

INVESTMENT IN INFRASTRUCTURE – ASSESSMENT OF EMPLOYMENT OUTCOMES USING PROJECT-LEVEL ANALYSIS: APPROACH AND INDICATORS

This policy paper presents an overview of the approach and indicators that were used to assess employment impact of investment in infrastructure using project-level analysis. It is based on 11 case study analyses that took place in 2013 for European Investment Bank (EIB)- financed investment projects in different infrastructure sectors in Jordan, Tunisia, Egypt and Morocco. Project-level analysis was utilized to assess direct employment outcomes, considering quantity and quality, both during the construction, and the operation and maintenance phases.

The project-level analyses were supported by macroeconomic studies that assessed macro-level outcomes of the same projects including direct, indirect and induced effects on production, income and employment. The macroeconomic studies used multiplier analysis based on accounting frameworks such as Input-Output tables, and Social Accounting Matrices. Another policy paper presents the approach and indicators of the macro-level analysis.

This policy paper presents the findings of the project-level analysis for the 11 projects that were assessed in 2013. It describes the approach that was used, and the indicators that could be extracted using this approach.

Background

Preceding the global economic crisis, most of the Mediterranean Partner Countries (MPC) supported by the European Investment Bank – Facility for Euro-Mediterranean Investment and Partnership (EIB-FEMIP), saw solid growth rates and economic reforms that were successful in many sectors including infrastructure. However, this growth did not translate into sufficient job creation. The countries suffered from the global recession in 2008 and, although there are encouraging signs of economic recovery worldwide, the ILO Global Employment Report of 2014 found that those economic improvements will not be sufficient to counterbalance the supply-demand gap in the labour market that built up in recent years. In fact, development policies did not generate sufficient employment opportunities for the fast-growing population and many workers ended up taking vulnerable jobs in the informal economy. This increased the concerns about the effects on wage levels, working conditions, child labour and increased labour market non-formalization.

As a result, the EIB and the ILO undertook a joint evaluation to analyze the employment outcomes of eleven EIB financed investment projects in four different infrastructure sectors; Transport, Energy, Sanitation, and Environment. The main purpose of the ILO-EIB collaboration was to formulate policy recommendations on how to better assess and monitor employment outcomes in future investments, and put forward these policy recommendations to the governments of the four countries covered in the evaluation on how to increase the employment opportunities, in a manner that could also be replicated in countries with similar challenges and opportunities.

Sectors and Projects

The eleven projects were chosen to cover the different types of infrastructure funded by EIB in each country. The selection considered the geographic distribution of the projects within each country, the coverage of different sub-sectors per sector, the inclusion of projects in urban and rural areas, the stage of project completion, and the extent of project implementing agency's cooperation.

Table 1: Projects and Sectors

Project	Sector
 – Amman Development Corridor	Transport
 – Tafila Wind Farm	Energy
 – Second National Program of Rural Roads	Transport
 – Solar Energy Plant in Ourzazate	Energy
 – Sanitation in Oujda	Sanitation
 – Sanitation in Sebou Basin	Sanitation
 – Urban Priority Roads V	Transport
 – Power Station Sousse C	Energy
 – Giza North Power Generation Plant	Energy
 – Egyptian Power Transmission Project	Energy
 – Egyptian Pollution Abatement Project II	Environment

The study covered the four main infrastructure sectors; transport, energy, sanitation and environment. As shown in the table above, two projects were assessed in Jordan and

Tunisia, three projects were assessed in Egypt, and four projects were assessed in Morocco.

Methodology and Approach

The approach entailed in depth examination of the 11 infrastructure projects to answer the four questions below about direct employment using structured interviews, site visits and document review.

1. How many direct jobs are created during construction, operation, and maintenance? This includes the estimation of the number of jobs that were created during construction and operation and maintenance.
2. Who gets the jobs? This included a detailed breakdown of the profiles and characteristics of the workers such as age, gender, level of education and previous employment status.
3. What kinds of jobs are created? This included the characteristics of employment such as sectoral decomposition, durability and sustainability, wage levels, skills requirements and levels of productivity.
4. Do the jobs go where they are most needed? This included the share of local employment and employment from areas of high poverty or unemployment rates.

The study utilized a number of data collection methods to answer the four questions above as follows:



Figure 1: Data Collection Methods

- Desk and literature review of the construction sector and the infrastructure sector in the study countries, and the overall labour market status, employment policies and laws. This also involved meetings and gathering of information from professional associations such as contractors' and engineers' associations, and statistics from national bodies regulating labour such as ministries of labour, and other labour and employment related agencies.
- Structured interviews with key informants such as ministries, national agencies, project management units,

contractors, sub-contractors and construction supervisors involved in the projects' various stages. This was accomplished through preparing a Structured Interview Guide. The guide consisted of various sections, with several questions under each section, to gather data about the projects in general, and labour/employment relevant information in particular. This information included numbers of employees hired, the approach followed in staffing the project, categories of job created, types of employment, compensation and fringe benefits. It also gathered qualitative data on how contractors work with local communities to recruit workers from the projects' vicinity where possible.

- Site visits to the ongoing and completed projects. Those visits addressed the quality of employment, the overall work environment, health and safety conditions, and the progress of work. Additionally, site visits allowed conducting informal discussions with employees to better understand the work conditions from their points of view, and verify the data collected through the interviews with the management. For completed projects, site visits helped to visualize the size of the work, and thus to correlate it to the employment data gathered through the interviews.
- Review of documents including appraisal reports, design reports, site records, bills of quantities, and physical and financial progress reports. This was achieved by collecting periodic progress reports from the contractors/subcontractors. Such reports usually cover the cumulative costs of manpower, cost status, manpower status, schedule status, cash flow, progress performance, meetings, travels, correspondence logs, and critical action reports.
- The above was followed by detailed analyses of the quantitative and qualitative employment data in addition to other relevant information gathered.

In projects that included a large number of sub-projects such as various rural roads, or various sanitation networks, representative samples of sub-projects were chosen in collaboration with the project implementing agency and the ILO. The selection of the sub-project took into consideration the overall project cost, the geographic location within the country, and degree of completion.

Indicators

Assessing employment impact of investment in infrastructure using project-level analysis allows the estimation of several indicators related to direct employment created by the project



during construction and operation and maintenance. It is important to mention that direct employment refers to employment created directly by the construction of the infrastructure project including all workers directly recruited by the main contractor and subcontracts, construction supervisor and project manager.

Utilizing the findings of these 11 case studies in addition to other studies conducted by the ILO, The Employment Impact Assessment (EmplA) Indicators Guide identified nine key indicators that can be estimated using project-level analysis. These indicators were selected to strike a balance between: “(a) the objectives of the project-level EmplA studies; (b) having clearly defined and easy to understand indicators, and (c) creating indicators which can be readily estimated and used”¹. These indicators are:

1. Labour intensity during construction. This is a conventional indicator that refers to the proportion of project cost which is paid to all categories of workers in return for their input. The labour intensity during construction is defined as: (The construction wage bill) / (The total construction cost).

2. The ratio of skilled and unskilled workers' wage bill to professional, technical and administrative workers' wage bill. This indicator reflects the relative value of payment to skilled and unskilled workers for whom the problem of obtaining well remunerated employment is often more acute. Skilled workers are typically project site workers with specialist skills such as carpenters, masons and plumbers. Technical staff typically perform technical and supervisory functions such as surveying, supervising and testing materials. This indicator can be calculated as: (Skilled labour wages + Unskilled labour wages + Security guard wages) / (Project managers and engineers' wages + Technical staff wages + Administrators wages).

3. Full Time Equivalent (FTE) years of direct employment per million USD during construction. This is a good indicator for the cost of generating jobs which can be compared between projects and programmes. This indicator can be calculated as: FTE years of direct employment from construction / Construction cost in USD million.

4. The cost in USD per one FTE year of direct employment. This indicator presents the same information as indicator 3 above, but to show the cost of each job, this indicator is more clearly understandable. It is calculated by dividing the total infrastructure investment in USD by the total FTE years of direct employment during the construction.

5. The ratio of average annual Operation and Maintenance (O&M) jobs in FTE years to ten construction jobs in FTE years. This indicator captures the ratio of jobs needed for the O&M of the infrastructure after construction to jobs created during construction. It provides an estimate of the longer-term job creation relative to the construction phase jobs. This ratio is defined as: (Average annual FTE years of O&M jobs) *10 / (FTE years of direct employment during the construction).

6. Female employment (in FTE years) as a percent of total employment. This indicator helps identifying the extent to which there is a need to address gender equality issues. This can be calculated by dividing the number of female FTE years of direct employment during construction, by the total number of FTE years of direct employment created during construction.

7. Youth employment (in FTE years) as a percent of total employment which reflects the extent to which investment is responsive to the need of providing employment for the young. Youth is defined by the age bracket of 16 to 29 years. This indicator can be estimated by dividing the number of youth FTE years of direct employment during construction by the total number of FTE years of direct employment created during construction.

8. The ratio of average skilled and unskilled wage rate (weighted) to average project management and professional engineers' wage rates. In combination with indicator 2, above, this indicator provides an indication of the relative level of remuneration for skilled and unskilled workers, and the quality of jobs for these categories of workers.

9. Work related welfare indicators which include provision of social security, medical insurance, paid leave, sick leave and health and safety measures as an indicator of the quality of jobs. It can be presented using three descriptive levels for employment quality: (1) indicates full provision of social security, medical insurance, paid leave and other welfare benefits, (2) Indicates partial provision of social security, medical insurance and paid leave (one of the three not provided or low quality provision), (3) Indicates no or very limited provision of social security, medical insurance and paid leave.

The following table lists some of the main indicators calculated in the study for ten of the eleven EIB financed projects. Since the Tafila Wind Farm in Jordan was in its early stages of implementation, data collection was limited and resulted in the estimation of few direct employment indicators, thus it was not included in the table below.

¹ The indicators were extracted from ILO Indicator Guide for Infrastructure employment Impact Assessment, 2015 (p.5-6, 22-23).

Table 2: Direct Employment Main Indicators Using Project-Level Analysis for 10 Projects

Project	Sector	Labour Intensity* ¹	Ratio of workers to professional wages* ²	FTE per USD million* ³	Female Employment* ⁴	Youth Employment* ⁵
 – Amman Development Corridor	Transport	25.6%	93%	21.1	1%	<2%
– Second National Program of Rural Roads	Transport	12.0%	194%	24.3	3%	30%
 – Solar Energy Plant in Ourzazate	Energy	2-3%	32%	3.0	5%	24%
– Sanitation in Oujda	Sanitation	11.2%	649%	19.1	N/A	N/A
– Sanitation in Sebou Basin	Sanitation	5.5%	65%	20.5	N/A	N/A
 – Urban Priority Roads V	Transport	14.2%	48%	24.0	N/A	N/A
– Power Station Sousse C	Energy	9.4%	45%	19.2	2%	<2%
 – Giza North Power Generation Plant	Energy	10.0%	N/A	7.5	3%	30%
– Egyptian Power Transmission Project	Energy	11.2%	N/A	5.0	3%	35%
– Egyptian Pollution Abatement Project II	Environment	3.7%	N/A	3.0	4%	25%

*1: Labour intensity during construction.
*2: The ratio of skilled and unskilled wage bill to professional, technical and administrative workers' wage bill.
*3: FTE years of direct employment per million USD during construction.
*4: Percent of female FTE years in total direct employment.
*5: Percent of youth FTE years in total direct employment.
N/A: Not Available.

Table 3: Additional Direct Employment Dimensions Captured Using Project-Level Analysis for 10 Projects

Project	Sector	Jobs Created* ¹	Job Categories* ²						Type of Employment* ³	
			PM&E	Tech	Skilled	Unskilled	Guards	Admin	P	T
 – Amman Development Corridor	Transport	4,800	10	19	46	15	5	5	65	35
– Second National Program of Rural Roads	Transport	7,700	4	9	43	39	4	1	55	45
 – Solar Energy Plant in Ourzazate	Energy	1,600	21	6	1	70	0	2	30	70
– Sanitation in Oujda	Sanitation	1,600	2	6	42	50	0	0	31	69
– Sanitation in Sebou Basin	Sanitation	1,600	19	7	16	49	4	5	18	82
 – Urban Priority Roads V	Transport	4,950	8	17	25	25	6	19	80	20
– Power Station Sousse C	Energy	6,300	4	48	32	1	5	10	33	67
 – Giza North Power Generation Plant	Energy	5,000	14	19	20	36	5	6	65	35
– Egyptian Power Transmission Project	Energy	1,550	11	19	10	48	7	5	85	15
– Egyptian Pollution Abatement Project II	Environment	4,800	1	7	43	40	2	1	80	20

*1: FTE person year.
*2: Percent of each category. PM&E: Project management and engineering, Tech: technicians, Skilled: skilled workers, Unskilled: unskilled workers, Guards: security guards, Admin: administrators.
*3: P: Permanent contract for the project duration. T: Temporary employment.

Examining the results reveals a number of areas where interventions could help both increase labour generation and improve the quality of employment for various labour categories. Such interventions could target certain labour groups such as youth and females. These interventions can be best achieved through introducing certain policies and

practices to help achieve employment objectives as covered in the following section.

In addition to the nine principal indicators mentioned above, assessment of employment outcomes using project-level analysis can provide detailed information on the characteristics

of jobs and employment. Examples of these are provided in table 3 above.

Assessing the employment impact of investment in infrastructure using project-level analysis allowed comparing employment generation estimates made during the planning of the projects, and the actual labour generation during their construction. The employment estimates during planning were higher than the actual direct employment estimated in the study, with the exception of the Sanitation Project in Sebou Basin in Morocco and the Giza North Power Generation Plant in Egypt.

Table 4: Employment Estimates and Study Findings

Project	Estimate*	Study*
– Amman Development Corridor	9,000	4,800
– Second National Program of Rural Roads	20,000	7,700
– Solar Energy Plant in Ourzazate	3,000	1,600
– Sanitation in Oujda	2,000	1,600
– Sanitation in Sebou Basin	900	1,600
– Urban Priority Roads V	7,000	4,950
– Power Station Sousse C	10,000	6,300
– Giza North Power Generation Plant	3,000	5,000
– Egyptian Power Transmission Project	1,800	1,550

*FTE Years

The approach also emphasizes the importance of structured monitoring of employment generated by infrastructure projects during their implementation. While there were cases of proper monitoring and reporting of labour in some of the studied projects, it was not the case for all. Therefore, it is very important that future projects have a structured approach whereby key labour generation and other labour related indicators be closely kept and monitored.

Strengths and Limitations

Assessing employment outcomes using project-level analysis is a relatively simple approach that can be tailored for the objectives of each EmplA study. It provided a systematic and standardized assessment for the 11 case studies mentioned above, that was applicable to all projects in the four countries. Furthermore, the approach succeeded in answering the four questions mentioned above about direct employment including the number of jobs created, characteristics of employment and the characteristics of the employed. It also allowed the estimation of a number of useful indicators to better understand the impacts of the projects on employment and labour generation.

The information collected using this approach is highly reliable. All the data were collected from the relevant parties, including the contractors and construction supervisors. Additionally, several key informant interviews were conducted

for each project, which allowed for the verification and validation of the collected data.

Project-level assessments provide an in-depth analysis of the project being assessed. Consequently, generalization of the findings to other projects or other countries should not be made unless the elements affecting employment creation are carefully considered. Technology used in construction, for instance, can have a significant effect on employment generation. Equipment-based roads construction, for example, generates far less job opportunities than labour-based approaches.

Cooperation of stakeholders and availability of data can significantly affect the breadth and depth of the assessment findings. Although the assessment of employment impact using project-level analysis is a relatively simple approach, it requires the collection of a significant amount of data on employment creation during the construction phase. Key informant interviews and project documents provide the sources of those data, thus cooperation of stakeholders and availability of data can significantly affect the breadth and depth of the assessment findings. The assessment of the 11 case studies mentioned above faced a number of challenges in this regard as follows:

- Certain official communication protocols had to be followed before meetings with implementing agencies could be held in some of the targeted countries. Kick-off meetings organized by EIB in each country helped to inform implementing agencies of the ongoing effort, and to solicit their cooperation. Despite that, responsiveness remained an issue for some projects and required constant follow up. This resulted in delays in obtaining certain information elements that often required further interventions from EIB, the ILO, and other relevant authorities in the study countries.
- Obtaining data on wages was difficult. Even with cooperating stakeholders, obtaining data related to salaries and compensation rates, especially from the contractors was very difficult. This was attributed to the sensitivity of the data, despite assurances from the study team that such data would not be disclosed and would only be used for analyses. Contractors were more willing to provide a range of wages for an employment category rather than the specific wage for each job.
- Lack of records related to labour generation by small contractors. This was faced mainly with small sub-contractors, or the contractors for small sub-projects that were usually small to medium sized companies. A number of these contractors did not keep records related to labour, especially on projects that had already been completed at the time of the assessment. This often led to such contractors estimating the labour

related numbers based on memory, or based on their knowledge and experience in the sector.

- Limited tracking and reporting on employment indicators in general. With the exception of a very few cases, reporting on manpower or employment was not part of the regular reports submitted by the contractors to the implementing agencies although most of the contractors track this information with a good level of detail. In the cases where such reports were provided to project implementer, it did not include sufficient information on the job categories, the characteristics of employment or the characteristics of the employed.

Policy Recommendations

EmplA studies raise awareness on the employment impacts of infrastructure investments. In addition to informing policy makers about the employment dimensions of such investments, they support the development of employment related and wider policies and strategies appropriate to the labour market context and employment creation priorities.

The use of project-level analysis to assess direct employment of investment in infrastructure provides a relatively simple approach for EmplA studies. It provides quantitative and qualitative data on the overall employment generation, characteristics of employed, and characteristics of employment. Furthermore, it allows the calculation of several principal indicators that describe different dimensions of direct employment. In order to expand the use of project-level analysis to assess direct employment of investment in infrastructure, below are some practical recommendations.

- Improve the monitoring of employment in infrastructure projects. Recording of employment data on regular basis using simple spreadsheets or Management Information Systems (MIS) can significantly improve the data available for EmplA studies. Employment data should include categories of staff, hours worked by each, and average wages for each category. This data should be disaggregated by sex and age group and supported by sufficient details on other cost elements of the project.
- Ensure that employment is part of the regular reports submitted by the contractors to implementing agencies and/or funding agencies. This will also increase the use of employment data in project implementation.
- Conduct analysis of completed projects to capture the employment impact of investment in infrastructure. This will facilitate future decision making and in particular, allows the assessment of trade-offs with other investment alternatives in which employment can outweigh other criteria.

The assessment of employment outcomes of the 11 case studies mentioned above, using project-level analysis, was followed by several workshops with policy makers from the four countries. The findings of the studies and the workshops resulted in a few policy areas and recommendations to enhance the employment impact in the sectors and sub-sectors studied. Such policy areas include:

1. Enhancing the employment content in the infrastructure portfolio of funding agencies and/or governments through:
 - Considering balancing large-scale infrastructure investments with lower-cost local infrastructure investments, which tend to generate more immediate employment opportunities, noting that employment is only one dimension taken into account during project selection and that this is also a matter for the Mediterranean partner countries proposing projects for financing.
 - Designing projects with more emphasis on optimizing employment such as applying appropriate technologies, based on technical feasibility and economic justifications that would enhance the share of employment in the project
 - Including a cost item in Bills of Quantities to cover costs of apprenticeships during implementation of projects.
2. Addressing skill gaps in infrastructure investment by revisiting the technical and vocational education and training (TVET) approach for the infrastructure sector
3. Adopting specific policies targeting vulnerable and disadvantaged groups, particularly youth, and that aim at enhancing job creation and quality of employment in the construction sector.

Additional policy areas could also be considered to enhance the quantity and quality of employment generated by investment in infrastructure. These policies include:

- Promoting and strengthening professional associations for construction workers. This helps make the profession more attractive for both genders, through improving employment conditions, promoting and improving health and safety conditions, and organizing the sector as a whole.
- Developing certification programs for unskilled and semi-skilled workers to also make those professions more attractive and career-path oriented. There have been several success stories of such policies in a number of MENA



countries that could be used to design such programs.

- Improving vocational training, especially in rural areas, to help individuals become more involved in projects in their areas. This can also even improve their chances of employment in other areas once the works are completed, which helps them establish career paths and makes the transfer to the more skill- demanding jobs possible.
- Capitalizing on acquired specialized skills by local employees, particularly for highly specialized projects such as solar energy plants and wind farms. This also applies to traditional projects that utilize new and specialized modern technologies. Policies should be put in place that incentivize contractors involved in such projects to capitalize on this gained experience to enhance the chances of their companies, and the local labour that they use during construction, in gaining more work in the region. This will help create both corporate and individual employment opportunities.
- Promoting entrepreneurship and encouraging small-scale contractors to start their own business, especially for small to medium sized projects in rural areas. Therefore, there is a need for policies that promote entrepreneurship and create an enabling environment for groups of local labourers to establish small enterprises to provide basic routine maintenance works for projects such as rural roads, small sanitation and water supply networks, and so on. Special incentives should be given to youth groups, and female entrepreneurs.

Key ILO resources

1. Employment Impact Assessment of Infrastructure in three Mediterranean Partner Countries. Final Report – Morocco. April, 2014.
2. Macroeconomic Employment Impact of EIB Infrastructure investment in Jordan. Final Report – Jordan. 30 October 2014.
3. Employment Impact Assessment of Infrastructure in three Mediterranean Partner Countries. Final Report – Tunisia. August, 2014.
4. Employment Impact Assessment of Infrastructure in three Mediterranean Partner Countries. Final Report – Egypt, February, 2015.
5. ILO Data Guide for Infrastructure Employment Impact Assessment, 2016.
6. Employment Impact of Infrastructure Investments in the Mediterranean Partner Countries, Study Summary Report. June, 2015.

Contact:

Employment Policy Department
Employment Intensive Investment Programme

DEVINVEST
International Labour Office
4, route des Morillons
CH-1211 Geneva 22, Switzerland

www.ilo.org

For more information on links between infrastructure investment and employment creation, visit the website of the Employment Intensive Investment Programme:

<http://www.ilo.org/global/topics/employment-intensive-investment/lang--en/index.htm>