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ABSTRACT

The International Bank for Reconstruction and Development (IBRD), a World Bank subsidiary, is one of the leading International Finance Institutions (IFIs) that fund infrastructure projects in developing countries. The Bank provides an array of funding services to its member states through its various subsidiaries. These services such as grants and soft loans are often least burdensome on general budgets of governments. However, there are significant differences in the nature of these funding instruments and ability to address certain project risks. This paper focuses on two instruments provided by the Bank which are the Investment Project Finance (IPF) and the Program-for-Results (P-for-R). The feedback of 21 international experts is analyzed in order derive a logistic regression model that yields the recommended funding instrument. Furthermore, the devised tool is applied on a case study from the infrastructure sector in Egypt in order to assess its validity.

Keywords: Infrastructure, International Finance Institutions, World Bank, IPF, P-for-R, Logistic Regression.

Introduction

Background

The development of infrastructure is necessary for inciting economic growth, combating poverty, and improving the quality of life of citizens. The Government of Egypt (GoE) has committed to an ambitious Sustainable Development Strategy widely referred to as "Egypt 2030". The four pillars of this strategy are Economic Development, Citizen Happiness, Human Development, and Market Competitiveness (GoE, 2017). The cornerstone for achieving significant improvements in such domains is the development of the various infrastructure sectors such as health, sanitation, education, energy, irrigation, and transportation. Accordingly, a major portion of Egypt's budget is expected to be dedicated to investing in infrastructure development. Hence, the effective management of investments in infrastructure and the search of the best-suited instruments for financing such projects are of paramount importance.

International Finance Institutions as Sources of Finance

The main conventional sources for financing infrastructure projects are shareholders who provide equity, banks that provide debt, and government general budget. Moreover, International Financial Institutions (IFIs) such as the World Bank, the African Development Bank, and the European Investment Bank play a major role in financing infrastructure projects of developing nations in particular (Turner, 2007). Egypt relies heavily on IFIs as development partners not only to finance infrastructure development, but also to build the institutional capacity through technical assistance. This research focuses on the World Bank in particular and the instruments it offers for financing infrastructure projects (CBE, 2015).

The World Bank

The prime mission of the World Bank is to "end extreme poverty" and to "promote shared prosperity". Through its various subsidiaries, the bank partners with client countries in order to identify achieve sustainable development goals that would serve the Bank's mission. The cornerstone for achieving significant improvements in such domains is the development of the various infrastructure sectors such as health, sanitation, education, energy, irrigation, and transportation. The World Bank Group provides an array of alternatives to fund infrastructure projects through its subsidiaries: The International Finance Corporation (IFC), International Centre for Settlement of Investment Disputes (ICSID), Multilateral Investment Guarantee Agency (MIGA), the International Bank for Reconstruction and Development (IBRD), and the International Development Association (IDA) (The World Bank, 2017). This paper focuses on the lending instruments offered by the IBRD for funding large-scale infrastructure projects.

Literature Review

Infrastructure in Egypt

Egypt was ranked 118 out of 148 countries in terms of infrastructure (World Bank, 2015). Improvements in infrastructure are necessary to improve quality of life by increasing access to basic services, create jobs, and encourage economic growth. The Government of Egypt plans to allocate EGP 135.4 Billion of the General State Budget for the fiscal year 2017/2018 for investments on its infrastructure (MoF, 2017).

The development of Egypt's infrastructure is a cornerstone for the World Bank's Country Partnership Strategy with Egypt. The World Bank highlighted the following aspects as strategic priorities for sustainable development in Egypt:

1. Energy & Power: there is a need to diversify the sources of energy by utilizing more sustainable renewable technologies. The expansion of energy infrastructure is a priority to reduce power outages and allow for industrial development
2. Healthcare: The target is to cover the lowest 40% of the population with proper healthcare, with a focus on quality of health services.
3. Irrigation and Agriculture: Food security is a major concern, in addition to the income and quality of life in Egyptian villages.
4. Wastewater and Sanitation: The priority for this sector is to encourage decentralization and improve the capacity of implementing agencies. Improvements in wastewater management are vital for addressing water pollution issues.

In light of the above, this research focuses on the risks encountered by projects in these specific infrastructure sectors.

Infrastructure Projects Risk Classification

There are several categorizations for infrastructure project risks in the literature, however, this paper utilizes the categorization of World Bank Systematic Operations Risk-rating Tool (SORT). SORT guidance note includes the following risk categories (World Bank 2014):

1. Political and Governance: This category covers challenges to the achievement of project objectives due to the political context of the country. It includes Factors that might affect the commitment of political leadership to the project/program, such as upcoming elections, change in Government, overall political instability or conflicts, absence of (transparency, accountability, and participation)
2. Macroeconomic: Includes both external and internal economic risks such as; high inflation, low foreign exchange reserves, large budget deficits. It considers the overall macroeconomic instability that would affect the

ability to pay for key public services (utilities). Government macroeconomic policy as well as expected economic shocks should be considered

3. Sector Strategies and Policies: This category focuses on "industry risks" or risks that are specific to the sector of the infrastructure project that requires finance. Examples of these risks include strategies that may be financially unrealistic, or policies are financially unsustainable. funding for a certain sector may also be unpredictable (highly variable from year to year)
4. Technical Design and Implementation: covers risks stemming from design complexity, technical feasibility, lack of experienced professionals, designs can include unfamiliar technologies.
5. Institutional Capacity: covers risk of achieving project goals due to inadequate resources, or inadequate processes and/or systems, risks related to competence of the implementing agency staff, and its organizational knowledge and financial resources to implement project and monitor results. It includes high staff turnover rates, no access for proper training. Also, depends on whether the implementing agency has sufficient internal monitoring and evaluation systems, whether the project involves multiple donors, and if the implementing agency has the required skills to coordinate between the different entities. It also considers if the implementing agency have dealt with international banks similar to the world bank before
6. Fiduciary: this category is concerned with the proper use of funds; The risk that funds: (i) are not used for the intended purposes; (ii) are not properly recorded and accounted for; and (iii) do not achieve the value-for-money objectives of the programs they finance. This risk appears when the financial management and auditing systems of the implementing agency is weak, and the agency lacks transparency, effectiveness and efficiency
7. Environmental/Social: This category includes risk due to natural disasters such as earthquakes or floods, risk that the project has a negative impact on the environment, environmental risk mitigation measures are complex or unproven. Social risks include negative effects on the people surrounding the project (like forced relocation) or the project might stimulate conflict between certain social groups
8. Stakeholders: The risk that the project would be opposed by stakeholders such as civil society, private sector organizations, labor unions, Governments of other countries, other donors and other members of the general public.
9. Other (Liquidity): The "Other" category was utilized to introduce Liquidity risks in order to orient the selection process more towards the borrowing government's perspective. This risk category considers the probability of facing funding gaps throughout the project duration, and projects with unique financial needs such as projects with huge procurement packages that require major upfront financing.

IBRD Financing Instruments

The available financial instruments offered by the IBRD are the Development Policy Finance (DPF), Investment Project Finance (IPF), and the recently introduced Program-for-Results (P-for-R). DPF loans do not support specific projects as they are designed to support policies and Institutional transformations, hence they are irrelevant to the purpose of this research. Most large-scale infrastructure projects in the past were financed through IPF, however, the use of P-for-R has been steadily increasing since its introduction in 2012 (Ezeldin and Moussa, 2017).

Investment Project Financing

Investment Project Financing (IPF) was the standard World Bank instrument for financing infrastructure projects until the inception of P-for-R operations in 2012. The IPF instrument is a restructuring of the former Investment Lending, which was a broad category of investment loan services. In IPF loans payments are made against specific expenses making this instrument suitable for effectively controlling inputs. IPF is often suitable for financing projects where the main challenges are the lack of financial resources and the technical design and/or implementation of the project.

Funding through IPF is subject to a number of environmental, social, and legal safeguards that are detailed under the IPF Operational and Bank Policies (World Bank, 2017).

Program-for-Results

The Program-for-Results (P-for-R) was introduced in 2012 as a result-oriented funding tool to support projects where the main challenge to delivery is the institutional capacity to achieve development goals.

The main pillar of the P-for-R is the Disbursement Linked Indicators (DLIs). DLIs are selected key performance indicators that serve or milestones that the project has to achieve as a prerequisite for disbursement. DLIs can be categorized in to (1) Specific program outcomes, (2) Participatory governance, (3) System improvements, and (4) Access to services.

The World Bank project team jointly develops the project DLIs along with the DLI verification protocol. It is important for this protocol to be consensual as it governs the disbursement of funds throughout the project. Once the project execution is initiated, an Independent Verification Agency (IVA) is hired in order to confirm that each DLI is indeed achieved in order for the Bank to disburse the respective amounts. The agreed Verification Protocol governs the operation of the IVA throughout the project execution.

It is important to note that some projects and activities are not eligible for funding through P-for-R which are high risk "Category A" projects and "High-value Contracts". The P-for-R Bank Policy and P-for-R Bank Directive explain these exclusions from P-for-R funding in details (Zahran and Ezeldin, 2016).

Considerations and Criteria for the Selection from World Bank Instruments

World Bank Guidance for the Selection of Instrument

While there is an abundance of sources explaining each World Bank lending instrument, there is considerably less literature providing guidelines for opting the best-suited method for any given project. However, the World Bank outlines certain guidelines for the choice of the proper financial instrument for any given project/program in the official bank policy documents for these instruments. Moreover, In the P-for-R concept note as well as the P-for-R 2 year review document, the World Bank explains each of the 3 bank main lending instruments and their uses (World Bank, 2013).

Figure 1. *World Bank Lending Tools Comparison from the P-for-R 2-year Review*

Category	***Project support: IPF***	***Program support: PforR***	***Policy support: DPF***
Purpose	Supports specific investment operations	Supports government programs or subprograms	Supports policy and institutional actions
Disbursement mechanism	Disburses against specific expenditures that support the operation	Disburses upon achievement of results according to performance indicators	Disburses against policy and institutional actions
Implementation mechanisms	Bank IPF rules and procedures Funds for specific expenditures	Program systems Funds for specific expenditure programs	Country policy processes Non-earmarked funds for general budget support

Under the "Use of P-for-R" section of the P-for-R concept note, the following conditions were identified for the suitability of the P-for-R tool:

- Expenditure is necessary for achieving project goals.
- The borrowing government aims at achieving the project goals using its existing systems.
- The main risk to the achievement of such goals relates to the institutional capacity of the relevant government bodies to accomplish the necessary outcomes.

While the concept note explains that the Investment Lending would be used if the project meets these criteria:

- Main risks to be managed are related to the inputs.
- The main challenges relate to the design and execution of the project.
- Most of the expenditure involves the procurement of goods and services.

Exclusions from P-for-R Financing

According to the P-for-R Bank Directive and Bank Policy issued on July 2015, projects with possible serious unfavorable social or environmental repercussions are not to be financed by P-for-R.

Moreover, the aforementioned documents refer to "High-value Contracts" and indicate that such contracts are to be excluded from P-for-R financing. The bank directive defines high-value contracts as contracts with values higher than the threshold beyond which a review from the World Bank Operating Procurement Review Committee (OPRC) is mandatory. These threshold values are specified in the Bank Procedures BP11 Annex D, and they are subject to changes from time to time (World Bank, 2015).

Figure 2 is extracted from the bank procedures and it provides the threshold for mandatory review by the OPRC as a function of the risk of the contract and type of contract.

Figure 2. *Compulsory Prior Reviews by RPMs and OPRC, Bank Policy 11 Annex D*

	PS/PAS Thresholds	RPM Thresholds [1]				OPRC Thresholds [1]			
Type of Procurement / Type of Contract	**Estimated Contract Cost in US Dollars (millions)**	**Estimated Contract Cost in US Dollars (million)**				**Estimated Contract Cost in US Dollars (million)**			
		Low	**Moderate**	**Substantial**	**High**	**Low**	**Moderate**	**Substantial**	**High**
Works, Turnkey and S & I of Plant and Equipment		≥ 25 & < 200	≥ 25 & < 115	≥ 25 & < 75	≥ 25 & < 50	≥ 200	≥ 115	≥ 75	≥ 50
Goods	< 10	≥ 10 & < 125	≥ 10 & < 75	≥ 10 & < 50	≥ 10 & < 30	≥ 125	≥ 75	≥ 50	≥ 30
IT Systems, and Non-Consulting Services [2]	< 5	≥ 5 & < 100	≥ 5 & < 60	≥ 5 & < 40	≥ 5 & < 20	≥ 100	≥ 60	≥ 40	≥ 20
Consultant Services	< 3	≥ 3 & < 40	≥ 3 & < 30	≥ 3 & < 20	≥ 3 & < 15	≥ 40	≥ 30	≥ 20	≥ 15
All Direct Contracting and Single-Source Contracts with Consultants (Firms)	< 0.5 [3]	≥ 0.5 and upper threshold as per the type of procurement and corresponding thresholds above				As per the type of procurement and corresponding thresholds above			
Single-Source Contracts (Individual Consultants)	< 0.25 [4]	≥ 0.25 and upper threshold as per the Consultant Services thresholds above				As per the Consultant Services thresholds above			

As shown in the figure, the threshold for compulsory review allows for higher contract costs for lower risk contracts. Procurement risk is assessed in this case following the bank's Procurement Risk Assessment & Management System (P-RAMS).

It is noteworthy that the Bank Policy and Directive indicate that high-value contracts can be financed through P-for-R on two conditions:

1) If these contracts are vital for the integrity of the overall program financed.
2) The value of these contracts has to be less than 25% of the overall program budget.

It has to be noted that the exclusion from financing is limited to the specific project activities not the whole projects. Meaning that while the bank would normally refrain from financing high-value contracts or activities of considerable social and environmental risks through P-for-R, the rest of the project might still be eligible for P-for-R finance.

Exclusions from IPF Financing

The World Bank specifies a number of *legal*, *environmental*, and *social* safeguards that govern the use of the IPF instrument. The main applicable Safeguards are included in the following Operational Policies:

Table 1. *Applicable Safeguards on IPF Instrument (World Bank, 2017)*

Operation Policy	Description
OP 7.50	Excludes Projects on International Waterways
OP 7.60	Excludes Projects in disputed areas
OP 4.01	Excludes projects that contravene the borrower country's obligations under international agreements
OP 4.04	Prohibits the conversion or degradation of "critical natural habitats"
OP 4.09	Excludes projects using certain categories of pesticides under specified circumstances
OP 4.11	Excludes certain activities adversely affecting physical cultural resources
OP 4.12	Excludes involuntary land acquisition absent specified pre-conditions
OP 4.36	Prohibits significant conversion or degradation of critical forest area
OP 4.37	Concerned with the Safety of Dams

Other Criteria from the Literature

Ezeldin and Moussa (2017) identified cost of finance, financial barriers, and project risks as the main criteria for the selection of financial instruments in the literature. However, the effectiveness of lending instruments in addressing project risks was highlighted as the most relevant criteria in the case of the IBRD financial instruments. The paper also proposed a 4-step framework for the optimum selection between IBRooooD instruments, with a focus on the project risk profile as decisive criteria.

This paper presents a logistic regression model that matches the risk profile of a given infrastructure project with the best-suited financial instruments offered by the IBRD; the Investment Project Finance (IPF) and the Program-for-Results (P-for-R).

Methodology

Research Strategy

Surveys were conducted with 21 international experts with previous experience in World Bank funded projects mainly in Egypt. Respondents were asked to rank how well IPF and P-for-R address each of the infrastructure project risk categories. The expert feedback is used to derive a logistic regression model that matches the project risks with the preferred lending instrument.

Interview Architecture

The conducted interviews explored the different risks associated with infrastructure projects in Egypt. The focus of the interview was to quantify the suitability of each of the instruments under study to address each of the infrastructure project risk categories previously discussed.

Figure 3 demonstrates the design of the survey that was filled by the international experts. The experts were asked to rank each instrument against each risk category, and these rankings were consequently used to derive the decision support model.

Figure 3. *Survey Design*

Risks	Investment Project Financing					Program for Results				
	Worsened → Addressed					Worsened → Addressed				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Political and Governance	O	O	O	O	O	O	O	O	O	O
Macroeconomic	O	O	O	O	O	O	O	O	O	O
Sector Strategies and Policies	O	O	O	O	O	O	O	O	O	O
Technical Design for Project/ Program	O	O	O	O	O	O	O	O	O	O
Institutional Capacity	O	O	O	O	O	O	O	O	O	O
Fiduciary (optimum use of funds)	O	O	O	O	O	O	O	O	O	O
Environmental and Social	O	O	O	O	O	O	O	O	O	O
Stakeholders	O	O	O	O	O	O	O	O	O	O
Liquidity Risk	O	O	O	O	O	O	O	O	O	O
Other (Specify): _____	O	O	O	O	O	O	O	O	O	O
Other (Specify): _____	O	O	O	O	O	O	O	O	O	O

1 = Risk is extremely exacerbated by this instrument choice
2 = Risk is somewhat worsened by this instrument
3 = Neutral- risk is not affected by either of the instrument types
4 = Risk is addressed by instrument
5 = Risk is fully mitigated through instrument

Analysis Techniques

Likert Scale

A 5-point Likert Scale was used in the interviews for ranking the feedback of experts on various aspects of the research. The reason this scale was adopted is its prevalence in the literature, in addition to the fact that it allows the respondent to provide neutral answers or express certain inclinations with varying extents. This is important to the nature of this study in order to assess the relevance of each factor to the research objective.

Logistic Regression Modeling

After the experts have ranked the performance of each instrument with respect to each risk, there was a need to transform these rankings in to a tool that would establish a link between these rankings and the choice of instrument. This tool can then be used to reverse the process; it can be used to determine which tool is better suited to address a certain group of risks.

The tool chosen for that purpose was a logistic regression model. Logistic regression is well suited to develop models that are design to predict one of two outputs. The output of the regression equation ranges from 0 to 1, accordingly if the output is closer to 0 the prediction becomes what 0 denotes and vice versa (Sainani, 2014). The general logistic regression equation is:

$$Log\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9$$

After rearrangement to make π the subject of the formula, it becomes:

$$\pi = \frac{\exp\left(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9\right)}{1 + \exp\left(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9\right)}$$

Where;

α: intercept (to be obtained from the logistic regression)

β_1: coefficient of first parameter (to be obtained from the logistic regression)

X_n: severity of risk$_n$, the user inputs those risks are as per the following numbering:

X_1	Political and Governance	X_4	Technical Design/implement	X_7	Environmental/Social
X_2	Macroeconomic	X_5	Institutional Capacity	X_8	Stakeholders
X_3	Sector Strategies/Policies	X_6	Fiduciary Risk	X_9	Liquidity

π: the model output, it ranges from 0 to 1 while the cutoff is 0.5, if π turns out to be less than 0.5, then the model has favored IPF. If π is more than 0.5, then the regression model recommended the P-for-R.

Findings/Results

Expert Feedback on IPF and P-for-R Instruments

The analysis of expert feedback indicated that P-for-R is believed to address Institutional Capacity, Sector Strategies and Policies and Stakeholder risks better than IPF. On the other hand, IPF is believed to address Fiduciary, Technical

Design/Implementation, Environmental/Social, and Liquidity risks more effectively. Table 1 shows the average ranking provided by experts for the performance of each instrument against each risk category.

Table 2. *Mean Value for Rankings of Performance of Instruments against Each SORT Risk*

SORT Risks	Investment Project Finance	Program for Results
	Mean of Rankings	Mean of Rankings
Political and Governance	3.19	3.33
Macroeconomic	3.33	3.38
Sector Strategies/Policies	2.76	4.29
Technical Design/ implementation	4.05	3.19
Institutional Capacity	3.24	4.33
Fiduciary Risk	4.10	3.52
Environmental/Social	4.05	3.43
Stakeholders	3.62	4.00
Liquidity	3.86	3.48

Discussion of Expert Feedback

The feedback received from experts revealed that IPF is better suited to address Technical Design/implementation, Fiduciary, and Environmental risks. On the other hand, P-for-R is believed to better address Institutional Capacity, Sector Strategy and Stakeholder risks. The feedback of the respondents is consistent with nature of these instruments and their intended purposes; considering that IPF is focuses on the control of inputs and adequacy of resources to ensure project success, while P-for-R was developed to assist implementing agencies that lack the capacity to achieve results.

Risk-based Decision Support Model Development

Decision Support Tool Architecture

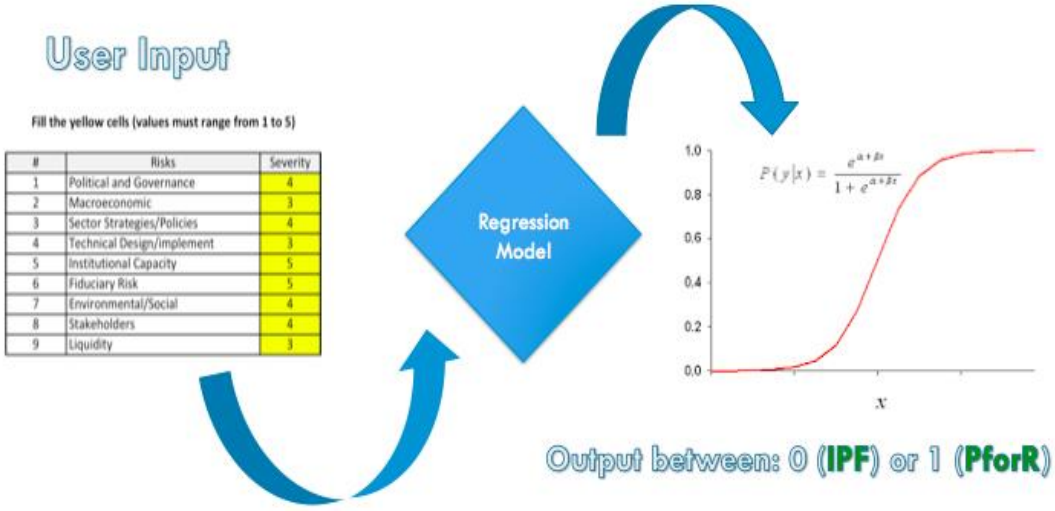
The interface of the developed tool is quite simple to use; the user is asked to input the severity of each risk as shown in Figure 4.

Figure 4. *Decision Support Tool Inputs*

Fill the yellow cells (values must range from 1 to 5)		
X#	Risks	Severity (User Input)
X1	Political and Governance	4
X2	Macroeconomic	4
X3	Sector Strategies/Policies	4
X4	Technical Design/implement	3
X5	Institutional Capacity	4
X6	Fiduciary Risk	4
X7	Environmental/Social	3
X8	Stakeholders	4
X9	Liquidity	2

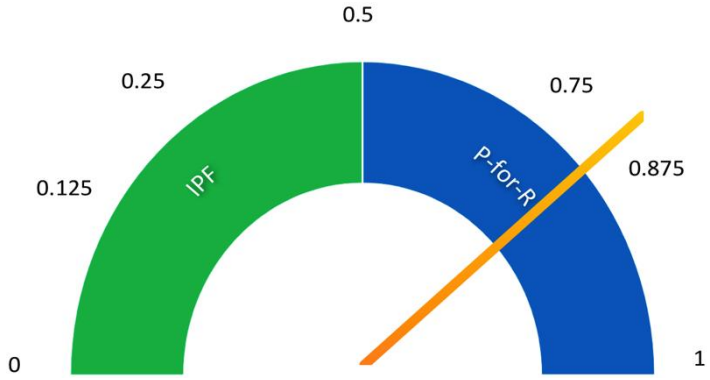
The severities of all risk categories are then substituted as "*x*" in the summation of the derived logistic regression equation. The regression equation will yield a value between 0 and 1; if this value is greater than 0.5 it will be concluded that P-for-R better addressed the risk profile provided by the user and vice versa. Figure 5 demonstrates the overall architecture of the devised tool.

Figure 5. *Decision Support Tool Architecture Explained*



The final output is presented graphically as shown in Figure 6, in order to aid the user in visualizing to what extent the model is inclined to either choice.

Figure 5. *Example of Decision Support Tool Output*



Logistic Regression Model Coefficients Derivation

As explained in the methodology section, interviews were conducted with experts with thorogh experience in various infrastructure sectors in Egypt. The scores provided by the experts for how well each instrument addresses each project risk, are used to tailor the regression model for the optimum choice of instrumentfor infrastructure projects in Egypt.

The expert feedback was analyzed using specialized statistical analysis software in order to obtain the coefficient "β" corresponding to each risk and the intercept "α". The below equation is the final for the derived logistic regression model, Once the severities "*X*" are substituted in the model, the output "π" is calculated as a number between "0" and "1".

$$\pi = \frac{\exp\left(-10.515 - 1.430X_1 + 0.506X_2 + 3.857X_3 - 0.942X_4 + 1.233X_5 - 0.188X_6 + 1.297X_7 - 0.217X_8 - 1.222X_9\right)}{1 + \exp\left(-10.515 - 1.430X_1 + 0.506X_2 + 3.857X_3 - 0.942X_4 + 1.233X_5 - 0.188X_6 + 1.297X_7 - 0.217X_8 - 1.222X_9\right)}$$

Model Validation

Validation Concept

In order to assess the validity of the developed decision support tool, the Sustainable Rural Sanitation Services Project (SRSSP) in Egypt was selected as a case study. SRSSP is being implemented in the Nile Delta region in Egypt, under the supervision of the Ministry of Housing Utilities and Urban development.

Interviews were conducted with professionals working on the SRSSP and their feedback on project risks were inserted in the risk-based decision support model to obtain the recommended instrument.

The output of the model was compared to the actual instruments used in each project. Afterwards, the official World Bank reports evaluation for the project's implementation status and performance were used to assess the suitability of the chosen instruments for the project under study.

Brief on the SRSSP Project

The Sustainable Rural Sanitation Services Program (SRSSP) is the first phase of multi-phased development program that aims at improving access to sanitation in 769 villages in delta area of Egypt, this stage targets completing 167,000 household connections in Beheira, Dakahliya, and Sharkiya. In addition to improving the capacity of Public Water and Sanitation companies in Egypt. The SRSSP is a P-for-R Project that includes 6 broad Disbursement Linked Indicators (DLIs).

Table 3. *SRSSP Disbursement Linked Indicators*

DLI #	Description	Type	Purpose	Weight. %
1	Number of functioning Household Connections (167,000). Minimum % for Satellites (10%)	Access to services	Directly ensures increased access to sanitation, % for satellites ensures poorer households are included	40%
2	Initiate Central Government Fiscal transfers based on sector performance	Improved Systems	Provides a positive financial performance incentive for Water & Sanitation Companies	5%
3	Design and Implement Annual Performance Assessment System. Determine baseline scores and achieve target scores each year	Participatory Governance	The presence of such system ensures positive citizen inclusion in performance assessment of service providers. It directly improves financial performance and institutional capacity.	30%
4	Preparation and Approval of a new Tariff Structure to allow for project cost recovery	Improved Systems	Introduces Financial sustainability to projects within the sector. Will allow in the future for the involvement of private investors	10%
5	Establishment of PMU and a new national Rural Sanitation Strategy	Specific Program Outputs	Aims at extending the program benefits to the whole sector and other governorates.	10%
6	Establishment and Approval of Standard Operating Procedures for Land Acquisition for Rural Sanitation projects	Specific Program Outputs	Aims to simplify current mode of operation that involves multiple stakeholders. Will standardize the procedures for land acquisition across sector	5%

It is noteworthy that each DLI was designed to address a specific challenge that the implementation agency had encountered in projects with similar nature, objectives, location and stakeholders. These challenges were identified from the official World Bank implementation reports on projects such as ISSIP1 and ISSIP2.

Eligibility SRSSP for Finance through IPF and P-for-R

Prior to proceeding to analyzing the risk profile of the project and choosing the most suitable funding too, the eligibility of the project for finance through IPF and P-for-R must be assessed in accordance to the World Bank policies.

World Bank policies and procedures were reviewed to ensure that the projects are indeed eligible for finance through both instruments. It was found that the

selected projects were in compliance with all relevant safeguards and Bank Policies related to IPF and are hence eligible for finance through IPF.

Also, SRSSP were found to be eligible for P-for-R since it does not include any "High-Value Contract" and is not likely to be categorized as "Category A" projects.

Application of the Decision Support Tool on the SRSSP Project

After confirming that the SRSSP is valid for finance through both instruments, the risk severities corresponding to the project were inserted in the model. The project risk profile was found to be more inclined towards the sanitation sector strategies and the institutional capacity to achieve results. Risks related to technical design and implementation were found to be moderate and the mitigation of their probable impacts is within the capacity of the implementing agencies. Table 3 summarizes the assessment of the project team for the relevant project risks.

Table 4. *Project Team Risk Assessment for SRSSP*

SORT Risks	Expert Risk Assessment		
	P	I	Severity
Political and Governance	3	4	3.50
Macroeconomic	3	4	3.50
Sector Strategies/Policies	4	4	4.00
Technical Design/implementation	3	2	2.50
Institutional Capacity	4	4	4.00
Fiduciary Risk	4	4	4.00
Environmental/Social	3	3	3.00
Stakeholders	3	4	3.50
Liquidity	2	2	2.00

The above risk ratings were inserted in the developed Risk-based Decision Support logistic regression model, and the output was 0.9851≈ 1, which corresponds to P-for-R as shown in the below figure, indicating that "P-for-R" is better suited to address the risks associated with this project.

Assessment of the Validity of the Decision Support Tool Output

The output of the framework is consistent with the actual choice of lending instrument in the real project which favored **P-for-R**. Figure 7 is extracted from the Official Project May 2017 World Bank Implementation Status report issued 18 months after the project commencement (World Bank, 2017).

Figure 6. *Extract from Official World Bank Implementation Report (World Bank, 2017)*

Overall Ratings

Name	Previous Rating	Current Rating
Progress towards achievement of PDO	Satisfactory	Satisfactory
Overall Implementation Progress (IP)	Satisfactory	Satisfactory
Overall Risk Rating	Substantial	Substantial

As shown in the above figure, the project performance was found to be "Satisfactory". Moreover, the report confirms that the project is progressing with respect to all DLIs and 2 out of a total of 6 DLIs have been already achieved.

Assessment of the Validation Case Study

The purpose of the SRSSP case study was to determine the validity of the devised framework for the selection of optimum finance method for infrastructure methods in Egypt. The output of applying the framework was that P-for-R is best suited to finance the project.

The validity of this finding was tested against the actual method used to finance this project in real life and the projects actual performance. The actual tool used to finance the SRSSP was in fact the P-for-R and the project performance as per the latest available implementation report was satisfactory. Therefore, the output of the framework which yielded that P-for-R is more suitable for financing the SRSSP, was found to be valid.

Conclusions

This paper proposes a risk-based logistic regression decision support model that matches the risk profile of a given infrastructure project with the recommended IBRD funding instrument. 21 international experts were interviewed for this purpose and their feedback was analyzed to arrive at the sought-after model. The Sustainable Rural Sanitation Project located in Egypt's Nile Delta was chosen as a case study to validate the output of the model. The regression model yielded that the P-for-R is more suitable than IPF for funding the SRSSP project based on its risk profile. The output of the model matched the actual instrument that was used to fund the project which have been successful in achieving its goals. Accordingly, the devised regression model was found to be valid.

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