



Innovations through Information and Communication Technology



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“Advances in technology have accelerated history, shrunk the world, and connected people in ways never seen before. The WBG uses and builds on these breakthroughs to help millions around the world lift themselves out of poverty and move into a productive and fulfilling life. Funds entrusted with the WBG constitute a formidable financing lever to achieve our goals of ending poverty and boosting shared prosperity.”

—Ferid Belhaj

Chief of Staff, Office of the President, World Bank Group

While much progress has been made to date, the global development challenges are becoming more urgent in the face of slowing economic growth, increasing fragility and conflict, decreasing trust in government institutions, and impacts of climate change. There is growing consensus in the international development community that if we are to end global poverty by 2030 and create shared prosperity for all, a ‘business-as-usual’ approach is no longer sufficient. The WBG needs to collectively think outside the box, do things differently, push the envelope, and innovate. New ideas, new funding mechanisms, new partnerships, and especially new technologies can

help create high impact, provide low cost, and agile development solutions that can save lives, reduce poverty, and increase prosperity for all.

While many of these innovations are being pioneered by the private sector, technology specialists, academics, government staff, NGOs, and ordinary people, the WBG is fortunate to draw on and build upon the groundbreaking work of these individuals and institutions. The WBG is constantly seeking to help accelerate innovations in development by testing and scaling up innovations in different contexts given our unique local to global presence, demonstrating and documenting successes and failures, incorporating these lessons into our operations and knowledge work, facilitating their widespread awareness, and supporting their use for transformational impact. Trust funds are critical flexible financial instruments that help the WBG do all of the above to support innovations in development.

Emerging technologies are one of the key driving forces behind innovations in development. New ICT tools and systems are increasingly being introduced and adopted in the WBG portfolio to improve the lives of the poor and are reshaping many aspects of development work as we have traditionally known in the past.

Though trust funds support a wide range of innovations through ICT, the results featured in this chapter primarily focus on technological innovations that are: (i) assisting fragile and conflict-affected countries; (ii) building effective identification systems so that the poor can access basic services; (iii) increasing financial inclusion for those who get left behind; (iv) strengthening public financial management for improved resource mobilization; and (v) improving water resource management. These five areas are merely illustrative of the potential use of trust funds in supporting innovations through ICT across all the WBG's work.

I. Assisting fragile and conflict-affected situations

Technological innovations in knowledge, analytics, and data are helping the WBG gain an evidence-based and deeper understanding of different FCV contexts to effectively respond to protracted and recurring crises.

High Frequency South Sudan Survey

CONTRIBUTOR



UNITED KINGDOM

The **High Frequency South Sudan Survey** trust fund, established in FY15, aims to fill the void of reliable data with household survey data and market price data, and complement the quantitative findings of the surveys with the voices of the poor who often live in dire

conditions in South Sudan. This survey system is made possible through innovative use of ICT. The trust fund builds capacity of the South Sudan National Bureau of Statistics to effectively administer surveys that generate high quality data and analytical reports based on traditional data, as well as a deeper understanding of the poverty and conflict context directly based on feedback from South Sudanese people.

The trust fund developed an innovative survey design that allows enumerators to conduct household surveys and record short, personalized testimonials of the respondents using smartphones and tablets to make videos. With an estimated 66 percent of the population of South Sudan now living below the poverty line, the surveys provide a firsthand account of the situation on the ground and humanize abstract poverty numbers to reveal what it is like to live in poverty from the perspective of the poor. The opportunity to voice their situation is a first step to empowerment, allowing the poor to tell policy makers directly about the multiple dimensions of poverty they are facing, including powerlessness, exclusion, and violence, how they are coping with their situation, and their own solutions to help inform programs and policies for addressing their dire needs.

Capitalizing on technological and methodological innovations in survey data collection, the High Frequency South Sudan Survey uses smartphones and tablet computers to conduct computer assisted personal interviews. The rapidly expanding cellular network in South Sudan enables data to be instantly transmitted to data analysts in the capital, resulting in development of a real-time monitoring system including a dashboard for tracking cumulative number of interviews, the responses to the survey questions, and the missing variables from the traditional survey based on direct testimonials of the poor. This feedback and analysis enables the data analysts to verify and supplement core indicators and track situations on the ground, while field work is still ongoing, providing a unique opportunity to address real-life problems in real time.

Since 2015, the household surveys are updated annually to generate the latest poverty estimates for the government. The survey data and the video testimonials using ICT provide updated statistics to decision makers to design appropriate programs and policies based on a deeper understanding of poverty. A number of government ministries including the Ministry of Finance, the Ministry of Health, the Ministry of Humanitarian Affairs, the Ministry of Education, and others are regularly using this data for planning of policies and programs. The rich data are also enabling the production of a diverse range of analytical products. These include notes reporting on a deeper understanding of the well-being of the South Sudanese people during a tumultuous period of nation building, where internal conflicts escalated and macroeconomic conditions continued to deteriorate, generating evidence-based advocacy for focusing on South Sudan. Donors have also used the data to inform their programs and policies.

Many of the technological and methodological innovations of the survey are now being applied to other surveys within South Sudan, as well as in other countries including Ethiopia, Kenya, Nigeria, Somalia, and Sudan. For example, the National Bureau of Statistics in collaboration with the World Bank is undertaking a crisis recovery survey in internally displaced person camps across South Sudan, where many of the lessons learned during the survey are being applied and a similar methodology is being used. Similarly, in other countries, the World Bank and United Nations partners survey

An innovative survey developed in South Sudan in FY15, which combines traditional household data with testimonials from poor people using smartphones and tablets, is being used by the government and donors to inform policies and programs.

displaced populations using the same techniques developed in South Sudan as part of the High Frequency South Sudan Survey trust fund.

South Sudan has faced multiple shocks since its independence in 2011. An oil dependent country, the drop in oil prices adversely impacted the country's economy. Recognizing the need for data in South Sudan to assess the impact of such shocks and to inform policies and programs, a real-time dashboard was also developed to track daily exchange rate and weekly market prices. Data on market prices and exchange rates are collected in 15 locations in South Sudan using handheld tablet computers and uploaded directly to a cloud-based server via the 3G network. The data on market prices were recorded on a weekly basis for 20 consumer items such as sorghum, lentils, dried fish, charcoal, and petrol, while the exchange rate data tracked the buying and selling prices for \$100 from multiple traders in every location on a daily basis. The data are automatically processed in the server and made available in an online Tableau dashboard to help the government and donors stay informed of market fluctuations and take timely corrective actions.

A dashboard tracks daily exchange rates in 15 locations using handheld computers and cloud-based Internet technology to help the government and donors respond to exchange rate fluctuations based on real-time evidence since FY15.

The real-time dashboard provides much needed assistance to the Government of South Sudan. Given the severity of the depreciation of the parallel market exchange rate captured by the dashboard, the government responded by moving from a peg of approximately three South Sudanese Pounds/United States Dollar (USD) to a managed float on December 15th, 2015. The dashboard continues to track the response of the market indicating an almost continuous free fall reaching 81 South Sudanese Pounds/USD in early September 2016. It has also proven to be very useful for reporting on the inflationary spiral South Sudan is going through, and has allowed analysts to zoom into microeconomic conditions through the availability of panel data. The market price data provided valuable information to analyze agricultural markets integration and inform poverty reduction policies, all of this at a time when famine was threatening to spread to the entire country.

This innovative system helps overcome challenges in data collection in a fragile context and is a stepping-stone to achieving greater development impact. Although it is currently limited to real-time information of exchange rates and market prices in South Sudan, the innovation opens doors for broader use and can be implemented in multiple contexts. The system has also served the government and donors in designing policies and programs in the country to respond to the exchange rate crisis.⁸¹

⁸¹ The comprehensive micro-survey data from multiple waves of the surveys and the real-time market price tracking dashboard are available online in the World Bank micro-data-library along with the video testimonials. The multi-media presence called the 'The Pulse of South Sudan' can be accessed at www.thepulseofsouthsudan.com. The microdata library contains all micro-datasets as well as the complete cleaning and analysis codes. This helps to transfer knowledge for analysis and encourages researchers and policy analysts to reproduce results and conduct their own analyses.

Box 18: Building the Poverty Profile of Nomadic Population through Tracking Devices in Somalia

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Somalia is emerging from 25 years of political instability and economic difficulty; however, hard data are lacking for evidence-based planning. Civil war and conflict fragmented the country, undermining political institutions, and creating widespread vulnerability. The conflict also eroded the statistical infrastructure and capacity in the country, leaving policy makers to operate in a statistical vacuum due to the lack of reliable data. The absence of representative household surveys was impeding the design and implementation of effective policies and programs needed to support economic resilience and development.

The [World Bank Multi-Partner Fund \(MPF\)](#) in Somalia, established in FY15, financed data collection as well as poverty and distributional analysis to fill critical data and knowledge gaps for informed development planning and investment that is aligned with the National Development Plan.⁸² The Somalia High Frequency Survey financed through the trust fund conducted household surveys through face-to-face interviews producing the first poverty estimates for the Somali population for decades. The second wave of the survey also included nomads, who represent one-third of the Somali population. A new tracking device was developed that was sewn into tent covers to transmit location signals for up to two years to fully understand the migration patterns and develop accurate household data of the nomadic population. This will provide an analytical cornerstone to improve service delivery, especially in times of localized conflicts and natural disasters.

All of the World Bank's activities are conducted in close cooperation with the Directorate of National Statistics to enable Somali partners to utilize similar methods and technologies to fill data gaps using ICT to support the development of institutional capacity in Somalia.

Household surveys supported through the Somali High Frequency Survey helped produce the first poverty estimates for the Somali population in decades.

⁸² For further information on MPF, please refer to page 35.

State and Peacebuilding Fund

CONTRIBUTORS



AUSTRALIA



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SWEDEN



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The **State and Peacebuilding Fund (SPF)** is financing innovative approaches to state and peacebuilding in countries affected by FCV.⁸³

Conflict damage and needs assessment, in part using remote satellite imagery, informed the design of \$400 million IBRD additional financing for the Iraq Emergency Development project approved in FY15.

In Iraq, the SPF supported the conflict damage and needs assessments to evaluate the impact of crisis on the country, targeting five cities and nine sectors, and supported the preparation of the \$400 million IBRD additional financing for the *Iraq Emergency Operation for Development Project*, approved in FY15. Given the difficult operating environment in the country, innovative analyses and technology were adopted to conduct the needs assessment remotely, using a three-pronged approach. The assessment used publicly available information provided by the government, United Nations agencies, and relevant NGOs along with satellite imagery analysis for initial data mining. The information was further validated through social media analytics, which was then triangulated through ground sources. The data gathered through remote satellite imagery was further extrapolated using conflict intensity and asset base comparisons. Information from different organizations on demographic, sectoral, and economic outcomes supplemented the findings, whereby the results of the physical damage and loss of lives were used to employ an integrative model to match observed economic outcomes including GDP pattern and demographic mobility. The assessment provided the World Bank with the first opportunity to undertake a rapid remote needs assessment to inform the development of the national framework for reconstruction and development and potential investment operations in Iraq. The needs assessment also enabled the government to incrementally support recovery and resilience activities and be better prepared for future crisis situations.

SPF has also contributed to the establishment of a data desk in the World Bank to support teams working on crises analytics, with a focus on developing micro-data of crises situations. The initiative aims to help inform World Bank operations in crisis mitigation and post-crisis recovery and develop a rapid response survey methodology that can be applied to different types of crises where rapid data is needed. The data desk defines the core micro-data needs to understand households, markets, and firms during an active crisis. A pilot rapid emergency shock response phone survey was implemented in Nigeria, Somalia, South Sudan, and Yemen to identify critical developmental constraints to inform a developmental response to the current drought and famine at the humanitarian-developmental nexus.

⁸³ For further information on SPF, please refer to page 28.

II. Building effective identification systems

Advances in biometric and digital technologies is enabling the WBG to provide low-cost solutions for large-scale unique enrollment, identification, and authentication of citizens residing in remote and rural areas to enable them to access basic services and government programs.

Identification for Development

CONTRIBUTORS



BILL & MELINDA GATES
FOUNDATION



OMIDYAR NETWORK

The **Identification for Development (ID4D)**, a MDTF, was set up to accelerate the work of the ID4D Program in helping countries develop robust and inclusive identification systems using 21st century modern technology solutions. ID4D Global Dataset estimates 1.1 billion people (1 in every 7 individuals) around the world are unable to prove their identity, making it difficult for them to access basic services and government subsidies. The majority live in Africa and Asia, and more than a third are under the age of 18. Having a formally recognized form of identity strengthens the efficiency and effectiveness of the government in providing basic services to the poor, providing them with recognition and a ladder to climb out of poverty. With robust and efficient identification becoming a key priority for governments around the world, ID4D plays a critical role in helping countries achieve the SDG target “to provide legal identity for all, including birth registration.”⁸⁴

“We are at an exciting point of technology, collaboration, and commitment converging to make unprecedented improvements in the lives of the 1.1 billion people living without identification, especially in vulnerable and forcibly displaced populations.”

—Kristalina I. Georgieva, Chief Executive Officer IBRD/IDA, World Bank

Recent innovations in biometric and digital identification technologies have created transformational opportunities to leapfrog traditional paper-based approaches and build strong and efficient identification systems at a scale not previously achievable. There is evidence of this in a number of developing countries, which have found ways to effectively leverage technology and create points of reference for the World Bank and its client countries to build upon and learn from.

The ID4D program was established originally in 2014 to allow the World Bank to respond to ever increasing client demand for assistance in a variety of identification

Analytical work supported by this trust fund developed the first ever estimate that 1.1 billion people globally are without official proof of identity, becoming the most cited data point on identification.

⁸⁴ This is part of SDG Target 16.9. The SDG 16 calls for “promoting peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.”

Box 19: Homegrown Innovations in Biometric and Digital Identification Technology in India, Peru, and South Africa

The national biometric identification program, 'Aadhar,' in India covering 89 percent of the total population, is the largest biometric identification system in the world. The program has created an authentication mechanism for citizens to help open bank accounts, leverage credit and insurance services, and avail employment, subsidy, benefit and pension schemes, etc., where they can enable subscriber identification module (SIM) card registration to access government benefits and subsidies. To date, the program has facilitated 73 million bank accounts to be opened and 472 million bank accounts are now linked to the 'Aadhar' identification numbers. In Peru, the identification system has achieved 98 percent coverage, providing access to public sector services such as pensions, health services, social protection programs, financial inclusion, and education, particularly for the marginalized populations living in remote areas. In South Africa, the near universal coverage of the identification system has created an incentive for timely registration and update of personal data, and helped service providers to plan and deliver more efficiently. The linkage of the national identification system with civil registration has also enabled the production of accurate and timely statistics, such as improved health patient data, including patient history information for effective HIV disease management. In each of these countries, the biometric identification programs are being regularly refined based on implementation experience and feedback.

22 organizations endorsed key principles of identification for sustainable development in FY17, leading to the establishment of the ID4D high level Advisory Council co-chaired by Kristalina Georgieva and Amina Mohammed.

areas. Bringing together global knowledge expertise, and financing that spans across multiple sectors and countries, ID4D helps countries tackle the challenge of identification through three pillars of work: (i) leadership and analytics to advance the understanding of identification, develop evidence of its importance, and provide guidance on how to introduce and scale up identification initiatives; (ii) global platforms and convening to drive the global identification agenda, strengthen harmonization and coordination among key stakeholders, and promote south-south knowledge sharing; and (iii) country and regional engagement to provide technical assistance to countries through a range of instruments including assessments, development of road maps, and helping client countries roll out identification programs. The trust fund operates across the WBG, including IFC, working across ten Global Practices and Cross Cutting Solution Areas on issues of proper identification for social protection, health, governance, gender, legal, financial inclusion, and data.

Since its inception in 2014, the ID4D program has made significant progress across the three pillars. The impact was magnified with the creation of ID4D MDTF in November 2016. Under pillar one, the trust fund supported extensive analytical work to advance the understanding of identification issues, including developing the first ever estimate of population globally without an officially recognized proof of identity across 198 economies. The ID4D Global Dataset's estimate of 1.1 billion people without proof of identity quickly became the most cited data point on identification across public, private, and multilateral agencies.

Under pillar two, the ID4D program has made progress in unifying and driving the global identification agenda by raising awareness and harmonizing the varying interests on this topic through the development of key principles of identification, now endorsed by 22 organizations, including the United Nations, NGOs, and the private sector. The recently launched ID4D High Level Advisory Council, cochaired by World Bank CEO Kristalina Georgieva and United Nations Deputy Secretary-General Amina Mohammed, has further elevated the importance of proper ID4D impact. The Advisory Council comprised of eminent practitioners and thought leaders from the public and private sector was set up to provide strategic guidance to the ID4D initiative and leverage international forums and engagements with client countries to advocate for the transformational role of identification in achieving several of the SDGs.

“Digital identification can play an important role in achieving the SDGs. It can enable the world’s poorest and most vulnerable people to gain access to critical services, from education to health care and financing, while also advancing their legal and political rights.”

—Amina J. Mohammed, Deputy Secretary-General, United Nations

Under pillar three, the ID4D program supported over 30 country assessments, out of which nine assessments were financed by the ID4D trust fund. The country assessments aimed to facilitate in-country dialogue with governments to improve their foundational identification systems.⁸⁵ Building on these diagnostics, the ID4D trust fund has also supported demand for upstream technical assistance and advisory work and pilot interventions that support lending operations to finance the broader infrastructure required to build a robust identification system, including at the regional level. This upstream work has helped inform the design of World Bank lending operations worth around \$750 million.

Mutual recognition across identification systems is a powerful driver of regional, economic, and social integration as it facilitates safe and orderly migration, access to services across borders, and increased trade. In West Africa, the ID4D trust fund is supporting the preparation of the first World Bank regional operation on identification, the \$122 million IDA *West Africa ID4D Regional Project*, to be approved in FY18. The project will invest in developing robust, responsible, and inclusive foundational identification systems in up to 10 member States of the Economic Community of West African States (ECOWAS) that will, along with accelerating sustainable development in those countries, be recognized across ECOWAS, thus promoting safe and orderly migration and access to services in the region.⁸⁶ The operation is being rolled out using a staggered approach, with Côte d'Ivoire and Guinea participating in the first phase with preliminary interest from an additional eight ECOWAS countries joining in subsequent phases. The project aims to: (i) strengthen the legal and enabling environment within and between countries by developing legal and technical standards for systems across the region to

The \$122 million IDA West Africa ID4D Regional Project, which is expected to benefit 10 countries, and to be approved in FY18, is supported from this trust fund.

⁸⁵ These include: Bangladesh, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Egypt, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Morocco, Myanmar, Namibia, Niger, Nigeria, Peru, Philippines, Rwanda, São Tomé and Príncipe, Sierra Leone, Somalia, Tanzania, Tonga, Tunisia, Uganda, and Zambia.

⁸⁶ ECOWAS is a regional [economic union](#) of fifteen countries located in [West Africa](#) that was established in 1975 to promote economic integration across the region.

ensure privacy and data protection; (ii) develop new and improve the existing foundational identification systems; and (iii) promote the use of identity cards for free movement and service delivery, including for cross-border identity authentication, etc.



Daniel Silva Yashisato

The ID4D is supporting a cross-border identification agenda in Uganda.

The ID4D trust fund is also providing upstream technical assistance for a second regional operation currently being considered by East African Community (EAC) member States, the \$200 million IDA *Mutual Recognition of National Identification in East Africa Project*, currently scheduled to be approved in FY19. The details of the project, along with a finalized budget envelope, is currently under discussion. The work has involved working with six EAC member States and

Secretariats to develop a five-year road map for mutual recognition of national identifications in the EAC in order to accelerate realization of the EAC Common Market Protocol, especially the free movement of persons, labor, goods, services, and capital, and the realization of rights, such as residency and access to services.

In total, 485 million people are expected to be impacted by the East and West Africa Regional World Bank projects, with support from the ID4D trust fund. In addition, this work has linked with the \$150 million IDA *Tanzania Financial Inclusion Project*, to be approved in FY18, which includes a \$30 million component to support mass enrollment of the population and increase access to digital financial services using the national identification system.

III. Increasing financial inclusion

With less than half of all adults in the poorest 40 percent of households with a bank account and approximately 375 million unbanked adults in developing countries, the WBG is using innovative approaches to monitor the use of financial services and provision of financial services to those who get left out of formal systems, including through digital financial services.

Global Financial Inclusion Indicators

CONTRIBUTOR



BILL & MELINDA GATES
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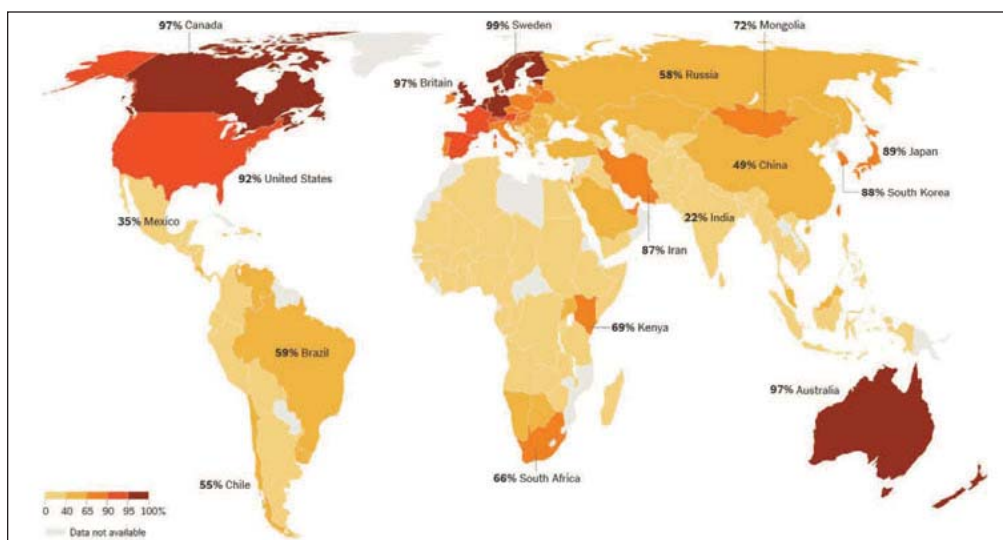
The **Global Financial Inclusion Indicators** trust fund monitors the use of financial services by disadvantaged groups, such as the poor, youth, and women around the world to

understand and measure financial inclusion and calibrate progress from different development interventions that are aimed at improving financial inclusion. To achieve this, the trust fund has developed a comprehensive database comprising key financial inclusion indicators that are comparable across countries, include demographic covariates, and are collected over time. The trust fund uses these indicators to collect and analyze data to develop policy papers, research reports, and publish flagship studies, which are then disseminated to key stakeholders across the globe.

The trust fund has supported the development of the [Global Findex](#) database, the world's most comprehensive database on financial inclusion that provides in-depth data on how individuals save, borrow, make payments, and manage risks in over 140 countries. The first Global Findex database developed in 2011 was a landmark, conducting interviews with over 150,000 national representatives and randomly selected adults age 15 and older, to provide unprecedented insights into how people use financial services.⁸⁷

The second edition of the database carried out in 2014 not only provided an update on the indicators collected in 2011, it went a step further to measure the use of new technologies such as mobile money and other digital financial services to support programs that provide access to financial services for the poor. Between 2011–2014, account ownership in Sub-Saharan Africa jumped from 24 percent to 34 percent due to an increase in the use of mobile money accounts, with more than 10 percent of adults having a mobile money account in the region. The 2014 Findex data indicated that adults in the region are using mobile accounts to make routine payments. In Kenya, about 20 percent of adults pay school fees through mobile money accounts. The data also revealed that both governments and businesses have increased account ownership by digitizing payments of social benefits and wages.

Second edition of [Global Findex](#) database carried out in 2014 covering 140 countries includes data on the use of new technologies such as mobile money and other digital devices that are providing access to financial services for the poor.



Source: The New York Times.

The World Bank [Global Findex](#) database showcases the global share of adults who received non-cash payments in 2014.

87 The complete dataset is available online at: <http://bit.ly/GlobalFindex>

With nine out of 10 wage earners in Bangladesh receiving cash payments, the Findex database helped highlight a huge opportunity to increase the use of digital payroll to strengthen financial inclusion.

In Bangladesh, the Findex database helped highlight opportunities to expand financial inclusion through an electronic wage payment system by surfacing several gaps in financial inclusion. For instance, there were significant gaps in account ownership between women and men, where only 26 percent of women owned a bank account, compared to 35 percent of men. Data also showed that nearly nine out of 10 wage earners in Bangladesh received their wage payments in cash only, clearly demonstrating that financial inclusion could be strengthened by increasing the use of a digital payroll. Moreover, with 18 million unbanked adults in Bangladesh receiving cash payments for the sale of agricultural goods, there is a big opportunity to increase financial inclusion by digitizing agricultural value chain payments.

Relying on cash increases the risk of wages being captured by unscrupulous people and heightens security risks, both for the employers and the employees. There is growing evidence that making the transition to digital forms of payment can save money and time for employers. For instance, garment factory owners in Bangladesh who pay wages in cash need to hire trucks and armed guards—and close production for days—to dole out millions of dollars in cash. Electronic wage payments are safer for employees—they don't need to travel home with wads of cash in their pocket. It also gives employees access to formal financial services and more control over their financial lives. For example, if the wage goes directly into the employee's bank account and there is no capture or leakage, it may offer the worker more decision making over their household budget, and thus provide a pathway to greater empowerment. This is especially true for poor women living and working in developing countries, and who may be opening their very first bank account to receive their salaries electronically.

The findings from the Findex database are being used to develop projects to encourage garment factories to migrate from cash to electronic wage payments. A current World Bank project is working with garment factories in Bangladesh to investigate whether automatically depositing wages into a formal bank account or into a mobile money account can improve workers' ability to save, meet end-of month expenses, and improve self insurance in the case of an emergency. Further work is also planned to examine the effects of electronic wage payments on remittances, loan demand, and worker productivity.

The third phase of the Global Findex expected to be launched in FY18 will feature new data on how adults use mobile phones and the Internet to make digital financial transactions, such as online purchases. It will also include data on how many adults have access to mobile phones and the Internet. By revealing the number of unbanked adults who have these technologies, the new Global Findex data will highlight new opportunities to increase financial inclusion using ICT.

IV. Strengthening public financial management

Emerging technologies are allowing the WBG to help client countries optimize mobilization and management of revenues and resources.

Zambia Public Financial Management Reform Program

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The **Zambia Public Financial Management Reform Program**, a MDTF, supports the implementation of the government public financial management reform strategy to ensure efficient, effective, and accountable use of public resources through improved fiscal discipline, increased accountability, and greater transparency in service delivery. The trust fund is working closely with the Government of Zambia to support budget reforms, public investment management, integrated financial management information systems, public procurement (including electronic procurement system), tax policy reforms, implementation of international accountancy standards, strengthening the accounting profession through new Chartered Accountants qualifications, and enhancing the effectiveness of the Auditor General. It has also supported Zambia in conducting the PEFA Assessment and the Report on the Observance of Standards and Codes—Accounting and Auditing assessment.

Zambia's primary export, copper and copper-related products, account for 77 percent of the country's exports. However, government revenues in the form of royalties, taxes, and customs duties ranging between 3 to 5 percent, are significantly lower than global averages of 24 to 40 percent. This is mainly due to the improper management of the mineral value chain system in the country. The Zambia mineral value chain, as in many resource-rich nations, is complex. From exploration to exports, it involves a myriad of complex operations including licensing, exploration, mining, beneficiation, sales, toll treating, taxation, and issues of export permits, etc. The lack of a reliable information system for production and exports, multiple regulatory agencies operating in silos with varying data on mining activities and limited coordination, and manual reporting systems are some of the main challenges faced by the Zambian government to effectively manage the mineral value chain system in the country.

Between FY13–FY17, the Zambia Public Financial Management Reform Program supported the development of the first ever online, integrated, and centralized revenue resource mobilization system, the Minerals Value Chain Monitoring Project. Anchored in the Revenue Authority, the project integrates information technology across all the institutions and stakeholders engaged in the mineral value chain from exploration to exportation. In addition, the trust fund promoted the use of information technology tools, such as handheld mineral analysis equipment, to allow for easy spot checks of mineral exports, while the establishment of the mineral analysis laboratory provided more accurate verification of mineral contents. Upon completion, the project will help

Zambia's first ever online, integrated, and centralized revenue mobilization system for copper exports, developed between FY13–FY17, is making compliance simpler, enhancing transparency, and increasing revenue collection.

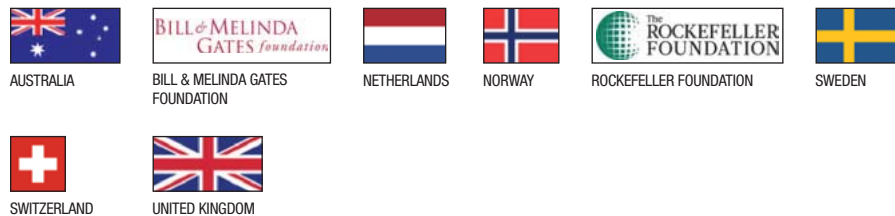
reduce costs for mining companies to achieve compliance, create greater transparency, and reduce transaction and monitoring costs for the government, ultimately increasing revenues for the country.

V. Improving water resource management

Technological improvements in remote sensing have generated an effective tool for the WBG to bridge key data gaps and improve data inputs to deliver better information to decision makers.

Global Water Security and Sanitation Partnership

CONTRIBUTORS



The **Global Water Security and Sanitation Partnership (GWSP)** trust fund helps clients build capacity to achieve water-related SDGs by generating cutting-edge global knowledge, providing country-level support, leveraging WBG financial instruments, and promoting global dialogue and advocacy with key partners and clients to increase outreach and impact. The GWSP builds on nearly a half century of collaboration driven by the Water and Sanitation Program, the Water Partnership Program, and other trust funds managed by the Water Global Practice, in an effort to consolidate and create a large global thematic trust fund. The partnership focuses on five priority themes: (i) sustainability; (ii) inclusion; (iii) institutions; (iv) financing; and (v) resilience. It also provides new opportunities to test and scale up innovations.

Remote sensing, also referred to as Earth Observation, allows the measurement of many hydrometeorological and environmental variables and plays an increasingly important role in providing the information needed to confront key water challenges. The GWSP supports a global initiative on remote sensing for water resources management to enable the World Bank to take advantage of fast improving remote sensing applications to support better water management using a two-phased approach.⁸⁸ Phase one aims to develop and disseminate a clear picture of the potential role of remote sensing in helping decision makers address water challenges, focusing on the accuracy, reliability, and validity of available remote sensing products. Phase two is intended for operationalizing and mainstreaming the beneficial use of remote sensing applications in client countries to inform and support decision making for water resources planning and management.

⁸⁸ This activity was originally financed through the Water Partnership Program.

Remote sensing initiative launched for Lake Chad between FY13–FY17 is expected to inform drought preparedness, increase agriculture production, protect people and livestock, and manage risks related to water resources across sectors.

Phase one resulted in the publication of *Earth Observation for Water Resources Management: Current Use and Future Opportunities for the Water Sector* to inform specialists and development practitioners around the world about the usability of remote sensing for water resources management.⁸⁹ The assessment concludes that there is still a large gap between existing remote sensing technologies and operational applications in support of the planning, design, and management of water resources. Although there is great potential for space-based remote sensing to enhance the capability to monitor the Earth's vital water resources, remote sensing data products are currently underutilized in water resources management.

To tackle these challenges, phase two of the remote sensing initiative supports World Bank teams by: (i) developing case studies and pilot projects in selected countries for the development of approaches that can be replicated in other countries facing similar challenges; (ii) providing world-class experts to offer targeted advice on specific problems related to World Bank operations; and (iii) carrying out knowledge dissemination, advocacy, and capacity building activities, in partnership with leading global and regional remote sensing and capacity building organizations.

Between FY13–FY17, one of the remote sensing initiatives supported by the trust fund was the hydrometeorological monitoring of flood and drought in Lake Chad. [Africa Flood and Drought Monitor](#), is an example of an operational hydromet monitoring and prediction system that uses historical data, near real-time remote sensing data, precipitation forecasts (short term and seasonal), and a land-surface model to produce useful data at different time horizons relevant for a range of water resources planning and management tasks. Building on the experience of that system, the remote sensing initiative developed a higher resolution monitoring and prediction platform called the [Lake Chad Flood and Drought Monitor](#).⁹⁰ The platform provides the Lake Chad Basin Commission, responsible for natural resource management in the basin, with hydromet monitoring, weather forecasts (10 to 15 days ahead), seasonal forecasts (six to nine months ahead), and the resulting hydrologic predictions. The platform provides information from a broad range of relevant hydromet variables, as well as drought indexes covering the Lake Chad Basin, and contributes to evidence-based decision making for sound management of water resources in the Lake Chad Basin.

This tool will be used to monitor the hydrologic state of the basin in terms of flood and drought risk, enabling the technical staff of the Lake Chad Basin Commission to report to decision makers on the state of water and associated resources in the basin. It provides a much needed basic understanding of rainfall and hydrologic partitioning across the basin: the spatial distribution of rainfall in near real time, and how much is expected in the near and mid-range future. This information is the basis for drought preparedness, agriculture production, protection of people and livestock, risk management, and adapting to water resources variability in a number of different sectors.

⁸⁹ To download a copy of the report, please visit <http://bit.ly/2EarthObservation>

⁹⁰ The Lake Chad Basin is about 2,300,000 square kilometers expanding over Niger, Nigeria, Cameroon, Chad, and the Central African Republic.