WHAT WORKS

MOZAMBIQUE

PROMAPUTO, MAPUTO MUNICIPAL DEVELOPMENT PROGRAM (MMDP I and II)

Report No.: 146784

PROJECT PERFORMANCE ASSESSMENT REPORT

MOZAMBIQUE

PROMAPUTO, MAPUTO MUNICIPAL DEVELOPMENT PROGRAM (MMDP I)
(P096332, IDA NO. 42570)

MAPUTO MUNICIPAL DEVELOPMENT PROGRAM II (MMDP II)
(P115217, IDA NO. 48110)

March 27, 2020

Financial, Private Sector, and Sustainable Development

Independent Evaluation Group

Abbreviations

APL	adaptable program loan
CCM	City Council of Maputo
DUAT	right of use and access to land
MMDP I	Maputo Municipal Development Program I
MMDP II	Maputo Municipal Development Program II
PPAR	Project Performance Assessment Report
SIGEM	Integrated Information Management System

All dollar amounts are U.S. dollars unless otherwise indicated.

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This is a Project Performance Assessment Report (PPAR) by the Independent Evaluation Group of the World Bank Group on the ProMaputo, Maputo Municipal Development Program I (MMDP I) (P096332, IDA No. 42570) and Maputo Municipal Development Program II (MMDP II) (P115217, IDA No. 48110). This instrument and the methodology for this evaluation are discussed in appendix C. Following standard Independent Evaluation Group procedure, copies of the draft PPAR were shared with relevant government officials for their review and comment. No comments were received from the borrower.

ProMaputo, Maputo Municipal Development Program (MMDP I) (P096332)

Basic Data

Country	Mozambique	World Bank financing commitment	$30.0 million
Global Practice	Social, Urban, Rural, and Resilience Global Practice	Actual project cost	$41.1 million
Project name	ProMaputo, Maputo Municipal Development Program	Expected project total cost	$43.0 million
Project ID	P096332	Actual amount disbursed	$29.4 million
Financing instrument	Adjustable Program Loan	Environmental assessment category	Category B
Financing source	International Development Association		

Dates

Event	Original	Actual
Concept review	—	January 17, 2006
Appraisal	—	November 13, 2006
Board approval	—	January 25, 2007
Effectiveness	April 25, 2007	April 25, 2007
Closing date	August 31, 2010	August 31, 2011

Key Staff Responsible

Management	Appraisal	Completion
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Practice/Sector Manager	Jaime M. Biderman	Alexander E. Bakalian
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Maputo Municipal Development Program II (MMDP II) (P115217)

Basic Data

Country	Mozambique	World Bank financing commitment	$50 million
Global Practice	Social, Urban, Rural, and Resilience Global Practice	Actual project cost	$115.5 million
Project name	Maputo Municipal Development Program II	Expected project total cost	$105.0 million
Project ID	P115217	Actual amount disbursed	$48.9 million
Financing instrument	Adjustable Program Loan	Environmental assessment category	Category B
Financing source	International Development Association		

Dates

Event	Original	Actual
Concept review	—	December 15, 2008
Appraisal	—	May 14, 2010
Board approval	—	September 30, 2010
Mid-Term Review	August 19, 2013	September 17, 2013
Effectiveness	February 17, 2011	January 21, 2011
Closing date	December 31, 2015	June 30, 2017

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Summary

Project Background and Description

Mozambique has been experiencing rapid urbanization associated with decreased urban poverty in its capital, Maputo, but with an unsustainable pattern of peripheral expansion due to rising land and housing costs in the city center. According to the World Bank's 2017 "Mozambique Urbanization Review," although Maputo's population grew by 1 percent each year between 1997 and 2007, the surrounding area of Matola grew by 4.2 percent. At the same time, 70 percent of Maputo residents live in informal settlements. This rapid, largely unplanned urban expansion puts enormous stress on the City Council of Maputo (CCM), which is ill equipped to supply infrastructure and services needed for the growing population.

The CCM partnered with the World Bank to implement a 10-year, two-phase Maputo Municipal Development Program (Phases I and II). The program was sequenced to first address "legacy" issues that were undermining sustainable growth and investment some 30 years after the end of the Mozambique civil war. Foremost among those issues were institutional, fiscal, and financial capacity constraints that required attention—as a precondition for sustainable service delivery—in areas such as solid waste collection, drainage, and road rehabilitation and maintenance.

The program's theory of change was premised on the assumption that a sequential approach was needed: the first phase would support institutional development and fiscal revenue growth as preconditions for a second phase that would focus on investments in municipal service delivery. The theory featured a strong accountability focus by establishing communication channels among the municipality, service providers, and citizens. Although the program was generally sequenced, it was necessary to provide select services and infrastructure—in parallel to the institutional and fiscal reforms—to cope with a rapidly expanding city system. A participatory approach ensured that the urban reforms were well understood and owned by urban residents.

Results

The Maputo Municipal Development Program helped strengthen the institutional capacity and service delivery of the CCM. It did this by helping the CCM reorient its staffing; establishing systems for land use mapping and planning; increasing fiscal revenue through improved property tax management; and establishing mechanisms for enhanced accountability among the municipality, service providers, and citizens of Maputo. The program also helped improve solid waste collection coverage. Support for

transportation infrastructure has improved access in terms of mobility, and interventions in informal neighborhoods have revitalized public spaces and led to improvements in access to and from the city center.

The institutional capacity of the CCM was strengthened in several ways. The project helped build critical urban management capacity, including land management and urban planning skills. This capacity building contributed to the development of 30 neighborhood urbanization plans, which, although fully developed, are yet to be implemented. The program also helped the CCM to achieve land tenure regularization targets: over 33,000 land property titles were issued, leading to an increase in property tax collection in both volume (the number of taxpayers increased sixfold) and value (revenues increased by 281 percent).

Service delivery targets were also exceeded, most notably in solid waste collection. The project achieved almost universal coverage of solid waste collection—across all of Maputo's neighborhoods—for a reported population of 1.2 million urban inhabitants, according to the 2017 National Census. The project also contributed to road rehabilitation and maintenance, which improved vehicular mobility, but not without implementation challenges associated with contractual issues that caused cost overruns and delays. One key innovation that made near-universal access achievable was the project's support for a "dual system" for solid waste collection that included differentiated designs for formal and informal areas.

These achievements were possible because of the World Bank's sequenced and sustained approach—implemented through a two-phase adjustable program loan. The program was appropriately designed to prioritize institutional strengthening as a precondition for citywide investment in infrastructure and service delivery. Achievements are also attributable to social accountability mechanisms that were established by the project between the municipal government and citizens, which provided for participation in the prioritization process, a necessary step to engender ownership of the urban reforms.

However, the sustainability of these results is uncertain because of weaknesses associated with institutional and financial management capacity after project close. At the time of the Independent Evaluation Group mission, communication among the municipality, service providers, and citizens had waned, and municipal resources were proving insufficient to sustain the reform momentum and service coverage achieved under the project. Independent Evaluation Group project ratings are described in appendix A. The evaluation methodology and evidence sources are described in appendix C.

What Worked, and Why?

The design and preparation of the first phase of the program was anchored in the 10-year Municipal Development Plan, which was instrumental in promoting project ownership by city government. The design and identification of priorities was well informed through studies, diagnostics, and extensive consultation at different levels, including with beneficiaries.

The project implemented an innovative approach to improve solid waste collection in informal areas. These areas, characterized by narrow alleys of informal settlements, saw the implementation of a cart door-to-door system run by a community-based organization. This solid waste management system could be replicated in similar informal settlements. In addition, the project helped increase the level of accountability among the municipality, service providers, and citizens by means of three citizen report card surveys and the extensive dissemination of their results through newspapers, television, radio, public forums, the internet, and other media.

What Didn't Work, and Why?

The decision to mainstream implementation within the structure of the CCM for financial management and procurement gave rise to trade-offs associated with knowledge flow and skills transfer. The low implementation capacity led to cost overruns and delays. The situation was reversed during the second phase by the creation of a project implementation unit. Although transitioning to a consultant-based model improved project implementation, it missed the opportunity to fully build financial management and procurement capacity within the CCM, which would have been important for its long-term performance beyond project closure.

Given the scope of the program and its complexity, there was insufficient attention to the institutional context and the political economy. Although the design drew on lessons from several countries and included integrated land administration features, it lacked sufficient adaptation to the local context. This stretched the local capacity to absorb, internalize, and institutionalize the required changes and negatively affected the project. Given the needs and the pace of urbanization, such scope might be justified. However, in a context of low capacity, poor governance, and dysfunctional land markets, an in-depth understanding of the political economy is required before developing such a comprehensive state-of-the-art program.

A stronger emphasis was needed to support a long-term strategy at the city level to ensure achievements from the 10 years of programmatic support could be sustained. Given the growth dynamics in the Greater Maputo area, and considering the positive yet incomplete achievements emanating from the first and second adaptable program loans

(APLs), the World Bank should have helped the CCM to put in place a longer-term strategy to support the sustainability of services after project closure.

The planned universal cost recovery based solely on solid waste collection revenues was too optimistic, and—especially for critical services such as solid waste management in Maputo—it would be advisable to design and work with various cost recovery scenarios, including alternative financial sources (for example, taxes).

Although the reach of the solid waste management service delivery of this project is impressive, efforts to achieve almost universal access to solid waste collection under the project were not matched by efforts to ensure appropriate solid waste disposal. Solid waste collection activities were conceived under the premise that a new sanitary landfill outside the Maputo municipality would be built by 2015 with alternative funding sources. However, as of the time of this Project Performance Assessment Report, such funding was not forthcoming, demonstrating that the risks of delays in the construction of an alternative landfill were underestimated and that mitigation measures were not addressed by the World Bank. Unattended risks are also associated with the human health effects experienced by the trash-picking community at the site.

Transfer of skills from consultants to staff often did not work as envisioned, weakening the sustainability of capacity building efforts. The project had to rely on external consultants to accelerate project implementation and to help transfer knowledge through on-the-job training and mentoring. However, the disparities in remuneration between international consultants and local staff discouraged local staff from learning and performing operational tasks.

Lessons

This assessment offers the following lessons:

In low-capacity settings, where cities are barely able to meet service delivery needs, it may be necessary to design interventions to deliver critical services while incrementally building municipal capacity for sustained service delivery over time. The World Bank's approach in Maputo was appropriately sequenced to strengthen the CCM's capacity, especially its tax collection and revenue raising potential, and its ability to deliver critical services that simultaneously improved the well-being of the city's citizens by providing learning-by-doing opportunities.

Interventions in land administration require a thorough analysis of the local, institutional, and political economy conditions. Rapid urbanization often requires immediate action, even in contexts of low capacity, poor governance, and dysfunctional land markets. However, given the high risk, a deeper understanding of ways to navigate

the complex environment could help shape the interventions with tools and mitigation measures adequate to achieving sustainable reforms.

Excessive reliance on external expertise can undermine knowledge transfer and ultimately the sustainability of municipal development projects. Attempts by the World Bank to mainstream implementation within the structure of CCM in the first phase led to contractual oversight challenges and implementation delays that required a switch to a dedicated program management unit in the second phase, which relied heavily on international consultants. Although the switch improved project implementation, the simultaneous hiring and excessive use of external technical consultants, remunerated at a much higher rate than local staff, along with the need for external consultants to focus first on service delivery, created tensions between the local and international staff, which resulted in a suboptimal knowledge transfer between the two groups. Good project oversight and the long-term sustainability of knowledge transfer must be balanced by ensuring that adequate capacity is transferred to local staff.

Achieving solid waste management development outcomes in low-capacity contexts requires a viable financial plan and mechanisms to cover capital and recurrent expenditures, which may in turn require contributions from national and local governments in addition to user fees. The World Bank's investments in Maputo show that such a financial plan requires a certain level of public sector support to deliver basic services and to manage and supervise private sector contracts. In such low-capacity contexts, the local private sector is likely unable to fill all service delivery gaps. The project demonstrates that where service delivery needs to be rolled out incrementally, it is unrealistic to expect full cost recovery exclusively from user fees and resources. Rather, a viable financial plan for sustained service delivery requires mechanisms that involve multiple actors (providers and users) across the solid waste management value chain.

Although achieving universal access to solid waste management is a significant achievement in low-capacity contexts, outcomes are undermined by insufficient investment in waste disposal, especially as this affects the most vulnerable. The World Bank's support for solid waste management in Maputo lacked a "value chain" approach: although universal access was achieved, the planned sanitary landfill to ensure safe disposal was not built. Because the existing dump site in Maputo was already at maximum capacity, this plan was a vital part of the city vision to promote residents' well-being through improvements to solid waste management. Waste disposal currently poses significant health and environmental risks to city residents. Unattended risks are also associated with the human health effects experienced by the trash-picking community at the site, and the need for alternative livelihoods as part of a

resettlement package. A modern sanitary landfill could also contribute to cost recovery through lower operations and maintenance costs and revenue from biogas generation.

Land use transformation brought about by infrastructure investments can contribute positively to the local tax base, but it can also negatively affect poorer residents when land and housing prices rise. The World Bank's support for infrastructure investments in Maputo shows that land use change (such as that resulting from road and drainage improvements) can stimulate private investment in housing and business development. If systems are in place, new formal housing units can enter the land registry and cadastre, and increased property tax collection can strengthen capacity for sustained service delivery. Likewise, business development can have multiplier effects on local job creation and growth. Simultaneously, though, an unmanaged process can quickly drive up housing and land prices, forcing poorer residents to migrate far from their sources of employment or even to unsafe living areas (such as slums).

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1. Background, Context, and Design

1.1   Despite its economic progress during the past decade, Mozambique is still experiencing a high level of poverty and inequality. Mozambique's annual growth rate averaged 7.9 percent in real terms between 1993 and 2014 (World Bank 2016a). However, this growth has not been accompanied by a comparable reduction in poverty. During the same period, for each 1 percent of growth, poverty fell by only 0.26 percent, representing less than half the rate at which poverty was concomitantly reduced in the region. A rise in inequality has reduced the effect of economic growth on poverty reduction (from a potential reduction of 26.8 percent to an actual reduction of 16.3 percent). Inequality exists between regions of Mozambique, between rural and urban areas, and within urban areas. The capital city of Maputo has a recorded poverty rate of 10 percent, the lowest in the country, but inequality is rising, associated with the evolution of the land and housing market.

1.2   The decline in poverty in Maputo has been accompanied by an unsustainable pattern of peripheral expansion, due to rising land and housing costs in the city center. Although Maputo grew by only 1 percent each year between 1997 and 2007, nearby Matola grew by 4.2 percent, owing to rising land and housing costs in its city center (World Bank 2017a). At the same time, recorded poverty in Maputo decreased from 37 percent to 10 percent between 1997 and 2007. Yet, 70 percent of people in the wider Maputo area live in informal housing. This informality and the rapid, largely unplanned urban expansion continue to put enormous stress on the City Council of Maputo (CCM), which is ill equipped to supply the necessary infrastructure and services for this burgeoning population.

1.3   The institutional capacity of the CCM has been constrained by legacy issues left over from the civil war that eroded institutions and capacity. Although the civil war ended 30 years ago, it left behind generational gaps in knowledge and capacity and severe underinvestment in infrastructure and services. In this context, the government of Mozambique with the assistance of the World Bank determined that strengthening the institutional and fiscal capacity of CCM was a precondition to any improvement in service delivery and investment in infrastructure. It was also recognized that such institutional strengthening would require a sustained approach.

Background and Context

1.4   The Maputo Municipal Development Program (MMDP) was designed to directly respond to the need for institutional strengthening to achieve sustained service delivery. At appraisal, in 2005, only 1.5 percent of the CCM's staff (out of 2,500) had attended university and only 7 percent had had technical training. Some key units were

understaffed: for example, in municipal finance, just 54 of 102 staff positions were filled. Of the 54 employees, only 18 had the required qualifications. Also, at appraisal, the CCM's budget was equivalent to $6 per capita (World Bank 2012). It faced severe budget constraints, with limited own-source revenue generation and capacity for budget planning and control. Taxes were paid on only 5 percent of the city's properties due to the city's lack of an up-to-date property cadastre and other tools to assess and collect taxes (World Bank 2012). The CCM also lacked the means to levy and collect other municipal taxes and fees. In addition, it could not effectively plan, execute, and control expenditures. Without the capacity of the CCM being strengthened, urban services and infrastructure would continue to worsen.

Objective, Design, and Financing

1.5   Given the need for sustained support, the project was conceived as multiphase programmatic approach of adaptable program loans (APLs) with sequenced objectives. The project development objective of phase I was "to strengthen the Maputo City Council's institutional and financial capacity to support achievement of long-term service delivery goals, and to implement selected priority investments" (World Bank 2007). Phase II continued to strengthen capacities and to scale up municipal service delivery and infrastructure investments. The project development objective of APL II was "to improve the delivery and sustainability of priority municipal services in Maputo Municipality" (World Bank 2010).

1.6   As illustrated in this assessment's reconstructed theory of change, activities were logically linked to expected outputs and outcomes. The theory of change was premised on a sequential approach, in which institutional development and fiscal revenue growth are preconditions for improvement in the municipal delivery of service and investment in priority infrastructure. Decisions on what services and infrastructure to prioritize were to be supported by communication channels established between the CCM and citizens. The theory also incorporates the need to deliver select services alongside the institutional tightening process to solve urgent challenges, and to develop local ownership and support for the urban reforms (figure 1.1). Many aspects of the theory are well aligned with the literature; however, in terms of sequencing and engaging the local community, time frames were too tight, and activities—such as the integrated cadastre system—were too complex given the capacity and timing (see the Relevance of the Design section of MMDP II in appendix A).

Figure 1.1. Project Simplified Theory of Change, Adaptable Program Loan Phases I and II
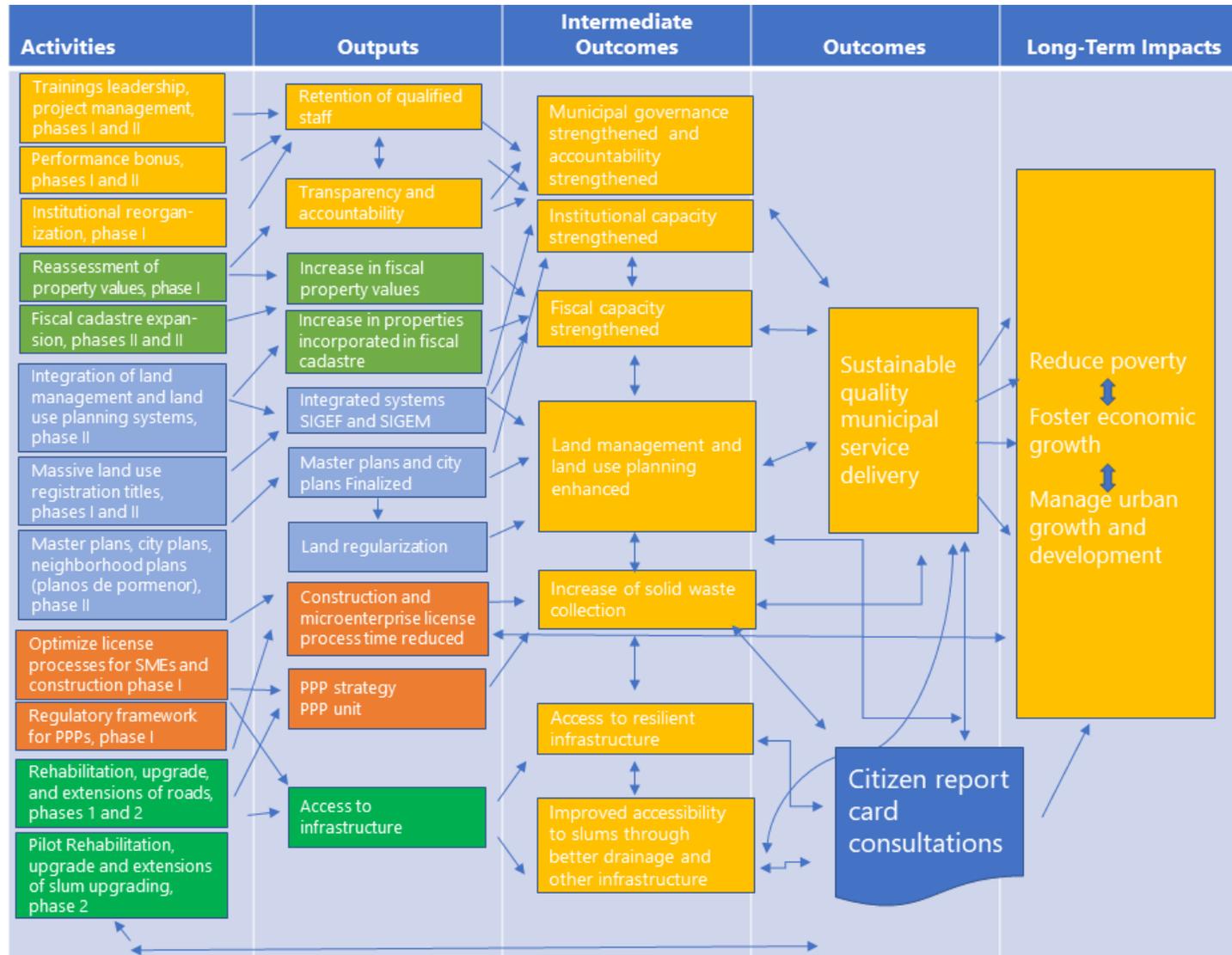
Note: PEU = Structural Urbanization Plan; PPP = public-private partnership; SIGEF = Integrated Financial Management System; SIGEM = Integrated Information Management System; SMEs = small and medium enterprises.

Costs, Including by Project Component

1.7 MMDP phases I and II were implemented between January 2007 and June 2017. Total costs were $41.1 million for MMDP I and $115.5 million for MMDP II. The International Development Association provided $30 million for APL I and $50 million for APL II. The remaining funds were provided by counterpart financing, including from the CCM, in phase II. A small grant of $0.08 million was also provided to phase I by the Public-Private Infrastructure Advisory Facility. Due to a sharp devaluation of the metical in relation to special drawing rights and the U.S. dollar, the project "gained" approximately $2 million as several contracts were signed in the national currency. These additional funds were used largely to finance infrastructure works that complemented the rehabilitation of Julius Nyerere Avenue, including the rehabilitation of a local market. Activity costs are shown for both phases in tables 1.1 and 1.2.

Table 1.1. World Bank Financing for APL I under the IDA Grant, by Component

	Appraisal Estimate ($, millions)	Actual Cost ($, millions)	% of Appraisal
Institutional reform and municipal governance	8.0	10.8	135
Municipal finance	4.7	5.3	113
Planning and service delivery improvements	26.3	25.0	95
Total project cost	39	41.1	105

Note: APL = adaptable program loan; IDA = International Development Association.

Table 1.2. World Bank Financing for APL II under the IDA Grant, by Component

	Appraisal Estimate ($, millions)	Actual Cost ($, millions)	% of Appraisal
Institutional development	12.4	9.4	76
Financial sustainability	4.6	3.0	65
Urban planning	15.2	13.4	88
Urban transportation investment and maintenance	38.1	51.2	134
Metropolitan development	26.7	38.5	144
Total project cost	97.0	115.5	119

Note: APL = adaptable program loan; IDA = International Development Association.

2. What Worked, What Didn't Work, and Why?

2.1 The MMDP helped strengthen the institutional capacity and service delivery of the CCM. It did this by helping it to reorient its staffing; by establishing systems for land use mapping and planning; by increasing fiscal revenue through improved property tax management; and by establishing mechanisms for enhanced accountability among the

municipality, service providers, and citizens of Maputo. The program also helped improved solid waste collection coverage. Support for transportation infrastructure has improved access in terms of mobility, and land use and interventions in informal neighborhoods have led to better access to and from the city center and to revitalized public spaces.

Results

This section focuses on the achievement of the main program development objectives: to strengthen the Maputo City Council's institutional capacity, enhance access to infrastructure and service delivery, and increase sustainability.

Institutional Capacity Building

2.2   First, the projects helped raise the skill level within the municipality through direct training and incentive bonuses. It helped raise the number of employees with postsecondary education or a university degree from 1.5 percent at appraisal of the first phase to 20 percent by 2018. Qualified staff (with a high school or university diploma) are being retained; low salaries, however, pose a problem for longer-term retention. Analysis of the CCM human resource data reveals that much more needs to be done to address the large number of illiterate staff and unskilled auxiliaries, who still comprise the largest staffing contingent.

2.3   Second, the project helped strengthen land management and planning tools, but there is limited evidence yet of these being used in neighborhood or sector planning. The projects supported the development of planning instruments critically needed to support sustainable urban growth in and around Maputo. These included the preparation of 3 citywide structural plans and 30 partial neighborhood urbanization plans, which provide the foundation for land tenure regularization and land use planning. However, the structural plans are not integrated with sectoral plans. For example, this was the case with the metropolitan master plan for mobility and transportation, initially included in the project, but later realized with support from the Japan International Cooperation Agency. In addition, the urbanization plans have not been updated and are underused. However, two neighborhood pilot projects supported by the World Bank, the CCM, and the Italian Agency for Development Cooperation have created land use plans that use detailed geospatial maps capturing income, construction materials, and construction types at a household level. Interviews revealed that this information has been used to plan and execute upgrading interventions in the Chamanculo C and George Dimitrov neighborhoods.

2.4   Additionally, the integrated geographic information system for land management, which was meant to be the backbone for CCM management and planning improvement, was only partially implemented. Although this Integrated Information Management System (SIGEM) was critical in speeding up land tenure regularization (right of use and access to land [Direito do Uso e Aproveitamento da Terra; DUAT]), benefiting many households, it has not been serviced or upgraded since project close. This has resulted in system glitches that have forced staff to process land use regularization titles partly by hand. Processing time for DUATs was significantly reduced during the project, from 150 to 45 days, but has increased since project closure to 80 days. At the time of this evaluation approximately 2,000 DUATs were being processed each year, which is significantly lower than the 10,000 per year during the project (2014–16). Moreover, an Independent Evaluation Group survey of beneficiaries of the massive regularization of land title shows that about 65 percent of the DUATs were delivered 90 days after the beginning of the process (see appendix C, table C.16).

2.5   Third, municipal revenue from property taxes increased due to several project interventions, including data collection, database management, staff training, property value calculation, and tax bill distribution. The cadastre of properties in Maputo more than doubled from 19,000 in 2006 to over 40,000 by project completion and had reached 42,000 at the time of this assessment. The percentage of property tax collected also increased from 64 percent in 2012 to 81 percent at project completion (CCM 2017); it rose to 86 percent in 2018 (figure 2.1, panel a). In 2012, 5 percent of households paid property tax (World Bank 2017c, 1); this figure increased to 30 percent in 2017.

2.6   Several project-supported interventions directly contributed to increased tax collection at the municipal level. The project helped the CCM to reconcile its databases and develop a new formula for property value calculation, and it supported significant fieldwork to collect new data. As a result of the success of these interventions in Maputo, the system has been rolled out nationwide. Although inflationary pressures and currency devaluation have negatively affected the value of fiscal revenues, the project targets for revenue collection were achieved with a notable increase in property-related taxes (281 percent) over the project periods (figure 2.1, panel b). However, challenges remain in ensuring the financial sustainability of the data collection system, which was mainly project supported and which underpinned revenue collection in the housing sector.

2.7   Despite achievements in increasing municipal revenue, financial sustainability of the municipality remains a challenge. The project supported the strengthening of municipal financial management revenue collection and expenditure management. Despite its growth, property tax revenue over time represents only 9–16 percent of total revenues (figure 2.2, panel a). The portion of current expenses covered by own revenue

during the 10-year program improved from 80 percent in 2007 to 120 percent in 2016, but since project closure, it has decreased to 91 percent in 2018 (figure 2.2, panel b). This drop can be associated with limited progress in implementing the Integrated Financial Management System to manage expenses; remarkable delays in both phases of the program resulted from problems with procurement and staffing, and technical and political economy issues.

Figure 2.1. Fiscal Cadastre and Property Tax Revenues

a. Fiscal cadastre, 2006–18
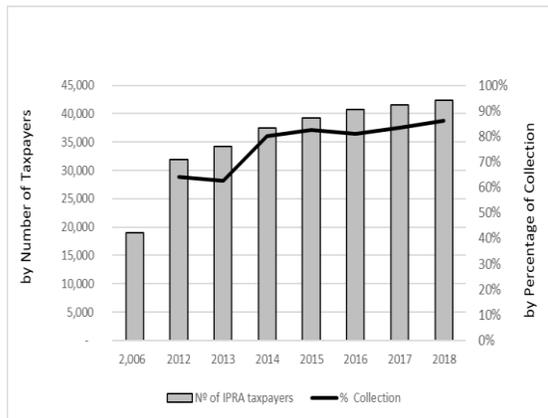
b. Property tax revenue, 2011–18
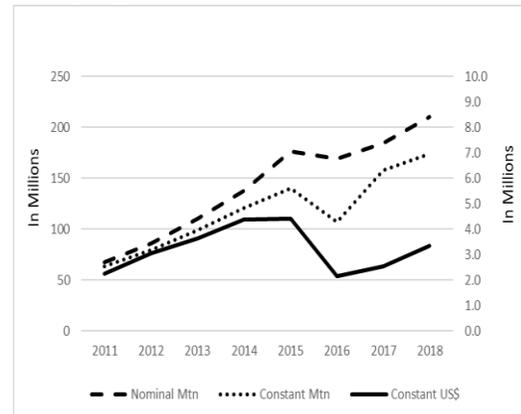
Sources: World Bank 2012, 2017b; CCM.
Note: IPRA = property tax; Mt = Mozambican metical.

Figure 2.2. Financial Sustainability Indicators

a. Property taxes to revenue collection, 2009–18
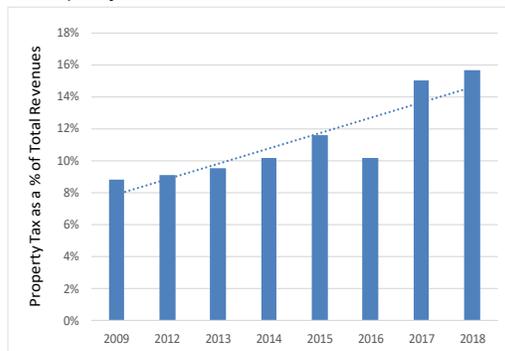
b. Own revenues to current expenditures, 2007–18
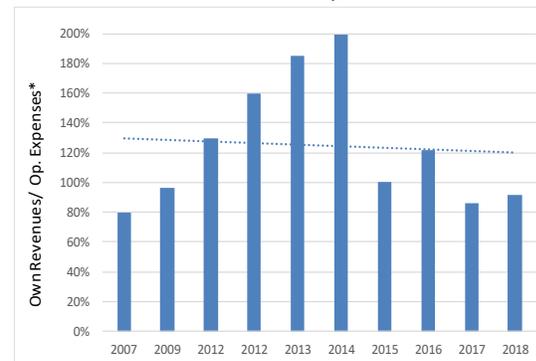
Sources: World Bank 2012, 2017b; CCM.
Note: Panel b considers change of accounting in 2016. Operators' fees are now classified as current expenditures.

7

Citizens' Increased Access to Improved Infrastructure and Service Delivery

2.8   The MMDP significantly expanded coverage of solid waste collection. Between 2006 and 2018, the CCM Solid Waste Management Department's reported collected and deposited urban solid waste increased from 253 metric tons per day to 885 metric tons per day, reaching 950 metric tons by 2018 (CCM 2017). All 43 Maputo suburban neighborhoods were served in 2011. The number of people served with regular solid waste collection rose from 100,000 in 2006 to 1.16 million by 2018. In addition, 590 jobs were created by 35 community-based organizations contracted for garbage collection by the CCM (World Bank 2012).

2.9   Notwithstanding this substantial gain in service delivery coverage, partial cost recovery and inadequate dump sites pose risks to the sustainability of the system. Cost recovery initially rose but then decreased; present levels are estimated to have declined to 2010 levels. The ratio of revenues from fees to costs shows an increasing trend (from 30 percent to 52 percent of costs between 2007 and 2018). But since cost recovery is only partial, this situation threatens sustainability (figure 2.3). Several factors explain this phenomenon, including (i) the CCM's inability to enforce collection on electricity bills, through which solid waste fees are charged; (ii) lack of information sharing between Mozambique's public electricity utility and CCM; and (iii) costly contracts with waste collection firms that were not reviewed for further improvement. Long-term contracts have expired and are being renewed for three to six months at a time, discouraging new investment and maintenance. In addition, the planned closure of the old waste dump and the opening of the new dump have not happened,[1] largely due to the government's delay in acquiring the land for the new landfill and in resettling the people who currently live there. This delay poses a significant threat to both the sustainability of the system and human welfare.

Figure 2.3. Solid Waste Collection Revenues and Cost Recovery, 2007–18

Sources: World Bank 2012, 2017b; CCM.
Note: CCM = City Council of Maputo; SWC = solid waste collection; SWM = solid waste management.

2.10   Support for transportation infrastructure has improved access in terms of mobility and land use. The two phases of the project collectively achieved the rehabilitation and extension of the Sebastião Marcos Mabote and the Nelson Mandela Avenues and the rehabilitation of key access, main, and secondary roads. This includes the rehabilitation of Julius Nyerere Avenue, a central avenue that crosses Maputo and links neighborhoods of the city that had been destroyed by flooding in 2000. Although this rehabilitation had significant delays and cost overruns due to technical design deficiencies (for example, lack of in-depth analysis of the drainage basin; an outdated engineering design prepared in early 2000), it was completed by project closure and showed tangible results. It helped improve mobility by reducing the travel time between two key squares from 45 to 7 minutes for an estimated 70,000 vehicles daily. APL II also is linked to a 16-fold increase in municipal expenditure in road maintenance (CCM 2017). Resources for road maintenance grew by 4 percent per year between 2017 and 2018, but considering that the inflation rate in 2018 was 3.9 percent, in real terms the growth has been practically zero.

2.11   The project also contributed to land use transformation. Investments in road corridors have also produced transformation in terms of land use. The Independent Evaluation Group carried out a spatial analysis of Sebastião Marcos Mabote and Julius Nyerere Avenues, roads rehabilitated by the program, which show significant shifts in land use in both corridors over time. On Julius Nyerere Avenue, the built-up area (that covered by housing or buildings) increased from 37 percent in 2009 to 57 percent in 2018 (figure 2.4).

Figure 2.4. Land Use Changes Before-and-After Road rehabilitation,
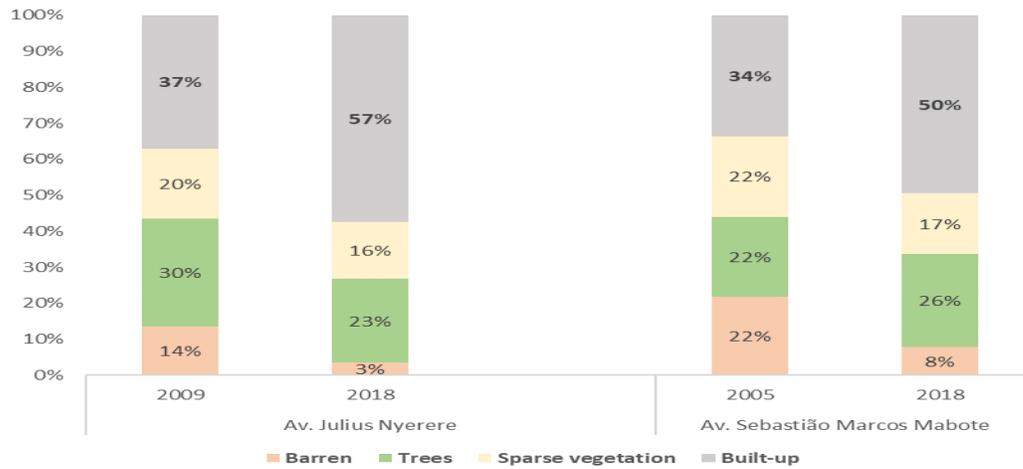
Source: Independent Evaluation Group.

2.12   Using observations from before and after the project, a difference-in-differences estimation was performed on the treatment and comparison areas with similar baseline characteristics around Julius Nyerere Avenue (see appendix C for methodology). Although both the treatment and the comparison areas show an increase in build-up, the increase is more pronounced in the treatment areas, suggesting that road improvements contributed to more densification around the corridor (figure 2.5). The increased build-up will likely increase property taxes, as the tax is determined mainly by the built space in the property itself. At the same time, the increase in build-up can drive up housing and land prices and force poorer residents to migrate far from their places of employment or even to unsafe living areas. Build-up is more pronounced in the project areas than in those outside the buffer zone.

Figure 2.5. Treatment of Julius Nyerere Avenue: Land Use Changes and Differences from Comparison Area

a. Built-up area, percentage change, 2009-18

b. Treatment versus comparison areas

Note: all the data are statistically significant at the 0.05 level.
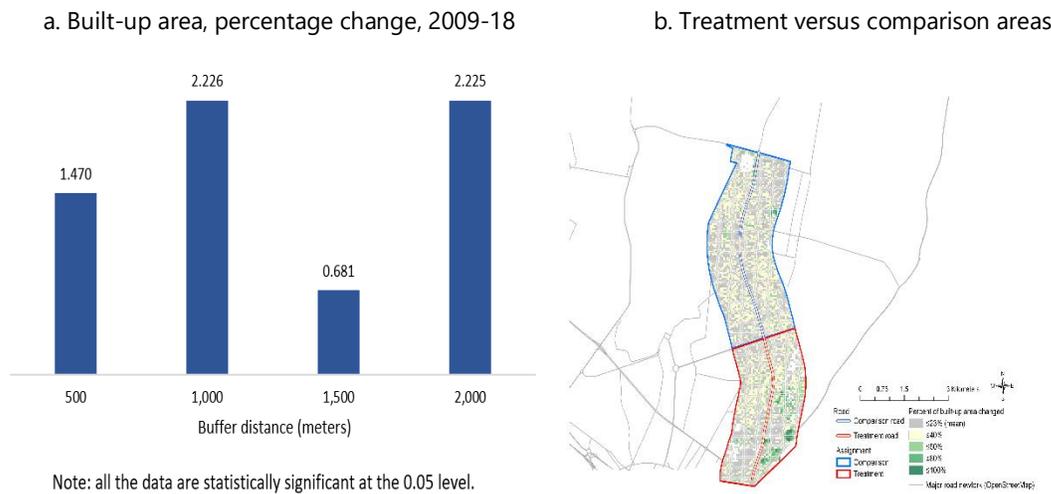
Source: Independent Evaluation Group.
Note: All the data are statistically significant at the 0.05 level.

2.13   The program achieved significant land tenure regularization, which has enhanced the security of beneficiaries but poses significant challenges to sustainability and operational efficiency. The project supported the development of the DUAT issuance program, in which more than 33,000 titles were issued by project close (CCM 2017). Since then, the number of titles issued has risen to 42,000 (CCM 2017). The program was supported by a firm that helped put in place administrative procedures, make available aerial photos, and conduct wide-scale field-level data collection. However, the firm left by project closure, and the land administration module (created as part of SIGEM) is only partly functional, and most of the work must be done manually. SIGEM requires software and hardware upgrades and a maintenance contract to become fully sustainable. These problems have created significant delays in DUAT issuance since project closure (see chapter 3). SIGEM must be fully functional to take full advantage of data and to more efficiently manage the planning of Maputo city and Greater Maputo.

2.14   Interviews conducted for this assessment of 160 persons in three targeted neighborhoods where residents had received DUATs reveal a widespread perception of increased tenure security. The interviews were designed to probe the project theory that persons who received DUATs would have increased tenure security and a higher quality of life (table C.14). Half of the DUAT holders interviewed reported an enhanced sense of security, and 9 percent reported enhanced gender security. In addition, the perception survey shows that households have made incremental physical

improvements to their properties, but no difference was observed between those with and without DUATs. Very few (6 of 160) DUAT holders interviewed reported using their house as collateral after receiving the formal title. At the same time, there was a general perception among DUAT holders that the value of their house had increased; but this cannot be attributed to the DUAT alone because of the complexity of the Maputo housing market.

2.15   The interviews also helped shed light on why many persons have not been able to finalize their land regularization. The assessment interviewed 173 persons in the project areas who had not received a DUAT. At least half of them had begun the process of regularization, but they had not finalized it by the time of the assessment. Several explanatory factors were provided, including processing delays and inability to pay registration fees (table C.13). For example, processing a title can currently take as long as 12 months. Interviews revealed a certain level of discontent with this, since the massive regularization program proved that the process could be conducted in as little as one month.

2.16   Project interventions in informal neighborhoods led to improvements in public spaces and access to and from the city center. The specific interventions in the George Dimitrov and Chamanculo C neighborhoods reduced flooding, decreased travel time to and from the city center, and offered residents improved public spaces such as squares and community centers. Before-and-after satellite images of the George Dimitrov neighborhood show a previously significantly flooded public space now dry; this square has become a central public space in the George Dimitrov community (figure C.3). In addition, a school was rehabilitated, informal street traders' use of public space was organized and improved, and a social development plan was prepared and partially implemented, benefiting local communities. These were the first interventions of CCM in informal settlements.

2.17   Moreover, a methodology for integrated neighborhoods upgrading in informal settlements was developed and has been replicated—but only on a relatively small scale so far. The methodology was the basis for a master's-level course in the Faculty of Architecture of Mondlane University (financed by the World Bank and the Italian Agency for Development Cooperation), which was attended by 98 professionals, and a manual on informal settlement upgrading, which was prepared under the project by the AVSI foundation (an Italian nongovernmental organization that had implemented this methodology in the Chamanculo C and George Dimitrov neighborhoods). AVSI is now using this same methodology in Pemba, Mozambique, in a project financed by the European Union. Part of the methodology has also been used in some small-scale and participatory projects focused on public space use. Based on these activities, AVSI has created a working group with stakeholders active in urban development, economic

empowerment of the poor, and active citizenship, including the Italian Agency for Development Cooperation and Architects Without Borders, supported by international funds. More important, the same methodology is to be replicated under a €16 million upgrading project of the Italian Agency for Development Cooperation in Chamanculo C.

What Worked, and Why?

Design and Preparation

2.18   The program design was a central part of the 10-year Municipal Development Plan, which was instrumental in promoting project ownership by city government. A comprehensive and articulated design was based on the selection of areas of support that were critical for CCM and for Maputo citizens. These included support of organizational design and human resources development, revenue collection and financial management, and the establishment of communication channels with citizens, as well as solid waste collection, road expansion and rehabilitation, urban planning and informal settlement upgrading, and land tenure regularization. These were also the pillars of the broader CCM development program (ProMaputo), whose main objectives were to raise the quality of life of municipal residents and create an environment conducive to investment and job creation.

2.19   MMDP design identified program priorities first through studies and diagnostics and then through exhaustive consultation with stakeholders. The project design was correct in addressing both the institutional strengthening of the municipality (including its fiscal and financial dimensions) and the selection of key service delivery and infrastructure investments. Institutional strengthening was necessary for achieving municipal gains and a sensible strategy to finance and implement actions that would concretely benefit citizens, thus demonstrating what is possible and building consensus to support institutional reforms themselves.

2.20   Given the long-term nature of institutional development and the low capacity of the targeted municipality, a programmatic approach was necessary. The sequencing—which involved building municipal capacity and then reinforcing that capacity through parallel investments in infrastructure and services—was appropriate given Maputo citizens' urgent need for improved services.

Implementation and Supervision

2.21   The project implemented innovative approaches jointly with the German Agency for International Cooperation to improve solid waste collection in the city through a dual model for reaching formal and informal areas. The dual system for formal and informal areas was designed by this agency but financed by the World Bank (BMZ

2012). A firm-based door-to-door collection system was established downtown, in the formal part of the city; in the informal part, characterized by narrow alleys of informal settlements, a cart door-to-door system run by a community-based organization was implemented. The community-based solid waste management system appears to be replicable in similar informal settlements.

2.22   Empowering citizens through a consultative approach helped not only to prioritize service delivery and address gaps but also to increase the level of accountability among the municipality, service providers, and citizens. Three citizen report card surveys were undertaken, and their results were widely disseminated through newspapers, television, radio, public forums, the internet, and other media. The objective was to help identify the main priorities for municipal service delivery and to help track progress in meeting citizens' demands. The citizen report card methodology was employed throughout implementation: public dissemination of its results was used as a key performance indicator for governance improvement activities supported under MMDP I and II. The citizen report card also increasingly collected and presented data at the submunicipal level to assist in the geographical targeting of service improvement.

2.23   Proactive coordination and constructive dialogue with the CCM, stakeholders, and beneficiaries were critical to enhance project performance. The World Bank supervision was proactive, building on a strong professional relationship between the World Bank team and CCM officials. The World Bank conducted regular supervision missions during the project's 10 years of implementation, as well as frequent video and audio conferences with the CCM between missions; it maintained a constructive dialogue with stakeholders and beneficiaries through the citizen report card. During supervision, missions' critical challenges were identified, and corrective measures were recommended during main road construction. Examples include updating technical designs after weaknesses in road and drainage works were identified and updating the Resettlement Action Plan after the appearance of informal settlements.

What Didn't Work, and Why?

Design and Preparation

2.24   Some lessons learned during the implementation of the first phase were not incorporated into the design of the second phase. For example, the Implementation Completion and Results Report for APL II notes that "being the natural continuation of its predecessor and the second phase of the APL, the project design *shares the strengths and some weaknesses of the MMDP I*" (World Bank 2017b). Although a consistent set of sectoral challenges would have been anticipated, the identification and handling of institutional risks could have been better integrated into the design of the second phase.

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2.25   The decision to mainstream implementation within the structure of CCM for financial management and procurement hindered knowledge flow and skills transfer in the municipality. One result of this design decision was the 68 percent cost overrun linked to contractual issues associated with the rehabilitation of Julius Nyerere Avenue.[2] The World Bank rectified the situation during the Mid-Term Review of the second phase by reverting to a project implementation unit which effectively separated the management of International Development Association funds and activities from the daily management of CCM's funds, and by hiring individual consultants to supplement financial and procurement functions. Although the move to use consultants improved project implementation, it missed the opportunity to fully build the financial management and procurement capacity within the CCM that would be important for its long-term performance beyond the project. The difference in remuneration between international consultants and local staff reportedly discouraged local staff from learning new skills or even performing tasks adequately. Such issues with borrower capacity are not uncommon in Mozambique. For example, a World Bank–financed rural investment in Mozambique faced capacity issues during its first phase (World Bank 2016a).

2.26   Given the scope of the program and its complexity, insufficient attention was paid to the institutional context and the political economy. Although the design drew on lessons from several countries and included integrated land administration features, it was insufficiently adapted to the local context. This stretched the local capacity to absorb, internalize, and institutionalize the required changes and negatively affected the project. Given the needs and the pace of urbanization, such scope might be justified. However, in a context of low capacity, poor governance, and dysfunctional land markets, an in-depth understanding of the political economy is required before developing such a comprehensive state-of-the-art program.

2.27   A long-term strategy was needed at the city level to ensure sustainability of achievements after the 10 years of programmatic support. Given the dynamic growth in the Greater Maputo area, and considering the positive but incomplete achievements emanating from APL I and II, the World Bank should have helped the CCM to put in place a longer-term strategy to support the sustainability of services after project closure. Although such a long-term strategy was envisioned during project implementation, it was not finalized at project completion. Such an exit strategy for the World Bank was critical, since at the time of this evaluation most successful MMDP activities are facing continuity challenges. For example, (i) the property tax database expansion slowed down as fieldwork stalled after the closure of the project and, consequently, the pace of property tax–based revenue collection growth reduced after project closure—as a consequence, coverage of current expenses by own revenues fell below 100 percent; (ii) the issuance of DUATs slowed down significantly because of lack of SIGEM

maintenance and interruption of data collection in the field; (iii) although solid waste collection under the dual system is operating and achieving full coverage, its financial sustainability and quality are progressively deteriorating; and, finally, (iv) the citizen report card, a key instrument to gauge perception and to communicate with citizens, did not continue after project completion despite the positive feedback obtained at the time of this evaluation.

2.28   The goal of achieving universal cost recovery through reliance on solid waste collection revenues was too optimistic. The solid waste management interventions achieved only half of the level of cost recovery envisioned at appraisal—54 percent versus 100 percent (CCM 2017)—suggesting both that the project target was too ambitious and that three years after project close, the achieved near-universal coverage seems unlikely to be sustained. Perhaps the planned cost recovery was too optimistic, and—especially for critical services such as solid waste management in Maputo—it would be advisable to design different scenarios for cost recovery and identify differentiated financial sources for covering costs (for example, taxes). Further, the solid waste management system suffers from little data on waste generation from ad hoc surveys, a decentralized management system, and few economies of scale in recycling (dos Muchangos et al. 2014)—all elements that, if addressed, would increase the system's efficiency and thus reduce its costs.

2.29   The risks of negative environmental and social effects were underestimated. The serious environmental and human health risks associated with the project's less-than-holistic focus on the solid waste management cycle undermine overall effectiveness. Although the service delivery reach of this project is impressive, efforts to achieve almost universal access to solid waste collection under the project were not matched by equal efforts to ensure appropriate disposal. Solid waste collection activities were conceived under the premise that a new sanitary landfill outside the Maputo municipality would be built by 2015 to allow the closure of the existing dump site in Maputo, which was already at its maximum capacity. However, by the time of this assessment, this had not taken place as conceived, showing that the risk of delays in constructing the new landfill was underestimated. The members of the trash-picking community at the existing site also suffer from health problems. If the program had developed alternative livelihoods as part of its resettlement package for residents at the location of the new landfill, construction might have been possible. Further, a modern sanitary landfill might contribute to solid waste cost recovery by allowing lower operation and maintenance costs and producing revenues from biogas generation.

Implementation and Supervision

2.30   Transfer of skills from consultants to staff often did not work as envisioned, weakening the sustainability of capacity building efforts. With weak local capacity, the project had to rely on external consultants to accelerate project implementation and to help transfer knowledge through on-the-job training and mentoring. Some of these consultants had an advisory role, and some a more operational one. However, the disparities in remuneration between international consultants and local staff discouraged local staff from learning new skills and performing operational tasks. In addition, given the urgencies to accelerate project activities, many (but not all) international consultants prioritized implementation over transfer of skills. Although consultants support project implementation, dependence on them may hinder long-term capacity building within the government agencies.

2.31   Citizen report cards were not used to best advantage to enhance governance and accountability outcomes of the project. Citizen report cards are tools to empower citizens. They show that program efforts of improving the provision of priority services did not translate into a perception of higher service quality. They should have been used to probe further the reasons behind this result and to help the municipality to devise a plan for corrective measures. Instead, citizen report cards were not used after project completion. Efforts to institutionalize community participation were wasted because they require commitment by government and an appreciation of their benefits. Community participation is expensive and must be justified through better decision-making and more satisfied citizens. The program's mechanism of establishing citizen reporting is relevant and in line with emerging findings from impact evaluations that show that citizen monitoring can lead to demands for better-quality public investments, which in turn can lead to improved welfare (Fiala and Premand 2018).

3. Lessons

3.1   In low-capacity settings, where cities are barely able to meet service delivery needs, it may be necessary to deliver critical services while incrementally building municipal capacity for sustained service delivery over time. The World Bank's approach in Maputo was appropriately sequenced to support strengthening the capacity of the CCM, especially by helping it to increase tax collection and revenue raising potential. It also helped deliver critical services that simultaneously improved the well-being of the city's citizens, providing opportunities for learning by doing.

3.2   Interventions in land administration require a thorough analysis of the local, institutional, and political economy conditions. Rapid urbanization often requires immediate action, even in contexts of low capacity, poor governance, and dysfunctional

land markets. However, given the high risk, a deeper understanding of ways to navigate the complex environment could help shape the interventions, with adequate tools and mitigation measures to achieve sustainable reforms.

3.3   Excessive reliance on external expertise can undermine knowledge transfer and ultimately sustainability in municipal development projects. The World Bank's support to the CCM is instructive: attempts to mainstream implementation within the structure of CCM in the first phase led to contractual oversight challenges and implementation delays. These delays prompted a switch to a dedicated program management unit in the second phase that relied heavily on international consultants. Although the switch improved project implementation, the hiring of and excessive reliance on external technical consultants, remunerated at a much higher rate than local staff, and the urgent need for the external consultants to focus first on service delivery created tension between the local and international staff. This situation resulted in a lack of knowledge transfer between the two groups. When selecting an approach, good project oversight must be balanced with long-term sustainability by ensuring that adequate capacity is transferred to local staff.

3.4   Achieving outcomes in solid waste management in low-capacity contexts requires a viable financial plan and mechanisms for capital and recurrent expenditures which may include contributions from national and local **governments, private partnerships, and user fees.** As the World Bank's investments in Maputo show, such a financial plan requires a certain level of public sector support to deliver basic services and to manage and supervise private sector contracts. Also, in such contexts, it is unlikely that the local private sector can fill all service delivery gaps. The project demonstrates that in such contexts, where service delivery needs to be rolled out incrementally, it is unrealistic to expect full cost recovery from the sector's own fees and resources. Rather, a viable financial plan for sustained service delivery requires mechanisms that involve multiple actors (providers and users) across the solid waste management value chain.

3.5   Although achieving universal access to solid waste management is a significant achievement in low-capacity contexts, outcomes are undermined if investment in waste disposal is insufficient, especially for the most vulnerable. The World Bank's support for solid waste management in Maputo lacked a value chain approach: universal access was achieved but the plan (outside of project financing) to build a sanitary landfill to ensure safe disposal was not achieved. Because the existing dump site in Maputo was already at maximum capacity, this plan was a vital part of the city vision to promote human welfare by improving the solid waste management sector. Waste disposal currently poses significant health and environmental risks to city residents. Risks are also associated with the health problems experienced by the trash-picking community at the

site and with the need for alternative livelihoods as part of a resettlement package. A modern sanitary landfill could also contribute to cost recovery by lowering operation and maintenance costs and by producing revenue from biogas generation.

3.6   Land use transformation brought about by infrastructure investments can contribute positively to the local tax base, but it can also negatively affect poorer residents when land and housing prices rise. As shown by the World Bank's support for infrastructure investments in Maputo, land use change (such as that resulting from road and drainage improvements) can stimulate private investment in housing and business development. If systems are in place, new formal housing units can be entered into the land registry and cadastre, and increased property tax collection can strengthen capacity for sustained service delivery. Likewise, business development can have multiplier effects on local job creation and growth. At the same time, an unmanaged process can quickly drive up housing and land prices in a way that forces poorer residents to migrate far from their places of employment or even to unsafe living areas (such as slums).

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[1] The site was opened in the mid-1960s with a planned capacity to operate for five years. The dump closure was initially planned for phase I and then was moved to phase II, but the original dump is still in operation and working beyond capacity.

[2] Specifically, this situation was caused by poor procurement, as the selected firm was not qualified to execute projects as complex as the rehabilitation of Julius Nyerere Avenue.

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Appendix A. Project Ratings

ProMaputo, Maputo Municipal Development Program I (P096332, IDA No. 42570)

Table A.1. ProMaputo, Maputo Municipal Development Program I

	ICR	ICR Review	PPAR
Outcome	Satisfactory	Satisfactory	Moderately satisfactory
Risk to development outcome	Negligible to low	Negligible to low	Substantial
M&E quality	n.a.	Satisfactory	Substantial
Bank performance	Satisfactory	Satisfactory	Satisfactory
Borrower performance	Satisfactory	Satisfactory	Satisfactory

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. M&E = monitoring and evaluation; PPAR = Project Performance Assessment Report; n.a. = not applicable.

Relevance of the Objectives and Design

Objectives

The project development objective (PDO) of phase I of the Maputo Municipal Development Program (MMDP) was "to strengthen the Maputo City Council's institutional and financial capacity to support achievement of long-term service delivery goals, and to implement selected priority investments" (World Bank 2007).

Relevance of the Objectives

The objectives of institutional development (which includes financial management) and investments in infrastructure and services were and remain **highly relevant** to World Bank and country strategies. First, the objectives were highly consistent with all pillars of the Country Assistance Strategy, 2004–07 (World Bank 2004), which aimed to support Mozambique in (i) improving the investment climate, (ii) expanding service delivery, and (iii) building capacity and accountability. Similarly, the objectives remained broadly aligned with the World Bank Country Partnership Strategy (CPS), 2008–12 (World Bank 2008) at project closing. The CPS emphasized support of competitiveness and employment to reduce vulnerability, improve resilience, and enhance governance and public sector capacity. Also, the objectives continue to be relevant to the current Country Partnership Framework for fiscal years 2017–21 and in line with two of its focus areas— (i) promoting diversified growth and enhanced productivity, and (ii) enhancing

sustainability and resilience—and with its objectives of improving economic management, improving the business environment, increasing accountability and transparency of government institutions, and promoting inclusive urbanization and decentralization.

Second, the project was and remains **highly relevant** to government and city plans. The project objective was fully aligned with the 10-year Municipal Development Program (2007–17) of the City Council of Maputo (CCM), whose main objectives were to raise the quality of life of municipal residents and create an environment conducive to investment and job creation. The program remains aligned with the five-year city plan that defines the governance principles and the city priorities. Relevant principles are transparency, budget management, and revenue increase, as well as combating corruption.

City priorities include management of urban land, rehabilitation and creation of infrastructure, transportation, and solid waste management, among others.

Third, the project remains relevant to the twin goals of ending extreme poverty and promoting shared prosperity.

Given the full alignment with World Bank and country strategies, as well as the municipal program and plan, the relevance of objectives is rated **high**.

Relevance of the Design

Design was a central part of the 10-year Municipal Development Program, which was instrumental in promoting project ownership by city government. The project design laid out a strong rationale for the selected interventions, and alternatives were considered both in scope and process aspects. The design was informed by extensive stakeholder consultations and the findings of municipal citizen report cards and studies before project preparation. The results framework included a logical link between the activities and the outcomes of the program. However, although rollout of interventions was planned in a phased manner, some interventions were too ambitious, particularly given the limited capacity of the municipality. The project was designed to be implemented within the structure of the municipality (without a project implementation unit). However, the success of this model relies on sufficient capacity and strong government ownership. These were identified as small to moderate risks at project approval, but as soon as a new government came in, moving the project forward became more difficult.

Given adequate overall design, but with some moderate shortcomings, relevance of design is rated **substantial.**

Efficacy

Objective 1: Institutional Capacity Strengthening

Rationale. It was reasonable to expect that institutional capacity strengthening supported by training in a broad range of areas, organizational restructuring, a human resources management plan, salary incentives, process simplification studies, a strategic plan for information systems, anticorruption strategies, a public-private partnership strategy, spatial planning, urbanization plans, and pilot infrastructure and service delivery, would eventually lead to increased retention, attract new staff, and improve efficiency. These, in turn, would result in strengthened capacity of the municipality.

Outputs. Given the limited capacity at the outset, different interventions were rolled out in parallel. A number of technical advisors were brought in to help transfer knowledge to local staff. A human resources management plan was developed. To identify the capacity gaps of human resources, (i) a full functional analysis was undertaken, followed by (ii) an aggressive recruitment plan for staffing CCM units, based on young graduates' hiring financed by the World Bank, together with (iii) a performance-based bonus (see box A.1), also financed by the World Bank, to motivate and retain staff, who might otherwise seek higher salaries elsewhere. Organizational redesign of all 29 CCM units was carried out, reaching the target of 100 percent. As an example, the CCM Department of Infrastructure was redesigned into five sectors: Studies & Projects, Sanitation & Drainage, Streets & Paths, Buildings, and Gardens, and was separated from the Urban Planning and Environment departments with which it was previously integrated. In Urban Planning, Land Concession was merged with Building Licensing. In parallel, a jobs description manual and a competence assessment were delivered.

Although no targets were set at approval, extensive training (3,573 trainees from 29 units) was carried out for CCM staff;[1] several themes were covered (for example, behavior, technical skills, general management, English, procurement, health, administrative procedures, financial management, taxation, school management, urban planning, and machine operation). Training sessions were designed to adjust the skill profile of staff to the CCM goals parallel to the organizational redesign of roles and responsibilities. Training was undertaken by international firms; by individual consultants from Portugal, Spain, and Brazil; and by the African Management Institute.

A master plan (Structural Urbanization Plan) was a priority for Maputo to help guide its disorderly growth. The Faculty of Architecture and Physical Planning of Mondlane University in Maputo was invited by the World Bank and the CCM to participate in the development of the Maputo master plan, which was considered an elementary but participatory master plan, containing a diagnostics and planning document. A futuristic

vision for the city of Maputo was expected to be delivered in MMDP II but did not materialize. In addition, partial urbanization plans were elaborated for 11 Maputo neighborhoods—including informal settlements, where urbanization plans are the necessary basis for issuing land use rights to residents. Finally, a land management and land cadastre geographic information system (Integrated Information Management System [SIGEM]) was not fully developed at completion and was moved to the project's second phase (MMDP II).

Additionally, three citizen report card surveys were conducted in 2007, 2008, and 2010 to collect information on Maputo residents' priorities and evaluation of municipal services. These report cards were part of a broader strategy to open channels of communication between the CCM and citizens. As discussed further below, the citizen report cards were instrumental in selecting some of the services to be improved under the project.

Outcomes. The project enhanced institutional capacity stated at approval. According to the Implementation Completion and Results Report (ICR) only 1.5 percent of the CCM's 2,500 staff had attended university. As of 2018 about 20 percent of the 2,700 staff had a bachelor's degree of or higher. A performance bonus plan was put in place to make employment more attractive, although given the limited capacity, it was a simple plan based on educational level and minimum targets achieved (see box A.1). Retention of qualified staff (high school or university diploma) has remained at the project closure levels (CCM 2017). These results show that more staff are better qualified in terms of education levels but not in competency and expertise mainly because a competency plan has yet to be developed by the municipality.

Box A.1. Performance Bonus Plan

The bonus plan—which is still in place—includes a 15 percent salary increase and a rudimentary performance bonus. A bonus plan was implemented, rather than a mere salary increase because the latter could not be financed by World Bank resources. The bonus plan was meant to make municipal employment attractive compared with the national government civil service and, to some extent, with the private sector. However, it was based on level of education rather than on skills and performance, and it was given to staff with technical and graduate degrees who complied with minimum targets such as activities over a certain period and attendance at the office. In practice, as an interviewee said, it is an incentive for people to go to the office, to establish discipline and retain staff rather than to improve performance. The relation of salary to performance, however, is complex: salary scales cannot be separated from position and skills, and performance must be measured by sophisticated evaluation methods. A Career Competence Plan would help establish benchmarks for bonus calculation, but it has not yet been prepared (see the MMDP II section).

Transfer of knowledge had mixed results as a high number of (mainly expatriate) consultants had to be hired by the CCM itself because of the decision to streamline

project implementation into CCM structure. Some of these consultants had an advisory role, and some a more operational one. Nevertheless, the huge disparity in remuneration between international consultants and local staff had a discouraging effect on the latter, often causing them refuse to execute operational tasks and forcing advising consultants to execute them themselves. The human resources sector mentions the case of a Portuguese consultant who explicitly allocated part of his consultancy time to workshops for capacity transfer to local staff and who left manuals and teaching material for continuous capacity building.

Tangible results of the Maputo master plan and the 11 urbanization plans are not clear. Interviews reveal that there has been little use of the master plan and the partial urbanization plans. Development of SIGEM, the land management and land cadastre geographic information system, began but was incomplete at project closure and continued during MMDP II. SIGEM under MMDP II was partially successful as it facilitated land tenure regularization and helped increase property tax collection. However, it was unsuccessful in achieving an integrated corporate system (for different CCM sectors and databases) whereby the land plot would be the common data reference. More detail on SIGEM is in box A.2.

Box A.2. Integrated Information Management System

The Integrated Information Management System (SIGEM) was meant to be the backbone information system on which to structure the institutional development of the City Council of Maputo (CCM). Initially, it was developed by Esri, a major supplier of geographic information software, with the CCM Urban Planning department, in a pilot phase (SIGEM 1 in 2007–10). It was begun as a geographic information system with the intent to make it multifunctional, linking urban land management to infrastructure licensing. But because the Infrastructure Department had its own system already, SIGEM kept its geographic focus. A geographic database was constructed from aerial pictures with land plots, streets, infrastructure, and so on, creating a geographic cadastre (GEOSIGEM). Other modules were developed (such as PROSIGEM) for all physical processes associated with land—these were digitized (for some plots these data already existed on paper, such as landowner identification, year of concession, and so on) and entered into databases. Currently the system is partially operational. It has glitches, has not been serviced or updated, and lacks the financial support for long-term sustainability.

Objective 2: Financial Capacity Strengthening

Rationale. It was reasonable to expect that expansion of coverage of property cadastre, reassessment of a new formula for property value, and organization of distribution of property tax bills, together with finance staff training, would eventually lead to increased municipal revenue. This in turn would result in strengthened financial capacity of the municipality. It was also reasonable to expect that improving the

management of expenditures—by implementing a financial management system and a planning and budgeting methodology and producing an expenditure framework— would likewise strengthen financial capacity.

Outputs. To increase tax revenue collection, focus was put on property tax (and, secondarily, on vehicle licensing fees; table A.2). The finance department of the CCM lacked experience or a formula to calculate tax value of properties. As land was (and still is) formally state owned, establishing criteria for property taxation was something new for the CCM. Extensive training for managers and technicians in municipal revenue management took place. Training included lectures on national legislation and practical classes on proposal of regulations. A law (decree 61/2010) was passed in 2008, and the property value formula was reassessed from a flat fee to a formula based on construction costs, to more realistically assess the value of properties. Coverage of property cadastre expanded, through both merging of databases and fieldwork, from 13,000 to 28,000 new registries in 2010, surpassing the targets. However, on the management of expenses, results were not as expected. Despite being a project trigger, the Integrated Financial Management System (SIGEF) was not completed and was moved to the second adaptable program loan (APL) phase. But in the end, it was not implemented for several reasons, including failures in procurement (due to complex terms of reference and contracting of a poorly performing company), technical issues (the system conception was too ambitious for CCM capacity and relied too much on World Bank expertise), and hidden interests (not all actors favored transparency and accountability in expense management). Other activities were executed, such as elaboration of an expenditure framework, revision of planning and budgeting methodology, and completed audits of financial statements for 2008, 2009, and 2010.

Table A.2. Summary of Fiscal Performance, CCM, 2017–18

	Baseline 2007	Target at Completion 2012	Completion 2010	Current 2018
Fiscal revenues/total revenues *(%)*	32 (2005)	n.a.	44 (2012)	41
Own revenues/current expenditures *(%)*	80	100	130	91
Coverage property cadastre	6,000	n.a.	34,000	40,684 (2016)
Additional coverage	13,000	18,000	28,000	27,684 (2016)
Share of total property taxes paid *(%)*	n.a.	n.a.	64	86
Property taxes as % of municipal revenues	n.a.	n.a.	10	16
Share of total properties registered in Maputo *(%)*	5 (2005)	n.a.	n.a.	30

Sources: World Bank 2012, 2017b; CCM.
Note: CCM = City Council of Maputo; n.a. = not applicable.

Outcomes. The number and value of households paying property taxes increased, resulting in increased revenue collection. The property value regulation is of national scope, so benefits will go beyond the municipality of Maputo. However, the new formula has limitations because it is based on arbitrary construction costs. It also limits the variations due to location and building depreciation, thus significantly reducing potential municipal revenues and creating a form of regressive property taxation (World Bank 2017c). Even with this limitation, property taxes as a percentage of municipal revenues have continued to increase since project completion, from 10 percent in 2010 to 16 percent in 2018. In contrast, adequate management of expenditures was not achieved because the management system was not implemented. Revenues over expenditures moved from 80 percent to 130 percent, but since project closure they have declined to 91 percent.

Objective 3: Improvement of Service Delivery

Rationale. It was reasonable to expect that improvements in institutional, financial, and spatial planning and in land administration and management capacity, along with some priority infrastructure investments such as road improvements, would lead to improvements in the delivery of municipal services.

Outputs. Roads were rehabilitated and solid waste collection expanded. Eleven kilometers of two roads (Sebastião Marcos Mabote and Nelson Mandela Avenues) were rehabilitated and expanded, street lights were installed, and 74 kilometers of unpaved roads were regraveled. Overall, 85 kilometers of roads were rehabilitated, surpassing the target of 20 kilometers. In addition, improving solid waste collection was a priority for CCM as well as for the population, as revealed by the citizen report card and other stakeholder consultations. The first action in this area was the reorganization of the sector responsible for solid waste collection management, which created specific units for planning, monitoring, control, and so on. It also opened the area to private sector participation through international bidding. Waste collection is based on a dual model system for formal and informal areas as designed by the German Agency for Technical Cooperation and financed by the World Bank. A firm-based door-to-door typical collection system has been established downtown, in the formal city; and, in the informal city, a contracted cart door-to-door system run by a community-based organization has been set up, in which waste is delivered to containers and then collected by another contracted firm. The reason for using the cart system is that trucks cannot drive through the narrow alleys of informal settlements. By project completion, two solid waste collection contracts were established with firms (one covering the urban core and the other the suburbs), selected through a competitive process assessing about 35 local microenterprises for the cart collection. Contracts vary based on population and neighborhood characteristics. At project start, the capacity for waste collection was only

250 metric tons; it almost tripled by project closure to 650 metric tons, thus surpassing the target. Capacity has continued to increase, reaching 950 metric tons in 2018. The service cost is partly covered by the waste fee; this fee is collected as part of the electricity bill through Mozambique's public electricity utility (EDM), which retains part of the fee. This model was replicated throughout Mozambique.

Outcomes. The joint support of the World Bank and the German Agency for Technical Cooperation enabled the improvement of solid waste collection. Fees significantly increased from $0.9 million to $3.3 million at project closure but have declined from 2015 to 2018 (table A.3). EDM charges a fee, which was reduced progressively (from 25 percent, to 15 percent, to 5 percent). Cost recovery has improved, but management of solid waste is still not self-sufficient. The revenues from fees over costs show an increasing trend but cover the costs only partially (from 30 percent in 2007 to 52 percent of solid waste management costs in 2018) (figure A.1). Possible reasons for this are (i) the CCM's lack of enforcement capacity; (ii) lack of transparency between EDM and CCM; and (iii) the need to review waste management contracts for further improvement. Long-term contracts have expired and are being renewed for three to six months at a time, discouraging new investment and maintenance. Closure of the waste dump initially planned for phase I was moved to phase II but never achieved. The main reason is the government's delay in acquiring the land and resettling families from the selected site.

Table A.3. Solid Waste Collection, Main Results 2007–18

	Baseline 2007	Target at Completion 2010	Completion 2010	Current 2018
Solid waste collection fees *($, millions)*	0.9	n.a.	3.3	2.8
Solid waste collection capacity *(MT per day)*	253	600	650	885
Solid waste collection coverage *(%)*	40.5	n.a.	66	100
Jobs created	0	n.a.	590	n.a.
Increase in containers	25	n.a.	110	n.a.

Sources: World Bank 2012, 2017b; CCM.
Note: MT = metric tons; n.a.= not applicable.

Figure A.1. Solid Waste Collection Revenues and Cost Recovery, 2007–18
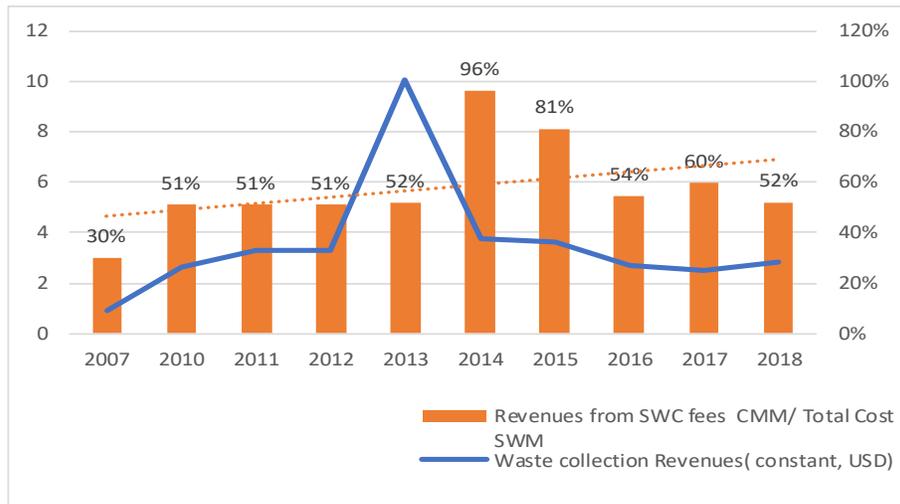
Sources: World Bank 2012, 2017b; CCM.
Note: CCM = City Council of Maputo; SWC = solid waste collection; SWM = solid waste management.

Overall Efficacy Rating. As both intermediate outcomes and the final outcomes were almost fully achieved, overall efficacy is rated **substantial.**

Other Important Results

The program contributed to land use transformation. Investments in road corridors have also produced other transformations in terms of land use, according to a spatial analysis of the rehabilitated area, and there have been significant changes in land use over time. The Independent Evaluation Group (IEG) carried out spatial analysis of Sebastião Marcos Mabote Avenue (see appendix C for methodology). Results show that in a 2-kilometer area around the corridor, built-up areas have increased from 34 percent to 50 percent from 2005 to 2018 (figure A.2). The increase is more pronounced in areas outside the buffer zone.

Figure A.2. Land Use Changes over Time, Sebastião Marcos Mabote Avenue, 2005–18
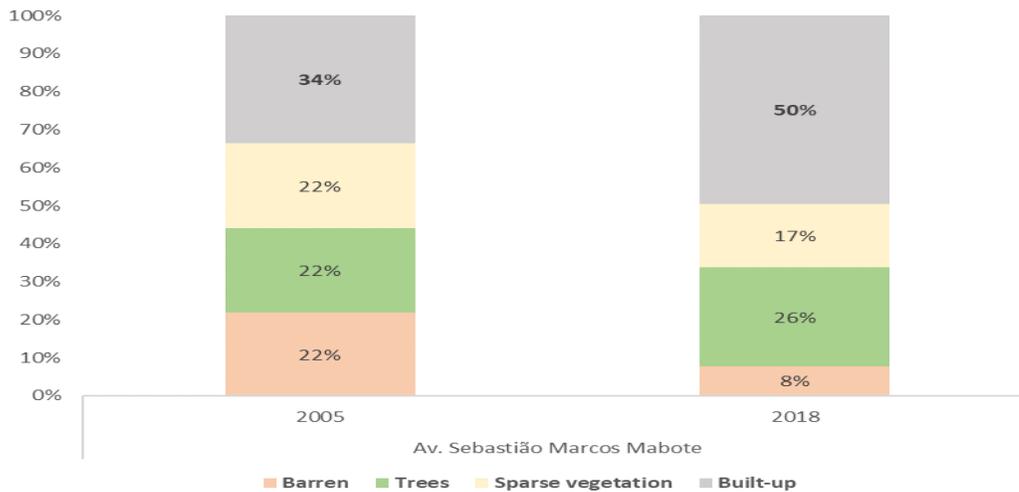
Source: Independent Evaluation Group.

Efficiency

The project appraisal document (World Bank 2006, 79–92) drew on an economic analysis that was undertaken primarily for infrastructure and service delivery improvements. The methodology used was cost-benefit analysis of "with-project" and "without-project" cases. The investments cover priority streets and main urban arterial roads. The project appraisal document's analysis covered selected interventions under component C (Municipal Service Delivery). The analysis did not address activities related to components A and B (Institutional Strengthening and Municipal Finance) because they are the foundations of the benefits from the Infrastructure Service Delivery Improvements component.

The cost-benefit analysis of the civil works is based on detailed cost and traffic data collected as part of the appraisal. Costs and benefits include vehicle costs, accidents, and benefits from diversified traffic using the highway development management model. Some potential benefits associated with the investment were not quantified due to lack of data (these benefits arise from savings in travel time, accident savings, additional income coming from rental properties that would have improved access, and savings from the prevention of damage to roads, properties, and structures due to improvement in drainage). The cost-benefit ratios were favorable under both worst- and best-case scenarios, showing that the program provides a significant return on investment.

The ICR calculated the economic rate of return of one of the two main roads that the project supported (World Bank 2012, 15–18). Sebastião Marcos Mabote Avenue's main

quantified benefits were related to improvements in vehicle operating costs due to better road quality. Both net present value and economic rate of return were slightly higher than projected. However, the project did not quantify additional benefits such as reduced travel times, rising property values as land is converted from agricultural use to housing and business use, inclusion of drainage systems to reduce storm water damage to the road, and creation of walkways. The story is similar for Nelson Mandela Avenue, but no net present values of economic rate of returns were calculated. These major roads connect the core city to outlying areas and to the highway that connects Maputo to the northern parts of the country. The unit costs of rehabilitating and regraveling roads were well below the average for African countries (World Bank 2008).

The cost-benefit analysis for solid waste management was calculated based on cost recovery. This methodology is inconsistent with that provided in the ICR. The ICR compared the costs of delivering solid waste services in Maputo with those in other medium-size cities in developing countries. Moreover, information provided during the IEG mission confirmed that cost recovery has not been achieved. Coverage from solid waste management service was at only 51 percent of costs at project closure and was tat 52 percent in 2018.

The project closing date was extended for one year, from August 31, 2010, to August 31, 2011. The decision at approval to not have a project implementation unit but rather to mainstream implementation within CCM led to implementation delays, mainly due to the very weak capacity of the municipality at project approval. The extension was granted to complete the ongoing activities, including the development and implementation of SIGEF and financing of contracts for solid waste management services until the contracts' end dates. The impact of the stated delays was moderate on project operations, and, except for SIGEF, targets were achieved in project areas throughout implementation.

Given the significant cost-effectiveness of the road improvements, lack of cost recovery for solid waste management, and moderate shortcomings in administrative and operational efficiency, overall efficiency is rated **substantial.**

Outcome

Overall outcome. Given **high** relevance of objectives, **substantial** relevance of design, **substantial** efficacy, and **substantial** efficiency, overall outcome is rated **moderately satisfactory,** indicative of essentially minor shortcomings in the project's preparation, implementation, and achievement.

Risk to Development Outcome

The risk to development outcome is rated **significant.** All the risks identified in the ICR and ICR Review remain relevant at the time of this evaluation.

The risk to maintaining the capacity building support of the project is moderate. Most staff were trained and mentored under the project in several aspects: financial management, procurement, contract management, urban and strategic planning, human resources management, communications, and information management. Though CCM staff turnover has remained stable, there has been turnover of the young university graduates recruited during implementation. In addition, (i) the staff bonuses were not based on performance, and although they have increased the CCM salaries, these remain lower than those in the private sector, and (ii) the disparity of salaries between consultants and local staff was a disincentive to enhancing local capacity and generated discontent among local staff.

The risk of sustainability of the solid waste management is substantial. The CCM has yet to achieve full cost recovery for solid waste management. Solid waste operating companies have been receiving short-term contract amendments, which do not allow them to plan long-term upgrades and maintenance. The CCM short-term debt with these companies has been increasing. In addition, the new landfill is not yet operating due to delays in land expropriation, and the current landfill is operating over its capacity.

Sustainability of the operations is considered substantial risk. CCM's sustainability will depend on its ability to mobilize increasing amounts of own-source revenue. Key components to achieve this rely not only on improving the revenue side but also on enhancing transparency and accountability of public financial management system activities and strengthening procurement and internal controls, both of which were significantly delayed and not implemented due to political economy issues.

Bank Performance

Quality at Entry

The project was designed as part of the broader ProMaputo Municipal Development Program, which was instrumental in promoting the mayor's and CCM's project ownership. Project design also benefited from the government's strong participation and used feedback from beneficiaries to determine objectives, activities, financing priorities, and implementation arrangements. The design was sound in its strategic relevance, selection of instruments, and phased approach. However, a flaw in the design was the planning of too many actions on too many fronts at the same time in relation to the local

capacity to absorb, internalize, and institutionalize changes. A more gradual and better-focused approach might have generated more sustainable results. Also, given the weak capacities of the municipality, it was overly optimistic to mainstream the activities within the CCM structures. Although preparation anticipated and mitigated potential implementation risks, the structures with insufficient fiduciary and procurement capacity were not adequately identified, and the high risk that uncertain political commitment poses to project success was underestimated. Quality at entry is rated **moderately satisfactory.**

Quality of Supervision

In terms of supervision, there were three task team leaders during implementation. Supervision was reportedly proactive, building on a strong professional relationship between the World Bank team and CCM officials and carried out through 11 regular supervision missions during the project's four and a half years of implementation, as well as frequent video and audio conferences with the CCM between missions. The team maintained a constructive dialogue with stakeholders and beneficiaries through the citizen report card surveys. The team carried out a focused Mid-Term Review, which was a comprehensive assessment of progress toward development objectives and implementation performance. It confirmed the overall relevance of the project, its objectives and key performance indicators, its design, and its implementation arrangements. It also identified implementation challenges and recommended extending the project's closing date by one year to allow sufficient time to complete key activities and achieve its objectives. The quality of **supervision** is rated **highly satisfactory.**

The aggregation of both subratings for quality at entry and supervision indicate an overall Bank performance rating of **moderately satisfactory.**

Borrower Performance

As previously indicated, the project was a central piece of the 10-year ProMaputo Municipal Development Program. This was instrumental in promoting the mayor's and CCM's ownership of the project. The loan was issued in the name of the national Ministry of Planning and Development, but the ministry played only a minor role as project management, and resources were transferred to the CCM.

Initially, the CCM's internal structure was responsible for project implementation. Due to very weak capacity, this arrangement led to significant delays with procurement, financial management, and contract management. Ownership and commitment to achieving development objectives were strong during the first two years of implementation as demonstrated through policy, institutional support, and budgetary

allocations. However, approximately two years after project approval, a new mayor was elected, and the level of commitment decreased and contributed to further implementation delays.

Implementation challenges in procurement and financial management were identified in the Mid-Term Review and pointed to hiring of a full-time procurement specialist to submit an action plan. This plan called for a fully operational procurement unit to achieve sustainability in the long term and agreed to extending the project's closing date by one year to allow enough time to complete key activities.

Overall government performance is rated **moderately satisfactory.**

Quality of Monitoring and Evaluation

Design

The project's indicators were appropriately linked with the intermediate and final outcomes. The key indicators included baseline data and measurable targets set at appraisal, but there were insufficient indicators to assess improvements to institutional capacity, which were considered necessary for improvements in service delivery. The PDO-related outcome indicators and two intermediate outcome indicators served as triggers for phase II. Due to their efficacy, many of the indicators were retained in phase II to monitor progress over time.

Implementation

A monitoring and evaluation (M&E) system was integrated with other systems of administration, and line managers in each directorate were assigned responsibility for collecting data in their areas of purview and providing them to the CCM's Office of Strategic and Institutional Development. Initially, M&E implementation faced challenges due to CCM's lack of experience with it (World Bank 2012). Under the M&E system, for instance, the CCM project manager began to present project updates (by means of a "traffic light" dashboard where project activities were ranked as green, yellow, or red according to their performance) to the CCM assembly each week. This fostered the project monitoring function and the diffusion of its results among key CCM decision-makers.

Use

Apart from the routine use of M&E during implementation, the findings were used by the government to inform the broader ProMaputo program.

Considering all aspects of M&E, its overall quality is rated **substantial.**

Maputo Municipal Development Program II (MMDP II) (P115217, IDA No. 48110)

Table A.4. Maputo Municipal Development Program II

	ICR	ICR Review	PPAR
Outcome	Satisfactory	Satisfactory	Moderately satisfactory
Risk to development outcome	Modest	Substantial	Substantial
M&E quality	n.a.	Substantial	Substantial
Bank performance	Satisfactory	Moderately satisfactory	Moderately satisfactory
Borrower performance	Satisfactory	Moderately satisfactory	Moderately satisfactory

Note: The Implementation Completion and Results Report (ICR) is a self-evaluation by the responsible Global Practice. The ICR Review is an intermediate Independent Evaluation Group product that seeks to independently validate the findings of the ICR. M&E = monitoring and evaluation; PPAR = Project Performance Assessment Report; n.a.= not applicable.

Relevance of the Objectives and Design

Objectives

Phase II continued to strengthen capacities as well as to scale up municipal service delivery and infrastructure investments. The PDO of APL phase II was "to improve the delivery and sustainability of priority municipal services in Maputo Municipality" (World Bank 2010).

Relevance of the Objectives

The objectives of phase II were in line with those of phase I, focusing on institutional development and sustainability of infrastructure and urban services; as a result, they remain relevant to World Bank and country strategies. First, the objectives were aligned to phase I and highly consistent with all pillars of the World Bank CPS 2008–12 (World Bank 2008) at project approval and with World Bank CPF 2017–21 (World Bank 2017a) at project closing. The CPS 2008–12 emphasized support of (i) competitiveness and employment to reduce vulnerability and improve resilience, and (ii) enhancing governance and public sector capacity. The latter objective is fully in line with the two focus areas of promoting diversified growth and enhanced productivity, and enhancing sustainability and resilience, and with its objectives of improving economic management, improving the business environment, increasing accountability and transparency of government institutions, and promoting inclusive urbanization and decentralization.

Second, the project was and remains relevant to government and city plans. The project objective was fully aligned with the CCM's 10-year Municipal Development Program (2007–17), whose main objectives were to raise the quality of life of municipal residents and create an environment conducive to investment and job creation. The PDOs contributed to the country's Five-Year Development Plan 2015–19 by supporting two of the plan's five priorities: improving productivity and competitiveness, and developing economic and social infrastructure. The program remains aligned with the five-year city plan that defines the governance principles and the city priorities. Relevant principles are transparency, budget management, and revenue increase, as well as combating corruption. City priorities include management of urban land, rehabilitation and creation of infrastructure, transportation, and solid waste management.

Third, the project remains relevant to the twin goals of ending extreme poverty and promoting shared prosperity.

Given full alignment with World Bank and country strategies, the relevance of objectives is rated **high.**

Relevance of the Design

The project design is part of a two-phase approach. As with phase I, design was a central part of the 10-year Municipal Development Plan, which in turn was instrumental in promoting project ownership by city government. Its priorities to focus on improving roads and service delivery of solid waste management followed extensive consultations with stakeholders. The results framework included a logical link between the activities and the outcomes of the program. However, there were specific design shortcomings that affected the achievement of interventions. First, institutional capacity was overestimated. The SIGEF component under phase I was significantly delayed (and eventually did not materialize); and although the capacity constraints and the complexity of the system were noted in the Mid-Term Review of phase I, the activities and components were not reformulated in the design of phase II. A second design shortcoming was the emphasis on an increase in revenues and fees but without a holistic perspective regarding the risk of not building the new landfill site. A third shortcoming was the deficient technical design of the Julius Nyerere Avenue rehabilitation, including (i) lack of an in-depth analysis of the drainage basin, which became an issue during execution, and (ii) the design of the road, which did not consider informal growth. These shortcomings were addressed in the 2013 Mid-Term Review.

Given the adequate overall design, but its significant shortcomings, relevance of design is rated **modest.**

Efficacy

Objective 1: To Improve Delivery of Municipal Services

Rationale. It was reasonable to expect that improvements in the delivery of municipal services would follow from improvements in institutional development (through strengthening of managerial and technical capacity via training, retention of qualified staff, and technical expertise) and from improvements in municipal fiscal performance, urban planning, investments, and maintenance in priority sectors (road infrastructure, informal settlements, and solid waste collection).

Outputs. Phase II shows mixed results. During phase II further training was given to 3,523 staff, and CCM staff salaries increased. The salary bonus plan continued during APL II. The results of annual citizen report cards were disseminated, and a manual for massive secure land use tenure was prepared and implemented. Processing of licenses for construction, microenterprises, and semicollective transport vehicles was realigned. CCM's policies were disseminated among citizens. Property tax registries in cadastre increased from 20,000 in 2010 to 40,000 in 2018. Reassessment of property values was finalized. Land Use Spatial Plans were prepared, covering 30 neighborhoods. The Faculty of Architecture at Mondlane University and contracted private firms prepared a significant number of partial urbanization plans (detailing land use and zoning), which in some rare cases included more detailed partial plans (which include land parceling) and in some instances included structural plans for specific areas (such as the reform of the Baixa neighborhood and Marginal Road area). In addition, several sectoral plans, which were being prepared by other agencies (regarding transportation, sanitation, and drainage), were meant to be integrated, but resources for these had to be shifted due to the rising costs of the Julius Nyerere Avenue rehabilitation. Thus in the end, the only strategic plan that was completed for the city was the original 2007 master plan. Two informal settlements were improved through upgrading pilot interventions. Additionally, a master's degree program on upgrading informal settlements was created and implemented by the Faculty of Architecture. The program ran for three years and trained 98 students, 52 of whom completed a dissertation and graduated. Now new master's and PhD courses on regional and urban planning are being launched, supported by the Italian Agency for Development Cooperation and the Polytechnic University of Milan. These will include modules on upgrading informal settlements.

Outcomes. **Institutional capacity development improved**. Municipal management and technical capacity have improved. The number of qualified CCM staff grew from 112 to 545 and now includes 507 graduates, 34 with a master's degree and 4 with a PhD; retention of staff with a high school diploma or a higher educational level is stable. However, it must be stressed that 285 CCM staff members are still illiterate, and that the

largest group of CCM employees comprises unskilled auxiliaries (826). According to interviews, salaries in the municipality remain low. A graduate employed by the municipality receives one-third the salary that would be offered in the private sector. Additionally, the human resource department has no Career Competence Plan, an activity that was canceled under the project. In the long term, it is important to set milestones for staff career advancement and standards to be used as benchmarks for performance measurement—elements that would help the municipality better compete with the private sector. Efforts to strengthen capacities are still needed.

Financial capacity has been partially strengthened. The project supported the strengthening of municipal financial management revenue collection and expenditure management. Fiscal (property tax) revenues improved due to land reassessment and a significant effort to accelerate massive land regularization titles, begun after the 2013 Mid-Term Review. However, revenues were affected by inflation and the currency devaluation in 2016. Targets were, however, achieved. The main pillar of expenditure management, SIGEF, was not implemented due to lack of political commitment because not all actors favored accountability and transparency. The percentage of current expenses that are covered by own revenue slightly increased from 96 percent at project approval to 98 percent at project closure, close to the target of 100 percent; however, this ratio not only varies significantly from year to year but also has declined to 91 percent since project closure.

Urban planning and management of urban space has improved but longer-term outcomes are not yet visible. The SIGEM urban planning module allowed massive regularization of land use titles that surpassed targets (30,800) at completion (33,057). Since project closure the number of land use titles has increased to 42,023. During this evaluation, a survey was conducted with beneficiaries of the massive land regularization (see appendix C for methodology and survey results). About 73 percent of beneficiaries of massive regularization report that their life changed with the right of use and access to land (DUAT) title (table C.14). The main benefit reported is security (50 percent). However, results also show that having a title is not tied to physical improvements, and very few beneficiaries have used their house as collateral. Despite the complex housing market in Maputo, about 72 percent of families perceive that housing prices have increased, although the increase is not necessarily linked to having a DUAT. Other outcomes of SIGEM are not yet visible, and the platform was not effective in integrating other modules and databases in the system. Partial urbanization plans were developed but have not been integrated in other sectors, and according to interviews they are rarely used. A metropolitan master transportation plan had initially been planned under the project but was then prepared by the Japan International Cooperation Agency; it has not been articulated to structural plans already elaborated by the project. The Maputo

master plan that was supposed to be developed and integrated with the partial urbanization plans was canceled due to lack of resources.

Improvement in informal neighborhoods has been strengthened through the development and piloting of a methodology for integrated neighborhood improvement in informal settlements. The specific interventions in the George Dimitrov and Chamanculo C neighborhoods had the effect of reducing flooding, decreasing travel time to and from the city center, and offering local residents improved public spaces (for the first time under a CCM intervention). Before-and-after satellite images of the George Dimitrov neighborhood show a previously significantly flooded public space now dry; this square has become a central public space in the George Dimitrov community (figure C.3). Moreover, the methodology has been replicated, albeit so far on a relatively small scale. The methodological manual on informal settlement upgrading that was prepared under the project is now being used by AVSI (an Italian nongovernmental organization that implemented the methodology in the Chamanculo C and George Dimitrov neighborhoods) in Pemba, Mozambique, in a project financed by the European Union. Part of the methodology is also used in some small-scale and participatory projects focused on public space use. Based on these activities, AVSI has created a working group, supported by international funds, with stakeholders active in urban development, economic empowerment of the poor, and active citizenship: the Italian Agency for Development Cooperation–Architects Without Borders.

Municipal service delivery of solid waste has improved significantly. Collected solid waste increased from 650 metric tons per day to 885 metric tons per day at project completion. Solid waste collection coverage increased from 66 percent in 2010 to 100 percent in 2016, corresponding to 1,136,568 people served and representing a 56 percent increase from baseline. The project introduced a fee model that has been replicated across Mozambique. The peri-urban collection model created under APL I to collect solid waste from informal settlements through a combination of microenterprises, community associations, and waste collectors seems to be working well.

Access to better transportation infrastructure was achieved through the reconstruction and rehabilitation of key access and main and secondary roads. This work included the rehabilitation of Julius Nyerere Avenue, a central avenue that crosses Maputo and links different neighborhoods of the city, which had been destroyed by flooding in 2000. The implementation of the road rehabilitation had design deficiencies such as lack of in-depth analysis of the drainage basin; and the engineering design prepared in 2000 had not been updated. There was also scant attention to the social and economic impacts on the highly populated informal areas along the avenue; for example, there were few concerns about safety and gentrification. Given the fast urban growth of this area, the

well-known problems with erosion and flooding, and the size of the intervention, it is now clear that this road design should have been updated during project preparation and should have incorporated a more integrated approach to urban development (World Bank 2017b, 5). Although at a substantially higher cost and with delays, 4 kilometers of the Julius Nyerere Avenue was reconstructed, reconnecting the central city to important peri-urban residential and commercial areas. This reduced travel time between two key squares from 45 minutes to 7 minutes despite increased vehicle traffic. The road rehabilitation has also produced land use changes, according to a spatial analysis of the rehabilitated area, and there have been significant changes in the land use over time (Fig. A3). The costs of the rehabilitation of Julius Nyerere Avenue rose from the planned $16.6 million to $20 million, representing 40 percent of the project's funds. This affected the execution of other project activities for which funds were reduced or canceled, including the second phase of the rehabilitation of the Julius Nyerere Avenue itself.[2] Financial resources were assigned to other areas such as the maintenance of unpaved roads, which increased significantly in the latter years of the project.

However, notwithstanding the objective improvements in municipal service delivery, the evaluation in the citizen report card fell short of the target (the perceived quality of municipal services scored 2.7 out of 5—the target was 3). The conclusion at the time was that citizens' expectations tend to increase as the availability and quality of services increases; therefore satisfaction should always be assessed according to objective, rather than only subjective, measurements of service quality.

Objective 2: To Improve Sustainability of Municipal Services Delivery

Rationale. It was reasonable to expect that sustainability in the delivery of municipal services would follow from improvements in institutional development (through improvements in managerial and technical capacity via training, retention of qualified staff, and technical expertise) and from improvements in municipal fiscal performance, urban planning, investments, and maintenance in priority sectors (road infrastructure, informal settlements, and solid waste collection).

Outputs. Outputs are the same as for objective 1.

Outcomes. Fiscal management capacity improved but still depends on implementing an adequate integrated land and property cadastre system. On the fiscal revenue side, the municipality was able to improve its collection capacity in real terms despite significant inflation in 2016 (table A.5). Even with a significantly reduced field data collection workforce,[3] property tax collection has continued to increase after project closure, albeit more slowly. Given the high potential to capture additional revenues,[4] the increased property tax collection depends on implementing a system that allows significant expansion of the tax base and periodic update of fiscal cadastres. However,

data are being collected by fewer staff from the Finance Department who are temporarily allocated to the field, and only in areas where DUATs have been issued; as well, the fiscal cadastre is not updated periodically. Consequently, the potential increase in property tax collection has not yet materialized.

Table A.5. Evolution in Property Tax Collection, 2009–18

	Baseline 2009	2012	2013	2014	2015	2016	2017	2018
Property tax (IPRA nominal) *(Mt, millions)*	35.9	86.0	110.6	137.8	176.8	169.8	184.5	210.3
Real IPRA revenues *(constant Mt, millions)*	36.9	69.0	86.6	103.5	129.4	120.1	160.2	202.4
Real IPRA revenues *(constant US$, millions)*	1.2	2.4	2.9	3.3	3.3	1.9	2.5	3.3

Sources: World Bank 2017b; CCM.
Note: IPRA = property tax; Mt = Mozambican metical; CCM=City Council of Maputo.

However, a basic capacity to manage expenses was achieved. As in APL I, the creation of SIGEF to better manage expenses was not achieved. The significant complexity of this activity and the lack of incentives to improve transparency were the main reasons for this failure. Following the 2013 Mid-Term Review it became clear that SIGEF would not be implemented as planned. Nonetheless, the capacity to manage expenditures has improved. Municipal expenses are currently managed through a mix of manual and automated tasks (for instance, the registry of expenses and payments, processing, and payment settlement are electronic, but final payment is manual). The CCM is meant to work jointly with a technical unit of the Ministry of Economy and Finance, the Center for Development of Systems for Finance, to develop a national system (Autarchic Management System) for the municipal sector, including Maputo. The conceptual model for budget execution has been completed. However, this national system has not yet been implemented.

Additionally, table A.6 shows that (i) the ratio between own revenues and expenses, after a peak during project implementation, has decreased close to the baseline value; and (ii) the ratio of collected property taxes to taxes billed has been increasing since 2015, although with some variability, showing improved efficiency in property tax management.

Table A.6. Evolution in Total Revenues and Total Expenses and Ratio, 2009–18

	Baseline 2009	2012	2013	2014	2015	2016	2017	2018
Total own revenues (nominal) *(Mt, millions)*	409.0	945.6	1,162.0	1,357.0	1,526.7	1,671.3	1,229.0	1,344.4
Total own revenues *(constant US$, millions)*	0.0	32.1	38.6	43.3	38.1	21.1	16.8	21.4
Total expenses (nominal) *(Mt, millions)*	392.7	590.4	627.0	681.5	777.0	877.8	0.0	0.0
Total expenses *(real Mt, millions)*	392.7	590.4	627.0	681.5	1,524.9	1,370.4	1,425.9	1,471.6
Total expenses *(constant US$, millions)*[a]	n.a.	20.0	20.8	21.7	38.0	17.3	19.5	23.4
Own revenues/expenses *(%)*	96	160	185	199	100	122	86	91
Collected/billed *(%)*	n.a.	64	64	63	80	96	—	86

Sources: World Bank 2017b; CCM.
Note: Mt = Mozambican metical; — = not available; CCM= City Council of Maputo.
a. Considers change of accounting in 2016. Operators' fees now classified as current expenditures.

The program achieved significant land tenure regularization, which has enhanced the security of beneficiaries but faces significant sustainability issues. There have been significant capacity improvements in the municipality through training and the development of some SIGEM modules. The program was supported by SIGEM together with a firm that helped put in place administrative procedures, make available aerial photos, and conduct wide-scale field-level data collection. However, the firm left by project closure, and the land administration module created as part of SIGEM under the program is only partially functional; most processes to produce DUATs must be done manually. SIGEM requires software and hardware upgrades and a maintenance contract to become fully sustainable. Also, many SIGEM modules were not developed. A fully functional SIGEM is needed to take full advantage of data and to more efficiently manage the planning of Maputo city and Greater Maputo.

Land use planning capacity has improved but requires continuous effort to ensure long-term sustainability. Similarly, partial urbanization plans have been used for land regularization because they are necessary to issue DUATs, but they are not updated and have not been integrated with sector or master plans. Additional support for planning capacity is necessary to ensure the sustainability of the achievements resulting from the ProMaputo municipal development program and to develop an updated long-term strategic vision for the municipality that will respond to the urban growth of the Greater Maputo area.

Sustainability of solid waste management is yet to be achieved. The average daily collection of solid waste grew after project closure from 885 tons under MMDP to 1.2 million tons. On approval, waste collection became a key service and a critical issue in the political agenda. Waste was then ranked first in citizens' complaints, and now it is sixth. However, the sustainability of the service is at risk. It has not achieved full cost recovery. According to table A.7, coverage of costs by associated revenues improved from 50 percent to 61 percent the year the project closed, but since then, it has decreased to 52 percent. There are several problematic reasons that explain this result. First, revenues are lower than expected. There is no official reporting on the number of households paying fees, so it is difficult to monitor the flow of revenues from the public electricity utility (which collects the solid waste fees) or enforce payment. Second, costs have been higher than planned, despite decreases in the public electricity utility fee.[5] The tender for renewing the contract for the central urban area received a proposal for double the planned cost. At the time of this evaluation, contracts with both firms and local waste collection community associations are being amended every three months. A debt of Mt 300 million ($4.8 million) is owed to the two firms. Third, a key aspect is that the new landfill is not yet operative due to government delays and occupation of the site by informal settlers. Fourth, the capacity of the current landfill has been exceeded, which poses significant environmental threats to the city. The present Maputo landfill and the presence of trash-pickers in it has led to many problems, including deaths. These people should be trained, equipped, and organized.

According to the firm responsible for the final waste collection in the peri-urban area, the presence of the World Bank in the project has represented a guarantee for the contracted firms. When the project was closed, CCM started delaying payments to firms, which, in turn, limited investments and service upgrades. Hence, waste collection has not been extended to new city areas, which have surged in population in the meantime.

Overall efficacy rating: Service delivery has improved but sustainability has not been achieved; overall efficacy is rated **substantial.**

Other Important Results

The project contributed to land use transformation. Investments in road corridors have also produced other land use changes. According to a spatial analysis of the rehabilitated area, there have been significant changes in the land use over time. IEG carried out spatial analysis of Julius Nyerere Avenue (see appendix C for methodology). Results show that in a 2-kilometer area around the corridor, built-up areas increased from 37 percent to 57 percent between 2005 and 2008 (figure A.3). The increase is more pronounced than in areas outside the buffer zone. The increased build-up is likely to

increase property tax collection, as the property tax is determined mainly by the built space in the property itself.

Figure A.3. Land Use Changes Over Time, Julius Nyerere Avenue, 2009–18
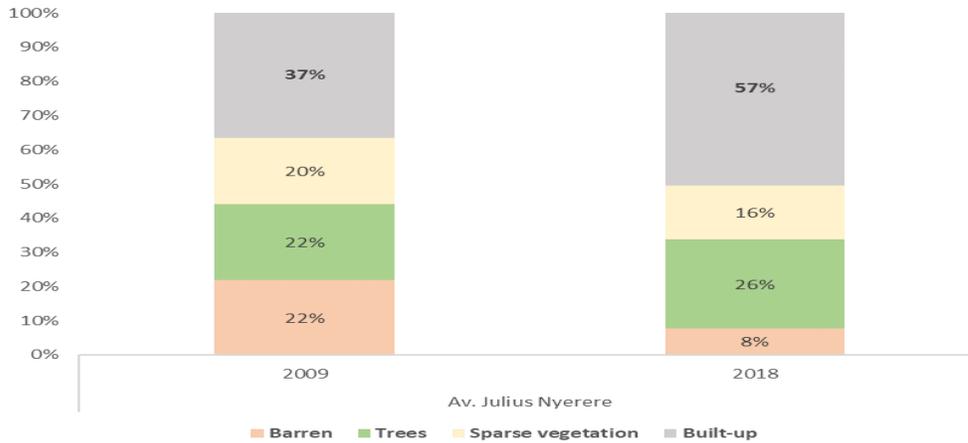
Source: Independent Evaluation Group.

Efficiency

The project appraisal document (page 24 and annex 9) and the ICR (World Bank 2017b, annex 3) focused the economic and financial analyses on the same three areas: (i) roads and maintenance, (ii) financial sustainability, and (iii) solid waste management services. A fourth area was added in the ICR, on slum upgrading improvements that were not identified at appraisal.

For roads and maintenance, the methodology used at appraisal and ICR was cost-benefit analysis, which assessed the present value of all costs and benefits using the same discount rate of 12 percent. The analysis calculated all the economic costs and benefits of each project using both present value and economic internal rate of return (EIRR) approaches. A financial analysis was conducted for financial sustainability and for the solid waste management services. Benefits were measured according to the type of intervention. For roads and maintenance, benefits arising from the project were measured using the time saved, the reduction in operating expenditures for road maintenance, and the reduction in accidents using the highway development management model. Actual costs using 2010 prices were compared with costs during appraisal. Cost comparison was used for "with-project" and "without-project" scenarios. The analysis was done for the first phase of the Julius Nyerere Avenue rehabilitation. The second phase was not built due to higher costs of the first phase. Ex post EIRR is 49 percent, lower than 153 percent at appraisal. This result, however, does not take into account added benefits derived from reduced flooding, lessened erosion along the rehabilitated roads, fewer road accidents,

and appreciation of property values and economic development along the rehabilitated road.

Table A.7. Intermediate Outcomes

	Baseline 2010	Target	Value at Completion 2016	2018
Fiscal revenues				
Cumulative annual real increase in revenue from IPRA *(%)*	—	288	281	464
Annual real increase in revenue from IPRA *(average per year, %)*	—	—	28	26
IPRA coverage	20,000	—	—	40,000
Ratio of current expenditures/own revenue *(%)*	96	100	98	91
Land use planning				
Households with secure land tenure formalized with DUAT	—	30,800	31,760	42,023
DUAT issuance *(number of days)*	150	40	45	80
Number of neighborhoods with land use oriented by local spatial plans	9	17	30	30
Institutional capacity				
CCM staff with graduate or higher degree *(number)*	112	—	—	545
CCM staff with high school or higher degree *(number)*	540	—	830	907
Retention of qualified staff *(% with high school or university diploma)*	95.4	—	99.6	99.4
Solid waste management				
Solid waste collection *(MT per day)*	650	—	885	885
Solid waste covered by CCM *(%)*	66	—	100	—
People in urban areas with access to regular solid waste collection *(number)*	729,264	1,041,545	1,136,568	1,159,848
Mean user perception for quality (out of 5)	2.8	3.0	2.7	—
Coverage from fees *(%)*	30 (2007)	—	57	49
Coverage from service *(%)*	50 (2007)	—	61	52

Sources: World Bank 2017b; CCM.
Note: CCM = City Council of Maputo; DUAT = right of use and access to land; IPRA = property tax; MT = metric tons; — = not available.

For slum upgrading, the cost-benefit analysis was based on one of the many benefits claimed by the project: the appreciation of property values. This was based on analytical work carried out during a study of urban poverty in Maputo by the World Bank and the

CCM evaluation report of the project (CCM 2017; World Bank 2017a). The ex post EIRRs for the upgrading of the two neighborhoods were 125 percent for the George Dimitrov neighborhood and 299 percent for the Chamanculo C neighborhood. Since this support was added after approval, there is no ex ante EIRR calculation.

Regarding financial sustainability, benefits came from the cumulative increase in property taxes and rationalizing expenditures. Both property tax value and collection have been increasing. In constant dollars, the revenue collected from property tax was about two times higher by project closure and as of 2018 was about three times higher than at baseline. The number of properties that are billed and that pay their bill more than doubled, and the collection efficiency rate increased to 96 percent in 2016 (table A.8). There was a change in accounting due to misclassification of technical assistance and supervision of works as capital expenses instead of current expenses. With the new classification, cost recovery still shows improvement at a ratio of 122 percent. After project closure this ratio has been declining. Using a cost of $2.67 million, ex post EIRR is 55 percent but is below appraisal EIRR of 79 percent.

Table A.8. Financial Results

	Baseline 2009	2012	2013	2014	2015	2016	2017	2018
Own revenues/expenses *(%)*	96	160	185	199	196	190	—	—
Own revenues/expenses (new accounting) *(%)*	96	160	185	199	100	122	86	91
Real IPRA revenues *($, millions)*	2.2	2.4	2.9	3.3	3.3	1.9	2.5	3.3
Collected/billed *(%)*	n.a.	64	64	63	80	96	n.a.	86

Sources: World Bank 2017b; CCM.
Note: IPRA = property tax; — = not available.

The ICR adopted two approaches for the financial analysis of solid waste management. One was based on a hypothetical without-project scenario and the other on a cost recovery with-project scenario. The without-project methodology assumed that revenues and operating costs at the time of appraisal remained the same and compared these with the actual figures. When only operating costs are included, the present value of incremental benefit for the CCM is $93,000. The second methodology was based on cost recovery of solid waste collection through improvements in coverage of solid waste, service fee increases, and reductions in commission fees, and shows a coverage increase from 66 to 100 percent and an increase in revenues in real terms (table A.9). Cost recovery, however, was half of that expected at appraisal due to lower-than-expected revenues and significant delays in opening the new landfill. Based on the hypothetical scenario, the project seems to be generating benefits that indicate improvements in

quality of life. However, the World Bank and IEG guidelines for reviewing projects assess financial analysis at closing as long-term financial sustainability.

Table A.9. Waste Collection Revenues

	2010	2011	2012	2013	2014	2015	2016	2017	2018
PAD—revenues estimated *($, millions)*	3.1	3.3	4.9	5.2	5.9	7.5	8.5	8.9	—
Actual—actual revenues *($, millions)*	2.6	3.3	3.3	10.0	3.8	3.7	2.7	2.5	2.8
Actual—nominal prices *(Mt, millions)*	84.6	98.4	99.7	301.0	112.9	146.4	149.1	159.2	172.2
Actual—real 2010 prices *(Mt, millions)*	84.6	94.3	99.5	300.5	112.9	144.0	118.5	138.3	165.7
PAD—ratio revenues/cost *(%)*	79	69	95	90	71	87	97	102	—
Actual—ratio revenues/cost *(%)*	51	51	51	52	96	81	54	60	52

Sources: World Bank 2017b; CCM.
Note: — = not available; PAD = project appraisal document.

The project closing date was extended twice for 18 months, from December 31, 2015, to June 30, 2017. As with APL I, the project continued to experience operational inefficiencies, particularly in financial management and procurement. The need to further enhance the overall project coordination was flagged in the 2013 Mid-Term Review. The review introduced changes such as transferring the overall project coordination to the newly created Office of Strategic and Institutional Development, and hiring a dedicated financial management specialist and a procurement analyst. Due to changes in government approach, it was clear that an integrated financial system was not going to be implemented as envisioned. The decision was made to collaborate with the development of a national system and to focus on a basic accounting package for the municipality. The Mid-Term Review also flagged challenges to improvements in information and communication technology (ICT) systems resulting from procurement delays. It was agreed to install a disaster recovery system and to include ICT system costs in the recurrent budget to serve municipality core ICT systems, as a full permanent backup of SIGEM images, data, and software. Two extensions were granted to complete the ongoing activities, including the introduction of a project management unit, the adjustment to solid waste fees, and the construction of Julius Nyerere Avenue (subject to delays). The project management unit was created and an effective 30 percent increase in the solid waste fee led to a 40 percent increase in revenues. The construction delays had a moderate effect on project operations, as targets were achieved in project areas throughout implementation.

During the project, there were moderate improvements in overall financial sustainability (in real terms), no improvements in cost recovery for solid waste management, and moderate cost-effectiveness of road improvements (but below appraisal). Overall efficiency is rated **modest.**

Outcome

Overall outcome. Given **high** relevance of objectives, **modest** relevance of design, **substantial** efficacy, and **modest** efficiency, overall outcome is rated **moderately satisfactory**, indicating essentially moderate shortcomings in the project's achievement of objectives and efficiency.

Risk to Development Outcome

The risk to development outcome is rated **significant.** All the risks identified in the ICR and ICR Review remain relevant at the time of this evaluation.

Institutional capacity risk is moderate. Despite improvements in capacity, the CCM needs further support to remain sustainable. About 80 percent of staff are unskilled, and salaries in general remain low. University-educated employees in the municipality are paid less than they would be in the private sector. Human resources management lacks a career competency plan, an activity that was canceled under the project. In the long term, it is important to set milestones for staff career advancement and standards to be used as benchmark for performance measurement—all elements that would help the municipality to better compete with the private sector. Efforts to strengthen capacities are still needed.

Financial sustainability risk. Increased collection of property tax revenues depends on expanding the tax base and requires periodic update of the fiscal cadastre; it would benefit also from an integrated land and property system. SIGEF remained pending by project close and poses a substantial risk to meeting CCM's financial administration objectives.

Solid waste management services risk. Solid waste management service contracts have expired and are being renewed for three to six months at a time. Given this uncertainty, operators are not renewing or upgrading their fleets. Overpayment for waste collection service remains a challenge because of lack of equipment (equipment to weigh incoming garbage was not working for extended periods of time; a less accurate alternative methodology was adopted). More important, an alternative disposal site (which was to have been funded outside the project but was not) poses serious risks to the outcome of this component. In addition, full cost recovery remains a challenge even as targets for increased revenue fees and reduction of administrative collection fees were reached by project closure. The lack of a disposal site, the lack of transparency in and enforcement of the fees collected by the Mozambique electricity utility, and overpayment for services limit the CCM's capacity to achieve full cost recovery. In addition, willingness to achieve full cost recovery depends on the strengthened capacity and political will of the CCM

and municipal leadership. Recently, the mayor who was in office when APL I started was reelected. During his tenure, he demonstrated his commitment to improve the sustainability of the CCM, and he is likely to adopt the same attitude for this new term.

Environmental and social risk. The closing of the project without the completion of the new landfill poses a risk to the positive outcome of the solid waste management component. The alternative landfill proposed but not financed by the project has not started because of issues such as resettlement of trash-pickers living on the site. At the time of this evaluation, there is no official date for construction of the new landfill or closing of the old one, which has reached maximum capacity. Disposal of waste poses significant health and environmental risks to city residents. In addition, for several years the weight of vehicles carrying waste has not been accurately measured.

Technical risk. The systems and procedures instituted under the project may not be sustained over time, including applicable software updates. There are insufficient own resources to pay for these periodic updates. The municipal revenue module under SIGEM is working, but it has glitches and there is no contract with suppliers or developers to improve and update the system over time. Hardware resources are also limited and have not been upgraded since project closure. Significant information must be preserved and updated to be useful in managing urban development in Maputo.

Bank Performance

Quality at Entry

Since this was a programmatic approach, the project design laid out a strong rationale for continuity of second-phase interventions. As expected, the alternative that was considered focused not on instrument changes but on expanding the scope to other cities. Design benefited from the outcomes of APL I, extensive consultations, and the annual citizen report card to determine objectives, activities, and financing priorities. The results chain was generally clear and linked activities to outcomes. Although in some aspects evidence from the first phase strengthened the project design (for example, hiring technical financial and procurement specialists), in some other aspects implementation weaknesses during the first phase did not trigger changes in activities, components, and scope of the second phase (for example, fully developing SIGEF and SIGEM, and creating a centralized project implementation unit model). Project preparation anticipated and mitigated several potential implementation risks. However, some risks to meeting the PDO were underestimated: (i) the ability to mobilize resources to sustain systems and assets, and (ii) the risk posed by limited transparency and accountability in making progress in improving financial capacities. In addition, the risks of exogenous factors (for example, the appearance of informal dwellers, delays in

the construction of a new landfill [funded outside of the project], and the changing political economy) to PDO achievements were not addressed or mitigated at approval. Quality at entry is rated **moderately satisfactory.**

Quality of Supervision

In terms of supervision, there were two task team leaders during implementation. Supervision was reportedly proactive, building on a strong professional relationship between the World Bank team and CCM officials and carried out through 11 regular supervision missions during the project's two and a half years of implementation, as well as frequent conferences with the CCM between missions. The team maintained a constructive dialogue with stakeholders and beneficiaries through the citizen report cards. Mission findings were comprehensive and candidly discussed. The team carried out a focused Mid-Term Review, which was a comprehensive assessment of progress toward development objectives and implementation performance. It identified implementation challenges and corrective measures such as the creation of a project implementation unit to ensure fiduciary compliance and overall project coordination, which proved to be critical to step toward achieving PDOs. It also addressed weaknesses in road and drainage works and the appearance of informal settlements by updating the original technical designs and the Resettlement Action Plan and recommended extending the project's closing date by one year. Changes introduced after the missions and after the Mid-Term Review and 2015 restructuring allowed sufficient time to complete key activities and improved project performance. The quality of supervision is rated **satisfactory.**

The aggregation of both subratings for quality at entry and supervision indicate an overall Bank performance rating of **moderately satisfactory.**

Borrower Performance

The central government, the Ministry of Finance, the Ministry of Planning and Development, and the Ministry of Environmental Coordination played specific roles. The Ministry of Finance was effective in providing timely resources in the CCM. The Ministry of Environmental Coordination reviewed the environmental impact assessments for infrastructure works. All of them were consulted at project design. The Council of Ministers approved a decree in 2010 allowing revaluing urban properties, enabling increased revenue potential.

As with APL I, the project was a central piece of a 10-year ProMaputo Municipal Development Program. Initially, the CCM was responsible for project implementation. This arrangement led to significant implementation delays of procurement, financial

management, and contract management due to the very weak capacity. As a result, changes were introduced in the Mid-Term Review to transfer the overall project coordination to the newly created project implementation unit, the Office of Strategic and Institutional Development. As recommended by the World Bank, this unit addressed capacity weaknesses by hiring experts in these areas, which helped advance the project implementation overall. Despite this, there were additional challenges and delays in implementation of financial management, SIGEF, and procurement.

Considering all aspects of government and implementing agency performance, overall government performance is rated **moderately satisfactory.**

Quality of Monitoring and Evaluation

Design

The project's indicators were appropriately linked with the intermediate outputs and outcomes. The key indicators included baseline data and measurable targets set at appraisal, but there were insufficient indicators to assess improvements of institutional capacity, which were considered necessary for improvements in service delivery.

Implementation

The M&E system was integrated with other systems of administration; line managers of each directorate were assigned responsibility for collecting data in their areas of purview and providing them to the CCM's Office of Strategic and Institutional Development. The CCM project manager continues weekly presentations of the project's progress to the CCM assembly. This helps the project monitoring function and communication of its results to key CCM decision-makers.

Use

Apart from the routine use of M&E during implementation, the findings were used by the government to inform the broad ProMaputo government program.

Considering all aspects of M&E, the overall quality of M&E is rated **substantial.**

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[1] Individual staff members received more than one training.

[2] This was a further 4 kilometers from Praça dos Combatentes to Praça da Juventude.

[3] Sixty temporary staff contracted to carry out property field collection data have left since project closure.

[4] According to a World Bank study, a potential revenue of Mt 44 billion ($704 million) from property taxes exists in Maputo, which could be realized through improving tax compliance, increasing the tax rate, and using market value to assess property tax. It is estimated that only 30 percent of approximately 200,000 existing buildings have been surveyed and registered. More realistically, property taxes should be collected at least for 120,000 properties that are registered as connected to the water provision system; in 2018 only 42,000 registered properties paid taxes, meaning that the revenue could grow almost three times (from 42,000 to 120,000 properties).

[5] The fee decreased from 25 percent to 15 percent, and has been 5 percent since June 2014.

Appendix B. Fiduciary, Environmental, and Social Aspects

Financial Management

Adaptable program loan (APL) I: Financial capacity was identified early on as one of the weaknesses of the City Council of Maputo (CCM). Support to this area had been given since the early years of implementation. The implementation of the Integrated Financial Management System was key to addressing the accountability and transparency issues. Despite this, the low capacity and the decision to use borrower systems resulted in a struggle to comply with the World Bank's fiduciary policies during implementation. Quarterly financial monitoring reports were often late, and many contained errors. Several annual audit reports were not submitted on time. Early audit reports revealed accountability issues at the CCM. The 2008 audit report was submitted nine months late with a qualified opinion due to the inability of the auditors to verify assets and some issues related to the project's system of internal controls and accountability. As subsequently was clarified by the project team, the qualifications had been addressed by the time the 2009 audit was conducted.

APL II: Poor performance in financial management continued throughout the second phase; errors in financial reports, excess payments in some categories, delays in submitting audit reports, and management letters were evidence of inadequate financial management capacity. This was addressed during the 2013 Mid-Term Review by hiring a dedicated financial management specialist to serve as the new project coordination unit within CCM. Financial management performance improved, with timely and satisfactory financial reporting. However, the implementation of the Integrated Financial Management System, which would have improved financial execution and financial controls mechanisms, was dropped. CCM instead conducted annual internal and external audits of all municipal accounts. These audits led to improved financial processes after the implementation of audit recommendations. The project itself was audited, and the last audit submitted in June 2017 indicated a qualified rating by the independent auditors.

Procurement

APL I: CCM had difficulty complying with the World Bank's procurement procedures, particularly in the early years of implementation, which led to delays in project execution. The challenges were due in part to the decision to use the CCM's structures to implement the project rather than a specialized project implementation unit. Despite

training and the hiring of external advisors, turnover of procurement staff was very high, necessitating continuous recruitment and training of new procurement specialists. Some weaknesses remained at project closing in the procurement filing system and in contract management. No faulty procurement was reported.

APL II: Delays during early implementation arose from limited procurement capacity to respond to a high volume of transactions. However, the situation improved after the decision to create a specialized project implementation unit.

Environmental and Social Safeguards

APL I: The project was classified as environmental assessment category B (partial assessment), because the planned urban infrastructure and services were not expected to result in environmental damage or significant resettlement. The environmental and social management framework and resettlement policy framework report stated "The project complied fully with the [World] Bank's Environmental and Social Safeguard Policies" (World Bank 2012, 10). Several missions included World Bank safeguard specialists, who visited project sites, interviewed people affected by the project, and held discussions with district and municipal staff and with officials from the Ministry of Environmental Coordination. They found that resettlement associated with road upgrading was carried out in full compliance with the project's resettlement policy framework before the commencement of the works. They also noted that the solid waste firms and microenterprises were generally providing workers with protective clothing and training aimed at encouraging its use. Several activities with potential environmental and social impacts that were initially programmed for phase I were shifted to phase II, including the closure of a waste dump. The site was opened in the mid-1960s and it was supposed to have five years' capacity. The dump closure was initially planned for phase I and then was moved to phase II but is still in operation and working beyond capacity.

APL II: The project was classified as category B. The project triggered four safeguard policies: Environmental Assessment (OP/BP 4.01), Natural Habitats (OPP 4.04), Physical and Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). The CCM prepared environmental impact assessments and environmental management plans. The CCM was adequately staffed and secured compliance with environmental safeguards. Compliance with social safeguards was uneven. The Resettlement Action Plan (RAP) for a segment of the Julius Nyerere Avenue was satisfactory, but the RAP for the segment where there were more informal settlers was more problematic. Many of these settlers did not agree to relocate to a new market with improved accessibility for both consumers and vendors. Instead these settlers had to be compensated using

resources brought about by foreign exchange gains. Erosion and flood risk in another segment of Julius Nyerere Avenue required emergency drainage works, which would have resulted in resettlement of some families who lived along the drainage canal. The World Bank did not accept an inadequate RAP for this part of the works because the resettlement site was far away from original residences and was located in a flood-prone area without access to basic infrastructure (World Bank 2017, 9n 7). The World Bank agreed to a subsequent solution, but before it could be implemented, a private developer compensated the informal settlers because of its interest in developing the area. The World Bank required an audit of the transaction to ensure compliance with the social safeguard.

The plan (outside of project financing) to build a sanitary landfill to ensure safe disposal was not achieved. Since the existing dump site in Maputo was already at maximum capacity, this plan was a vital part of the city vision to achieve the intended human welfare effects that could be brought about by improving the solid waste management sector. Waste disposal currently poses significant health and environmental risks to city residents. Unattended risks are also associated with the human health effects experienced by the trash-picking community at the site, and alternative livelihoods must be part of a resettlement package. A modern sanitary landfill could also contribute to cost recovery by allowing lower operation and maintenance costs and by producing revenue from biogas generation.

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Appendix C. Methods and Evidence

This report is a Project Performance Assessment Report. This instrument and its methodology are described at https://ieg.worldbankgroup.org/methodology/PPAR.

This report uses a layered approach which consisted of mainly a document review, literature review, primary and secondary data collection, and interviews (table C.1).

Table C.1. Evaluation Matrix: Links between Main Evaluation Aspects and Data Collection Methods

Harmonized Evaluation Criteria	Portfolio review	Literature review	Interviews with stakeholders	Surveys	Spatial analysis	Satellite before-and-after comparison	Field visits
Relevance							
Relevance of objectives	Yes	Yes	Yes				
Relevance of design	Yes	Yes	Yes				
Efficacy, phase I							
Institutional capacity strengthening	Yes		Yes	Yes			
Financial capacity strengthening	Yes		Yes				
Improvement of municipal service delivery	Yes		Yes	Yes	Yes		
Efficacy phase II							
Improvement of municipal service delivery	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improvement of sustainability of municipal service delivery	Yes	Yes	Yes		Yes	Yes	Yes
Efficiency							
Benefit-cost ratios, net present value, rate of return, and so on	Yes						
Aspects of design and implementation affecting efficiency	Yes		Yes	Yes			

Interviews were designed to capture lessons across the cycle of project operations, including results, implementation experience, challenges encountered, quality aspects, contextual factors, and views on what did and did not work and why. Interviews were held with (i) national officials of the Ministry of Land Environment and Rural Development, the Ministry of Public Works, Housing and Hydric Resources, and the Ministry of State Administration and Public Function; (ii) Maputo city officials, academics, private sector solid waste management companies, and small and medium enterprise solid waste contractors; and (iii) randomly selected project beneficiaries of solid waste management, slum upgrading, and urban development.

Primary data collection. Field visits were carried out in the two informal settlements supported by the project: George Dimitrov and Chamanculo C. The field visits were largely centered around areas supported by the project. Interactions were conducted with small and medium enterprises in charge of solid waste collections and beneficiaries.

Secondary data collection. Additional documentation was obtained from the City Council of Maputo (CCM) and the World Bank Country Office. The project already had a solid base of evidence on many of its effects, notably from a self-evaluation by the CCM (CCM 2017). Additional data were collected and analyzed for service delivery interventions: (i) a spatial analysis to calculate the extent of changes in urban form of two road corridors; (ii) visual before-and-after comparison through satellite imagery of an urban upgrading intervention; and (iii) a survey of beneficiaries of the massive land use title (DUAT) regularization.

Spatial Analysis Methodology

Urban transportation is the major determinant of shaping the spatial structure of cities. Improvement in transportation infrastructure reduces transportation costs, enhances mobility for people and goods, and informs the changes in land use and density. Cities require corresponding policy packages to harness the economic opportunities of the improved transportation through flexible zoning, an increase in floor area ratio along the corridor, or articulating density.

However, little is known about the extent of the impact of urban transportation projects on land use and density. The outcomes of the urban transportation projects are typically measured by kilometers of roads constructed, travel time reduced, travel cost decreased, and reduction in greenhouse gas emissions.

Measuring the impact on the urban form was challenging for reasons related to data accessibility and the inference of causal changes. Urban form is often assessed through remote sensing with satellite imagery. Since the early 2000s, the urban footprint has been

measured through medium- to low-resolution satellite imagery, but constraints remained at the local scale in which the project-level intervention occurred because of the limited spatial and temporal resolution of satellite imagery. In particular, measuring density is challenging because satellites typically do not provide three-dimensional images. Similarly, it has been difficult to conduct a pure experiment on assigning treatment and control to analyze the causal inference because the transportation infrastructure is a public utility and is not controlled explicitly.

In this analysis, the data limitation and local level spatial analysis was overcome by applying various geospatial data and technologies. The urban form, specifically land use and density, was assessed to determine to what extent urban transportation projects informed the changes in the land use and density in Maputo. First the theory of change of urban transportation intervention to spatial outcomes is introduced. Second, the sample selection methodology is explained. Third, data collection and its processing, including the machine learning methodology, is described. Fourth, the econometrics methodology with a difference-in-differences approach is provided. Fifth, the result of the analysis is discussed.

This appendix describes the methodology used to inspect land cover changes from 2009 to 2018 for the areas provided by the Independent Evaluation Group team. A traditional supervised classification method—maximum likelihood algorithm—produces a land cover map for each year. This is followed by a summary of land cover percentages and an examination of changes at different levels of proximity to the road development project area.

The theory of change (figure C.1) recognizes that the World Bank urban transportation project contributes to the increase in built-up area and density. The improved transportation modality reduces transportation costs, increasing housing and industrial plots. This leads to the increase in built-up area and density along the corridor area. There could be an underlying external environment affecting the causal outcomes such as building regulation, land use planning, real estate market, and the institutional capacity of the municipalities. These underlying factors affect the entire city, and the individual causal outcome between the project area and nonproject area is not differentiated.

Figure C.1. Causal Framework
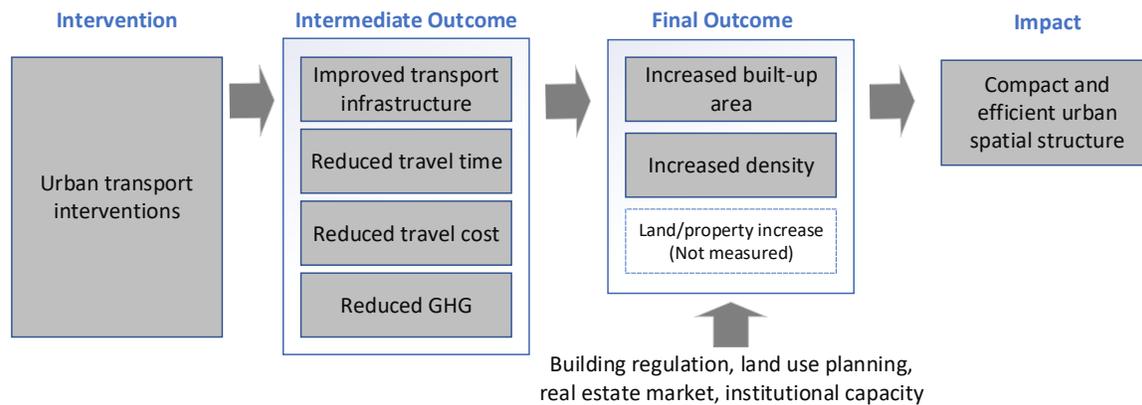
Source: Independent Evaluation Group.
Note: GHG = greenhouse gases.

The outcome not measured is changes in the land and property price. Available data around the project areas before and after the project implementation was examined, but no reliable price data were obtained. The latest property prices were obtained through a web scraping method; the data are skewed toward the frequent property transaction and are not a representative data set. Without additional data that applied a statistical sampling method, the web scraping data are not reliable for price change analysis.

Sample Selection and Project Characteristics

Sample Selection

An urban transportation corridor project in Maputo was selected for this analysis. The following three steps were developed to identify the samples.

First, the transportation projects supported by the ProMaputo program were identified, and the candidate projects of the spatial analysis were carefully examined. Consideration was given to (i) whether the project was in urban or urban fringe areas; (ii) whether the project investment contributed to a corridor development; (iii) whether the project documented the physical location of the project, which was complemented by the interview with the task team leaders; (iv) whether data were available; and (v) whether transportation is constraining urban development in the area.

Second, the data availability of the project area was reviewed. As the following section describes, the primary data used were (i) project location data; (ii) public and commercial satellite data; (iii) digital surface model; (iv) digital terrain model; and (v) OpenStreetMap. In some countries, such as Vietnam, it has been found that digital surface model data were not available before the project.

Third, the project intervention was reviewed, and the measurability was assessed. Difference-in-differences estimation was applied (see the Econometrics Methodology section), which requires data on pre- and post-project observations on the treatment and comparison areas. Based on the document review and interview with the task team leaders and clients, the measurability was assessed; this step was primarily informed by the possibility of identifying the treatment and comparison areas.

As a result, a geospatial impact evaluation for the Julius Nyerere Avenue was chosen (table C.2).

Table C.2. Project Description

Title	Project Development Objective	Year	Amount ($, millions)	Corridor	Length (km)
Maputo Municipal Development Program II	Improve the delivery and sustainability of priority municipal services in Maputo	2009–17	49.96	Julius Nyerere Avenue	3.81

Source: Independent Evaluation Group.
Note: km = kilometer.

Project Characteristics

Maputo Municipal Development Program II: With 1.1 million residents in 2010, Maputo was Mozambique's largest urban center. It was also the city of greatest economic importance, accounting for about 30 percent of the country's gross domestic product. However, the city also faced enormous urban development challenges. In 2010, 54 percent of its residents were living below the poverty line and 70 percent in informal settlements. Moreover, most residents lacked access to basic infrastructure services, including solid waste collection, drainage, and adequately maintained unpaved and paved roads.

Data Source and Data Processing Methods

The estimation of the land use and density changes was implemented by using the following geospatial data: project location; satellite imagery; OpenStreetMap; digital elevation model; and other spatial information. Unless specified, Python language was used to implement data processing.

Figure C.2 presents the data generation and processing methodology. There were five major processes: The first process was to generate grid cells in treatment and comparison areas, which were regarded as observation points of the assessment that contain all the data sets supplied to the individual grid. Second, satellite imagery was processed with machine learning and deep learning. More specifically, a land use classification was conducted with various machine learning methods while generating a

digital surface model with a deep learning model. After processing the image, zonal statistics of the built-up area and volume matrix for each grid were generated. Third, OpenStreetMap was used to develop the control variables because the land use and density might have been independently influenced by the distance to key urban fabrics. Fourth, the digital elevation model was processed to obtain the elevation of each grid as well as to calculate the slope. Fifth, other supplementary data for locations such as the central business district, coastline, and airport were collected. Nearest neighbor analysis or zonal statistics provided the nearest distance from each grid cell to key urban features.

Figure C.2. Schematic Diagram of Data Processing Methodology
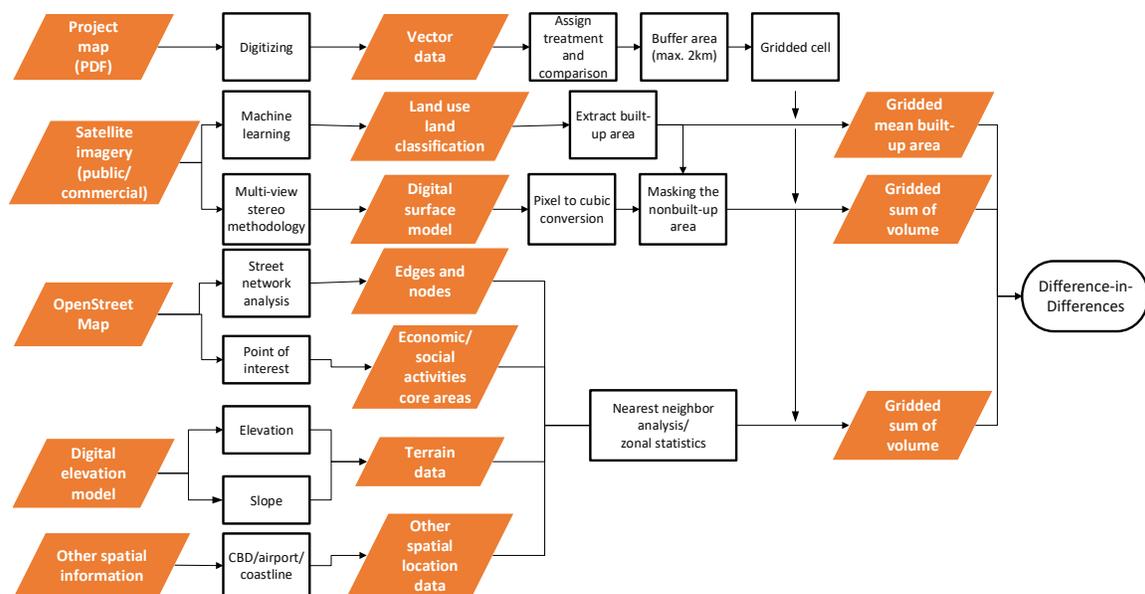
Source: Independent Evaluation Group.
Note: CBD = central business district; km = kilometer; PDF = portable document format.

The following section describes the detailed data processing methodologies.

Project Location

Although project documents were reviewed and several key informants were interviewed, raw project location data (vector or raster data) have not been collected. Hence, the PDF map of the project in the project appraisal document or Implementation Completion and Results Report was manually georeferenced. QGIS, an open-source GIS software, was used to execute the georeferencing of the project map. To increase the accuracy of digitization, a snap option was enabled to closely align with the existing street network, for which the road network data from OpenStreetMap were used.

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Once digitization was completed, the treatment and comparison sections were created, forming the buffer area at a maximum length of 2 kilometers from the road (see more details in the Econometrics Methodology section). A 10-meter grid cell grid was then created within the buffer area for Maputo. The grid cells are the observation points, which contain all the variables such as land use, density, and distance variables.

Satellite Imagery

Satellite imagery was used to develop (i) a land use and land classification (LULC) model and (ii) a digital surface model. Through supervised machine learning, land use was classified, although the methodologies applied were slightly different due to the use of different spatial resolution. The details are explained in the following section.

LULC Maputo. Supervised machine learning was used to classify land use. First, two high-resolution images from Digital Globe's platform (GDBX) were retrieved (table C.3).

Table C.3. Satellite Imagery Used for Maputo Land Use and Land Classification

Source	Acquisition Date	Resolution (cm)	Bands (no.)
QuickBird	May 23, 2009	60	4
WorldView-3	May 6, 2018	30	8

Source: Independent Evaluation Group.

In supervised classification, training samples are used to register the spectral signature of each land class. Each signature registers values from all the bands available in the image (multispectral and infrared). The information from this file is then used to classify pixels across the entire input image.

1. **Create training samples.** Training samples were created through visual inspection of each image and manual digitization of small polygons that visibly belonged to the same land class, through the ArcMap Training Samples Manager.

2. **Evaluate training samples.** The quality of training data depends on the number of samples created and whether samples from different classes register differentiable band statistics. After evaluating histograms and scatterplots from the first set of samples, the following five land cover classes were chosen: built-up (including roads, buildings, and other infrastructure), barren land (primarily reddish color), sparse vegetation (agricultural plots and sparsely vegetated fields), trees, and water.

   To ensure that the same set of samples could be used for two separate runs of the model, the sample was verified as valid for both images (2009 and 2018), and changes were made to the polygon geometry or class value where needed. Two

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different shapefiles were created (training set 2009 and training set 2018), but each sample preserved the same unique ID. The final number of samples digitized was 130.

3. **Create test data.** To validate the classification output, 20 percent of the samples were randomly selected and withdrawn from the training data. The water class was not considered in the test data set. To ensure a balanced test data set, a sampling weight inversely proportional to the number of training samples from each class was applied.

4. **Apply classifier.** Two signature files (one for each image) were created with the remaining training data using the ArcGIS Spatial Analyst extension, and the Maximum Likelihood Classification tool was applied. This algorithm is based on the maximum likelihood probability theory.[1] For each pixel, the algorithm assigns a class probability based on the means and covariances of the class signature. The output pixel represents the class with the highest probability. In this analysis, no minimum probability was enforced, and therefore every cell obtained a class value.

5. **Perform postclassification processing.** A majority filter was applied to clean the noise in the land cover output and remove isolated pixels, which are likely to be errors. This filter looks at the neighboring cells and reassigns the majority class value to the center cell.

6. **Examine results.** How well the algorithm classified the test data (also referred to as actuals) was calculated. Overall, accuracy was 81.2 percent (2009 data set) and 94.3 percent (2018 data set) of the machine learning model. The confusion matrix provides more granular prediction results (table C.4).

Table C.4. Confusion Matrix (percent)

Actual Class	Predicted Class 2009				Predicted Class 2018			
	Built-up	Barren	Sparse vegetation	Trees	Built-up	Barren	Sparse vegetation	Trees
Built-up	86.28	9.66	1.86	2.11	94.40	0.92	2.55	2.13
Barren	0.40	99.48	0.12	0.00	1.01	98.83	0.16	0.00
Sparse vegetation	0.28	4.37	74.02	21.33	1.74	0.46	95.49	2.31
Trees	1.23	0.18	2.27	96.32	0.56	0.00	0.56	98.89
Overall	81.2				94.3			

Source: Independent Evaluation Group.

With LULC data sets for Maputo, the built-up area was extracted and the zonal statistics of the grid cell were executed, deriving the proportion of the built-up area of each cell. The proportion of the built-up area can be constructed as follows:

$$\overline{builtup}_{it} = \frac{1}{n}\sum_{j=1}^{n}\left(P_{ijt} * BU_{jt}\right) \text{ (1)}$$

where $\overline{builtup}_{it}$ is the proportion of built-up area in grid cell i observed at time t; P_{jt} is pixel j within the grid cell i at time t; BU_{jt} is a binary variable denoting the built-up area in pixel j at time t:[2] $BU = 1$ if the pixel is a built-up area, and $BU = 0$ if it is a non-built-up area.

OpenStreetMap. Although the satellite images are used as dependent variables, such outcome variables may be influenced by other independent factors, including access to streets or intersections; access to markets, schools, hospitals, or airports; or elevation and slope. These control variables were created from OpenStreetMap, the digital elevation model, and other key urban locations.

OpenStreetMap is an open data project that maintains geospatial data, including street networks, building footprints, and amenities such as banks, schools, hospitals, and public facilities. Street network and point of interest (POI) data were extracted by using the OSMnx Python library (Boeing 2017). The Euclidean distance from each grid cell to (i) street; (ii) intersection; and (iii) POI was calculated.

Given the lack of historical POI data in these cities, it was hypothesized that the current high concentration of economic and social activities in a specific area would have been the same in the past. Hence, using POI data in OpenStreetMap, the longitude and latitude of all the amenities in the city were first extracted. The amenity class, such as market, financial center, health center, education center, and economic activities, was

recoded because the amenity class given by OpenStreetMap was too detailed for classification (for example, hospitals, clinics, and doctors were labeled separately). After the new classifications were coded, the location of each amenity was assigned to a grid cell, and the number of amenity classes in each cell was counted. Based on the descriptive statistics, over 95 percentiles of the grid cell were determined to be a high concentration of the activities (table C.5). With these core centers established, a nearest neighbor analysis calculated the nearest distance from each cell to the core centers.

Table C.5. Grid-Based POI Statistics in Maputo

	Economic	Financial	Health	Education
Count	87	50	16	88
Mean	2.87	1.96	1.19	1.53
SD	3.48	1.58	0.40	0.90
75 percentiles	3.00	2.00	1.00	2.00
95 percentiles	9.70	5.00	2.00	4.00
Maximum	24.00	8.00	2.00	5.00

Source: Independent Evaluation Group.
Note: POI = point of interest; SD = standard deviation.

Digital elevation model. Urban form is influenced by elevation as well as the slope of the city. Elevation data were derived from a 30-meter Advanced Land Observation Satellite digital elevation model.[3] With the elevation data accessed through Google Earth Engine, the slope of each cell was calculated based on the difference between the neighboring pixels. The pixel value of elevation and slope was upsampled to each grid cell.

Other spatial information. To increase the accuracy of the model, other spatial information was also collected for locations including the central business district, coastline, and airport. The coastline data were taken from the World Bank Development Data Hub, and longitude and latitude of the central business district and the airport were obtained through websites such as Google Maps and Wikipedia.

Table C.6 shows a summary of the data source, its architecture, and processing for this evaluation.

Table C.6. Data Source and Processing

Data Type	Data Source	Data Architecture	Data Processing
Project location	PDF map	Vector (line)	Georeferencing, buffer, cell grid
Satellite imagery	QuickBird/WorldView-3	Raster (0.6 m/0.3 m)	Machine learning for Maputo LULC
	QuickBird/WorldView-4	Raster (0.5 m)	Deep learning for DSM
Street network	OpenStreetMap	Vector (line and point) with nodes and edges	Nearest neighbor analysis
Point of interest	OpenStreetMap	Vector (point) of each location	Nearest neighbor analysis
Digital elevation model	ALOS	Raster (30 m resolution)	Calculate slope, zonal statistics
Central business district	Web-based	Vector (point)	Nearest neighbor analysis
Coastline	World Bank	Vector (line)	Nearest neighbor analysis
Airport	Web-based	Vector (point)	Nearest neighbor analysis

Source: Independent Evaluation Group.
Note: ALOS = Advanced Land Observation Satellite; DSM = digital surface model; LULC = land use land classification; m = meter; PDF = portable document format.

Econometrics Methodology

To determine treatment and comparison areas in Maputo, the road improved by the project was assigned as the treatment road (3.81 kilometers); this was Julius Nyerere Avenue from the intersection of Kenneth Kaunda Avenue to the intersection of Avenida Das Forcas Populares De Liberascao De Mocambique. The comparison road (5.17 kilometers) was assigned to the northern edge of the treatment road, specifically from the intersection of Avenida Das Forcas Populares De Liberascao De Mocambique to Maria Lurdes Mutola Avenue (map C.1). The treatment road was constructed beginning in 2009 and completed in 2017, whereas the comparison road was initially supposed to be improved by the project. Improvement of the comparison road was not implemented because of the project restructuring.

After the treatment and comparison roads were chosen, the treatment and comparison areas were created, which were considered as the potential catchment area of the road improvement project. The literature review suggests that the maximum distance that would have been influenced by the typical road improvement project was 2,000 meters from the road, and the impact areas for both treatment and comparison areas were created by generating the buffer areas from the road stretch. To estimate the granular impact, 500-meter, 1,000-meter, 1,500-meter, and 2,000-meter buffer zones were created for both areas.

Exploiting temporal and spatial variations in land use patterns and density in the project area, the impact of the project was evaluated through the difference-in-differences (DID)

method. Defining the unit of analysis as a grid cell (aggregated from a number of pixels for the construction of the unit of analysis), the basic DID model can be constructed as follows:

$$y_{ijt} = \beta_0 + \beta_1 D_{jt} + \beta_2 T + \beta_3 (D_{jt} \times T) + \varepsilon_{ijt} \quad (2)$$

where y_{ijt} is the ith outcome variable of interest (the proportion of built-up area or density), in plot j observed at time t; D_{jt} is an indicator denoting plot j's "treatment" status, that is, whether plot j belongs to the project-affected (treated) corridor: $D_{jt} = 1$ if plot j is within the corridor of the buffered distance from both sides of the road, and $D_{jt} = 0$ if the plot is located within the comparison corridor of the buffered distance; T denotes time periods: $T = 1$ if the outcome is observed in the current year, and $T = 0$ if it is observed in the year when the project was started; the parameters β_0 through β_3 are coefficients to be estimated, among which the coefficient on the interaction between D_{jt} and T, β_3, is the DID estimate of the project impact on the ith outcome.[4]

A set of control variables, $\boldsymbol{X}_{ist}$, which should *not* be affected by the project but could potentially affect the outcome of interest (such as construction projects or business events within the corridor that are independent of the road construction project), can be added to the model to help assess the robustness of estimation results, and improve precision of the estimation:

$$y_{ijt} = \beta_0 + \beta_1 D_j + \beta_2 T + \beta_3 (D_j \times T) + \boldsymbol{X}_{ijt} \boldsymbol{\beta}_4 + \varepsilon_{ijt} \quad (3)$$

Results and Discussion

The main regression results are reported in tables C.7 and C.8. The coefficient indicates how a given variable affects the built-up area in the square grid; tables C.7 and C.8 represent a 10-meter × 10-meter square grid. The results were presented by the buffer distances from the corridor: 500 meters, 1,000 meters, 1,500 meters, and 2,000 meters. Variables that showed multicollinearity were removed from the regression. The variable of interest in assessing the project impact is provided as post × treatment. The change of the built-up area and density is visualized in map C.1.

Map C.1. Land Use Changes in Built-Up Area
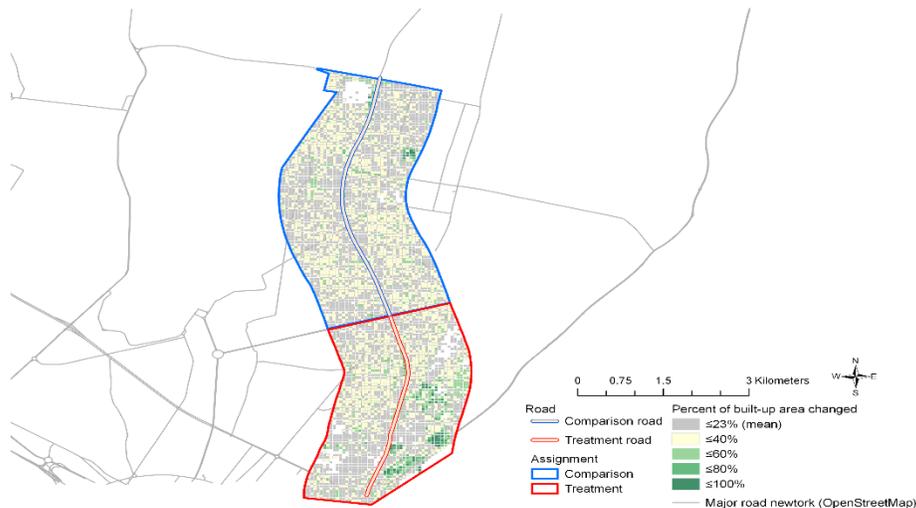
The results found that the average treatment effects (ATE) were all statistically significant at the 0.05 level. Based on the regression results of the fixed effects, the ATE was recorded between 0.68 and 2.26 percentage points (pp). Distance to the road also matters. We see that the ATE gradually increases from a 500-meter buffer (1.47 pp) to a 1,000-meter buffer (2.26 pp), which then fluctuates to 0.68 pp at a 1,500-meter buffer and 2.26 pp at a 2,000-meter buffer (tables C.7 and C.8). This means that the closeness to the corridor does not uniformly influence the project outcome, and there could have been a heterogeneous impact in spatial terms. Most control variables, which are independent of the project intervention, are statistically significant except distance to the central business district, average slope, and average elevation, yet their coefficients are too small to explain the mechanism of the change.

Table C.7. Regression Results for Maputo, 500-Meter and 1,000-Meter Buffers

	500-Meter Buffer Mean Built-Up Area			1,000-Meter Buffer Mean Built-Up Area		
	1	2	3	7	8	9
Post	0.223**	0.223***	0.224***	0.220***	0.220***	0.222***
	(164.30)	(164.30)	(57.70)	(225.66)	(225.66)	(80.17)
Treatment	0	−0.0194***	0.00775	0	0.00859***	0.0250**
	(.)	(−8.56)	(0.65)	(.)	(5.18)	(2.90)
Post × treatment	0.0147*	0.0147***	0.00636	0.0226**	0.0226***	0.0185***
	(6.09)	(6.09)	(0.93)	(12.79)	(12.79)	(3.73)
Distance to the nearest intersection *(m)*			0.000220*			0.000197**
			(2.49)			(3.22)
Distance to the airport *(m)*			−0.0000540***			−0.0000387***
			(−12.51)			(−14.20)
Nearest distance to the corridor *(m)*			−0.000130***			−0.0000514***
			(−7.09)			(−7.60)
Distance to the central business district *(m)*			−0.00000411			−0.00000361*
			(−1.65)			(−2.01)
Average slope			−0.00280*			−0.00177
			(−2.58)			(−1.90)
Average elevation			−0.000237			0.000325*
			(−0.81)			(1.96)
Constant	0.453***	0.460***	0.728***	0.443***	0.439***	0.611***
	(795.13)	(327.22)	(27.93)	(1,075.60)	(439.67)	(34.09)
Observations	149,498	149,498	18,390	279,988	279,988	34,556
Adjusted R-squared	0.351	0.131	0.145	0.357	0.134	0.147
Fixed effects	Yes	No	No	Yes	No	No

Note: t statistics in parentheses. m = meters.
* p<0.05
** p<0.01
*** p<0.001

Table C.8. Regression Results for Maputo, 1,500-Meter and 2,000-Meter Buffers

	1,500-Meter Buffer Mean Built-Up Area			2,000-Meter Buffer Mean Built-Up Area		
	13	14	15	16	17	18
Post	0.222***	0.222***	0.223***	0.218***	0.218***	0.219***
	(249.80)	(249.80)	(88.25)	(235.14)	(235.14)	(82.56)
Treatment	0	−0.0583***	0.00417	0	0.0130***	0.0259**
	(.)	(−90.29)	(1.34)	(.)	(8.13)	(3.14)
Post x treatment	0.00681***	0.00681***	0.00635***	0.0225***	0.0225***	0.0199***
	(10.47)	(10.47)	(3.43)	(13.24)	(13.24)	(4.15)
Distance to the nearest intersection *(m)*			0.000127*			0.000180**
			(2.49)			(3.09)
Distance to the airport *(m)*			−0.0000190***			−0.0000385***
			(−10.59)			(−14.95)
Nearest distance to the corridor *(m)*			−0.0000489***			−0.0000494***
			(−11.48)			(−8.44)
Distance to the central business district *(m)*			−0.00000862***			−0.00000441*
			(−10.29)			(−2.52)
Average slope			−0.00300***			−0.00129
			(−3.81)			(−1.39)
Average elevation			0.000591***			0.000563***
			(4.42)			(3.50)
Constant	0.396***	0.454***	0.571***	0.442***	0.438***	0.605***
	(1,323.37)	(503.05)	(65.95)	(1,125.25)	(460.17)	(34.73)
Observations	493,214	493,214	61,188	303,910	303,910	37,600
Adjusted R-squared	0.372	0.155	0.175	0.353	0.131	0.145
Fixed	Yes	No	No	Yes	No	No

Note: t statistics in parentheses. m = meters.
* p<0.05
** p<0.01
*** p<0.001

Before-and-After Satellite Imagery

Before-and-after satellite images were obtained from the Global Ocean Security Technologies team through a library of high-resolution and 0 percent cloud-cover imagery with the sole purpose of visual comparison before (August 2009) and two years after (March 2018) the World Bank slum upgrading infrastructure interventions in

George Dimitrov (figure C.3). The interventions targeted highly vulnerable to flooding public areas including access roads, the central plaza, and a school. According to the interviews, the specific interventions in the George Dimitrov neighborhood had the effect of reducing flooding, decreasing travel time to and from the city center, and offering local residents improved public spaces. The images show the status of the main targeted areas. This before-and-after visualization shows the sustainability of improvements over time.

Figure C.3. Before-and-After Satellite Imagery of George Dimitrov

a. Before—August 2009

b. After—March 2018
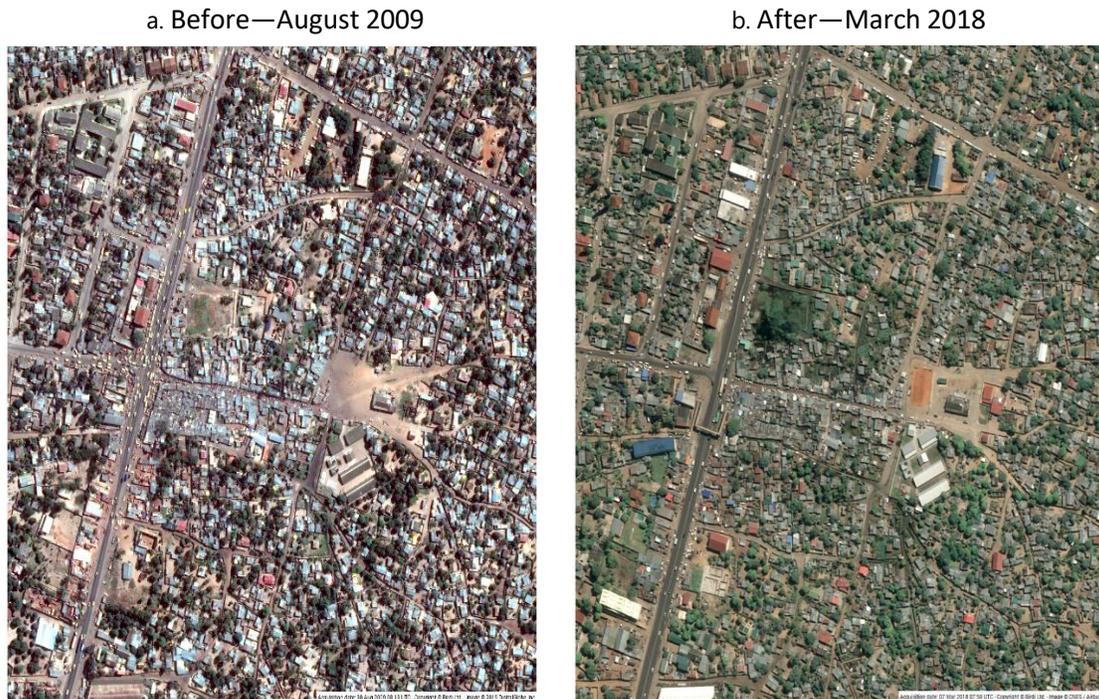
Source: Global Ocean Security Technologies, Birdi Ltd. – Image (left) @ 2019 DigitalGlobe, Inc., Image (right) @ CNES/AirbusDS

Land Use Title Survey

The ProMaputo program, implemented by the CCM between 2006 and 2016 aimed at the institutional and financial sustainability of the CCM and the improvement of the services provided. In its second phase (2011–16), the program supported five components:

- A: institutional development

- B: financial sustainability

- C: urban planning and environment

- D: urban infrastructure and services

- E: metropolitan development

Components C and D aim at ensuring equitable and sustainable management of municipal territory, including the improvement of informal settlements. These two components have two objectives:

- Ensure tools for the proper management of urban land; and

- Ensure the improvement of neighborhoods and reduce informal settlements.

This second objective should be achieved through the improvement of informal settlements and the regularization of occupations. One of the key activities under the program was to regularize land use titles. A survey was done to understand the effects of obtaining a land use title according to direct beneficiaries.

Land Use Title Survey Methodology

During APL II, the DUAT (right of use and access to land) Massive Regularization Program (RMD) was focused in KaMavota municipal district 4 (DM4) and municipal district 5 (DM5). The following five neighborhoods were targeted for RMD:

- 3 de Fevereiro (DM4)
- Bairro Ferroviário (DM4)
- Laulane (DM4)
- Mahotas (DM4)
- Magoanine "A" (DM5)

The task was performed during 2014–16. Out of 33,877 DUATs, we selected those for homes only (29,595); other titles given for business, religious, public services, tourism, and other uses were excluded. Three bairros were randomly selected for this survey: Mahotas, 3 de Fevereiro, and Bairro Ferroviário (table C.9).

Table C.9. DUATs by Neighborhood

	All DUATs	Household DUATs	Select Neighborhoods
3 de Fevereiro	6,243	4,365	Yes
Bairro Ferroviário	6,554	4,702	Yes
Laulane	5,752	5,736	
Mahotas	9,468	8,932	Yes
Magoanine "A"	5,860	5,860	
Total	33,877	29,595	

Source: CCM.
Note: DUAT = right of use and access to land; CCM = City Council of Maputo.

In this context and to assess from various socioeconomic aspects the impact of obtaining this document on family life, the World Bank engaged a consultancy service for the application of surveys in three out of the five neighborhoods covered by phase I of RMD: Bairro 3 de Fevereiro, Ferroviário, and Mahotas.

Results

Table C.10 presents a summary of the data collected from interviews conducted in three neighborhoods, through a sample of 429 families, distributed as follows:

- Bairro das Mahotas—150 families
- Bairro 3 de Fevereiro—129 families
- Bairro Ferroviário—150 families

Table C.10. Summary of Interview Data

	3 de Fevereiro	Ferroviário	Mahotas	Total
Not an owner	7	3	8	18
No DUAT	75	89	87	251
DUAT	68	37	55	160
Final DUAT	56	25	37	118
Provisional DUAT	12	12	18	42
Total	150	129	150	429

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land.

DUAT Holders

Excluding the renters, about 37 percent (160) of the people interviewed had a DUAT; 61 percent (251) had no DUAT but 40 percent had started the process. Of the 61 percent (160) that have a DUAT, about 74 percent have a final document and the remaining 26 percent have a provisional one. The 3 de Fevereiro neighborhood has the highest percentage of final land use titles (table C.11).

Table C.11. Summary of DUAT Holders (percent)

	3 de Fevereiro	Ferroviário	Mahotas	Average
DUAT	45	29	37	37
Final DUAT	82	68	67	74
Provisional DUAT	18	32	33	26
No DUAT	52	71	61	61

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land.

Beneficiaries of Massive Regularization

The majority (83 percent) of the interviewees with a DUAT obtained their land title through massive regularization, and the rest through their own initiative (27 percent). Although about 173 families interviewed (64 percent) do not have a DUAT, that at least half of these had begun the process of regularization but never completed it (table C.12).

Table C.12. Massive Regularization versus Own Initiative for Obtaining DUAT

	3 de Fevereiro	Ferroviário	Mahotas	Total
	With DUAT			
Own initiative	6	4	18	28
Massive regularization initiative	62	33	37	132
Total	68	37	55	160
Massive regularization, % of total	91	89	67	83
	Without DUAT			
No initiative	36	85	52	173
Own initiative	1	0	1	2
Massive regularization initiative	39	4	34	77
Total	82	92	95	269
Massive regularization, % of total	48	4	36	29

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land.

The main reasons for households not receiving DUATs are process delays (25 percent) and lack of payment (25 percent). For households that had applied through RMD and not received DUATs, the two main reasons were also delays (69 percent) followed by lack of payment (23 percent) (table C.13).

Table C.13. Reasons for Not Obtaining DUAT (percent)

Reason	Massive Regularization (N = 77)	Own Initiative (N = 2)	No Initiative (N = 173)
Delay	69	0	25
Lack of payment	23	0	25
Property does not qualify	0	0	5
Other	3	2	4
Not available	5	0	51

Source: Independent Evaluation Group.
Note: DUAT = Right of use and access to land.

Change of Life

Before these interviews, it was already assumed that families would benefit from having a DUAT, because the document gives them security over land tenure and use. Results show families feel safer having their land tenure regularized (table C.14). The majority of families (73 percent) that have DUATs report a positive change since receiving the DUAT. The most frequently mentioned change is security, at 50 percent (including 9 percent for gender security). A large percentage of families with a final DUAT (81 percent) feel that their life changed as a result of the DUAT; for families with a provisional DUAT, the share was a little over half (54 percent).

Table C.14. Life Changes Resulting from Having DUAT (percent)

Change in Life	3 de Fevereiro	Ferroviário	Mahotas	Total
	Has the DUAT changed your life?			
Not available	7	0	15	8
No	15	19	24	19
Yes	78	81	62	73
Total	100	100	100	100
	How has the DUAT changed your life?			
Security	40	45	39	41
Gender security	11	8	7	9
House price increase	8	0	15	8
Can leave property, move	5	12	12	8
Can rent	9	6	8	8
Reduce inheritance conflicts	7	6	3	6
Home improvements	5	4	5	5
Resolve family conflicts	5	4	3	4
Community recognition	5	2	4	4
Use as collateral	2	10	1	3
Business improvement	2	4	0	2
Sell house	2	0	4	2
None	0	0	0	0
Increase capacity of indebtedness	0	0	0	0
	100	100	100	100

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land.

Home Improvements

Households made incremental house improvements regardless of whether they had a DUAT (table C.15). About 47 percent of DUAT holders made improvements before

receiving any type of document, and 53 percent after receiving a provisional or final DUAT. However, having a DUAT motivated households to invest in their infrastructure.

Table C.15. DUAT and Home Improvements

	3 de Fevereiro	Ferroviário	Mahotas	Total	% Total
Home improvement after provisional DUAT	12	6	17	35	47
Home improvement before provisional DUAT	8	9	3	20	27
Home improvement before final DUAT	8	6	5	19	26
Total	28	21	25	74	100

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land.

Use of Property as Bank Guarantee

Having a DUAT allows someone to use the property as collateral to access funds. However, interviews show that at this time, only 6 of 160 families with a DUAT had used their house as collateral. Of these, 4 used it to help finance their business.

House Price Increases

Among the 160 families that received a DUAT, 72 percent believed that their house prices had increased. Forty-three percent estimate the increase at 90–100 percent, 19 percent at 50–89 percent, and 9 percent at 10–30 percent. There is no difference in perception according to whether title is provisional or final.

DUAT Waiting Time and Costs

Waiting times vary, but it takes 2 to 12 months for the majority of families to receive the final DUAT (table C.16). During RMD, about 15 percent of the DUATs were processed within 1 month. There is therefore some degree of discontent within the community about the time it takes to process a DUAT.

Table C.16. Length of Time to Receive Final DUAT

Days	Own Initiative	%	Massive Regularization	%	Total
0–90	3	15	30	34	33
91–180	9	45	25	28	34
181–360	5	25	16	18	21
Over 360	3	15	18	20	21
Subtotal	20	100	89	100	109
Not available	2	n.a.	6	n.a.	8
Total	22	n.a.	95	n.a.	117

Source: Independent Evaluation Group.
Note: DUAT = right of use and access to land; n.a. = not applicable.

Out of 160 interviewed families that received either provisional or final DUATs, 116 (73 percent) do not know how to transfer the title to someone else or sell the property. This points to the need for more awareness campaigns within the communities. There are still 39 families that have only provisional title through RMD. About 80 percent of these have had their processes finalized, and are just waiting for the documents to arrive. A small group (12) were unaware of the program; some of these people were working outside the country. The cost of receiving a DUAT through RMD was lower on average than through one's own initiative.

References

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[1] See ArcGIS documentation at https://pro.arcgis.com/en/pro-app/tool-reference/spatial-analyst/how-maximum-likelihood-classification-works.htm.

[2] A pixel of the land use land classification model is coded as a numerical number by its land use type (for example, 1 = built-up, 2 = green, and so on). The built-up area was selected from the land use land classification data set, and the non-built-up area was converted to 0. Thus the built-up data set is a binary data set that shows both built-up and non-built-up a.

[3] Publicly available digital elevation models can be accessed through Advanced Land Observation Satellite, Shuttle Radar Topography Mission, or Advanced Thermal Emission and Reflection Radiometer. Research shows that Advanced Land Observation Satellite has the highest accuracy among these freely available digital elevation model data sets. See Santillan and Makinano-Santillan (2016).

[4] Under the assumption that $E[\varepsilon_{ist}|D_{st}, T] = 0$, this can be seen by deriving the following conditional means: $E[y_{ist}|D_{st} = 1, T = 1] = \beta_0 + \beta_1 + \beta_2 + \beta_3$, $E[y_{ist}|D_{st} = 1, T = 0] = \beta_0 + \beta_1$, $E[y_{ist}|D_{st} = 0, T = 1] = \beta_0 + \beta_2$, and $E[y_{ist}|D_{st} = 0, T = 0] = \beta_0$. Thus, it can be easily seen that $\{E[y_{ist}|D_{st} = 1, T = 1] - E[y_{ist}|D_{st} = 1, T = 0]\} - \{E[y_{ist}|D_{st} = 0, T = 1] - E[y_{ist}|D_{st} = 0, T = 0]\} = \beta_3$.