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Taking Management Digital

Lessons from the Development of an Innovative Management Information System for Small Businesses in Ethiopia

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Abstract

In many aid projects, monitoring and evaluation is a static exercise driven by donor reporting requirements. After project closure, there are seldom sustainable benefits of the monitoring and evaluation system. This paper examines how monitoring and evaluation can be transformed into a dynamic tool for effective project management, with benefits carrying over beyond the typical project lifecycle. The paper assesses an innovative, digital management information system developed under the Women Entrepreneurship Development Project, a Government of Ethiopia initiative financed by a World Bank International Development Association loan and grant funding from Global Affairs Canada. The paper examines the context of the development of the management information system, its effectiveness, and its potential for sustainability. Ethiopia is among the poorest countries in the world, and government administration units involved in administering projects often face funding and resource shortfalls. The paper demonstrates how effective and sustainable monitoring and evaluation systems can be developed even in challenging contexts such as these, by focusing on simple technical solutions that can be maintained and refined locally, ensuring low development and maintenance costs compatible with government monitoring and evaluation budgets, and linking project-level monitoring and evaluation to broader government operations.

Taking Management Digital:

Lessons from the Development of an Innovative Management Information System for Small Businesses in Ethiopia

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1. Introduction

How can project monitoring and evaluation (M&E) be transformed into a dynamic tool for effective project management? How can M&E tools be integrated into national government structures and carry over beyond the lifecycle of a project? These are the two key questions that this paper aims to address.

In many aid projects, M&E is a static exercise driven by donor system reporting requirements. An external consultant is often hired to develop the framework, the client reluctantly generates the data as an addition to its ordinary data collection, and the M&E serves solely project purposes. When the project closes, the M&E system is also shut down, and there are seldom any sustainable benefits of the M&E component. This seems to be a misuse of resources that would not be tolerated in other project components, where the requirement is usually that the benefits of a program continue after donor funding ceases (Chianca 2008).

Sustainability of the resources used for M&E in development projects should be a concern, with sustainability of development assistance defined as the extent to which the benefits of the project continue after donor assistance has been completed (OECD 2010a). Sustainability in foreign aid is one of five objectives the Organization for Economic Cooperation and Development recommends for inclusion in any evaluation of development aid projects (OECD 2010b), but there is usually very limited focus on sustainability of M&E components in development evaluation. For example, in a review of Norwegian evaluations, all sustainability assessments omitted the M&E components (Norad 2014).

Maintaining the benefits of M&E investments after project closure is challenging. Often, investments in M&E involve the design and deployment of novel management information systems (MIS), to track project-level outcomes. However, there is no consensus in the literature on information systems (IS) in developing countries on how to achieve sustainability of such technologies, and information technology (IT) projects in general have a high failure rate. In the government sector alone, failures of IS projects in developing countries are as high as 85 percent (Silva and Fernández 2016). A review of World Bank support of information and communications technology (ICT) from 2003 to 2010 found that only 25 percent of projects supporting diffusion and use of ICT achieve their results (IEG 2011). Moreover, fewer than 60 percent of the ICT components of World Bank projects achieved or were expected to achieve their intended results. Similarly, in more than 70 percent of projects supporting public sector governance, the ICT components of World Bank projects were modified, cancelled completely, or substantially delayed. Although some explanations have been offered, the reasons for the poor performance and high failure rates of ICT initiatives in development are poorly understood (Silva and Fernández 2016).

In this paper, we discuss the effectiveness and sustainability of the M&E component of an aid-funded project in Ethiopia: the Women Entrepreneurship Development Project (WEDP). This project was selected because we believe it provides some useful and illustrative lessons. Our aim is to document an innovative approach to developing the M&E framework that not only resulted in an effective online management information system (MIS), but also generated sustainable results in and of itself. The MIS used a low-cost, easily accessible platform that can be adapted to almost any other project or organization, with particular benefits when semi-autonomous entities collaborate and need to coordinate their M&E functions. In addition to serving project purposes in a timely and accurate manner, the MIS had a large potential catalytic function in that it served as a demonstration scheme for MISs within the recipient government.

The purpose of the paper is therefore twofold. First, the paper explores how an MIS can be created to serve as an effective project management tool, even under challenging conditions. Second, the paper assesses some features that lead to sustainability of an MIS. These discussions provide some practical guidance for others with similar intentions of developing an ambitious MIS at a very low cost in a developing country context. We document the process leading to a fully functional MIS that provides real-time access to all monitoring data across participating institutions that is accessible online from anywhere in the world.

The MIS examined was developed in Ethiopia, one of the poorest countries in the world, whose government administration units often face funding and resource shortfalls, especially for lower-level units responsible for data collection. The MIS was implemented at the central and regional or district levels in 45 sites around the country. This regional dispersion is something that greatly increases the complexity of the project and makes it much more challenging (Dener et al. 2010).

Despite a challenging context, local IT consultants developed the WEDP MIS at very low cost using free software platforms as its basis. We believe that similar MISs can be implemented in most other developing countries from similar challenging starting points. To facilitate learning from the development of the Ethiopia MIS, we also provide an overview of the system and document its features and advantages over the standard M&E approaches.

The main approach taken in this paper was to interview the key users of the MIS and the associated stakeholders and to assess the project documentation. The authors have played central roles in the WEDP and the development of the MIS on behalf of the World Bank, and we used our own reflections and experiences in conjunction with secondary sources in the assessment. Therefore, the judgements in this paper should be seen not as independent scrutiny but as a type of self-assessment. We do not believe that this biases the review or diminishes the importance of the findings. We make reference to the empirical foundations of our conclusions to facilitate subsequent independent evaluation of the WEDP and the MIS.

Our main finding is that the government's commitment to the project was one key to its success. In order for an MIS to be sustainable, it must serve the government's needs and be seen as a useful tool beyond project purposes. The system must be based on simple technical solutions that can be maintained and refined locally, and development and maintenance costs must be low and compatible with the government's M&E budget if the system is going to continue to be used. Finally, building an IT culture was important for making the system work in practice.

Section 2 is a review of the literature; section 3 explains the context; section 4 provides details of our methodology; sections 5 and 6 analyze the effectiveness and sustainability, respectively, and section 7 highlights lessons learned and concludes.

2. Literature review

There is a large and growing literature on IS in developing countries (Avgerou 2008, Pires and Fernández 2016). Coverage is broad, with specialized journals developed for such purposes, such as *Information Technology for Development*, *Information Technologies and International Development*,

and the electronic *Journal of Information Systems in Developing Countries*. Moreover, broad ICT journals such as the *Journal of Global Information Technology Management* often include papers on IS in developing countries, and there are general IS research conferences that include panel and paper sessions on developing countries. General IS journals also frequently publish papers on research in developing countries, including special issues on this topic.

Our paper is about the sustainability of IS in developing countries, especially assessments of what factors are important for system survival. This literature has much broader coverage than the scope of our project management IS-focused assessment. The literature assesses many information and communication systems with widely different functions, aims, sectors, implementers, and users,[1] but there are many useful lessons to be learned about why systems survive or not. We first focus on proposed, general explanatory factors for the failure and success of IS projects and components because this helps identify common characteristics. The material presented here is manly taken from reviews and broader studies. Second, we present the existing evidence in a structured way according to this categorization, including a range of case studies in developing countries.

The sustainability of IS solutions in developing and developed countries is much discussed in the literature because sustainability is critical to the steady future flow of benefits from these projects (Yogesh et al. 2015; Pires and Fernández 2016). The literature notes an extraordinarily high incidence of failure rates of IS projects and components, which suggests that IS projects and components to a large degree have been a waste of resources. A striking example is World Bank investments in financial MIS, which amounts to approximately US$2.2 billion from 1984 to the 2010 to finance 87 projects in 51 developing countries. Only approximately half of the projects completed by 2010 were rated as likely or highly likely to be sustainable (Dener et al. 2010).

There are many well-known examples of large, complex IS in developed countries on which hundreds of millions of dollars were spent on planning and development that never came into operation (Nelson 2007). The focus on the lack of sustainability in the literature on developing countries is not so much on the investment and preparation phase. The general impression seems to be that, with the right support, relatively simple systems can be made to work in the initial phase, albeit with substantial delays and changes to the original design (IEG 2011). The critical phase for sustainability seems to be after the system has been put into daily operation, particularly after donor financial and technical support has ended.

Because the continued high failure rates of IS are a common theme, the literature contains many assessments of what factors need to be in place for the systems to survive and function, although in developing countries, the literature is to a large extent anecdotal, focusing on achieving individual aspects of sustainability that by themselves may not solve the problem because the reasons for failure can often be a combination of factors (Pires and Fernández 2016). Moreover, it is sometimes

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[1] Dener at al. (2010) provide many examples. In service delivery, for example, one would find IS in health projects with objectives ranging from strengthening medical statistics systems to setting up an integrated bio-behavioral surveillance system for HIV/AIDS. In disaster management, IS systems are used to develop better digital elevation models and obtain supporting satellite imagery. In social protection, pension projects use IS to improve efficiency of government services by financing IT improvements for pension offices and providing training for staff and management. In education, IS projects have been used to prepare for modern technology in the recipient country. In water and sanitation, a project intended to supply and install IT equipment to allow for regular, efficient monitoring of utility performance and program implementation.

impossible to determine exactly why the successes occurred because so many factors need to be in place for success (IEG 2011). The general IS literature contains many attempts to identify predictors of IS success (Petter et al. 2013). Most of these mirror the failure literature in that what is identified as a key factor to success (e.g., user involvement) is also identified as a key factor for failure (lack of user involvement).

It is inherently difficult to identify the critical factors leading to success because separating out the binding constraints may often be impossible. Identifying which factors led to failure may be more informative, although different stakeholders may have different opinions about what constitutes a failure and the reasons for the poor results (see Yogesh et al. 2015 for a discussion).

General factors of sustainability

Kumar and Best (2006) propose five factors of sustainability that together seem important for the continuation of IS after the initial investment stage:

1. Political and institutional sustainability: a political and institutional environment for IS implementation and continued system use and improvements.

2. Financial and economic sustainability: the financial support necessary for continued system use, maintenance, and enhancement.

3. Technological sustainability: technology-related support such as hardware, software, and infrastructure needed for continued use, such as interface and maintenance of the technology.

4. Cultural and social sustainability: a social setting and system culture receptive to the new approaches. Local customs (values and principles), equality or inequality of access to the system, and continued delivery of benefits to relevant actors are critical.

5. Environmental sustainability: environmental concern of IS implementation and use (IT equipment use, reuse, refurbishment, recycling, disposal).

Pires and Fernández (2016) take this further and argue that, within each of these factors, the IS needs to be shaped and adapted to the context by cultivating local learning processes and institutionalizing routines of use that persist over time. They also add a sixth factor that could explain lack of results of IS projects: the large number of actors with competing interests and different rationales.

Pires and Fernández (2016) also contend that the various involved parties (top management, vendors, donors, end users, project implementers) may have different incentives and agendas that could influence project sustainability and different interpretations of the realities and cultures of project management. When the new IT solution is implemented, this may affect the organization and in turn the positions and power structures, which can lead actors to oppose or change the direction of the implementation. The authors hence take a holistic approach to sustainability and argue that each of the six factors and not any single aspect or factor must shape IS design, implementation, and use. They claim that the high failure rates are a consequence of not taking into account all these factors that influence sustainability. This resonates with Dwivedi et al. (2015) and the Independent Evaluation

Group (IEG 2011), which emphasize the failure to account for complexity and multifactorial nature of problems as a reason for the failure of IS interventions.

Similarly, a World Bank review (Dener et al., 2010) of experiences with financial MIS in 55 projects revealed that lack of human resource capacity was the single most important factor in project failure, mentioned as a factor in 60% of the projects. In addition, they reveal that institutional and organizational resistance were key factors that could cause failure and that this was interlinked with weak leadership from senior management. This accords with the findings of Nelson (2007), who points to lack of proper management as a critical factor in failure. The last factor mentioned in the World Bank review was complexity of project design and lack of project preparation and planning.

Heeks (2002) developed two models for understanding and explaining failure of IS in government organizations, although the models apply more widely to general IS failure. The first, the Factor Model, uses five factors that can be sources of failure: strategy, management, design, competencies, and technology. The second, the Design-Reality Gap Model, assesses gaps between project design and the actual situation to explain failure, focusing on areas such as information, technology, processes, objectives and values, staffing and skills, management systems and structures, and other resources. Similarly, Rand Europe (2010) listed five capacities and readiness conditions (infrastructure, financial, institutional, human, relationship or receptivity) for using ICT successfully in service delivery.

In donor-funded projects that the recipient government implements, the question of recipient ownership and government commitment to the project usually plays a role. An evaluation of World Bank performance of all ICT components of projects between Fiscal Year 2003 (FY03) and FY10 highlights government commitment as an important factor that needs to be in place to avoid failure (IEG 2011). The IEG finds that the rate of achievement of ICT objectives is low (IEG 2011). Intended results are achieved in only half of the ICT components in projects supporting public sector governance in which MIS development is included. Again, the quality of design of ICT components is essential to avoid project failure and is listed as the most critical factor leading to poor performance. The poorly performing projects were found to have overly complex designs in contexts in which stakeholders lacked basic abilities to address problems. The IEG (2011) also highlights implementation shortcomings and a high rate of cancellation of ICT components. In a summary of others' experiences, the IEG refers to complexity that organizational and political pressure adds to "think and act big" as a source of failure, as well as users' lack of understanding of the system and failure to focus on real problems and needs.

Systematizing the case study evidence

Many case studies confirm the main findings described in the reviews and larger studies cited above. To provide a comprehensive picture of the factors, taking these case studies into account, Table 1 provides a summary of the evidence of factors that probably contribute to IS project failure.

Table 1: Main Factors Contributing to Information System (IS) Project Failure

Areas	Factors	Suggested effects (source of evidence)
Incentives and agenda	Agents with opposing incentive	-Local actors behave according to own values or vested interests not aligned with IS project requirements (Walsham and Sahay

	structures and agendas in preparation, implementation, and daily use	1999; Leidner and Kayworth 2006; Kenny 2013; Imran and Gregor 2011).
		-Donor agency and foreign actors involved in IS implementation act in accordance with own agenda (Ciborra 2006).
		-Vendors push foreign solutions not adapted to local realities (Heeks 2002, 2003; Avgerou 2000).
		-IS projects change internal incentives that those who lose oppose (Kumar and Best 2006; Chan and Pan 2008; Jensen and Aanestad 2007; Montealegre and Keil 2000; Scott, Golden, and Hughes 2004; Bartis and Mitev 2008).
	Misalignment with user interests	Misalignment with user interests leads to resistance, disparity in system use, unsustainable system implementation (Yogesh et al. 2015).
	Weak project management	Project is poorly estimated, scheduled, sized, or scoped; the effort and time required are incorrectly estimated, not taking into consideration resource availability or technical aspects of acquisition; follow-up is weak, contract management is poor (Nelson 2007; IEG 2011; Dener, Watkins, and Dorotinsky 2010).
Political and institutional setting	Lack of leadership	Lack of leadership and clear responsibilities lead to failure in system implementation and sustainability (IEG 2011; Imran and Gregor 2010; Young and Jordan 2008).
	Misalignment of goals and ambitions	Goals of relevant institutions are not aligned to deliver organizational changes that IS implementation requires, resulting in cancellation or minimum system use (IEG 2011; Dhillon 2004; Heeks and Stanforth 2007; Ciborra and Navarra 2005).
	Lack of involvement	Lack of involvement, leads to user resistance (Chan and Pan, 2008, Scott, Golden, and Hughes 2004; Lin and Silva 2005; Joia and Magalhães 2009; Jensen and Aanestad 2007).
	Asymmetric relationships between stakeholders	Top-down approaches and frequent changes are made to systems without consultations with stakeholders, conclusions about system success or failure conflict (Kimaro and Namphossa 2005; Bartis and Mitev 2008; Joia and Magalhaes 2009; Nyella and Mndeme 2010).
	Lack of trust	Direct donor handling of project financial transaction, leads to lack of cooperation between stakeholders or abandonment of IS because of lack of trust between core stakeholders (Kimaro and Nhampossa 2004; Vaidya, Myers, and Gardner 2013).
Ownership	Commitment	Lack of political commitment and ownership in implementing institution leads to project failure(IEG 2011).
	Preferential relationship	Vendor receipt of funding directly from donor, undermines client, leading to to lack of cooperation from client (Kimaro and Nhampossa 2004).

	Gap between design and reality	Gap between technological solutions and reality regarding environment, organization, and capacity of end-users results in long implementation process and unsuccessful system implementation (Heeks 2002; Nguyen and Fernandez, 2009).
Technology	Lack of technical capacity	Relevant users and operators in developing countries often lack technical capacity to develop, use, and maintain IS solutions; donors sometimes also lack technical capacity (IEG 2011; Imran and Gregor 2010; Lee 2001; Nguyen and Fernandez 2009).
	Technical solutions	Too-advanced, -ambitious, -complex technical solutions, lead to inability to implement is envisaged (IEG 2011)
	Dysfunctional relationships between stakeholders	Dysfunctional relationship between implementing institutions leads to poor system implementation and user resistance because of slow responses (Bartis and Mitev 2008, Kimara and Nhampossa 2004)
Culture	Organizational and national culture	There is lack of cooperation between actors, lack of system use, unclear decision-making process influenced by cultural background and knowledge; local context is not taken into consideration (IEG 2011; Walsham and Sahay 1999; Westrup et al. 2003).

3. The Ethiopian Context and the WEDP

The local context

With a per capita gross domestic product of US$1,900, Ethiopia is one of the poorest countries in the world. Government administration units often face funding and resource shortfalls, especially the lower-level units responsible for data collection. The Government of Ethiopia takes a hands-on approach to project implementation, with strong ownership of their policies and projects. Once projects and policies have been decided on, there is a strong will to move toward implementation. The government structure is strictly hierarchical, and coordination challenges between lower-level administrative units are usually solved at a higher level on a case-by-case basis. For projects involving more than one ministry and semi-autonomous institution (e.g., Development Bank of Ethiopia (DBE), microfinance institutions (MFIs)), there is no formally established system for communication and interaction.

The hierarchical government structure has several layers, subdivided into regional states with a high degree of autonomy. Government offices have large variations in staff competencies and capabilities and a high degree of turnover, especially in the one-stop shops (OSSs), which are entry positions for young people into the government.

In our experience, at the lower administrative levels, staff lacked basic competencies for operating in an electronic office environment. For example, most data entry staff had no experience using the Internet for work purposes, such as emailing, saving and sending files, and using search engines, although most were well acquainted with mobile phone social media applications (e.g., Facebook) and

Internet-based communication (e.g., Viber, WhatsApp). They seldom required more than three to four days of training to be able to manage the MIS. In many OSSs, annual turnover exceeded 30 percent, with many staff leaving shortly after they had been trained on the MIS. Turnover was also high in MFIs and the DBE, making training of staff on the MIS a continuous, ongoing process.

WEDP: A complex project

Ethiopia has achieved high economic growth in the past decade, averaging 10.7 percent per year, establishing it among the fastest growing economies in Africa and the developing world, but it is falling behind its peers in terms of credit to the private sector. According to the World Bank Enterprise Surveys, micro (41 percent), small (36 percent), and medium (29 percent) enterprises in Ethiopia perceive access to finance to be the main business environment constraint, compared with Sub-Saharan Africa averages of 24 percent, 20 percent, and 16 percent, respectively.

Opportunities for female entrepreneurs in Ethiopia lag far behind those for men. In *The Economist* Women's Economic Opportunity index, Ethiopia ranks 107 of 112 countries. Most growth-oriented female entrepreneurs fall into a "missing middle" trap, in which neither commercial banks nor MFIs serve them. High minimum loan sizes and excessive collateral requirements restrict women's access to loans from commercial banks. MFIs primarily cater to micro-firms with group lending schemes that provide very small loans and tend to have poor outreach to women (30 percent). Growth-oriented women-owned enterprises are therefore starved of the investment they need to thrive.

To address this challenge, the Government of Ethiopia, with the support of the World Bank and the Governments of Canada and the United Kingdom, launched the WEDP in 2012 to support women-owned micro and small enterprises (MSEs). The WEDP aimed to increase the income of female entrepreneurs and to create employment and job opportunities. MSE development was critical to the government's efforts to increase the economic empowerment of women, and the development of income-generating activities for women was a specific aim of the five-year plan of the government at that time – the Growth and Transformation Plan 2011-2015.

The WEDP was established in October 2012 as a $50 million International Development Association investment lending operation. In addition to the World Bank, the Governments of Canada and the United Kingdom were the core development partners, contributing an additional $13 million. In 2017, the Governments of Japan and Italy added resources, bringing the total donor contribution to approximately $130 million.

The project development objective of the WEDP has been to increase the earnings and employment of female-owned or partly owned MSEs in the five main cities of Ethiopia. This was to be achieved by removing two of the main barriers to female enterprise growth by tailoring financial instruments to the needs of the target group and ensuring availability of finance and by developing women's entrepreneurial and technical skills. The target beneficiaries were growth-oriented female entrepreneurs.

The implementing structure was complex, involving entities from several different government structures. The components included access to finance; entrepreneurial skills development; and project management, advocacy and outreach, M&E, and impact evaluation.

Access to finance

To facilitate access to finance for female entrepreneurs, WEDP created a dedicated line of credit, with the DBE acting as a wholesaler and MFIs acting as retailers. The project used an incentive-based approach aimed at helping the DBE develop a new business line involving wholesaling of MSE subsidiary loans, providing related technical support to participating MFIs, and helping the MFIs build up a high-quality MSE loan portfolio based on lending techniques that have been developed and validated under successful MFI expansion approaches in other countries.

Using a dedicated technical assistance component, WEDP built the capacity of Ethiopia's leading MFIs to deliver loans to female entrepreneurs on an individual basis with larger average loan sizes. The MFIs' improved ability to appraise loan applications resulted in their capacity to reduce the collateral requirements from an average of 200 percent of the value of the loan to 125 percent. At the same time, WEDP MFIs are adopting and diffusing new techniques to reach and serve female entrepreneurs better. They are developing new loan products and recognizing new forms of collateral such as vehicles, personal guarantees, and even business inventory to secure loans.

The disbursement and management of the line of credit required a complex structure, with multiple financial intermediaries bearing full credit risk. Figure 1 provides an overview of the resource flows of the component.

Figure 1. Resource Flow in the Access-to-Finance Component of the Women Entrepreneurship Development Project
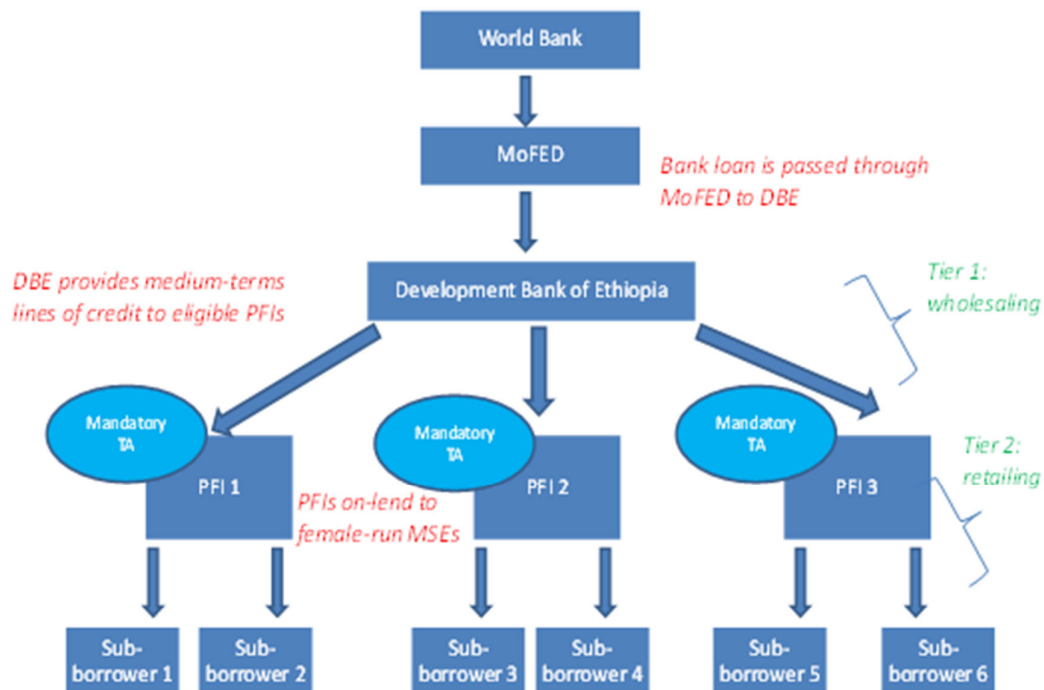
Notes: MoFEC, Ministry of Finance and Economic Cooperation; DBE, Development Bank of Ethiopia; PFI, Participating Financial Institution; TA, Technical Assistance; MSE, Micro or Small Enterprise.

Entrepreneurial skills development

The aim of this component was to develop growth-oriented female entrepreneurs' skills in a way that would help them to increase their profit. An international consulting firm was hired to design and implement a top-class capacity-building technical assistance program to increase the capacity of the institutions that provided direct services—primarily the technical and vocational education and training (TVET) institutions. Training modules were developed and offered at 11 selected TVET colleges in the five cities. Two additional training providers were commissioned to broaden the scope of training offered: the Digital Opportunity Trust,[2] supported by Canada, and the Entrepreneurship Development Centre[3], a quasi-governmental entity established under the framework of the Entrepreneurship Development Program developed in partnership with the UN Development Programme.

The Federal Urban Job Creation and Food Security Agency (FUJCFSA) had direct responsibility for planning, designing, and coordinating the WEDP project in close collaboration with the National TVET Agency. FUJCFSA also had the overall responsibility for ensuring delivery of high-quality training and support to WEDP members in entrepreneurship and technical skills. The two additional training providers were also reporting training achievements to FUJCFSA.

Implementing structure

The implementing structure for WEDP implied that the DBE and MFIs were central in service delivery under the project, with responsibility for disbursement of credit to female entrepreneurs. At the same time, the TVET Agency and its colleges and two private training providers in the country, Digital Opportunities Trust and the Entrepreneurship Development Centre, taught entrepreneurial skills to the same target population. Adding to the complexity, project management was assigned to FUJCFSA, which reports not to either of the two main service providers but to the Ministry of Urban Development and Construction. The project was a national urban project covering the four regional capitals of Tigray; Amhara; Southern Nations, Nationalities, and Peoples' Region; and Oromiya and the two chartered cities, Addis Ababa and Dire Dawa. These features and the geographic coverage required coordination, especially for monitoring progress and collecting and compiling data. Five government ministries and agencies and dozens of implementing entities below them are involved in running the WEDP project.

This complexity necessitated a sophisticated MIS to collect and provide access to project information for management and supervision. Developing and establishing a suitable M&E system to accurately track and assess the progress and results of WEDP was a subcomponent of component 3 of the project. During development of the WEDP, it was not envisaged that MIS development would be used as a catalyst for reforming the client's approach to using data for monitoring its own performance but that a consultant would be hired to perform the tasks. The initial proposed terms of reference for the M&E work confirm this approach and specify assignment of consultants to develop a turnkey M&E system that would require a minimum of client involvement in development (World Bank 2012). Nevertheless, the project design stipulated that "the data collection and reporting on WEDP will be based on the existing structures and Federal Medium and Small Enterprises Development Agency's (FeMSEDA)[4] own

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[2] https://ethiopia.dotrust.org/about/about-us/
[3] https://www.edcethiopia.org/index.php/contact
[4] In 2016, as part of the Ethiopia government restructuring, FeMSEDA was restructed to be the Federal Urban Job Creation and Food Security Agency (FUJCFSA).

M&E system," although this was abandoned during implementation of the MIS, especially because the compilation and oversight functions in the hierarchical structure were no longer needed when the data were automatically aggregated and instantly available online for involved institutions.

During implementation of the WEDP, the approach to developing the M&E system gradually became a partnership, with active client participation. The Government of Ethiopia made the decision to develop and test an ambitious online real-time MIS, which they deemed could potentially be useful to the government structure more broadly. The government therefore engaged its own IT experts from the IT department at FeMSEDA to assist the WEDP in developing specifications for the MIS and ensure that the system would be developed so that it would be useful at a later stage. On the technical side hardware such as servers, networks, and server rooms were upgraded to serve larger data flows than what the WEDP would generate. The client's eagerness to develop the MIS into a system of general applicability highlights the potential for using M&E efforts to generate sustainable results in capacity building.

A local IT company was hired through a competitive bidding process to develop the MIS. Based on initial rounds of developing the MIS specifications, a simple, low-cost solution satisfying some minimum requirements was selected. The aim was to develop a real-time web platform–based system that was as simple as possible and at the same time choose solutions that would enable the FeMSEDA IT department to manage and develop the system once the IT company withdrew from the project. The contract with the IT company included one year of support after start-up of the MIS. It was envisaged that FeMSEDA could subsequently manage the MIS without external support.

Finally, the WEDP had a unique design in that rigorous impact evaluations were included in a separate component of the project (World Bank 2012). Hence, from the start the involved parties wanted to learn about how the WEDP was working and how to increase its effect. This may have increased awareness of the usefulness of accurate, timely data and interest in using data to monitor progress and achievements.

4. Methodology

The empirical foundations for this paper are the experiences of the involved stakeholders as reflected in qualitative interviews collected in Addis Ababa in June 2017, approximately six months after the MIS had started basic operations. We also used the full archive of project documents and internal World Bank documentation used in developing the MIS. Our own experiences complement this.

At the data collection stage, the WEDP project was coming to an end,[5] and World Bank support to project M&E was at a minimum. We collected data from the key stakeholders, primarily focusing on the three main user categories of the MIS: FUJCFSA, DBE and the micro finance institutions, and the Federal TVET Agency.

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[5] The project was extended for two additional years with additional funding from the Governments of Italy and Japan. As of September 2018, the project implementation end date is expected to be December 31, 2019.

To capture any broader strategic use of the MIS in the government, we also interviewed representatives from the Federal Small and Medium Manufacturing Industries Development Agency because they expressed interest in developing an agency-wide MIS with the same structure as that of the WEDP MIS. We also interviewed the Association of Ethiopian Microfinance Institutions (AEMFI) because they were planning a similar MIS for connecting MFIs and because they attempt to coordinate MFI M&E and reporting systems.

Conceptually, one can think of developing an M&E framework for a project on three levels. On the most basic level, the M&E framework needs to deliver as required from the project perspective. This includes the donor's, client's, implementers', and other stakeholders' needs to be informed about project progress and likely outcomes. In this case, the standard approach entails hiring an external M&E consultant to develop the framework.

The second level involves more-integrated development of the M&E framework using the client's M&E systems. The donor and client together map out the indicators, modes of data collection, and other components of the system. Although learning may not be part of the objective, working closely together usually entails some capacity building to meet the required standards.

On the third and most-advanced level, there is an explicit capacity-building aim, with the client learning through the project how to develop its own M&E systems and systematically using the information provided to manage the project. In this latter case, the system for generating the data for the M&E is often referred to as an MIS.

5. Effectiveness: How to Establish an Effective MIS

5.1 An effective MIS

By September 2018, the MIS contained a database of approximately 25,611 female business owners who had applied to the WEDP and fulfilled the participation criteria. Data are entered in the MIS at three main points: when an eligible client registers with the WEDP, takes training, and takes a loan from the MFI. We present information from each of the sources and provide a graphic overview of some of the functions that can be applied to display the overview of the data and trends.

The MIS has an easy-access user-friendly interface that is suitable even for people without basic computer skills. Most users at the entry level have had no prior experience with computers, and only some have experience with the Internet through mobile phone applications. The start page when accessing the webpage (available here: http://197.156.90.249:8100/)

The website start page contains real-time data on project indicators, number of clients, number of clients trained, and number of loans that these clients have taken out. Refreshing the browser provides instant changes in the figures when a new client has been registered, some training has been completed, or a loan has been disbursed. Everything can be viewed in Amharic to ensure that nothing is lost in translation for individuals without strong English skills, for instance, lower-level government staff.

Image 1: Screenshot of WEDP MIS Webpage Start Page (as of September 29, 2018)

The front page is also used to present WEDP news, and the MIS can provide messages directly to various participating institutions. Logging on would then provide the user with a dashboard displaying categories of reports, tables, and figures that can be produced with a few clicks. The full database is available for WEDP management to export into Excel for more-advanced analysis. We return to this below.

Registration data

Entrepreneurs register locally in OSSs at the lowest government administrative level (kebele or subcity office) in the five largest cities in Ethiopia. During registration, basic information on the entrepreneur and her business is collected. Entrepreneur data include personal information such as education; years of business experience; whether the registrant has taken out a loan before and, if so, the largest amount taken; and what services she needs to expand her business.

Registration data on the entrepreneur's business include the year the business was established, the current number of female and male employees, her ownership share in the business, the starting capital for that business, its yearly earnings, and the number of employees. Upon completion of registration, the client receives a membership card with a unique WEDP identification number that WEDP service providers use to identify each client.

If a WEDP staff member requires information about a WEDP member, he or she can click on "Details" on the member of interest in the membership list, which will display the registration details in the system for each client.

Image 2: Screenshot of the First of Four Steps for Entering Registration Information

When the client obtains a WEDP loan or takes WEDP training, the service provider accesses the MIS and registers detailed information about the services provided to each client. The database therefore contains a wealth of information on clients that is accessible to WEDP staff with access rights to the various types of data.[6]

Training data

Training data are available in the MIS for each individual, including information about categories of training the client has taken, training content, and duration of training completed. An examination is administered after completion of each course, and the client's performance is recorded.

A detailed record of previous WEDP and non-WEDP training taken is also available, as well as an assessment of each client's needs for further training. Client satisfaction is also reported after each course. For management purposes, it is important to identify the training provider and the trainers, including names and contact information, so that it is easy for the WEDP to follow up on poor performance, report problems, and perform other quality checks.

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[6] There is a detailed list of access rights to various information in the MIS, and clear responsibilities have been assigned to the appropriate staff.

Image 3: Screenshot of Report Category in the Pull-Down Menu
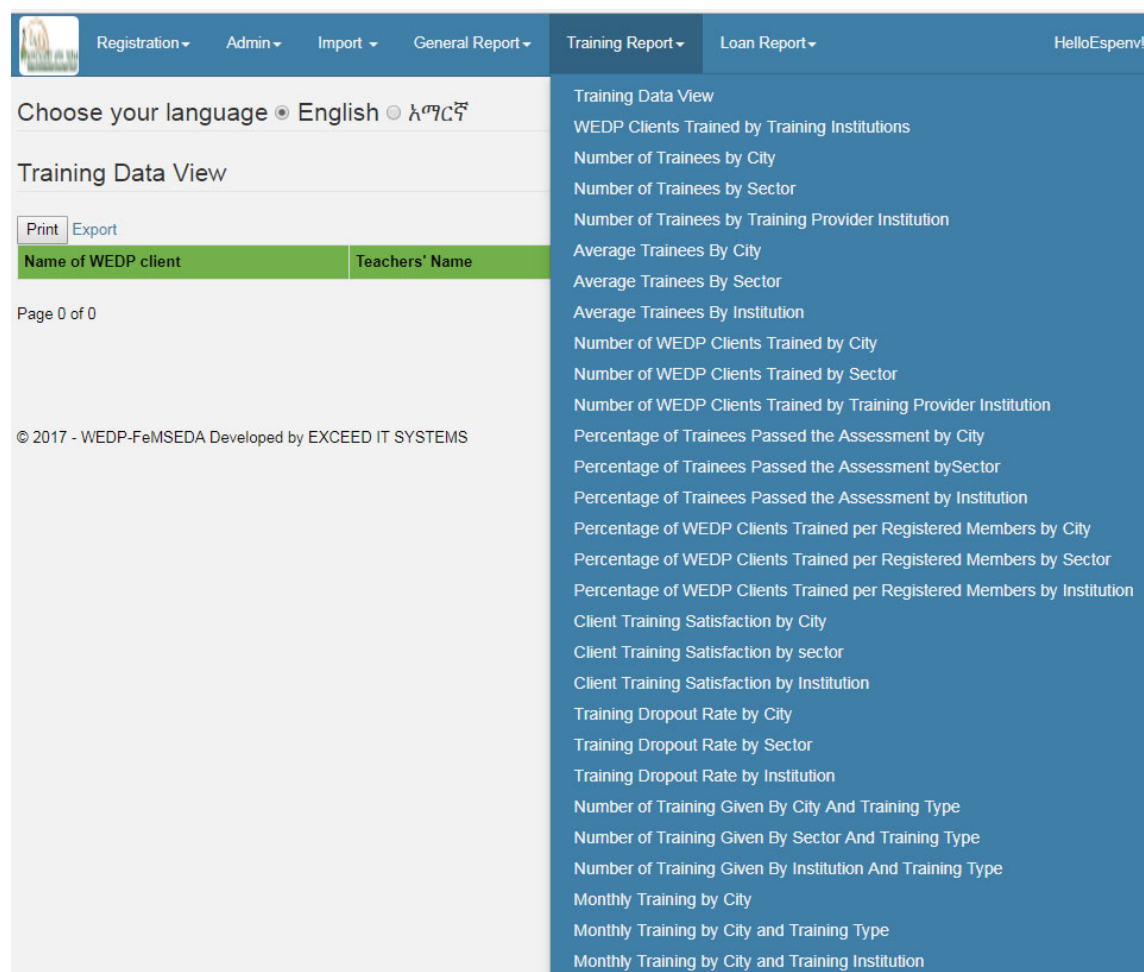
Loan data

Loan data registered in the MIS contain information about the loan (size, date of agreement, MFI branch), intended use of funds, and sector and subsector of intended investment. The reporting opportunities link this information to the registration and training data so that a compound picture of borrowers can be provided. The MIS webpage can show reporting opportunities for WEDP staff and a display of average loan size for those who have never borrowed before.[7]

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[7] Average loan size for those who have never borrowed before is an important indicator of market imperfections for female entrepreneurs in finance: Why had the women not borrowed before but then suddenly started to take large loans when WEDP gave them the opportunity to do so? The most likely answer, and the answer we get from discussing this with clients, is that they were credit constrained and not able to access large loans in the market.

Table 2: Number of First Time Loan Clients (as of September 2018)

Sector	Number of Loans	Average Loan (ETB)
Manufacturing	569	ETB 273,088.00
Construction	191	ETB 298,660.00
Trade	3467	ETB 232,220.00
Service	2277	ETB 248,185.00
Agriculture	131	ETB 164,924.00
Other	127	ETB 322,520.00

Management tools and reports

The MIS can generate a range of descriptive reports that are useful for project implementers at the local and central levels to monitor and analyze project progress under their responsibility in their area. It also provides project management with detailed and aggregated figures and trajectories that enable them to see whether the project is achieving its overall aims. Management can easily identify whether local units are delivering according to plan and immediately identify those that are not.

The critical performance indicators are number of clients registered, number of trainings delivered, and number of loans disbursed. These indicators are reported in a standard format that individuals with basic understanding of the software can amend.

Other examples of reports useful for management are those that provides users with basic WEDP performance indicators, average number of female and male employees that WEDP clients in each sector have hired, average earnings, and average loan size (not including themselves), such as the loan report by sector.

Chart 1: Trends of WEDP Members Registration, Training and Loan (as of September 2018)
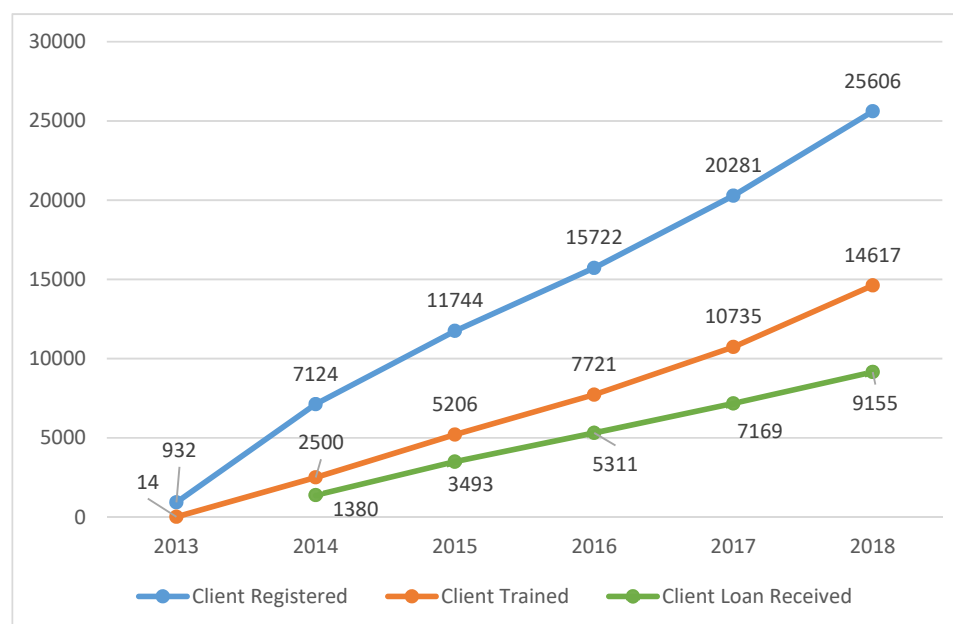

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Table 3: Loan Report by Sector (as of September 2018)

Sector	Ave. Female Employees	Ave. Male Employees	Average Earning		Average Loan Taken	
Agriculture	1.85	1.4	ETB	546,796.00	ETB	193,055.00
Construction	2.68	3.32	ETB	361,921.00	ETB	325,797.00
Manufacturing	2.29	1.77	ETB	807,156.00	ETB	282,563.00
Other	2.76	1.97	ETB	367,175.00	ETB	378,036.00
Service	2.29	1.36	ETB	823,229.00	ETB	260,160.00
Trade	10.59	0.64	ETB	554,863.00	ETB	238,844.00
Total	**22.46**	**10.46**	**ETB**	**3,461,140.00**	**ETB**	**1,678,455.00**

Management and local staff can also obtain disaggregated figures to see how WEDP performs locally. For example, the number of clients that have registered in each city can easily be provided, as well asthe number registered at each OSS.

Much of the information can be displayed for any time period specified and disaggregated according to OSS, MFI, TVET Agency, and city for various indicators and information collected. Data can be extracted and used for advanced analysis using statistical software. Frequently used WEDP bimonthly reports generated from MIS data include the training provided report, the lending performance reports, and the report on the discrepancy between new members registered and trained.

1. *Training provided*

Chart 2: WEDP Training by Training Institutions (as of September 2018)
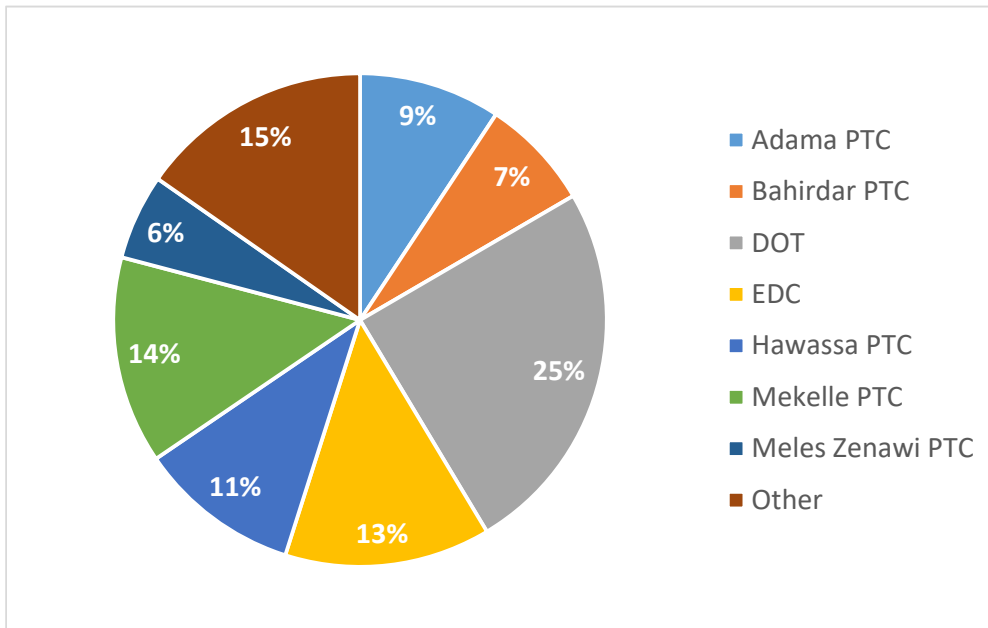
2. Lending performance

According to WEDP MIS reports, 2,538 new clients who have received WEDP loan between July 2017 to July 2018, a 48% increase from the number of new clients the year before. So far, a total of 9,338 loan data has been uploaded in MIS, which can track WEDP loan by city and by disbursing MFI respectively.

Table 4: Number and Size of Loans by City (as of June 2018)

City	Number of Loans	Ave. Loan Size	
Addis Ababa	5085	ETB	274,057
Bahir Dar	1064	ETB	389,659
Hawassa	312	ETB	256,170
Adama	1269	ETB	192,032
Mekelle	1180	ETB	172,883
Dire Dawa	232	ETB	118,095
Assela	13	ETB	253,077
Total	**9155**	**ETB**	**236,568**

Table 5: Number and Size of Loans by MFIs (as of July 2018)

MFI	Number of Loan	Ave. Loan Size	
WASASA	358	ETB	356,022
SFPI	308	ETB	418,498
OCSSCO	1,380	ETB	283,019
ADCSI	2,957	ETB	224,826
ACSI	1,079	ETB	628,908
DECSI	1,195	ETB	290,835
HARBU	249	ETB	291,332
OMO	204	ETB	413,501
MEKLIT	80	ETB	200,018
METEMAMEN	206	ETB	283,226
AGAR	715	ETB	304,663
VISION	606	ETB	231,654
Total	**9,337**	**ETB**	**327,208**

3. Discrepancy between registration and training of new members

Chart 3: Trends of WEDP Client Registration and Training from April 2018 to September 2018
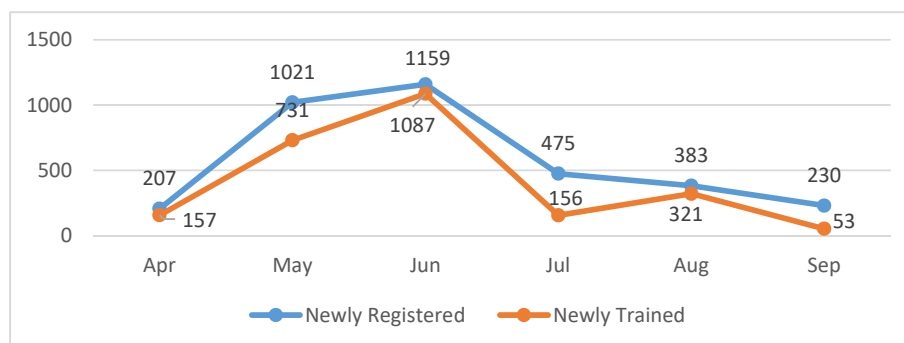
5.2 Establishing the MIS and success factors

This section describes the evolution of the M&E of the project and what factors have contributed to success in developing an effective MIS. We use the categories found in the literature review when they are relevant to our case. We highlight not only functional and system developments, but also processes leading to various achievements.

Establishing an IT culture

The experiences of the involved parties indicate that it would not have been possible to establish the MIS without developing an IT work culture. This accords with findings in the literature on IS solutions but adds a new dimension: The WEDP was established in a work setting that was not digitalized.

From the beginning, most staff involved in WEDP tasks were not used to digital work solutions. In particular, OSS and TVET staff had used only paper-based systems, although some MFIs had digital solutions. The project therefore not only provided software and hardware for OSSs, TVETs, and the FUJCFSA WEDP office, but FUJCFSA IT staff also provided a substantial amount of training to operate the systems.

FUJCFSA staff emphasized that one of the keys to making the MIS work was developing an IT culture among involved WEDP staff. In the beginning, operating the IT systems was seen as a burden, but at the time of our interviews, most involved parties saw the usefulness of operations and management having an instantly updated overview of project implementation.

We also found that maintaining an effective MIS required user acceptance. To achieve user acceptance, solutions must be compatible with users' skills, and the system must improve their work operations. To this end, the WEDP developed videos that show the functionalities, which serves as refresher training between regular face-to-face staff trainings. This was a popular way to learn how to operate the MIS.

Finally, development of the MIS was strongly embedded in the local context, which is an additional condition for success in terms of cultural sustainability. Given that the FUJCFSA, which also took responsibility for detailing the specifications, commissioned the MIS, the starting point for developing the MIS was the existing capabilities of the FUJCFSA's IT department. Moreover, a local IT firm designed the MIS, the government paid for it, and a local project implementation unit ran and maintained it, which contributed to establishing the IT culture and to a feeling of strong ownership of the system.

Political setting and ownership

As discussed in the literature review, embarking on an inclusive process in which the client takes ownership of the project seems to be essential to developing a system that works well once World Bank supervision ends. Similarly, without clear leadership, likelihood of IS failure is high.

Our interviews revealed that a strong, hierarchical political leadership endorses the MIS and wants to broaden its reach to other enterprises in the country. Over the extended project period, the WEDP is opening operations in four new cities; the MIS will have to be established there first. Compatibility

between the low-tech MIS solutions, the local situation for the implementing organizations, and the capacity of the end-users contributed to a high degree of local ownership of the MIS.

Local solutions

Developing simple, accessible technical solutions also contributed to establishing an effective MIS. An Ethiopian IT firm developed the technical solutions locally, which were based on free software with a user-friendly design, so even if many of the individuals involved lacked technical capacity to develop, use, and maintain the IS solutions, which the literature has identified as a risk factor, the low-tech solution helped overcome this challenge.

Developing the MIS was a long process, starting with initial specification of the core data requirements for the project and development of a full M&E manual. The first steps in registering clients involved developing and testing of an Excel-based registration form, which provided useful insights into what a functioning MIS should look like.

Attention to Data Quality

The WEDP intended to provide several services to clients, mostly financial services and training. Because clients could access many combinations of services from different service providers that were not linked to each other, it was essential from the planning stage of the MIS that WEDP services provided should be identified for each client. The first step was therefore to develop a unique client identifier.

Another important challenge was to ensure basic data quality. Given that so many diverse users were accessing and uploading data to the system, it was important to develop quality checks to minimize errors in data entry and avoid misunderstandings. To avoid confusion, training and demonstration videos were complemented with pop-up boxes that would explain in the local language exactly what information needed to be entered. If an incorrect data format was used, the user would receive an error message with an explanation of the correct format or type of information to enter. In addition, experience suggested that pull-down menus with fixed choices simplified data entry and minimized likelihood of errors.

In the initial phase, tests were run on the database to ensure data quality. The database could be exported to Excel and then used with any statistical software. This was helpful for detecting errors in the system and refining data entry procedures. Moreover, WEDP M&E staff used exported data regularly to conduct advanced analysis. Although the built-in reporting functions shown in the previous section worked well for basic monitoring and provided some standard evaluation tools, the richness of the database could be used in a range of ways when not restricted to prespecified parameters.

The WEDP also had a database expert conduct in-depth advanced data quality assessments and check for errors,[8] which provided useful technical inputs for refining the system.

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[8] It was necessary in this case to inquire into errors leading to incorrect identifications when uploading data from the first-phase Excel-based system into the final version of the MIS. It is difficult to guard against human errors, but the MIS minimizes the likelihood of such errors.

Finally, the role of users in ensuring data quality should not be underestimated. Users have a unique opportunity to detect errors in their daily work with the system, and it is important to create feedback loops from them to the system manager. Users had good suggestions for developing automatic aggregations for key figures and for how the data should be displayed, such as how it should appear in terms of tables, graphs, charts, and the like.

Although the MIS has generally been a success, there were many rounds of fixing problems until it was working in an acceptable manner. Some of the challenges encountered stemmed from lack of Internet reliability in Ethiopia. Frequent Internet interruptions can lead to duplication errors with automatic database updates and data not being automatically uploaded to the central server from satellite offices. Close monitoring and checking data transfer was therefore needed, even when the MIS was in regular operation.

6. Sustainability

At the time of our fieldwork, the MIS was functioning well and was popular among users, although its sustainability depends on the sustainability of the WEDP. If the WEDP is discontinued, there will be no need for joint reporting even if training and finance continue to be provided to growth-oriented female entrepreneurs. M&E of the services would then be integrated into the regular government system, and it would probably not be possible to continue to identify growth-oriented female entrepreneurs registered in the WEDP (under the current government SME registry).

Our sustainability assessment is therefore split into two parts. First, we assess sustainability based on the assumption that the WEDP would continue as a dedicated program after donor support ends and assess the likelihood that the government will continue with the MIS, as opposed to integrating it into their regular M&E system. Then, we assess spillovers from the MIS and the benefits generated beyond its functions as an MIS project.

Continuation of the MIS beyond project life

If the WEDP is maintained after donor financing ends, it is mostly a question of the costs of running the MIS in relation to FUJCFSA IT operating costs. We inquired into the operating costs of the MIS and those of the regular FUJCFSA IT system.

The operating costs for the MIS at the TVET colleges are minor, and the TVET colleges could take them on easily if they continue to provide training after project closure. One relatively costly support function has been the WEDP city coordinators, who have facilitated data transfer. They have acted as a link between the implementing institutions (mainly OSS and TVETS) and the head office. In the first phase of the WEDP, they were instrumental in collecting and submitting data. As the MIS started to function and gradually improved, their contributions decreased, although they still represent a substantial cost in operating the MIS.

The city coordinators have mainly provided temporary support in the start-up phase. Challenges such as poor Internet connections, high OSS staff turnover, and limited administrative resources for WEDP management have made the role of city coordinators important. For the TVETs, for example, once

their new fiber cables are installed, there will be no need for city coordinator support as long as TVET management assigns administrative personnel capable of basic data entry. Only a short training is needed, depending on staff knowledge of the Internet and basic use of Excel.

Microfinance

Duplication of efforts in the registration process needs to be avoided to obtain microfinance support. This is an inherent challenge for any finance project; loans provided to clients from project funds must be recorded to account for resources provided, and if the client's MIS is not compatible with that of the MFI, loan transactions must be recorded twice—first as a WEDP loan and then entered into the MIS of the MFI. If the WEDP is discontinued, all stakeholders indicated that the MFIs would be unlikely to continue to maintain such a double registry. WEDP clients would then be treated like any other customer and be registered in the ordinary system. The proposed solution was to make the WEDP MIS compatible with the MFI MIS. Our interviews with AEMFI made it clear that it was important to align donor reporting needs with the current MFI systems. AEMFI has initiated a large MIS project with the goal of connecting all MFI reporting and information sharing in real time.

Spillovers

A qualitatively different benefit of the MIS is the learning effect on other government entities and on other projects.

There were two initiatives in which there were direct influences of the WEDP MIS on government learning and using the knowledge generated. First, the FUJCFSA has developed a new MIS that will connect the 1,600 OSSs in the country. They used experiences and took many components of the new system from the WEDP MIS.

Second, the newly created Federal Small and Medium Manufacturing Industry Development Agency, which has de facto responsibility for support to SMEs in Ethiopia, expressed strong interest in obtaining their own MIS, with a similar structure to that of the WEDP MIS. The Director General stated that, with the churn in the SME sector, it is necessary to have a system that can easily be updated. Moreover, the agency had recently developed a catalog of SMEs in Ethiopia, but it was already outdated and no longer used. The WEDP MIS could easily connect information from licensing offices with the agency and provide real-time information about the number of SMEs in the country.

The WEDP MIS has also influenced other World Bank–supported projects in Ethiopia, especially the SME finance and urban food security and safety projects.

The government's commitment to the project is one aspect of its success. Moreover, for this approach to be sustainable, the MIS must serve the government's needs and be seen as a useful tool, be based on simple technical solutions that can be maintained and refined locally, and have low development and maintenance costs that are compatible with the government's M&E budgets.

7. Lessons learned and conclusions

An important lesson from the WEDP experience is that the government's commitment to the project was critical to its success. By developing a system that served the government's needs and was seen as a useful tool beyond project purposes, the WEDP MIS generated extensive local support.

A second lesson from the WEDP experience is that the MIS must be integrated into local cost and implementation structures. The WEDP MIS achieved a high degree of sustainability by developing a simple technical solution that can be maintained and refined locally and is compatible with the skills of the involved parties.

A final lesson from the WEDP experience was that building an IT culture was important for making the system work in practice. Creating an IT culture in a low-tech, largely analog environment is a challenging but achievable task. In this case, government commitment and willingness to endure were central to success.

The main reason for the success of the WEDP MIS was the interplay of these critical factors to make the system work; government commitment helped generate an IT culture of working with a system that the local staff was able to operate. In addition, because local government entities can afford to maintain and operate it, the sustainability of the MIS is high. As long as the WEDP continues, the MIS will continue in its current form. Once the WEDP closes, the MIS is likely to transform into a broader tool to help manage future government initiatives providing support to private enterprises in the country.

Given the high failure rate of IS interventions around the world, the WEDP lessons seem particularly germane. By garnering deep government support, developing a locally relevant solution, and staying the course in a challenging context, an effective system for information management was developed, and a lasting technological solution was provided to manage complex public sector programs in Ethiopia.

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Name	Affiliation	Role	Date
Ato Asfaw Abebe Eregnaw	Federal Small and Medium Manufacturing Industry Development Agency	Director General	15.06.17
Ato Yohannes Solomon	FUJCFSA	WEDP project leader	14-15.06.17
Ato Getachew Yimer	Federal Small and Medium Manufacturing Industry Development Agency	Advisor to Director General of FUJCSA	15.06.17
Dr. Behailu Kassaye	Development Bank of Ethiopia, Special Funds Administration	Director	19.06.17
Ato Teklit Berhe	FUJCFSA	FUJCSA Information and Communications Technology Director	15.06.17
Ato Ahmed M	FUJCFSA	WEDP Information Technology Specialist	14-15.06.17
Ato Dagnachew Amberbir	FUJCFSA	WEDP Monitoring and Evaluation Coordinator	14.06.17
Ato Mulugeta Alemu	Nefas Silk technical and vocational education and training college, Addis Ababa	Regular and extension division training program coordinator, WEDP focal person at Nefas Silk college	16.06.17
W/ru Tsigereda Worku	Association of Ethiopian Microfinance Institutions	Ethiopia Inclusive Finance Training and Research Institute Management Information System Officer	21.06.17
W/ru Seblewongel Ayalew	World Bank		14-15.06.17
W/ru Tsedey Asheber	World Bank	WEDP Skills Development Specialist	14-15.06.17

Notes: FUJCFSA, Federal Urban Job Creation and Food Security Agency; WEDP, Women Entrepreneurship Development Project.

If they want to do more complex larger projects, it might require much more resources and complex IT solutions.