Ouled Zerad) composed of 8 ethnic communities over an area of 14,686 Ha.

ERR parameter	Measurement
Incremental benefits from increased investment	We will use impact estimates from the evaluation to estimate changes in farming income arising from the project. This evaluation can be used to update the incremental benefits generated from greater investment in collective land.

E. Challenges and mitigation strategies

We anticipate a number of important risks to the evaluation. Below we explain the risks to the evaluation and the strategies in place to mitigate them.

Spillover effects. Our impact estimate will be biased if the participation of a collective in the *melkisation* program affects the outcomes of interest in neighboring collectives. For example, issuing titles to some parcels may affect land purchase and rental prices in the wider area if more land owners can now sell or lease their land at better prices, which displaces poorer tenant farmers, who might look for informal land contracts or sharecropping arrangements in neighboring collective parcels. In the event that we learn of potential spillover effects from the program that will affect nearby parcels, we will adjust our sampling strategy to exclude potentially affected parcels in a band around the treatment area and use an MCG design instead.

Collective boundaries determine outcomes through another channel other than *melkisation*. Our identification strategy relies on the assumption that observable and unobservable determinants of the outcomes of interest are comparable (smooth) on either side of the treatment boundary. However, in order to ensure that we are identifying the effect of *melkisation,* we need to ensure that program eligibility due to being in a collective does not perfectly correlate with shared characteristics of the collective, such as the quality of local leadership or access to services. We propose conducting some of our qualitative work in advance of the data collection in order to learn more about how the collectives work and to assess the extent to which these political units matter for the day-to-day operation of farms. Our understanding is that although land use in collectives was previously organized along more communal or collectivist patterns, clear property rights and ownership structures have emerged. Based on our review of the RNA data (which contains information on Douar and Commune), we found that there was not necessarily direct overlap between these administrative units and the collective boundaries. These administrative boundaries may be more important determinants of agricultural productivity, input use, or credit access, especially if public services and agricultural extension services are provided through these channels rather than through the collective. We will work closely with MCA-M and with the relevant GoM to establish the importance of the collectives on key outcomes.

Contamination and noncompliance. If the *melkisation* program is not successfully implemented in some collectives or the project leads to the *melkisation* of some of the remaining eligible collective land in the regions, we will lose statistical power. To address this risk, we have adjusted the proposed sample size to take into account potential noncompliance or contamination of the control group. We will also ensure that where empirically justified we select a sample that has broad geographic coverage. This will ensure that in the event some of the control collectives undergo *melkisation* we still retain a sample that allows us to conduct an

impact evaluation. If we identify treatment and control pairs, as discussed above in Section B, we can also consider dropping individual matched pairs from the sample when we face contamination or noncompliance.

Implementation delays and staggered issuance of titles. We currently expect that titles will be issued near the end of the compact; however, we are aware that the collectives participating in the *melkisation* are at different stages of the process and that titles may be issued over three waves, beginning in August 2020. Unforeseen delays may also reduce the number of collectives we can include in our sample. In order for data collection to remain economical, we prefer to conduct data collection rounds at the same time across the project areas. In general, we would be able to respond to implementation delays by shifting the interim data collection and would work with MCC to decide how best to do this in a cost-effective manner. We will consider conducting the interim data collection at different times for Gharb and Haouz, taking into consideration differences in planned implementation, and/or to account for any situations in which one region faces severe delays while the other region completes *melkisation* on schedule.

VI. INDUSTRIAL LAND ACTIVITY EVALUATION DESIGN

This chapter describes our proposed evaluation design for the Industrial Land Activity. Section A briefly summarizes the overall design and our plan for addressing each of the activity's evaluation questions. In Section B, we elaborate on our quantitative research methods; in Section C, we describe the qualitative performance evaluation. Section D describes how we will update the ERR to assess the cost-effectiveness of the Industrial Land Activity. Finally, Section E addresses potential risks to the evaluation, and proposed mitigation strategies.

A. Research questions and evaluation approaches

We propose a mixed-methods performance evaluation that combines implementation analysis, benchmarking analysis, a quantitative analysis to track changes in key outcomes, and a qualitative analysis to uncover explanations for why particular outcomes and conditions are observed. Table VI.1 provides a summary overview for which methods will be used to answer each of the research questions, the data sources we will use, and the key outcomes of interest.[23]

Our implementation analysis will examine whether Activity components were carried out as intended and the guiding reasons for any changes to the original Activity design. Our qualitative analysis will offer in-depth narratives on how the activity contributed to changes in zone performance, legal and policy developments affecting the industrial land sector, and the various factors and challenges that facilitated and impeded progress. Our quantitative analysis will consist of performing trend analyses (or descriptive statistics, depending on data availability), benchmarking, and developing models that leverage remotely sensed data.

We have proposed the most rigorous quantitative performance evaluation design we believe feasible, given several constraints. Most importantly, the vast majority of quantitative impact evaluation approaches are not applicable, given the small number of zones the program will directly affect.[24] Second, as described below, historical data that would be necessary to establish pre-treatment baseline levels do not appear to be available. Lastly, identifying a suitable comparison group would require that pre-treatment data be available to assess comparability with the treated, demonstration, and FONZID grantee zones.

[23] The phrasing of the research questions in this report vary slightly from their original format in MCC's request for quotations for this evaluation. Table A.1 in Appendix A compares the original phrasing with the revised phrasing and provides the rationale for any changes made. In most cases, we revised phrasing for questions that suggested an impact evaluation would be carried out to wording that reflects the proposed performance evaluation.

[24] Although shifting focus to firm-level outcomes would enable us to increase our sample size, given the large number of firms within a zone, the program logic more appropriately targets outcomes at the zone level. For example, tracking the actively used share of gross zone area over time will be a better proxy for program effectiveness than the status of any individual land parcel.

Table VI.1. Performance evaluation design overview for Industrial Land Activity

Research question	Proposed approach	Data source(s)	Key outcomes
RQ1: Were the activities implemented as planned?	• Qualitative performance evaluation	• KIIs • Project documentation	• Adherence to original project design • Factors contributing to changes in activities
RQ2: What were implementation challenges and successes?	• Qualitative performance evaluation	• KIIs	• Facilitators and barriers to project success • Coordination among stakeholders
RQ17a: How has the activity contributed to changes in the development, management, and maintenance of industrial zones? **RQ17b:** Has private sector involvement in these areas increased and, if so, to what effect?	• Qualitative performance evaluation • Performance evaluation (descriptive quantitative)	• KIIs • Investment contracts • KIIs	• Industrial zone policies and practices • Share of zone development and management responsibilities by sector (public/private) • Infrastructure and service availability and quality (electricity, water, waste management, etc.) • Efficiency and equity of institutional models, structures, and processes
RQ18: What is the total private investment in the development of the three pilot demonstration industrial zones under PPPs?	• Performance evaluation (descriptive quantitative)	• Investment contracts	• Cumulative private investment, by type of financing • Investment outcomes
RQ19: What is the number of hectares of previously undeveloped land that has been put into use in the existing industrial zones targeted by the project, both in terms of gross area and area used by enterprises?	• Performance evaluation (trend analysis; interrupted time series when possible) • Predictions from calibrated remote sensing/machine learning models	• KIIs • Radar (Sentinel-1) and optical daytime imagery (Sentinel-2); nighttime lights (VIIRS)	• Industrial land zone occupancy and utilization rates • Issuance of building permits • Gross zone area • Vegetation/built index values
RQ20: How many jobs were created in the zones covered by the compact (including the demonstration zones and zones supported under FONZID), measured as the number of full-time employees added after the project?	• Performance evaluation (trend analysis)	• CNSS • KIIs	• Number of jobs created within demonstration zones • Number of women employees
RQ21: How have levels of investment and productive use of land changed in the demonstration zones compared to other zones in Morocco?	• Performance evaluation (trend analysis) • Benchmarking analysis • Predictions from calibrated remote sensing/machine learning models	• MICIEN zone-level database • Radar (Sentinel-1) and optical daytime imagery (Sentinel-2); nighttime lights (VIIRS)	• Total private investment under PPPs • Land productivity (number of hectares of “previously undeveloped land” put into use)

Research question	Proposed approach	Data source(s)	Key outcomes
RQ22: How has the delivery of land to market changed in the industrial zones targeted by the project? On the supply and quality of land in industrial zones? On occupancy and utilization rates of land in industrial zones?	• Qualitative performance evaluation	• KIIs • MICIEN zone-level database	• Land availability • Land rental and sale prices • Time on market

Notes: CNSS = La Caisse Nationale de Sécurité Sociale; FONZID = Fonds des Zones Industrielles Durables; KII = key informant interview; MICIEN = Ministere de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numerique; PPP = public-private partnership; VIIRS = Visible Infrared Imaging Radiometer Suite.

B. Quantitative performance evaluation

1. Evaluation design

Our quantitative analysis will leverage three distinct approaches. First, we will use **trend analysis** to identify the magnitude of change over time for outcomes of interest relative to baseline values. For outcomes for which sufficient pre-compact data are available—preferably annual data for the five preceding years—we would pursue an interrupted time series approach that would allow us to estimate whether the timing of the activity's start coincides with a trend break. Such a break may be either a level change, such as a step function, or a rate change, such as a shift in the growth rate. As alluded to earlier, the small number of observations possible given the number of affected zones would imply that any estimated confidence intervals are likely to be very wide. We therefore will focus primarily on relative magnitudes and the directionality of change, rather than reporting estimated coefficients from a regression model.

Second, when data for other zones or firms in other zones are available, we will conduct a **benchmarking analysis**. It is a descriptive, non-causal approach of visually comparing developments among the outcomes of interest from our target zones relative to non-target zones and a common method for examining zone performance (see Sibley International 2011 and Erdman 2015 as examples). We emphasize that this approach is descriptive because a multiplicity of factors, unrelated to MCC/MCA-M activities, may be responsible for any observed changes.[25] When data are available from a large enough number of non-demonstration zones, we would be able to characterize changes over time for the demonstration zones in percentile terms for the full sample. For example, if data on occupancy rates are available for a total of 23 zones, Had Soualem may shift from the 17th percentile at baseline (if 4th out of 23) to the 83rd percentile (if 19th out of 23) at endline. This approach will enable us to discern whether changes in outcomes among the demonstration zones and FONZID grantees occurred at a faster rate, a slower rate, or were flat relative to other zones.

Last, we propose building **calibrated regression and supervised learning models that use remote sensing data** to predict values of outcomes of interest, such as developed land area and zone-level economic activity. If such models are sufficiently accurate, we will use them to

[25] Regression analysis could be used to control for such factors but is inappropriate for the sample sizes under consideration when analyzing either the demonstration or the FONZID zones.

understand changes in the sector more frequently and across broader territory than is possible from ground-collected and existing secondary data. For example, models built using freely available data from Google Earth Engine (Gorelick et al. 2018) for 2018 through 2020 on land use can be used to predict annual land use outcomes for each year in the subsequent decade without additional data collection. By collecting continuous data through the post-compact period, we will be able to include these values in the updated ERR.

2. Outcomes and their anticipated time frame for realization

The key outcomes of interest are informed by the activity's program logic and largely revolve around measures of investment, employment, and land productivity. Our quantitative analysis will examine whether compact activities increased the amount of private investment spent on demonstration IZs, whether gains in the number of people employed in the zones can be observed, and whether vacant and underutilized land has been built on and converted to productive use. The last column of Table VI.1 indicates which outcomes will be collected to address the research questions.

The existing literature does not provide a consensus on the expected time frame over which outcomes respond to changes in IZ environments. Contextual factors are important, and firms are making investment, location, and operating decisions using an array of inputs. As described earlier, empirical work has largely focused on effects from the development of new zones. Notwithstanding the scarcity of well-established guidance for when outcomes should respond, we propose obtaining existing data annually to ensure that any changes in outcomes are detected. Our quantitative data collection approach relies on using regularly collected administrative and secondary data sets, as described below, which will enable us to determine ex-post when outcomes are responding. We believe this approach is preferable to a traditional baseline, midline, endline approach, in which outcomes may be responsive in between rounds and yield limited information on the exposure time.

3. Analysis plan

As mentioned earlier, the methodological options available for any quantitative treatment of the activity are limited by the sample size of affected zones and the anticipation that response times for outcomes will be slow. We consequently propose a descriptive approach that aims to draw out general trend directions and magnitudes, with no expectation that observed changes, in whole or in part, can be causally linked to compact programming.

Our use of satellite data will require several analytical steps. First, we will determine which outcomes can plausibly be measured from space. We believe that daytime satellite imagery can reliably identify whether a parcel of land has been converted from undeveloped to built, but cannot determine whether a building is actively used. Nighttime lights data capture luminosity, which has been shown to be a reliable proxy for economic activity that is especially useful when direct measures of economic activity are unavailable (Chen and Nordhaus 2011; Henderson et al. 2012). We believe the nighttime lights data can provide information on whether productivity at the zone level is changing, and such a method has been used in earlier cross-sectional examination of value-added in IZs (World Bank Group 2017b).

We will then assess the availability of ground-truth data. Such data are a crucial input into the model-building process that relates information encoded by the satellite with objects on the ground. For example, satellites record the intensity of electromagnetic radiation (visible and infrared) reflected back to space, which is called an object's "spectral signature." Knowing the identifying characteristics of these signatures for objects like grass and metal roofs enables us to use satellite data to predict what object is being detected. Land plots covered by vegetation would be indicative of undeveloped land, and our time-series approach would determine the timing for when any substantial land use changes occur—for example, from "undeveloped" to "built." Next, we will set aside 20 to 25 percent of the data as a "test set," which later will be used for developing model accuracy metrics.

We then will use the remaining 75 to 80 percent of the ground-truth data as our "training set," from which models will be developed. For detecting whether a plot of land is undeveloped or developed, will we consider linear regression models, using indices like the Normalized Difference Vegetation Index (NDVI) (Pettorelli et al. 2005) and the Normalized Difference Built-up Index (NDBI) (Zhang et al. 2009). We will use similar models for our analysis of nighttime lights, in which we regress a measure of zone performance on the left-hand side (for example, total production in dirhams) with the total luminosity measured by satellite on the right-hand side. We can then determine whether a stable linear or nonlinear relationship exists, which would generate confidence in out-of-sample predictions. We will also consider supervised learning models, such as random forests and neural networks, with daytime imagery. Such models require a database of "labeled" parcels, which we manually label as "built-up" or "not built-up" by visual inspection. A machine learning algorithm would identify the key characteristics that differentiate these two types of land classes in the training data and then predict in the test set whether other locations are built up or not built up. Last, for all models we construct, we will use metrics of model prediction accuracy, such as R^2 and confusion matrices, to characterize their performance and benchmark against other methods for detecting land use change over time.[26]

4. Data sources and data collection

Our proposed quantitative analysis will be conducted with administrative and secondary sources. Table VI.2 summarizes the data sets we will use, details about their collection, and the areas of focus for each.

a. Primary data collection

We do not anticipate conducting surveys as part of the evaluation. Quantitative data not available through the secondary and administrative data sets described below will be collected as part of our qualitative approach and are detailed in Section VI.C.4.

[26] Used when predicting categorical data, a confusion matrix reports the percentage of correct predictions for each category. As an example, reported values in this context would describe the percentage of parcels predicted to be undeveloped that in fact are undeveloped.

b. Administrative data sources

We anticipate using several administrative data sets that will provide comprehensive, high quality data for analysis. For 2019, the Ministry of Industry has adopted a census-based approach that collects data from all firms with employee headcounts above a threshold.[27] This data set includes variables on sector, exports, production, value-added, intermediate consumption, payroll, and investment. This firm-level data must be partially aggregated before being shared, but the minimum aggregation size is two firms.

These data will be helpful as the activity progresses, but because previous years' surveys (2013, 2014, 2015) were stratified by sector and region, firms included in the sample are unlikely to be representative of all firms located within the affected zones. Regardless, as these data already are being collected and include pre-treatment observations, we propose monitoring the 14 firms from the Bouznika IZ and 13 from Had Soualem included in the MICIEN sample to examine their responsiveness to changes in their respective zones.[28]

Table VI.2. Overview of quantitative data collection for Industrial Land Activity

Data source	Coverage	Frequency	Area of focus
Firm-level survey (MICIEN)	Stratified sample at the sector/region level (2013–2015); census (2019–onward)	Annual	• Total production • Firm-level investment • Exports • Value-added
Remote sensing imagery (Google Earth Engine)	Global	Annual composite (VIIRS); every 3 days (Sentinel-1 radar); every 5 days (Sentinel-2 optical)	• Economic activity • Land utilization • Roof detection
National Social Security Fund database (CNSS)	Firm-level, with employee-level granularity	Annual	• Total payroll • Employee counts, by gender and status (permanent/non-permanent)
Industrial zone database (MICIEN)	Industrial zones (107) with partial or complete support from the Ministry of Industry in their creation and/or ongoing operations	Irregular—less than annual	• Land utilization rate • Zone gross area • Number of newly proposed, developed, and/or expanded industrial zones
Investment contracts	Demonstration zones and FONZID grantees	Irregular	• Financing arrangement • Investment targets
ONEE, RADEEC	Demonstration zones and FONZID grantees	Continuous	• Water and energy output intensity measures • Wastewater production volumes • Greenhouse gas emissions

[27] The Ministry of Industry data therefore will not support analysis on small firms—those whose employee headcounts fall below the threshold. Upon gaining access to these data, we will propose methods to discern the share of total employment represented by businesses included in the census data.

[28] We estimate that there are 150 and 100 firms, respectively, operating in Bouznika and Had Soualem, based on their available shapefiles.

Notes: CNSS = La Caisse Nationale de Sécurité Sociale; FONZID = Fonds des Zones Industrielles Durables; MICIEN = Ministere de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numerique; ONEE = Office National de l'Électricité et de l'Eau potable; RADEEC = Regie Autonome Intercommunale de Distribution d'Eau et d'Electricité de la Chaouia; VIIRS = Visible Infrared Imaging Radiometer Suite.

The Ministry of Industry has also constructed a zone-level database that we will use to understand zone-wide changes over time. Its data set includes information on the gross area, available area, occupancy rate, identity of the zone manager, and type of zone management for 107 zones throughout the country. Prices for land transactions are available for a subset of these zones but do not include either Had Soualem or Bouznika. The most recent data are from 2015, but additional rounds will be collected in upcoming years. A key advantage of this data set is the sizable number of non-demonstration zones against which changes in demonstration zones can potentially be compared over time by using the benchmarking procedure described earlier.

We propose using CNSS data for employment outcomes and firm revenues. Moroccan law requires that companies pay into social security; firms report their revenues and employee headcounts each year. Information is also available about the average number of days worked per year for the firms' employees. The CNSS data do not include geographic identifiers that enable us to immediately place a firm inside any given IZ. Instead, we propose to maintain an updated listing of firms that operate within the demonstration and FONZID zones, along with their *Identifiant Entreprise* identifiers. We will then aggregate the revenue and employee indicators up to the zone level.[29]

The aforementioned data sources are our key sources of administrative data. They will be supplemented by investment contracts data collected for any private or PPP-driven investments in the demonstration and FONZID zones. We will also use any available utilities data from the *Office National de l'Électricité et de l'Eau potable* (ONEE) and *Régie Autonome de Distribution d'Eau et d'Electricité de la Chaouia* (RADEEC) to track the resource and environmental efficiency of the zones by examining their total energy usage, water consumption, and greenhouse gas emissions.

c. Other secondary data sources

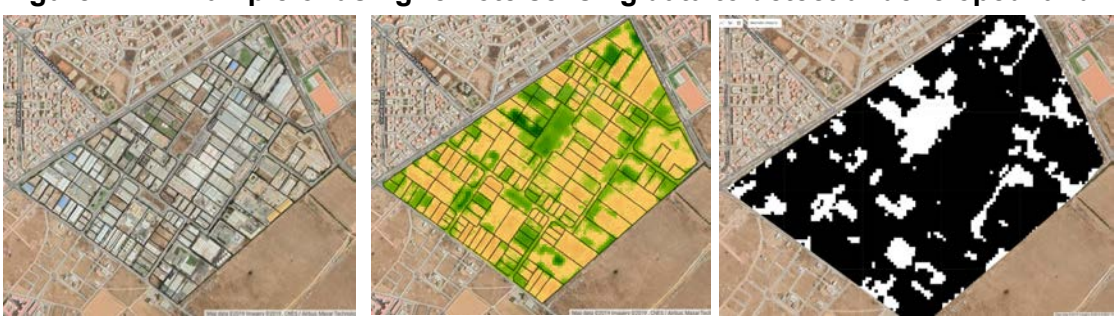
We believe that remotely sensed data can be used strategically to answer a subset of research questions and present opportunities that complement the aforementioned data sets. We propose using both daytime and nighttime satellite imagery as sources of continuous, free data that can provide information on a targeted subset of outcomes. Although this method is limited in the range of outcomes for which it can present insights, it has several major advantages. First, satellite data offer continuous coverage that does not require sending enumerators out to the field. Second, given the global coverage of such products, we would be able to examine changes occurring on the periphery of zones to test for spatial spillovers. In contrast, data collection

[29] Our approach prioritizes measuring employment over time for firms located inside the zone. If the investments lead to substantial growth in firm activity inside the zone, then it is likely that support services neighboring the zone may also increase, driving additional employment gains. While we assume that changes in employment outside the zones will move in the same direction as inside the zone, it is likely they will be a degree of magnitude smaller.

efforts targeted at the zone level, or on firms operating within zones, would be unable to offer evidence on spatial spillovers without expanding the scope of work. Last, satellites will continue transmitting data even after compact close, allowing interested parties to track changes indefinitely. Another key advantage of this approach is cost reduction. The code development process of building a model and fine tuning the algorithms happens once and can then be rerun on a regular basis at nominal marginal costs. As additional rounds of administrative data become available, we can test whether model accuracy declines in out of sample prediction performed further away in time.

We plan on sourcing data from at least two satellite programs. The 10-meter resolution Sentinel-2 constellation of satellites offers daytime optical imagery with a five-day revisit time. Sentinel-2 data are commonly used for monitoring vegetation and have spectral bands that can be used for detecting built-up surfaces, such as building roofs. For the Had Soualem IZ, Figure VI.1 depicts how a simple algorithm of converting average NDVI values (middle panel) into binary outcomes (right panel) exhibits acceptable performance in identifying undeveloped areas within the zone. Green (grass) or brown (dirt, sand) locations in the left panel represent parcels without buildings. This basic algorithm performs well in identifying such locations, which appear white in the right panel. More advanced models are likely to be more accurate, and we will engage in model testing to compare the relative performance across competing algorithms.

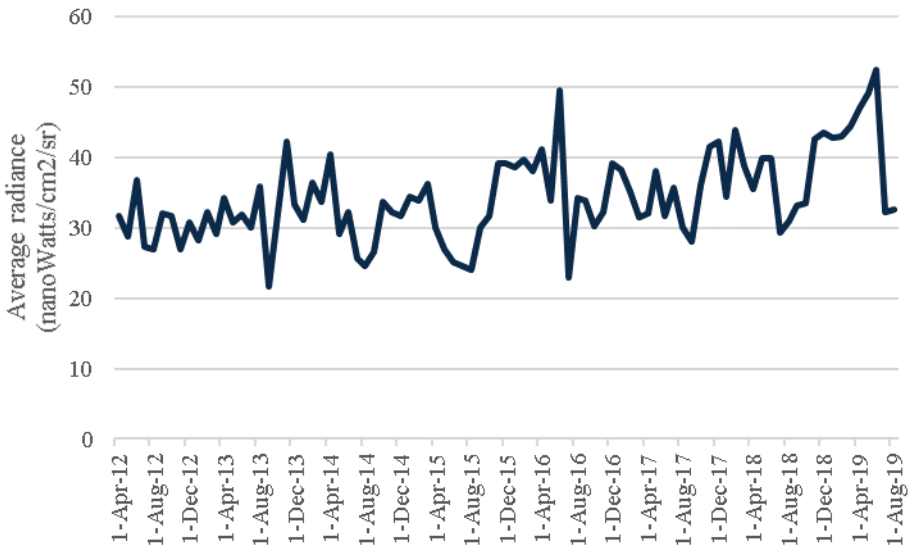
Figure VI.1. Example of using remote sensing data to detect undeveloped land



Notes: *Left*: Aerial image of the Had Soualem IZ, with individual parcel boundaries denoted as black lines. *Middle*: Composite values of the Normalized Difference Vegetation Index (NDVI) averaged over 2018. Green areas represent high NDVI values (more likely to be vegetation), whereas yellow values represent low values. *Right*: Output from a binary transformation of the middle panel, with pixels whose NDVI values exceed 0.15 appearing in white (high NDVI) and low NDVI pixels in black.

We will also use nighttime lights data from the Visible Infrared Imaging Radiometer Suite (VIIRS) sensor. VIIRS data are of lower spatial resolution, at 15 arc-seconds (~450 meters), but the zones are large enough that each will comprise multiple VIIRS pixels. Radiance data from the sensor measure total luminosity, which we will track over time. Figure VI.2 plots the monthly average luminosity of the Had Soualem IZ, which trends upward over the period, indicating economic growth in the zone.

Figure VI.2. Time series average nighttime luminosity of Had Soualem IZ



Notes: Values represent the mean, monthly nighttime lights intensity over all pixels encompassed by the Had Soualem IZ.

Data: VIIRS Nighttime Day/Night Band Composites Level 1 (Vermote et al. 2016).

d. Data processing and data quality

We will work with all data providers to understand caveats to their use and any necessary processing and cleaning steps that might be required. Data sets stored on the Google Earth Engine platform (Gorelick et al. 2017) have already been processed for immediate use, such that additional data cleaning requirements are minimal. Instead, the majority of data processing effort will be focused on identifying features (for example, vegetation indices and other transformations of spectral band values) and algorithms to operationalize the models. We will work with MCC and MCA-M to determine the minimum performance requirements of models that would be used to support policy evaluations.

C. Qualitative performance evaluation

1. Evaluation design

The intended outcomes of the Industrial Land Activity are likely to accrue only when stakeholders achieve clarity about forthcoming reforms, confidence that legal changes will be enforced, and perceive the changes as an improvement over the status quo. Although our quantitative analysis focuses on tracking movements in key indicators, such as land utilization and private investments, our qualitative approach prioritizes understanding the motivations, perceptions, and beliefs of stakeholders involved in the demonstration zones, the FONZID program, and the broader Moroccan industrial land sector. Our qualitative analysis will diagnose how the various actors have or have not responded to the reforms, the factors and concerns that animate their perceptions, and a description of any salient barriers that may present obstacles to larger gains in sectoral productivity.

We will incorporate **implementation analysis** to understand when and why deviations from MCC/MCA-M's original plans occurred. Because we will not be able to conduct quantitative analyses to link inputs and outcomes, we will use **process tracing** (Collier 2011) to map the sequence of events connecting reform measures to eventual changes in investment, land productivity, and employment. Process tracing involves formulating hypotheses (for example, "The lack of wastewater management services in zones is causing pent-up demand for industrial land.") and collecting evidence to test them, both through examining temporal relationships in general (for example, "Once a zone begins offering wastewater connections to parcels, does the average days on market decrease?") and changing circumstances of individual cases (for example, "Was there more interest in IZ X once the wastewater treatment plant was constructed?"). Our analysis will cover the duration of the activity. We will start by chronicling the initial stages of project planning and any deliberations over the legal and policy reform options. We will trace how those decisions were implemented and then incorporated by sector stakeholders, and their perceptions and beliefs regarding those changes. Last, we will follow through to the end of the evaluation to identify which new practices eventually became mainstreamed and the reasons why other practices did not become commonplace or were perceived as being of limited effectiveness.

We propose a performance evaluation to synthesize the disparate trajectories that each component of the Industrial Land Activity may follow. Table VI.3 reflects the range of intended beneficiaries and parties the activity will affect. Our evaluation of Had Soualem and Bouznika is intended to document how existing zones undergo rehabilitation and their experiences incorporating PPP-supported practices into their operations.[30] The study of Sahel Lakhyayta will offer the example of a greenfield project in which development, management, and maintenance procedures enjoy a larger option space than is available for already existing zones. We will write about the FONZID program and a subset of grant recipients, with a focus on profiling whether the innovative economic, social, and environmental sustainability practices envisioned for the grants window have been realized. The final study will document whether the legal and procedural changes enacted by the government, as well as practices promoted by the compact, have been absorbed by zones outside of the three demonstration and FONZID recipient zones. The zones selected for inclusion in this case study may be chosen according to their size, location, and/or composition of tenants. The final criterion used in the selection process may reflect interests in both identifying zones similar to the demonstration zones and those that are distinct for the purpose of understanding whether spillover effects arise only among similar zones. Each of the studies will capture the perspectives of the zone management/zone association, tenants, and the government agencies with which they coordinate. Section VI.C.4 offers a comprehensive list of stakeholders with whom we will engage to obtain source material.

[30] Had Soualem and Bouznika may be consolidated into a single study if there is significant overlap in their respective responses to program activities. We will make this decision in conjunction with input from MCC and MCA-M.

Table VI.3. Summary of qualitative data collection approach

Focus	Key themes
Had Soualem industrial zone Bouznika industrial zone Sahel Lakhyayta industrial zone	• Lessons learned in zone rehabilitation • Lessons in zone expansion • Remaining constraints to investment • Changes in management and maintenance practices • Experience in attracting tenants or supporting incumbent tenants' expansion • Factors leading to attracting PPPs and private capital • Tenants' perceived return on investment from updated zone infrastructure or practices • Opportunities for human capital development • Changes in public sector's role in zone management • Lessons learned in greenfield development • Experience in attracting tenants • Opportunities for human capital development • Public sector coordination • Decision-making processes used in infrastructure selection, procurement, and land pricing
FONZID recipients	• Role of grant and FONZID support • New governance approaches and effects relative to status quo • Innovations in economic, social, and environmental sustainability practices
Firms and zones outside of the demonstration zones and FONZID program	• Perceptions of industrial land market performance • Adoption of new zone management practices • Management and career development opportunities for women • Realized investments and their financing arrangements • Effects, perceptions, and awareness of new land laws • Requirements and obstacles to new zone development • Managers' and tenants' needs from industrial land offerings

Notes: FONZID = Fonds des Zones Industrielles Durables; PPP = public-private partnership.

2. Outcomes and their anticipated time frame for realization

Our qualitative analysis will center on understanding why changes to the key outcomes of land productivity, investment, and employment have or have not occurred. As mentioned earlier, there no well-established literature exits on the effects of zone rehabilitation or legal/policy reforms on these outcomes, so we cannot refer to empirically supported average response times over which firm- and zone-level outcomes would be observable. The exposure time frames are likely to be highly contextualized and depend heavily on how quickly reform measures are supported and promulgated by relevant government agencies.

We plan to engage in three rounds of qualitative data collection. In Q3 2020, we will collect baseline data with the aim of a refined understanding of the early stages of the industrial land legal reform process and improved zone operations frameworks. We will document the experience of establishing the CEILD and incorporation of the PPP transaction advisor, and represent the pre-intervention experiences and perceptions of zone managers and firms located within zones. Our midline data collection, scheduled for Q3 2022, will be timed to follow completion of the PPP, infrastructure, and environmental and social performance (ESP)/geographic information system (GIS) activities.[31] Endline data collection will be

[31] As per the February 2019 pilot sites timeline, activities are scheduled to conclude by July 2022.

conducted in 2027 and will focus on evaluating whether long-term outcomes were achieved and stakeholders' views on the facilitators and barriers to project success.

3. Analysis plan

Each round of our qualitative analysis will begin with a thorough document review to understand project developments, the status of key inputs, and any ancillary analyses relevant to this evaluation. A review of these documents will inform our KII interview protocols and ensure that the questions target information gaps that cannot be filled by other sources. We will conduct content analysis on any notes and transcripts recorded in the course of qualitative data collection, as well as documents received from MCC, MCA-M, and GoM agencies. We will identify key themes that emerge from these conversations, such as "barriers to zone expansion," "firm-level responses," and "results from PPPs," and triangulate responses across stakeholders to differentiate between areas in which consensus exists from areas in which stakeholders' accounts conflict. Our triangulation efforts will enable us to note when multiple interviewees report similar statements, representing higher credibility than claims made by individuals. Our quantitative and qualitative approaches will be conducted in tandem, so that qualitative data collection will benefit from and be driven by insights obtained through our quantitative analyses.

4. Data sources and data collection

Table VI.4 details the stakeholders with whom we plan conducting **KIIs**, along with the key areas of focus that will guide the interviews. Our interviews will inquire about zone management, development, and maintenance while remaining cognizant that stakeholders' responsibilities will vary across those dimensions. We believe that this list is nearly exhaustive in its scope of stakeholders directly or indirectly affected by the activity. This selection is representative of the nested layers of stakeholders: firms operating or considering operations inside the project zones; managers responsible for zone operations; zone managers from zones not directly affected by the activity but potentially experiencing spillover effects; government agencies tasked with devising, creating, and enforcing updated industrial land laws; and members of the project teams from MCC, MCA-M, CEILD, and FONZID who oversee the entire activity. Our interview questions will be highly targeted to the interests and needs of the stakeholder, with the aim of gaining a wraparound view of the perspectives of all parties involved in an exchange. For example, to better understand whether in-zone investments are responsive to the needs of prospective tenants, we will speak with private investors about their perceptions of project risk that may be holding back profitable investments, with government agencies about effective models for catalyzing private sector participation, with IZ managers on barriers to investment inflows, and with firms that have the most information about how such investments would shape their business behavior.

Table VI.4. Summary of qualitative data collection approach

Stakeholder	Number of KIIs and timing	Areas of focus
Zone managers of demonstration sites (i.e., CDG, MedZ, Ouland Hriz communes)	• 3 (baseline)[a] • 4 (interim) • 4 (endline)	• Availability, reliability, and quality of social and business services • Changes in infrastructure connectivity
FONZID grantees	• 5 (interim) • 5 (endline)	• Efficacy of FONZID support • Experience with innovative governance and operating practices
Non-demonstration zone developer/managers (e.g., Al Omrane subsidiaries, urban commune associations, Agence Nationale des Port)	• Up to 8 (baseline) • Up to 8 (interim) • Up to 8 (endline)	• Legal, political, and financial dimensions of zone development and rehabilitation • Zone maintenance requirements • Investment returns • Perceptions of the quality of newly available industrial zone land • Obstacles to expansion and/or upgrading
Firms operating within demonstration zones and FONZID grantees zones	• Up to 20 (interim) • Up to 20 (endline)	• Satisfaction with zone services and infrastructure • Development of innovative governance and operating practices • Determinants of and impediments to relocation and/or expansion • Professional development opportunities for women and financial instruments for women-owned enterprises
Morocco land market experts (e.g., academics, analysts, consultants)	• 3 (baseline) • 3 (midline) • 3 (endline)	• Availability of information on land pricing and availability • Perceived suitability and quality of available industrial land • Determinants of and impediments to relocation and/or expansion
Ministry of Industry (MICIEN)	• 1–2 (baseline) • 1–2 (interim) • 1–2 (endline)	• Data collection and data quality procedures • Involvement in new zone planning and development
Ministry of Interior	• 1 (baseline) • 1 (interim) • 1 (endline)	• Permitting processes and regulatory compliance requirements • Legal concerns with updated land use zoning practices
PPP investors	• 3 (interim) • 3 (endline)	• Perceived returns on investment • Project risk perceptions
CEILD, FONZID, and PPP transaction advisor	• 2 (baseline) • 2 (interim) • 2 (endline)	• Grants management and project tracking • Best practice examples of innovative practices • Zone- and firm-level TA requirements for operationalizing new practices
MCA-M and MCC	• 2 (baseline) • 2 (interim) • 2 (endline)	• Deviations in implementation from original plans • Consultants' roles in achieving outcomes • Perceptions of inter-ministerial communication and involvement
Investment promotion agency	• 1 (baseline) • 1 (interim) • 1 (endline)	• Total employment generated • Total capital inflows • Marketing and promotion approaches of demonstration zones • Perceived foreign investment demands

Stakeholder	Number of KIIs and timing	Areas of focus
Document review	N/A	• Contracts and consultants' reports • Annual reports by investors • Reports/documentation from zone managers and zone associations

Notes: CDG = Caisse de dépôt et de gestion; CEILD = Center of Expertise for Industrial Land Development; FONZID = Fonds des Zones Industrielles Durables; MICIEN = Ministère de l'Industrie, de l'Investissement, du Commerce et de l'Economie Numérique; TA = technical assistance.'

[a]We anticipate that Sahel Lakhyayta will not have an active zone manager at the time of baseline data collection, but will have one by the interim collection.

Before our meetings with zone managers, we will request that they compile and share with us annual statistics specific to their zone on key outcomes such as land utilization rate, new on-site investments, land sales and leasing prices, and any services or amenities that have been added or modified since our previous meeting.

We will devise a data collection approach that maximizes the effectiveness of each meeting and strives to obtain as much meaningful information relevant to the evaluation as possible. Our interviews will adopt a tiered approach, with questions tailored according to the status of steps in the program logic. If the program logic indicates that a short-term outcome is a prerequisite to a medium-term outcome but has not been achieved, our interview focus will rest squarely on understanding the status of the short-term outcome. As a more concrete example, if neither the reformed industrial land law has been passed nor the sustainable management frameworks finalized at midline, our interview questions at that time will not focus on the status of short-term outcomes, but rather in diagnosing the impediments to achieving the prerequisite outputs. We will use the snowball method, soliciting recommendations from interviewees regarding other stakeholders we should contact based on their experiences or relevance to understanding sectoral changes. When responses begin to saturate, such that each subsequent interview provides only nominal new information, we will stop conducting interviews of that stakeholder group for that time period.

We will establish an internal knowledge management system to ensure that each visit with a stakeholder builds off knowledge gained during the previous visit, as well as any relevant information provided by other stakeholders or documents. We will request regular updates on any newly available **documentation and reports** submitted to MCC/MCA-M, with the intent that such information will help to refine questions asked of each stakeholder and reduce respondent burden when descriptions of processes and outcomes have already been published.

D. Economic rate of return analysis

MCC's investment in the Industrial Land Activity is expected to benefit employees of firms in the targeted industrial zones, and their families. Prior to Compact signing, MCC estimated an initial ERR of 16.7 percent for the Industrial Land Activity, assuming a 50 percent cost contingency and that an overall land utilization rate of 80 percent is obtained within eight years (MCC redacted Investment Memo). The ERR for the Industrial Land Activity estimates project benefits as the increase in the present discounted value of all future value-added resulting from

converting land from agricultural or non-utilized to industrial use. The expected project outcome for the Industrial Land Activity is thus estimated using the price of developed industrial land (reflecting the maximum potential productivity for the project, including wages earned, employment generated, returns to capital, and so on). The counterfactual (status quo) is estimated by the price of land absent project activities (considering both land in existing industrial zones that is owned but unutilized, and undeveloped agricultural land outside of existing or new industrial zones). The ERR uses a real estate price method to estimate the improvement in industrial land productivity and employment by observing the change in the price of land that will occur as a result of the intervention. The price of land should capture all private costs and benefits generated through MCC activities.

Mathematica provided an initial assessment of MCC's estimated ERR in the Evaluability Assessment (Litke-Farzaneh et al. 2019). As part of the evaluation, we will compute the ex-post ERR using updated estimates of benefits and costs of the Industrial Land Activity. Table VI.5. below outlines how we will update specific parameters of the ERR through our evaluation.

Table VI.5. Industrial Land Activity ERR parameters and measurement

ERR parameter	Measurement
Infrastructure costs	The evaluation will use industrial zone operator surveys to collect data on total private investment.
Land utilization rates	Administrative data collected by CEILD and MICIEN will track changes in the availability and area of vacant industrial land within and beyond the demonstration zones. Landsat 8/Sentinel-2 satellite data will be used to proxy for land use change outside areas directly affected by the activity.
Demand absorption	Data will be collected from zone managers on the number, sizes, and types of firms operating in the zones.
Firm productivity gains	Key informant interviews with zone tenants can inform perceived returns on investment.
Zone-level employment gains and returns to capital	The evaluation will validate the benefit stream as captured in the price of land by tracking land sale and rental prices through administrative land data. The benefit stream will be further disaggregated by using data from industrial zone managers and the CNSS on key metrics of zone performance such as counts of permanent employees.
Negative externalities	The evaluation will explore using utilities data to track water and energy output intensity, wastewater production, and greenhouse gas emissions.

E. Challenges and mitigation strategies

The following are challenges that we foresee potentially affecting our ability to adhere to the evaluation design described above. We will report to MCC and MCA-M on important developments about the likelihood or materiality of these challenges while we gain more information as the compact progresses and additional connections with relevant stakeholders are established.

- **The GoM's data collection efforts thus far have not prioritized zones as the unit of analysis**. As mentioned earlier, a consequence of this fact is that zone-level longitudinal data

are unavailable; thus, zone responses to MCC's programs can be compared only to values collected at baseline. We will aim to mitigate this challenge by using the administrative, firm-level data sets described above, aggregating those results to the zone level and carefully documenting shortcomings from this approach (for example, questions about the representativeness of reporting entities).

- **Data collected by zone managers are still of unknown quality and consistency**. To minimize data collection costs, we plan to rely on data collected by zone managers. Because country-wide data standards do not exist, we will need more information about their data collection practices to assess the comparability of data across zones. For example, we do not know how or when a zone updates its listing of active firms located inside that zone. For zones with substantial churn in their list of tenants, the timing of such updates would have implications for important outcomes, such as the number of employees working in the zone and the rate of unavailable land. Such information will provide more clarity on whether cross-zone comparisons can meaningfully be made with existing data resources.
- **Consistent data access will be crucial for completing this evaluation**. Because the quantitative portion of the industrial land evaluation hinges exclusively on administrative and secondary data sources, ensuring that we have continuous access to updated data from the various data providers will be essential. We will communicate regularly with these data providers, explain how we are using their data in our analyses, and will work with MCC and MCA-M to address any shortcomings that may arise.

VII. ADMINISTRATION

Given the complexity of this multicomponent project and evaluation, carefully managing the evaluation and its timeline is essential. In this section, we discuss administrative issues related to the evaluation and present a timeline of its activities.

A. Summary of IRB requirements and clearances

Mathematica is committed to protecting the rights and welfare of human subjects by obtaining approval from an IRB for relevant research and data collection activities. IRB approval requires three sets of documents: (1) a research protocol, in which we describe the purpose and design of the research, and provide information about our plans for protecting study participants, their confidentiality, and human rights, including how we will acquire individual consent for participation from them; (2) copies of all data collection instruments and consent forms we plan to use for the evaluation; and (3) a completed IRB questionnaire that provides information about the research protocol, how we will securely collect and store data, participants' protection, and any possible threats to them resulting from the study or compromise of data confidentiality. For example, we will ensure that interviewees, survey respondents, and participants in the focus groups are not identified in the reports. We expect our documents to qualify for an expedited review by the IRB because the study presents minimal risk to participants. IRB approval is valid for one year; we will submit annual renewals for subsequent years as needed.[32]

B. Preparing data files for access, privacy, and documentation plan

The qualitative and quantitative data collected for this evaluation will be stored on Mathematica's secure server and will be accessible only to project team members. After producing and finalizing the interim and final evaluation reports, we will prepare corresponding de-identified data files, users' manuals, and codebooks based on the quantitative data. We understand that these files could be made available to the public, so we will de-identify data files, user manuals, and codebooks according to MCC's most recent guidelines. Public use data files will be free of personal or geographic identifiers that would permit unassisted identification of individual respondents or their households, and we will remove or adjust variables that introduce reasonable risks of deductive disclosure of individual participants' identity. We will also recode unique and rare data using top and bottom coding or by replacing these observations with missing values. If necessary, we will also collapse any variables that would make an individual highly visible because of geographic or other factors into less easily identifiable categories. We will not submit qualitative data as restricted or public use files, though we will submit qualitative instruments and codebooks.

C. Dissemination plan

To ensure that the results and lessons from the evaluation reach a wide audience, we will work with MCC to increase the visibility of the evaluation and findings targeted to the land sector,

[32] The local data collection firm will obtain permits or clearances from the relevant national or local government offices before starting field work.

particularly for policymakers and practitioners. During the first year of the evaluation, we will release outreach materials based on our final design report to inform and engage stakeholders in the evaluation process. As we proceed, we will share relevant materials, such as survey instruments, with the relevant ministries, local authorities involved in land activities, and other representatives of the GoM. We will present the findings from the final report to MCC in Washington, DC and key stakeholders in Morocco.

We expect the broader research community to have a strong interest in the findings from the evaluation. To facilitate wider dissemination of findings and lessons learned, we will collaborate with MCC and other stakeholders to identify additional forums—conferences, workshops, and publications—for disseminating the results, and encourage other donors and implementers to integrate the findings into their programming.

D. Evaluation team roles and responsibilities

Our team will contribute our extensive experience and expertise to meet MCC's evaluation needs. Mr. Matt Sloan, the project director, will oversee the design and implementation of the evaluation. Mr. Sloan also will have primary responsibility for coordinating deliverables and ensuring that the quality of work is high and completed on time and within budget.

Drs. Anthony Harris and Anthony D'Agostino will lead the quantitative and qualitative performance evaluations, direct data collection activities, and lead the analysis of qualitative and quantitative data with the help of expert consultants Mr. Daniel Roberge and Ms. Deborah Porte. Dr. Nancy Murray will ensure that only high quality deliverables are produced by the team. Ms. Sara Litke-Farzaneh will support Dr. Harris and Dr. D'Agostino in the technical design process and quantitative and qualitative analysis activities. Ms. Beryl Seiler will manage the project internally for Mathematica and support programming and research activities. Our team also will draw on the expertise of our local expert consultant, Mr. Morad Said, as well as other Mathematica staff.

E. Evaluation timeline and reporting schedule

The evaluation activities will be clustered into three time periods, corresponding to the baseline, interim, and final data collection. Table VII.1 and Figure VII.1 provide an updated evaluation timeline and reporting schedule for the remaining work.[33]

Baseline and interim data collection will take place in the fourth quarter of 2020 and 2022, respectively. Endline data collection will take place in the third quarter of 2027. We expect to finalize a report summarizing the findings from these data in the third quarter of 2021, 2023, and 2028, respectively after we have presented the draft report to stakeholders and gotten their feedback.

[33] The timeline and reporting schedule for the Land Governance Activity will be completed in the Land Governance evaluation design report.

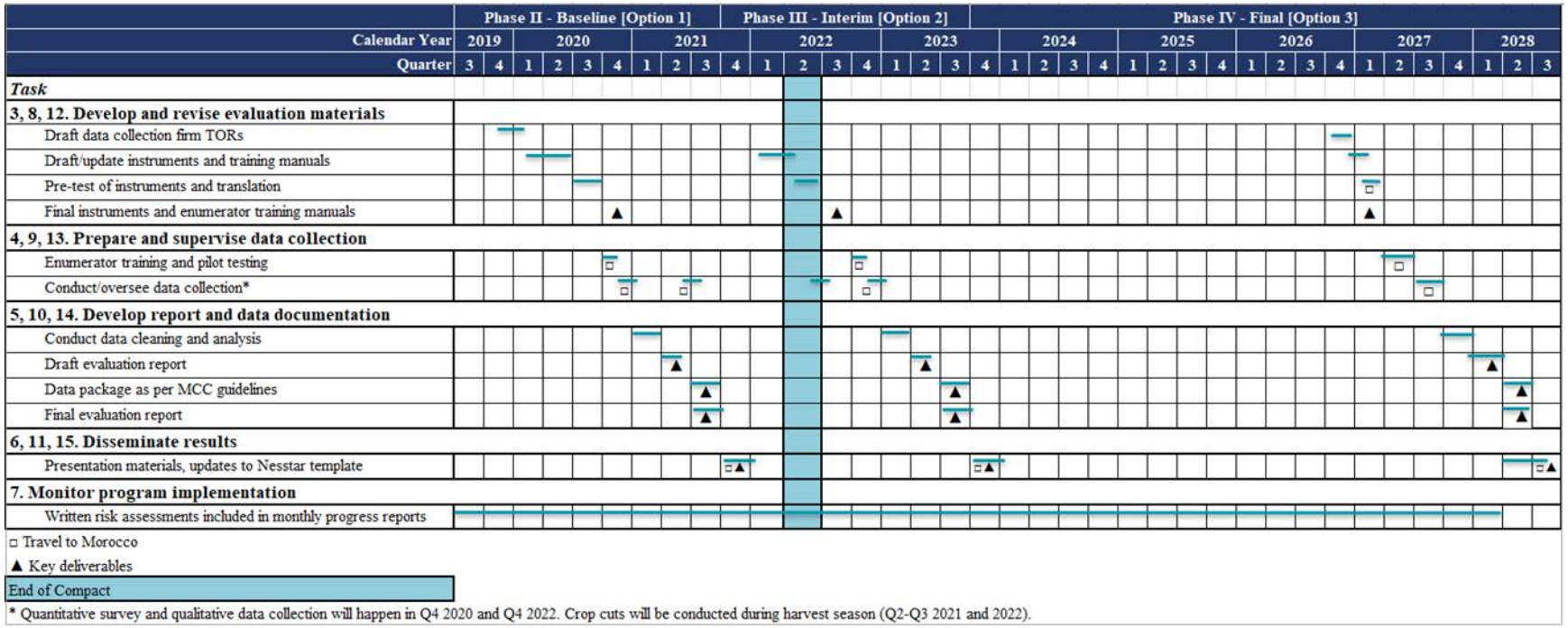
Table VII.1. Evaluation timeline and reporting schedule for Rural Land and Industrial Land Activities

Task #	Task name	Activity	Date
2	Develop evaluation design report	Draft evaluation design report	October 2019
		Stakeholder review and evaluation management committee presentation	November 2019
		Design presentation (Morocco)	January 2020
		Nesstar metadata template for evaluation catalog entry	December 2019
		Final evaluation design report (English and French)	December 2019
3	Develop evaluation materials	Draft data collection terms of reference (TORs)	January 2020
		Draft English questionnaires and enumerator training manuals	February to June 2020
		Translate baseline evaluation materials[34]	July 2020
		Written review of back translation IRB package	August 2020 September 2020
		Summary of pilot test	October 2020
		Final English and local language questionnaires and enumerator training manuals	November 2020
4	Prepare and supervise baseline data collection	Data collection - Written minutes of meetings with data collection firm(s) - Summary of enumerator training - Written summary of quality control checks and results	November to December 2020
5	Develop baseline report and data documentation package	Draft baseline report	January to July 2021
		Final report and data package	August to October 2021
6	Disseminate baseline package	Presentations, updates to Nesstar template	November to December 2021
8–11	Interim evaluation[35]	Revise interim evaluation materials Supervise interim data collection Develop interim report Disseminate interim report	January 2022 to December 2023
12–15	Final evaluation	Revise endline evaluation materials Supervise endline data collection Develop final report Disseminate final report	October 2026 to September 2028

[34] The timing of this step and subsequent steps will depend on the length of MCA's data collector procurement process.

[35] The timing of the interim evaluation is illustrative and may shift depending on implementation or MCC's needs. If necessary, we will update the timing of the evaluation in a subsequent memo.

Figure VII.1. Suggested timeline for Rural Land and Industrial Land Activities



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Appendix A

Explanation of Revised Research Question Phrasing

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Table A.1. Explanation of revised research question phrasing

RFQ research question	Revised research question	Explanation
RQ17: How has the Activity impacted the development, management, and maintenance of industrial zones?	How has the Activity contributed to changes in the development, management, and maintenance of industrial zones?	The absence of random treatment assignment, along with the small number of demonstration zones and FONZID recipients, suggest there is no scope for conducting an impact assessment. As a result, any observed changes in outcomes cannot be causally linked to program activities.
Has private sector involvement in these areas increased and, if so, to what effect?	*No change*	
RQ18: What is the total private investment in the development of the three pilot demonstration industrial zones under PPPs?	*No change*	
RQ19: What is the number of hectares of previously undeveloped land that has been put into use in the existing industrial zones targeted by the project, both in terms of gross area and area used by enterprises?	*No change*	
RQ20: How many jobs were created in the zones covered by the Compact (including the demonstration zones and zones supported under FONZID), measured as the number of full-time employees added after the project?	How many jobs were created in the zones covered by the Compact (including the demonstration zones and zones supported under FONZID), measured as the number of permanent employees added after the project?	The CNSS collects employment data from firms with more than 30 employees, but does not disaggregate into part- or full-time employees or employee equivalents.
RQ21: What is the Activity's impact on investment and/or increased productive use of land in the demonstration zones compared to other zones in Morocco?	How have levels of investment and productive use of land changed in the demonstration zones compared to other zones in Morocco?	Project implementation does not support random assignment nor the making of causal claims about project impacts.
RQ22: What is the Activity's impact on the delivery of land to market for industrial zone development? On the supply and quality of land in industrial zones? On occupancy and utilization rates of land in industrial zones?	How has the delivery of land to market changed in the industrial zones targeted by the project? On the supply and quality of land in industrial zones? On occupancy and utilization rates of land in industrial zones?	Project implementation does not support random assignment nor the making of causal claims about project impacts.

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