



EMPLOYMENT RESEARCH BRIEF

EMPLOYMENT IMPACT OF INFRASTRUCTURE INVESTMENTS IN JORDAN

This country brief provides insights into the various employment outcomes of European Investment Bank (EIB)-financed investment projects in different infrastructure sectors in Jordan. The study focused on the two sectors of transport and renewable energy where one project was studied in each sector. In the transport sector the project was the Amman Development Corridor, while in the energy sector, the study focused on the Tafila Wind Farm project.

Infrastructure Development

Jordan has come a long way in terms of infrastructure development since its independence in 1946; it now boasts apt facilities in telecommunications, power and electricity, water, and transport infrastructure. It also has a growing renewable energy sector.

The **transport** infrastructure in Jordan can be summarized as follows:

- One sea port (Aqaba) located on the Red Sea.
- Two railway corporations, the Aqaba Railway Corporation (ARC) which transports phosphate and other mining products from the mines to the Port of Aqaba, and the Jordan Hijaz Railway Corporation (JHRC) which is not in operations for the time being.
- A road network totaling 7,200 km classified as follows:
 - Highways or main roads (2,718km / 40%)
 - Secondary roads or side roads (1,876km / 28%)
 - Village roads or rural roads (2,607km / 32%)
- Two international airports (Queen Alia international, and King Hussein International)

Jordanians also have widespread access to **power and electricity**, with well over 98% of the population having access to electricity. Total electrical energy production currently exceeds 14 million kWh.

Although Jordan has been a pioneer in **renewable energy** promotion in the Middle East (its first wind power pilot project completed in 1988), the present share of renewable energy technologies within Jordan's power plant portfolio is negligible. There are only two small hydro power plants, two

small wind power projects, and a pilot bio-gas power plant, altogether representing less than 0.5% of the overall installed capacity. Renewable energy remains largely untapped due to high costs. Jordan aims to cover 30% of total domestic energy needs by domestic energy resources (i.e. 14% oil shale, 6% nuclear energy, 10% renewable energy). However, investments in oil shale and nuclear power should be judged critically since both technologies include significant external costs for the national economy due to environmental impacts, water consumption, decommissioning, security reasons, and very long construction times.

Construction Activity

Overview of potential and challenges

The construction sector is an integral part of Jordan's infrastructure development, and it significantly boosts its economy. The sector accounted for 5 - 8.3% of the country's GDP during the period from 1998 to 2012.

There has been an increasing collaboration between Jordan's construction industries with international partners, with more efforts yet to be realized. Typically, international firms are providing specialized technical expertise, while local firms are contributing with their technical services.

The construction sector has been facing some challenges. Being a protected sector has reduced competition in the domestic market, allowing a certain degree of inefficiency in many local companies. Institutionally, some aspects of the business are over regulated. Additionally, access to finance and limited funds for Research and Development are marked to delay the development of sustainable construction.

Other significant factors are also impacting the construction industry including: a) the lack of specialized skills in many areas of the business, such as large-scale project development, and b) the lack of semi-skilled workers and the reliance on foreign labour, coupled with permanent migration of highly skilled engineers and professionals to the Gulf.

Approach and Methodology

Two research methods were used to quantify the employment impact of EIB infrastructure investments in Jordan. The first method examined specific case studies of projects funded by EIB. It aimed to answer the below four questions about direct

employment through structured interviews, site visits, and document review.

1. How many direct jobs are created during construction, operation, and maintenance?
2. Who gets the jobs?
3. What kinds of jobs are created?
4. Do the jobs go where they are most needed?

The second method was a macroeconomic study that used a multiplier analysis based on accounting frameworks such as the latest Input-Output table and Social Accounting Matrix. The macroeconomic study was used to capture direct, indirect and induced effects on production, income and employment. (Findings using the macroeconomic study approach can be found under the section direct, indirect, and induced impacts of the projects).

Projects Under Study

Amman Development Corridor (Amman Ring Road)

The Amman Development Corridor project covers the construction of the first phase of the planned Amman Ring Road. The project includes the section of about 41 kilometres around Amman on its eastern side and links the Airport Highway in the south to the northern Zarqa area (a total length of 116 km is planned for the future).

The project will provide a bypass on the main North-South link between the Syrian and Iraqi borders on the one hand and the port of Aqaba on the other, and serves as a distributor for local traffic. Two sections of the project have been completed, and the final section is nearing completion.

The total cost of the project is JD233 million, with the highest cost factor being construction costs, followed by construction material and distantly by electrical and machinery equipment.

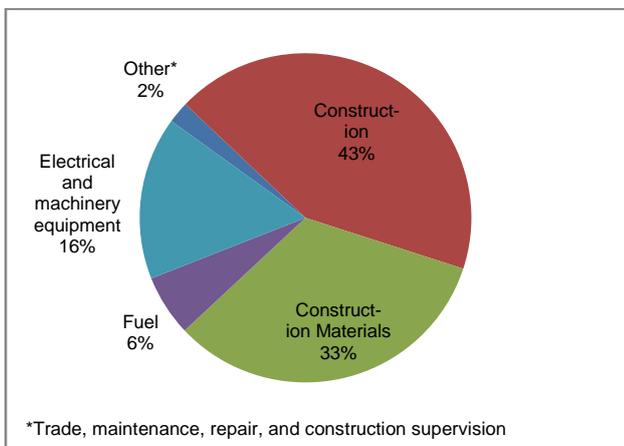


Figure 1: Amman Ring Road Project Cost Breakdown



Figure 2: Amman Ring Road

Tafila Wind Farm

The Tafila Wind Farm entailed the development, construction and operation of a 117 MW wind farm equipped with 38 turbines with a unit capacity of 3.075 MW. The project included studies, design, construction, commissioning and operation of the wind farm in the governorate of Tafila. The project also included the associated electrical and civil works and the construction of a permanent warehouse for wind farm spare parts.

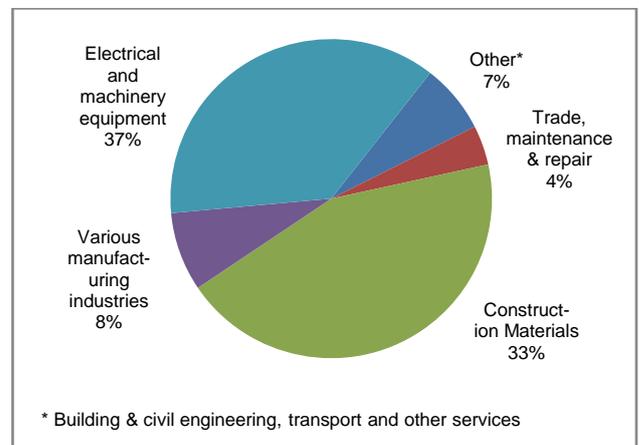


Figure 3: Tafila Wind Farm Project Cost Breakdown

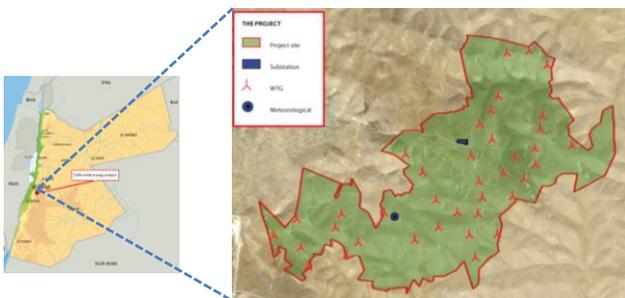


Figure 4: Tafila Wind Farm Location

Employment analysis

Labour market synopsis

Unemployment in Jordan remains to be stubbornly high even during high growth years. Unemployment rates, especially among youth, have remained in the double digits over the last decade; labour force participation rates, especially among women, are among the lowest in the world, and periods of strong growth have not translated to strong job creation for Jordanians.

Unemployment rate (2012), national level	12.2%
Males, Females	10.4%, 19.9%
Males above 25 years	6.6%
Males, Females 15-24 years	25.2%, 48.8%
Unemployment rate (2011), rural areas	18.4%
Males, Females	17.1%, 21.3%
Economic participation rate (2009)	40%
Males, Females	65%, 15%

Sources: Department of Statistics, Jordan National Employment Strategy

The interaction between infrastructure and construction projects, and the creation of employment opportunities in Jordan reveals various findings. The assessment found that generally, the construction sector employs a large number of people. However, the profiles of employees differ according to the sub-sector. For example, the building construction sector is mainly dominated by non-Jordanian unskilled labour which is mostly comprised of Egyptian labour.

In other construction sectors (e.g., roads and utilities) where more technology and machinery is used, the profile is different with Jordanians assuming more of the job opportunities. Several contractors noted that there is a general lack of skilled labour in the market. While there are some conditions that require contractors to hire Jordanians, those conditions are not correlated with job categories, and rather apply to the overall hires. Also, hiring labour from areas far from the project's vicinity remains to be cumbersome, due to the need to provide them with housing and transportation.

Impact of projects on the job market (Direct employment using the case study approach)

The total resulting employment from the Amman Ring Road project is nearly 4,727 person-years including construction, engineering supervision, and project management services. Additionally, operation and maintenance employment was estimated between 1,654 - 1,890 person-year over the project lifespan. Compared to the estimates of employment generation during the project planning phases of 9,000 person years during construction, we can see that the actual employment numbers are significantly lower than the estimates made during the project preparation phase.

This is due to multiple factors including inaccurate projection times and large construction companies investing in higher construction technology that is less labour intensive. Employment and timeline estimates were inaccurately judged; a better evaluation of local contractors and their construction methods is required for better estimates.

The employment breakdown of the Amman Ring Road project is shown in the table below. The majority of jobs went to skilled labour, technicians and engineers with relatively high education attainment levels. For the Amman Ring Road, the full-time employment (FTE) per million USD (Direct Employment from construction / cost million USD) is equal to 21.1

Table 1: Amman Ring Road Project Employment Breakdown

Position	Employment Breakdown	Education Level	Average Salary (JD/ month)
Project Managers & Engineers	10%	U: 100%	3,000
Technicians	19%	U: 75% C: 25%	1,500
Skilled Labour	46%	H: 95%	1,000
Unskilled Labour	15%	S: 60% D: 40%	550
Security Guard	5%	S: 60% D: 40%	300
Administrative	5%	U: 20% C: 60% S: 20%	300

U: University Degree, C: Community College, H: high school degree, S: 10-12 years of schooling, D: Less than 10 years of schooling

Most of the employed were adult males who were hired for the entire duration of the project. An estimated 65% of employment contracts were permanent (for project duration), and 35% were temporary contracts. However the latter were often retained for employment in other projects. Female employment stood at less than 1%, and youth employment (ages 16 – 29) at less than 5%.

Al Tafila Wind Project is still in its very early stages, therefore, the approach that will be followed in hiring and recruiting is still unknown. Discussions with the project promoter, however, indicate that the non-Jordanian Engineering, Procurement and Construction (EPC) contractor will hire local sub-contractors for the majority of the civil works (e.g. foundations, buildings, utilities, etc.).

Given the nature of the project, and being a technology that has never been used in Jordan before, Jordanian labour will only be needed for the traditional aspects of the project, and only small portions of the materials used will be manufactured in Jordan. This will mainly include the majority of the construction materials (e.g., cement, and steel). Other components could be cables and electricity transmission materials. The bulk of the value, however, will be materials manufactured abroad.

Direct, indirect and induced impact of projects (results of the macroeconomic study)

Through the tables below we can begin to understand the direct, indirect and induced impact of the projects. It is apparent that the sectors that would contribute to increasing employment in the economy via investment, are the sectors characterized as labour intensive in Jordan, at present time (i.e. Road Transport).

Table 2: Impact of increasing sectoral investment by JD1 mn on the economy

Sector	Output	New Income	Employment Impact
	JD mn	JD '000	Job Opportunity (FTE)
Construction	1.387	402	46
Road Transport	1.389	143	232
Air Transport	1.823	227	31
Electricity	1.585	223	24
Telecommunication	1.531	161	21
Water Supply	1.618	482	58

Simulating the impact of these projects on output, income and employment using Input-Output table, the table above indicates that the ring road project will generate JD59.1 million in income when investing the total amount in addition to creating 10,330 total job opportunities (direct, indirect and induced). The Tafila Wind Project with an investment capital of JD224.5 million is estimated to generate JD41.9 million and create a total of 13,130 direct and indirect jobs. The construction material which represents 44% of project cost creates about 5,200 jobs (part of the 13,130 jobs).

Table 3: Direct, Indirect and Induced Effects of the Amman Ring Road

Project	Output	Income	Employment
	JD mn	JD mn	Job Opportunity
Amman Ring Road Project (JD233 mn)	334.7	59.1	10,330
T1 (Indirect effects multiplier)*	1.4	2.1	1.9
T2 (Indirect + Induced effects multiplier)**	2.2	2.7	2.7

* T1 is type I Leontief multiplier. $T1 = \text{Sum}(\text{direct} + \text{indirect}) / \text{direct}$.

**T2 is type II Leontief multiplier. $T2 = \text{Sum}(\text{direct} + \text{indirect} + \text{induced}) / \text{direct}$.

Table 4: Direct, Indirect and Induced Effects of the Tafila Wind Farm Project

Project	Output	Income	Employment
	JD mn	JD mn	Job Opportunity
Tafila Wind Project (JD224.5 mn)	362.9	41.9	13,130
T1 (Indirect effects multiplier)	1.5	1.6	1.9
T2 (Induced effects multiplier)	2.0	2.1	2.4

* T1 is type I Leontief multiplier. $T1 = \text{Sum}(\text{direct} + \text{indirect}) / \text{direct}$.

**T2 is type II Leontief multiplier. $T2 = \text{Sum}(\text{direct} + \text{indirect} + \text{induced}) / \text{direct}$.

The T1 and T2 multipliers indicate high backward linkages for the transportation sector. High investment by government and the private sector in the road transport sector would considerably affect, as well as directly and indirectly (and through the induced effect) the whole economy.

Both projects have demonstrated the importance of the indirect effect through the supply chain, and the induced effect for employment creation. Both sectors are also exposed to significant leakages in the form of imported material and equipment, and migrant workers. In order to increase the multiplier effect on the economy and on employment, we need to have a better understanding which parts of the production chain could be done locally.

From the table below we can conclude that skilled labour got the highest proportion of projected jobs in both projects (46% in Amman Ring Road and 54% in Tafila Wind Project).

Table 5: Decomposition of projected job creation classified by categories for the two projects

	Amman Ring Road		Tafila Wind Project	
	FTE	%	FTE	%
Project Management	103	1%	307	2%
Engineers	929	9%	736	6%
Technician	1,962	19%	1,485	11%
Skilled Labour	4,750	46%	7,129	54%
Unskilled Labour	1,549	15%	2,098	16%
Security Guards	516	5%	712	5%
Admin Staff	516	5%	663	5%

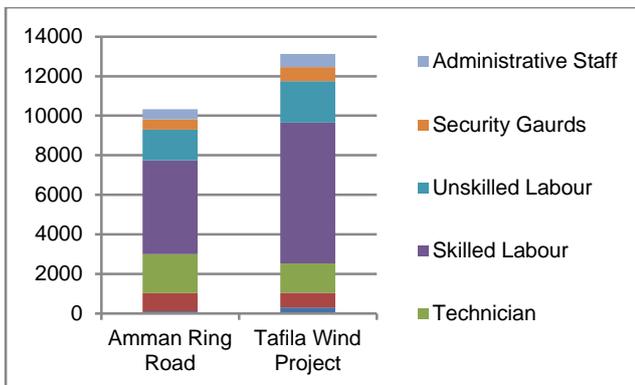


Figure 3: Decomposition of projected job creation classified by categories for the two projects

Concluding remarks

- Generally, the construction sector employs a large number of people but the lack of skilled labour is a major challenge to the contractors and the sector's employment potential. Jordanians also tend not to accept physically demanding jobs. Consequently, a significant share of the skilled and unskilled jobs in the sector are going to foreign workers.
- In sub-sectors of roads and utilities, more technology and equipment is used during construction requiring skilled workers and technicians. As a result, Jordanians assuming more of the job opportunities. But even in those projects, the majority of the unskilled manual labour remains non-Jordanian. The significance of this is that nearly half of construction projects' staffing, as indicated in the two projects assessed above, is for the skilled labour category. Therefore, increasing the capacity of Jordanians in this category will increase their employability and will enhance the responsiveness of the workforce to the increased job opportunities for skilled labour.
- Almost all of the workers in the construction sector are males

Way Forward

Practical recommendations that can enhance the employment impact in the sectors (or sub-sector)

- Intensify operations and maintenance efforts of roads, as it will help recipient countries like Jordan to maintain road quality, and at the same time create permanent jobs for Jordanian labour.
- Making training and vocational training more structured; this is to encourage Jordanians to acquire construction

related skills and become able to claim a larger portion of the skilled labour category in construction projects.

- Designing and implementing a certification program for unskilled and semi-skilled positions; acquiring certification can help skilled labourers advance their careers.
- Developing incentive programs for contractors; if contractors are given incentives and requirements to hire Jordanians across all categories, employment numbers will improve.
- Capitalizing on acquired skills for Jordanian employees; developing new skills such as renewable energy construction can propel Jordanian labourers to become pioneers in the field with a regional competitiveness.
- Supporting unions and professional associations for construction workers; this is intended to make the profession more attractive to Jordanians and improving work conditions for all.

Alternative ways of project development and methods of construction

- Provision of training on planning and scheduling for non-technical positions. Formal training for semi and skilled labour related to planning and scheduling should help such workers enhance their productivity, which will reflect positively on the overall sector.
- Adopting modern construction methods that require skilled labour. Several contractors interviewed indicated that skilled jobs are taken by Jordanians while semi-skilled and labour intensive jobs are usually less attractive to the local labour.

Key ILO resources

1. Macroeconomic Employment Impact of EIB Infrastructure investment in Jordan. Final Report – Jordan. 30 October 2014.
2. Employment Impact Assessment of Infrastructure in three Mediterranean Partner Countries. Final Report – Jordan. August 2014.
3. ILO Data Guide for Infrastructure Employment Impact Assessment, 2016.

Other resources

1. Department of Statistics, www.dos.gov.jo
2. Ministry of Planning and International Cooperation and Ministry of Labour, Jordan National Employment Strategy, 2011

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>