

Assessment of Infrastructure Investments in Transport and Job Creation

Examples from Road Sector Investments in Lebanon and Jordan



**Final Report
December 20, 2018**

ACKNOWLEDGEMENT

This report was prepared jointly by the World Bank and the International Labor Organisation (ILO). The World Bank team included Ziad Nakat, Radia Benamghar, Mira Morad, Rene Antonio Leon Solano, and Abdulkhakim Ali Ahmed Al-Aghbari. The ILO team included Chris Donnges, Tomas Stenstorm, and Htun Hlaing.

TABLE OF CONTENTS

| | |
|---|-----------|
| ABBREVIATIONS | 2 |
| DEFINITIONS | 3 |
| TRANSPORT SECTOR CONTEXT | 4 |
| OBJECTIVE OF THE STUDY | 5 |
| KEY FINDINGS AND OBSERVATIONS | 5 |
| 1. HOW MANY DIRECT JOBS ARE CREATED DURING CONSTRUCTION, REHABILITATION, AND MAINTENANCE? | |
| 5 | |
| 2. WHO GETS THE JOBS (THAT IS, EDUCATIONAL REQUIREMENTS, AGE GROUPS, GENDER, NATIONALITIES, AND SO ON)? | 7 |
| 3. WHAT KINDS OF JOBS ARE CREATED (SKILLED, UNSKILLED, PERMANENT/TEMPORARY, BENEFITS, AND SO ON)? | 8 |
| 4. WHAT CAN BE DONE TO INCREASE THE DIRECT LABOR INTENSITY IN ROAD SECTOR INVESTMENTS?..... | 9 |
| ANNEX 1: DETAILED STUDY | 13 |
| STUDY BACKGROUND | 13 |
| 1.1 Roads Transportation in Lebanon | 14 |
| 1.2 Roads Transportation in Jordan..... | 15 |
| STUDY APPROACH | 19 |
| RESULTS AND FINDINGS | 21 |
| 3.1 Rehabilitation of Old Damascus Road, Hazmieh, Mount Lebanon | 21 |
| 3.2 Saadiyat-Ain El Hour Road, Chouf District, Lebanon..... | 26 |
| 3.3 Rehabilitation of Nabatieh- Doueir Road, South Lebanon | 31 |
| 3.4 Herbet El Ma'ani Road, Ba'albak, Lebanon | 33 |
| 3.5 Edde-Toula-Mayfouk Road in Jbeil District, Mount Lebanon..... | 35 |
| 3.6 Rehabilitation of Azraq Highway, Jordan | 37 |
| 3.7 Al-Salt Ring Road, Jordan..... | 43 |
| 3.8 Maintenance of Roads Project in Mafraq under EIIP, Jordan..... | 49 |
| KEY FINDINGS AND RECOMMENDATIONS | 54 |
| ANNEX 2: MOCK PROJECT - LEBANON | 65 |
| DIRECT EMPLOYMENT FOR MOCK PROJECT..... | 65 |
| INDIRECT EMPLOYMENT FOR MOCK PROJECT..... | 68 |

ABBREVIATIONS

| Abbreviations | Definition |
|----------------------|---|
| ARC | Aqaba Railway Corporation |
| BoQ | Bill of Quantities |
| CDR | Council for Development and Reconstruction |
| CEDRE | Conférence Économique pour le Développement, par Les Réformes et avec les Entreprises |
| CIP | Capital Investment Plan |
| EIIP | Employment Intensive Infrastructure Program |
| EmpIA | Employment Impact Assessment |
| GAM | Greater Amman Municipality |
| GDP | Gross Domestic Product |
| GIME | Sao Tome and Principe Community Road Maintenance Groups |
| GTD | Government Central Tenders Department |
| id:rc | Interdisciplinary Research Consultants |
| ILO | International Labour Organization |
| JHRC | Jordan Hijaz Railway Corporation |
| MoPWH | Ministry of Public Works and Housing |
| MoPWT | Ministry of Public Works and Transportation |
| SFD | Saudi Fund for Development |
| SME | Small and Medium Enterprises |
| UNDP | United Nations Development Programme |
| VAT | Value Added Tax |

DEFINITIONS

Direct employment - employment created directly by the road rehabilitation and/or construction activity (including workers directly recruited by the main contractors and subcontractors, technicians, supervisors, and other skilled professional staff).

Skilled: General definition - work which involves skill or competence acquired through experience on the job or through training as an apprentice or in a vocational institute and the performance of which calls for initiative and judgement.

Semi-skilled: General definition - work which involves some degree of skill or competence acquired through experience on the job and which is capable of being performed under the supervision or guidance of a skilled employee and includes unskilled supervisory work.

Unskilled: General definition - work which involves simple operation requiring little or no skill or experience on the job.

TRANSPORT SECTOR CONTEXT

1. The Governments of Lebanon and Jordan identified job creation as one of the key priority areas for support from international partners.

Lebanese Republic

2. **The road network in Lebanon is generally in poor condition due to years of underinvestment and inefficient spending.** Road transport is by far the most dominant form of transport in Lebanon for passengers, freight, and commerce, with about 1.2 million vehicles in a country of only 4.5 million people. Lebanon ranks 121 out of 137 countries on road quality, with rural roads in lagging regions in particularly bad condition. Lebanon also has one of the worst road safety records globally, and the economic cost of road traffic fatalities and injuries in Lebanon is equivalent to 5.5 percent of national gross domestic product (GDP). In addition, since 2011, the influx of Syrian refugees has put further stress on Lebanon's deteriorating roads and transport network, particularly in the lagging regions where the infrastructure is in bad condition and the concentration of refugees is high.

3. **The transport sector is one of the main employment generators in Lebanon.** Prior to the onset of the Syrian crisis, 70 percent of working age men were participating in the labor force, compared to 24 percent of working age women. Females and youth face higher unemployment rates than men (18 percent and 34 percent, respectively, versus 9 percent amongst men)¹. Currently, about 7 percent of Lebanon's labor force is employed in transport services (truckers, taxis, ports, and airports). In addition, a significant part of workers in the construction sector are actually working in the construction of transport infrastructure. On the other hand, the construction sector in Lebanon is facing a slowdown due to the economic situation and the decrease of real estate prices. Therefore, there is currently an oversupply of labor, both skilled and unskilled; however, the oversupply is expected to decrease sharply when the reconstruction of Syria picks up. Also, Lebanon hosts major construction and engineering consulting firms, with recognized international and regional experience. The needed workforce is available in Lebanon, including project managers, engineers, technicians, and skilled and unskilled labor.

The Kingdom of Jordan

4. **Recently, some of the major corridors of the Kingdom of Jordan have suffered from deteriorated conditions attributed to the lack of maintenance, which has resulted in severe operational and safety constraints along those corridors.** Jordan is a small country that can be driven across in 5 hours, but in spite of its size, the country has a wide network of roads exceeding 7,000 km in length. Jordan ranks 68 out of 137 countries on road quality. In addition, transport-related inefficiencies account for at least 5 percent of national GDP yearly, and the economic cost of road traffic fatalities and injuries in Jordan is equivalent to 1.6 percent of GDP. The government has been investing in the past 5 years in reconstructing and rehabilitating many road corridors, with total investments amounting to US\$ 1.7 billion.

5. **The transport sector is one of the main employment generators in Jordan.** The transport sector contributes over 10 percent of national GDP while employing about 7.2 percent of the work force. The sector is a particularly important employment generator for the unskilled and low-income population (truck drivers, taxi drivers, construction workers, and so on). On the other hand, the construction sector in Jordan suffers from several constraints: (a) the lack of specialized skills in many areas of business such as large-scale project development, and (b) the lack of semi-skilled workers and the reliance on foreign labor, coupled with migration of highly skilled engineers and professionals to the Gulf.

6. **Unemployment rates, especially among youth, have remained in double digits over the last decade.** According to the Department of Statistics in the Kingdom of Jordan, the unemployment rate in Jordan in 2017 is at 18.1 percent, segregated to 15.8 percent of men (15+) being unemployed and 27.2 percent of women (15+) being unemployed. Unemployment in Jordan remains to be stubbornly high even during high growth years. Labor 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.

¹ World Bank (2012), "Lebanon - Good jobs needed: the role of macro, investment, education, labor and social protection policies (MILES)," Report No. 76008-LB, December.

OBJECTIVE OF THE STUDY

7. The World Bank and the International Labour Organization (ILO) funded a study to assess the employment impact of road investment programs in Lebanon and Jordan. The objective was to assess the direct and indirect job creation effects of road projects (construction, rehabilitation, or maintenance) and make recommendations for increasing the employment impact in such projects. However, given data unavailability, the indirect part was later dropped. It is important to highlight that the study is not aiming to recommend road works as a mean to create jobs in comparison to other public investments; rather the study is aimed at analysis and recommendations for increasing the labor content of road works once such investments have been decided based on broader socioeconomic considerations.

8. **The study analyzed a total of nine projects, five in Lebanon and four in Jordan.** The study included three primary road rehabilitation projects, two rural road rehabilitation projects, two new primary road construction projects, and two secondary routine maintenance projects.² The projects were identified through interviews with the Council for Development and Reconstruction in Lebanon and the Ministry of Public Works and Housing (MoPWH) in Jordan. The selection of projects was aimed at having a diversity by location of project, size of projects, and type of road. In-depth interviews were then conducted with the contractors, supervision consultants, and project management firms wherever applicable, and additional site visits and document reviews were conducted. The World Bank and ILO had completed a study on a Mock Project earlier, which did not result in sufficient data, and required this detailed study of actual projects.

9. The aim of the study was to answer the following four questions about direct employment:

1. How many direct jobs are created during construction, rehabilitation, and maintenance?
2. Who gets the jobs (that is, educational requirements, age groups, gender, nationalities, and so on)?
3. What kinds of jobs are created (skilled, unskilled, permanent/temporary, benefits, and so on)?
4. What can be done to increase the direct labor intensity in road sector investments?

10. **The study encountered some constraints due to lack of data.** The study team has collected as much information as possible, which permitted the delivery of this report. However, some information is still lacking either because it was not well-documented by the contractors and the supervision consultants (such as age, educational level, and nationality) or for confidentiality purposes (sources of material that allow the calculation of indirect labor intensity).

KEY FINDINGS AND OBSERVATIONS

1. How many direct jobs are created during construction, rehabilitation, and maintenance?

11. The main findings in terms of labor generation for all the evaluated projects are shown in Table 1.

Table 1. Direct Job Creation

| | Hazmieh | Saadiyat | Nabatieh | Baalbak | Jbeil | Azraq Highway | Salt Ring Road | Manshyeh | Balama |
|-------------------------------|-----------------|----------|-----------------|---------|--------|------------------|----------------|---------------------|--------|
| Country | Lebanon | | | | | Jordan | | | |
| Classification | Highway/Primary | | Rural/Secondary | | | Highway/Primary | | Rural/Secondary | |
| Type | Rehabilitation | | | | | New construction | | Routine maintenance | |
| Project cost (US\$, millions) | 3.1 | 14.8 | 7.5 | 0.37 | 7.3 | 148.0 | 50.7 | 0.27 | 0.35 |
| Number of km | 1.7 | 14.7 | 12 | 4.3 | 7.28 | 47.3 | 22 | 57 | 64 |
| Direct person-month | 539 | 2,480 | 1,944 | 318 | 2,385 | 39,398 | 10,721 | 262 | 325 |
| Direct person-day | 13,486 | 62,016 | 48,600 | 7,950 | 59,625 | 601,787 | 268,015 | 6,551 | 8,122 |
| Direct labor-intensity | 18.4% | 17.0% | 21.8% | 72.3% | 33.0% | 21.9% | 19.8% | 51.0% | 50.0% |

² It should be noted that the two secondary routine maintenance projects are in fact part of the Employment Intensive Investment Program (EIIP) for Jordanian and Syrian refugees which was designed and is being implemented by the ILO to support the Government of Jordan in creating immediate jobs through employment of intensive public works.

| | | | | | | | | | |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Direct PM per million US\$ | 174 | 168 | 259 | 859 | 327 | 266 | 211 | 970 | 929 |
|----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|

Note: PM = Person-month.

Figure 1. Direct Labor Intensity

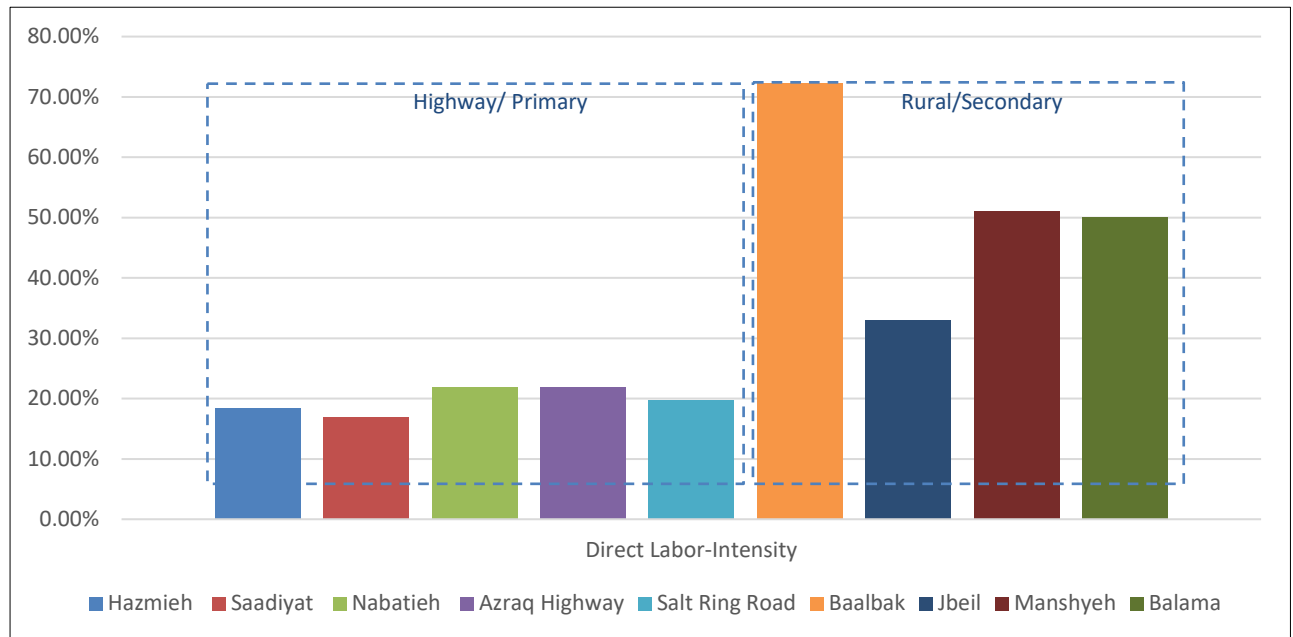
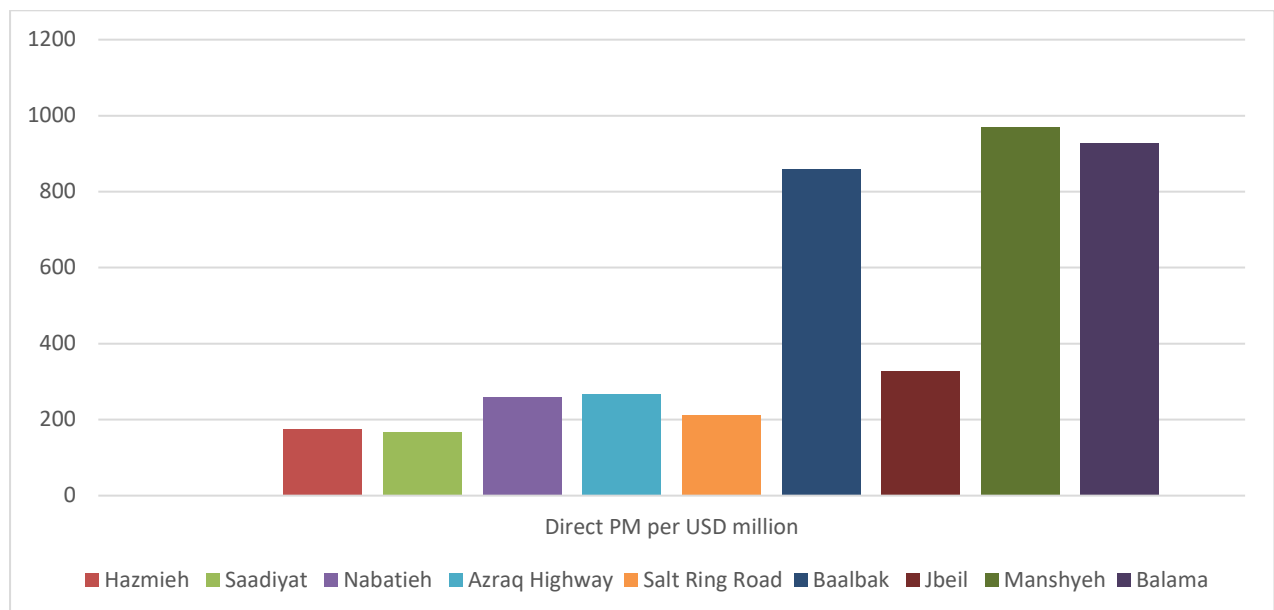


Figure 2. Direct Employment per million US\$



12. **Highway and primary road projects indicate a direct labor intensity of around 17 percent to 22 percent, which is in line with the international benchmark for job creation in road sector investments.** The results were relatively comparable among the five projects. Labor intensity in new road construction is slightly higher than rehabilitation works given that new construction involves more civil works which are more labor intensive (retaining walls, drainage channels, road base and sub-base, as well as utilities). In addition, the Azraq highway included the addition of nearly nine bridges which involved further civil works.

13. **Rural and secondary road projects indicate a direct labor intensity of around 33 percent to 73 percent.** The labor intensity highly depends on the type of works and type of road. The labor intensity of the Baalbak Project has an unusually high labor intensity. This could be due to the rural nature of the roads and the lack of proper documentation of labor data as well as the type of labor, especially that some engineers and project managers may have been engaged in other parallel projects. The two projects under the ILO Employment Intensive Investment Program (EIIP) in Jordan, which are primarily about routine maintenance, generate similar labor intensities of around 50 percent. The project in Jbeil was a regular road rehabilitation/reconstruction project of

secondary roads with labor intensity at around 33 percent. The higher labor intensity in secondary and rural works is due to the selection of smaller contractors, the use of less machinery and equipment, as well as a focus on road maintenance.

14. **Labor-intensive routine maintenance can create up to four times more person-months per million U.S. dollars invested than new highway construction.** New road construction and road rehabilitation create around 170 to 250 person-months per million U.S. dollars invested. As for routine maintenance of rural projects implemented using labor-intensive techniques, this can lead to a sharp increase in the labor intensity and can reach up to 1,000 person-months per million U.S. dollars. Direct employment per million U.S. dollars appears to be generally higher in Jordan which could be explained by the lower wages paid in Jordan. It is also important to note that new road construction would not only create jobs for the construction, but also create the need for routine maintenance at later stages.

2. Who gets the jobs (that is, educational requirements, age groups, gender, nationalities, and so on)?

15. **Higher categories of employment require university graduates while lower categories of employment require lower levels of education.** Based on the results of the projects studied, the employed project managers and engineers are university graduates. Most technicians hold community college degrees, while skilled and unskilled labor have a high school degree or 10 years of schooling with some of the skilled labor holding community college degrees. It should also be noted that in Lebanon, some engineers of Syrian nationality are accepting work as technicians due to the lack of job opportunities in the construction sector in recent years.

16. **Women are employed in very specific positions that represent 1 percent to 2 percent of the jobs created; this can be substantially increased in routine maintenance when some activities do not require difficult physical activity.** It is evident that women are employed in job categories such as project management, engineering, and administration, and rarely as technicians, skilled labor, unskilled labor, or security guards. The only exceptions are the two projects implemented using labor-intensive techniques in Manshyeh and Balama, where women were employed not just as engineers but also as unskilled labor. This is due to two factors: (a) some of the works do not require difficult physical activity such as removal, cleaning, and grubbing of bushes; and (b) the ILO has exercised an important effort to attract women for these positions, with a minimum target of 10% women under the EIIP. It is also worth mentioning that the employment of women by construction supervisors tends to be higher than the employment of women by contractors.

17. **Nationals are employed for higher category employment and non-nationals are employed mainly in the semi-skilled and unskilled categories.** The Lebanese and Jordanian nationals are usually employed as project managers, engineering and specialized technicians, a few skilled labor (for Jordanians), and administrative staff. The non-nationals (Syrians and Egyptians) are employed mainly as skilled and unskilled labor as well as security guards and sometimes, administrative staff. Using labor-intensive techniques in road construction, rehabilitation, and maintenance increases the labor intensity of the project including a larger increase in the man-days for skilled and unskilled labor as compared to the technicians, engineers, and project managers. While applying labor-intensive techniques increases the labor intensity for non-nationals, it also increases the labor intensity for nationals. In fact, heavy machinery decreases the labor intensity for both nationals and non-nationals.

3. What kinds of jobs are created (skilled, unskilled, permanent/temporary, benefits, and so on)?

Decomposition of job creation classified by categories

Table 2. Type of Jobs Created - Secondary and Rural Roads

| (In %) | Baalbak | Jbeil | Manshyeh | Balama |
|----------------------|---------|-------|----------|--------|
| Country | Lebanon | | Jordan | |
| Project management | 11 | 3 | — | — |
| Engineers | 21 | 6 | 3 | 3 |
| Technicians | 11 | 5 | — | — |
| Skilled labor | 11 | 12 | 6 | 5 |
| Unskilled labor | 36 | 62 | 85 | 87 |
| Security guards | 11 | 6 | 6 | 5 |
| Administrative staff | — | 6 | — | — |

Note: PM = Person-month; PD = Person-day; LI = Labor intensity.

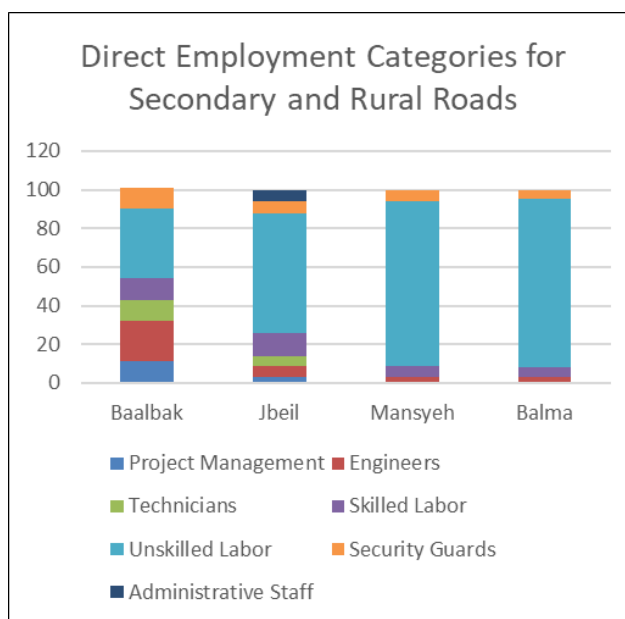
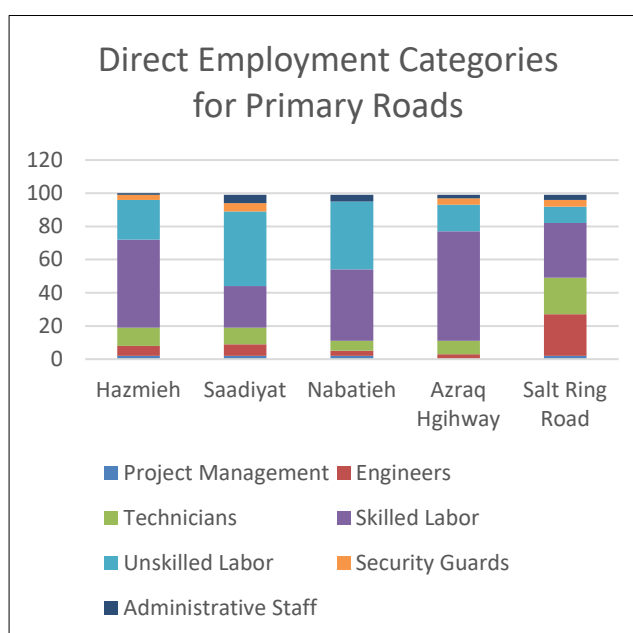


Table 3. Type of Jobs Created – Highway and Primary Roads

| (in %) | Hazmieh | Saadiyat | Nabatieh | Azraq Highway | Salt Ring Road |
|----------------------|---------|----------|----------|---------------|----------------|
| Country | Lebanon | | | Jordan | |
| Project management | 2 | 2 | 2 | — | 2 |
| Engineers | 7 | 3 | 6 | 3 | 25 |
| Technicians | 10 | 6 | 11 | 8 | 22 |
| Skilled labor | 25 | 43 | 9 | 66 | 33 |
| Unskilled labor | 45 | 41 | 56 | 16 | 10 |
| Security guards | 5 | — | 4 | 4 | 4 |
| Administrative staff | 5 | 4 | 13 | 2 | 3 |

Note: PM = Person-month;; LI = Labor intensity.



18. **Skilled and unskilled labor represent 75 percent to 80 percent of the jobs created.** For the Salt Ring Road, it is important to note that as the project was implemented using heavy machinery, the shares of engineers and technicians are higher than for regular projects. As for the Baalbak Project, it is likely that some of the labor, especially engineers and project managers may have been engaged in other projects during idle times and may, therefore, be double-counted and/or posted. The skilled labors are well-represented in highways and primary roads as these projects tend to be more complex than secondary road projects.

19. **Temporary positions represent 60 percent to 80 percent of direct employment created, depending on the type of project, while permanent jobs represent 20 percent to 40 percent of direct employment.** Direct employment is composed of some permanent jobs (project managers, engineers, and specialized technicians) and temporary jobs (other technicians, skilled labor, unskilled labor, security guards, and administrative staff).

Administrative staff are also often permanent staff as they are usually based in the main offices. Some very specialized engineers and/or technicians are employed on a temporary basis depending on the business needs. Most of the permanent positions are usually fulfilled by existing company employees. Meanwhile, unskilled staff are almost entirely recruited on a temporary (daily) basis. Investing in road construction and maintenance is particularly important during a downturn economy for both temporary and permanent jobs as (a) it will employ a large number of unskilled labor reducing temporarily the poor's unemployment, and (b) it will safeguard the permanent jobs of skilled employees who may find it difficult to find opportunities elsewhere during an economic slowdown in the country and region. Even though most of the jobs created are temporary, the implementation of a proper routine maintenance program will ensure the creation of longer-term jobs for the sector, for both skilled and unskilled labor.

20. **Local residents are employed for the majority of positions on the projects at the exception of managerial and engineering positions as well as a few highly specialized technical expert positions.** This helps the contractor to integrate with the residents in the region and to reduce the projects' transportation and/or housing allowance. This mainly applies to technicians, skilled and unskilled labor, and a few engineers. For the highway and primary road projects in Jordan, the Ministry of Public Works and Housing (MoPWH) had set targets for recruitment to be done from local areas of the construction activities. Such targets included both labor and fresh graduate engineers. Engineers who work on such specialized projects often continue with the contractor and are assigned to other projects when the original project they were recruited on is completed.

21. **Wages tend to be similar in both countries and depend on the position and the complexity of the project.** Wages in Lebanon are slightly higher than Jordan for most categories, reflecting the generally higher income levels and cost of living in Lebanon. The project management and engineering job categories appear to have higher wages in Jordan than Lebanon, but this may be explained by the fact that two projects assessed in Jordan (Azraq and Salt) are more complex projects with higher budgets than the projects that were assessed in Lebanon. In addition, most large engineering consulting firms in the region have their headquarters in Beirut, and hence some of their engineers may receive some form of mobility premium outside Lebanon.

22. **Higher category positions receive full benefits while lower category benefits are more limited.** In Lebanon, permanent positions receive full benefits while temporary positions only benefit from accident insurance. In Jordan, benefits seem to be provided to all the people employed on the project with some limitations of benefits for lower category positions. Also, in some cases, unskilled labor only benefits from social security such as under the ILO EIIP.

4. What can be done to increase the direct labor intensity in road sector investments?

23. While having very high labor-intensive projects is difficult in middle- to upper-middle-income countries like Lebanon and Jordan, given existing modern construction practices and with a large proportion of paved roads, the labor content of construction projects could be increased if some key measures are introduced. It is therefore recommended to do the following:

Technical Considerations and Type of Work

24. **Increase routine maintenance activities to improve road quality while increasing the temporary and permanent employment benefits for nationals and non-nationals.** Routine maintenance is one of the main ways to create employment, over the years, for people in the vicinity of sites. Labor-intensive routine maintenance work can create up to four times more person-months per million U.S. dollars than new road construction. It is recommended that countries like Jordan and Lebanon give careful consideration to funding routine maintenance to preserve the value of the assets, and generate opportunities for regular employment over an extended period of time. In addition, encouraging routine maintenance is a good road maintenance and asset preservation policy as it is estimated that for every US\$1 spent in routine maintenance, US\$3–4 is saved in road rehabilitation costs. There have been success stories (for example, the Sao Tome e Principe Project) that could be replicated. Such experiences included targeting the following maintenance activities: (a) periodic maintenance of small drainage structures; (b) maintenance and upkeep of the stability of embankments along major highways; (c) planting native vegetation, removing invasive species, afforestation and reforestation, and building structures that reduce erosion around road project; (d) outsourcing maintenance of guard rail, signage, and medians along major highways; and (e) outsourcing basic periodic and preventative maintenance of sections of secondary and rural roads to small contractors, or groups of local entrepreneurs. However, this may require continued technical assistance and oversight by the national agencies over an extended period.

25. **Increase the labor content of road projects that benefit both the national and non-national labor force.** Increasing the labor content is generally at the expense of the use of more equipment. The over reliance on equipment in road construction and maintenance will reduce the overall number of jobs created and will substitute both the use of skilled national workforce (masons, welders, and so on) and unskilled non-national workforce. Increasing the labor content of projects at the expense of equipment and/or material where appropriate, especially on lower volume roads and for routine maintenance, will therefore increase the employability of both nationals and non-nationals.

26. **Increase the number of small- and medium-size road projects as they create higher labor intensities than large-scale projects.** Throughout the world, experience has shown that labor-intensive work methods are more appropriate for improving access roads and streets, rural roads, and secondary roads rather than highways. This is because smaller contractors rely on and require less machinery and equipment and utilize more local material for construction and maintenance.

27. **Employ local entrepreneurs for the small-scale maintenance works.** Those entrepreneurs could be identified from local residents and trained early on and can be hired during the construction/maintenance phase. This has been effective in a number of countries where technical assistance programs were implemented to train small-scale entrepreneurs to partner with the Government in delivering public infrastructure and creating employment opportunities. For instance, the ILO implemented a project in Sierra Leone where 20 road construction supervisors were trained and provided with access to finance to acquire equipment to enable them to partner with the local road authorities in the implementation of works using employment-intensive approaches. The effort resulted in creating over 20,000 person-days of employment.

28. **Where applicable, introduce labor-intensive techniques in designs and tender documents.** At the design stage, design consultants should be asked to assess the impact of implementing labor-intensive techniques. There are two alternative procurement approaches to implementing employment-intensive works methods that can be adopted: (a) the first method is to lay down the use of specific employment-intensive technologies and methods of construction/manufacture in the tender document; and (b) the second method is to offer tenderers the opportunity to choose the construction method and the construction materials which they wish to use to maximize the participation of labor in construction works and, in so doing, win bids.

29. **Support young entrepreneurs and/or small construction company owners** to (a) setup procedures for the recruitment of youth; (b) provide technical and business training for company directors, supervisors, foremen, and skilled workers; (c) work closely with municipalities to develop documentation, manuals, and procedures for implementing labor-based works for municipal road projects; and (d) design and create funds to equip trained contractors with light equipment on a revolving loan basis. Similar approaches were followed by the Moroccan National Office for Water and Electricity. Another successful example of long-term employment creation through small-scale maintenance works is the Sao Tome and Principe Community Road Maintenance Groups (GIME). Over 30 GIMEs provide work for 1,700 people—3 percent of the total population. The initiative has been highly successful in terms of road maintenance and rehabilitation and generating employment opportunities for the very poor. It has also been found to be a very inexpensive way to maintain the roads.

30. **Develop local guidelines and best practices for the design and the implementation of labor-based methods and technologies for employment-intensive construction works.** Such practices would establish desirable and appropriate standards, processes, procedures, and methods relating to the design and implementation of labor-based construction technologies, methods for earthworks, and for materials manufacture. A successful approach was followed by the Construction Industry Development Board in South Africa, where technical manuals were developed to provide small-scale contractors and designers with technical guidance on the construction and upgrading of roads using labor-intensive methods. This would also require training of small and medium enterprise (SME) contractors and designers on the use of such methods. ILO is developing guidelines and SOP's in both Jordan and Lebanon for implementation of employment intensive infrastructure projects.

Training and Capacity Building

31. **The introduction of labor-intensive techniques should be coupled with the implementation of a proper training program for workers to strengthen their skills or acquire new skills.** The South African experience has shown that a properly established training program is an absolutely essential component of any successful labor-intensive construction initiatives, particularly when facing the existing equipment-based sociotechnical system. This can be implemented through joint programs with contractors to ensure that trainees are acquiring the skills that are actually needed in the field. Training has to be coupled with a proper certification program, where an unskilled or a skilled labor has to acquire certain preset measurable skills to excel in his or her

career. There have been success stories in Jordan for certifying water operators and the program could be easily replicated for the construction sector. It is also advisable that training programs diversify the skills among workers. Training programs should also aim to increase the number of skills of trainees. In Jordan, more structured training and vocational training is needed to encourage Jordanians to acquire construction-related skills and become able to claim a bigger portion of the skilled labor category in construction projects as it is the biggest category.

32. **Incorporate capacity building and apprenticeship of labor in large-scale projects.** This could be coordinated with national bodies that provide technical and vocational education. This not only helps increase the labor intensity during construction, but also helps equip a generation of local skilled labor that could escalate in their career paths in the construction sector. This could target key professions such as carpentry, blacksmiths, surveying, laboratory technicians, and others.

33. **Work closely with Workers and Employers Organizations and associations of contractors and of workers to build capacity and disseminate new practices.** For instance, provide support to the Jordan General Federation of Trade Unions, under which construction workers would fall and which currently suffers from low membership. The unions could become more effective in strengthening skills and rights and could also play a vital role in securing work permits for non-Jordanian workers. Similarly, it is important to work in Lebanon with trade unions and the association of contractors to discuss and mainstream new construction and maintenance methods.

34. **Ensure a continuous dialogue with employers and employers organizations to develop curricula that address the business needs.** Technical schools and universities often have curricula that are repeated year after year and are adapted every few years based on technological advancement and technical updates. However, it is rare to see curricula adapted based on the business needs, especially for public universities and technical schools. The adaptation of such curricula will increase the employability of youth who have already acquired the skills identified by the employers. This can also be reinforced by the development of mentoring programs between employers and students.

35. **Enhance youth employment through internship program.** Core skills are essential for employability, and these core skills are mostly acquired on the job. However, employers are not taking recruits without any core skills, and therefore, getting the first job is becoming very difficult. Thus, internships have become an important part of the transition from education to employment. This has demonstrated a very effective way of serving a bridge between education and paid work from conceptual knowledge to acquiring core skills through practice on the job. This can also be reinforced through the development of work-study programs, which benefits both employers and students.

Policies and Planning

36. **Establish policies and/or procedures to encourage the use of labor-intensive methods especially for rural roads.** This can be developed in consultations between the technical ministries and the ministries of labor, employer organizations, and workers organizations. Relevant ministries in Jordan and Lebanon should encourage training on new methods and apprenticeship opportunities into project designs and procurement processes. This could be incentivized, for example by giving bidders that provide for such matters extra points in their technical evaluations on bids. This also requires the development of monitoring systems to ensure that contractors offering such opportunities are indeed complying with them and are penalized in case of non-commitment. Such initiatives would require the involvement of trade unions and other workers organizations. This can be particularly relevant for rural roads given that the technological requirements are less important and timeliness is less economically significant. ILO is developing and introducing guidelines and operational procedures for employment intensive infrastructure works for relevant line ministries in Jordan and Lebanon. Experience in Nicaragua has shown that for rural road rehabilitation, using labor-based methods instead of machine-based methods generated 17 times more employment, with an average of 30 percent of this employment being for women.

37. **Introduce a standardized data collection system on employment creation in road projects, which could be piloted in Jordan and Lebanon.** It is therefore recommended that contractors adopt a documentation system for each project that collects all relevant information related to labor issues including those requested for this study. This includes information such as the number and type of employees for each project, number of working days, wages and benefits, type of contract, and other information pertaining to labor issues and compensation. A proper monitoring system needs to be in place to ensure that this data is accurate and timely.

38. **Encourage partnerships between Lebanon, Jordan, and agencies involved in labor-intensive infrastructure approaches.** These agencies have thorough experiences in implementing labor-intensive technique in projects around the world and can provide advice on the best practices and the most effective

techniques based on each country's context. Strategic and structured partnerships can be built between road development entities, local municipalities, and agencies involved in labor-intensive infrastructure such as the ILO-EIIP either directly through local budgets or as part of larger operations funded by donors.

39. **Adapting the working conditions to suit women and communicating on gender stereotyping can enhance the employment of women.** Women's participation in the transport sector is low, and in the construction of roads even lower due to two main reasons: work conditions and gender stereotyping. According to the ILO study on 'Promoting the Employment of Women in the Transport Sector', the work conditions that highly impact women are the working time, shift working, and distance from home. Adapting the working hours for women will enhance the attractiveness of jobs. In addition, women often cannot work in shifts, especially afternoons and nights as they need to be present with their families. The development of policies to motivate the employment of women by addressing their key concerns can have an important impact on increasing their participation. In addition, enhancing the work condition should be coupled with a communication campaign targeting both the employers and the employees to address gender stereotyping and showcase the importance of having women at the workplace. ILO has developed and is implementing such strategies in order to increase women's participation in the EIIP projects in Jordan and Lebanon.

40. **Promoting Decent Work principles.** Decent work principles include opportunities for work that are productive, equality of opportunity and treatment for all women and men, fair wage payment procedures and sufficient Occupational Safety and Health (OSH) measures amongst other. All actors involved in the implementation of construction projects in general and employment intensive projects in particular have a responsibility ensure compliance with the national labour law, core international labour standards and decent work principles.

ANNEX 1: DETAILED STUDY

Study Background

1. During the London Conference to support Syria and the region in February 2016, the Government of Lebanon identified job creation as one of the two priority areas for support from international partners in Lebanon. The Government had been highly concerned by the dire and worsening conditions that host communities are in, as well as the difficulties faced by Syrians across the country.

2. To address this situation, the Government proposed a new combination of interventions that aim to stimulate the economy by investing in several areas, which in turn would provide a solid foundation for sustained economic growth and trigger business expansion at the same time directly providing additional job opportunities for both the Lebanese and Syrians. One of those interventions was a Rural Public Works and Employment Program. Within this program, the World Bank plans investments (US\$200 million) in road rehabilitation and maintenance and aims to, wherever possible, implement this program using employment-intensive approaches.

3. Jordan is one of the Mashreq countries that was the most affected by adverse regional developments, in particular, the Syrian and Iraq crises. Since the start of the regional turmoil, Jordan has been facing major challenges related to the refugee influx across its borders; the large number of refugees entering the country is impacting the country's economy and social fabric. In addition, according to the World Bank, the growth rates of the Jordanian economy slowed down in 2015, averaging 2.4 percent, which is unlikely to generate enough employment growth to absorb the high unemployment rate³ and meet the needs of the Jordanian host communities and refugees.

4. Job creation was identified, by the Jordanian Government, as one of the priority areas for support from international partners in Jordan.

5. The World Bank and the ILO funded a study to assess the employment impact of their investment program in Lebanon and to explore how to design the program in a way that enhances its positive impact on employment. The study was intended to provide key data on the employment impacts of road investments in Lebanon to feed into the planning and programming of the new World Bank-supported road sector investments over the coming years. By increasing the employment impacts of their road investments in Lebanon, The study was implemented in the summer of 2016, and since then, a follow-on confirmation activity was undertaken to verify its findings in 2017.

6. Furthermore, the World Bank funded a similar study to provide key data on the employment impacts of road investments in Jordan to feed into the planning and programming of the new World Bank-supported road sector investments over the coming years.

7. The document at hand presents the findings for both assignments to assess the direct job creation effects of road projects (construction, rehabilitation, or maintenance) in Lebanon and Jordan and make recommendations for going forward. The studies aim to define the type of jobs created (direct), the breakdown between skilled and unskilled jobs, a breakdown by gender and nationality, and a measure of labor influx through the assessment of the number of local and non-local workers. In addition, the assessments include aspects related to the quality of jobs created (working conditions/environment, informality, wages, child labor, and so on), and the effects of technology used, the source of financing, and the size of contracts on the job creation potential of projects.

³ Unemployment rate achieved 13.2 percent in 2016. ILOSTAT database.

1.1 Roads Transportation in Lebanon

8. Road transport is by far the most dominant form of transport in Lebanon for passengers, freight, and commerce, with about 1.2 million vehicles in a country of only 4.5 million people.

9. Also, the transport sector is one of the main employment generators in Lebanon. Currently, about 7 percent of Lebanon's labor force is employed in transport services (truckers, taxis, ports, and airports). In addition, a significant part of workers in the construction sector are actually working in the construction of transport infrastructure.

10. According to the Council for Development and Reconstruction (CDR), Lebanon has an extensive network of roads (around 22,000 km), 6,380 km under the responsibility of the Ministry of Public Works and Transportation (MoPWT) and around 15,325 km under the jurisdiction of municipalities. The network comprises 529 km of roads classified as international, 1,673 km as primary, 1,367 as secondary, and 2,811 km as local. As for the condition of the classified network, it is as follows: 17 percent good, 70 percent fair, and 13 percent poor to critical. Figure 1.1 shows the major modes of transportation in the country. In fact, Lebanon ranks 121 out of 137 countries on road quality, with rural roads in lagging regions in particularly bad condition. Lebanon has also one of the worst road safety records globally, and the economic cost of road traffic fatalities and injuries in Lebanon is equivalent to 5.5 percent of the national GDP. In addition, since 2011, the influx of Syrian refugees has put further stress on Lebanon's deteriorating roads and the transport network, particularly in the lagging regions where the infrastructure is in bad condition and the concentration of refugees is high.

11. In Lebanon, the construction sector is facing a slowdown due to the economic situation and the decrease of the real estate prices. There is currently an oversupply of labor, both skilled and unskilled; however, the oversupply is expected to decrease sharply when the reconstruction of Syria picks up. Also, Lebanon hosts major construction and engineering consulting firms, with recognized international and regional experiences.

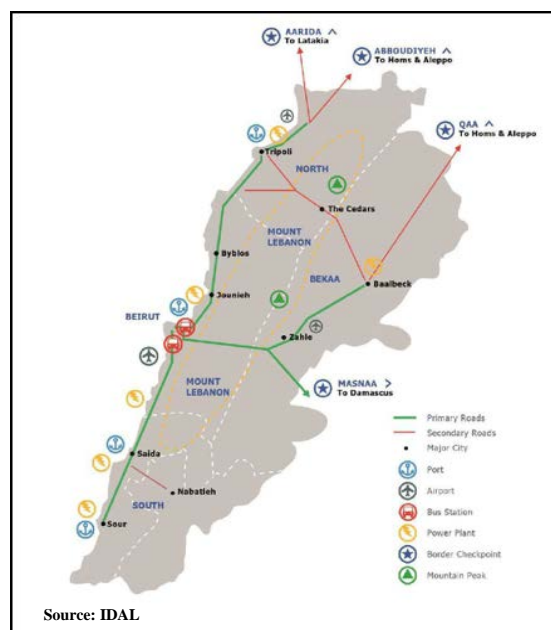
12. According to the World Bank database, the unemployment rate in Lebanon in 2017 is at 11 percent in 2017, segregated to 7 percent of men (15+) being unemployed and 15 percent of women (15+) being unemployed.

13. The transportation sector plays a vital role in the Lebanese economy and received a lot of attention during the post war reconstruction period in the 1990s. About 37 percent of the budget of Horizon 2000, the postwar reconstruction plan of Lebanon, was spent on physical services that included roads and highways. Between 1992 and 2013, the CDR awarded US\$2,258.33 million on road rehabilitation projects. Road network rehabilitation is still ongoing; in 2014, 11 projects totaling almost US\$30 million have been implemented. There are also 19 projects worth over US\$1 billion that were expected to start during the 2015–2017 period. Given the significant impact the transport sector has on Lebanon's economic growth, the *Conférence Économique pour le Développement, par Les Réformes et avec les Entreprises* (CEDRE), which took place on April 6, 2018, in Paris, France, highlighted the importance of investment in the transport sector and confirmed that public transport remains a major investment target for the Government and highlighted the importance of private sector investment in the transport sector. The Government requested, from donors at the CEDRE, US\$11 billion to cover Phase I (2018–2021) and US\$6.4 billion to cover Phase II (2022–2025) for a Capital Investment Plan (CIP) that covers financing commitments (that is, Board approval) for infrastructure projects, with the understanding that implementation would take longer. Transport sector investments represent approximately 33 percent of the total amount requested for Phases I and II, which highlights the importance of the transport sector to the Government of Lebanon.

1.1.1 Institutional Setup

14. The institutional structure of the transportation sector in Lebanon is complex leading to overlap of responsibilities shared by the MoPWT, CDR, municipalities, and the Ministry of Finance.

Figure 1.1. Main Modes of Transportation in Lebanon



- **MoPWT:** Established in 1959, the MoPWT is the Government entity in charge of all transportation-related activities and public works. In road construction, it is responsible for planning, design, supervision, implementation, and maintenance.
- **CDR:** Established in 1977, the CDR is in charge of reconstruction and development in Lebanon. It is a financially and administratively independent entity that reports directly to the Council of Ministers. Its main responsibilities are planning, consulting and guiding, financing, and monitoring and evaluation. The CDR plays a major role in the financing aspect of public projects, particularly those funded by international grants and loans. In the transportation sector, the CDR plays an active role during both planning and implementation.
- **Municipalities:** Municipalities are in charge of managing local projects such as public works, water infrastructure, public facilities, public lighting and roads, and so on. In public works, the municipality plays a role in project implementation, operation, and maintenance.
- **Ministry of Finance:** The Ministry of Finance's main role is financial management of all Government activities. The ministry therefore allocates state funds for the transportation sector, while the CDR manages funds from international agencies.

1.2 Roads Transportation in Jordan

15. The transport sector is a very important sector of the economy in Jordan. It serves the national economy essentially along the corridor Aqaba-Amman; it also plays an important role on a regional level to transport goods and passengers to and from the neighboring countries (Syria, Iraq, Saudi Arabia, Egypt, and potentially Israel and Palestine). 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 operation for the time being.
- A road network exceeding 7,200 km.
- Three international airports (Queen Alia International Airport, Amman Marka International Airport, and King Hussein International Airport).

16. As will be covered in more detail in a following section, the MoPWH is the entity responsible for conducting studies, design, and construction of the highway network in the country. The roadway/highway network in Jordan consists of nearly 7,200 km of roads with different classifications. Figure 1.2 shows the primary roads in the country. All classified roads are generally under the umbrella of the MoPWH, with the exception of roads in the Greater Amman Area that are under the umbrella of the Greater Amman Municipality (GAM). The limited railway network and the limited number of ports have caused road transport to be the leading sector in the transport of freight and passengers in Jordan.

17. Generally, there are three main roadway classifications in Jordan that are defined in Table 1.1. According to the MoPWH, nearly 40 percent of the country's roads are main roads, 28 percent are secondary roads, while the remaining 32 percent are rural roads.

Figure 1.2. Road Network in Jordan



Table 1.1. Roadway Classifications in Jordan

| Classification | Definition | Length in km |
|-------------------------------|---|--------------|
| Highways or main roads | Roads that consist of two or more lanes that connect the capital with other governorate urban centers, connect governorate urban centers with each other, and connect Jordan with neighboring countries | 2,718 |
| Secondary roads or side roads | Mainly two-lane (or more) roadways that connect main roads passing through urban areas other than governorates' centers, or serving village clusters | 1,876 |
| Village roads or rural roads | Roads that branch from main or secondary roads which usually serve villages or small communities. | 2,607 |

Source: The MoPWH.

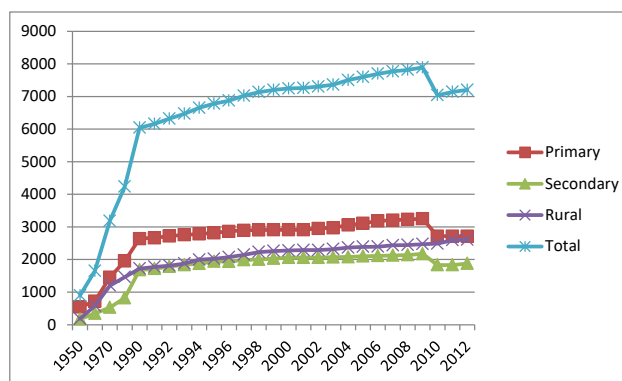
18. The highway network in Jordan has undergone significant expansion since the 1950s. In the year 1950, the total lengths of main roads, secondary roads, and village roads were 500 km, 869 km, and 2088 km, respectively. Today those lengths are nearly 2,718 km, 1,876 km, and 2,607 km, respectively. Evidently, a significant proportion of roads that were rural in the 1950s have become main and secondary roads over the past few decades. Figure 1.3 depicts the growth in the various road categories over the past decade as reported by the MoPWH. Nearly 20 percent of the transportation network is concentrated in the Amman-Zarqa area alone, which is the densest area in terms of population. This center serves as a strategic highways branch to the north to serve the northern governorates and connect the country with Syria, to the east to serve Mafraq to connect the country with Saudi Arabia and Iraq, to the south connecting the center with Jordan's port of Aqaba, and to the west to serve the Jordan Valley and connect Jordan with Palestine and Israel. According to the Highway Master Plan prepared by Lotti and Engicon in 2011/2012, new highway classification criteria according to function has been proposed, but is yet to be reflected in changes to the Roads' Law in Jordan. According to the Master Plan, the lengths of the various classifications of roads is as follows:

- Trunk roads - 1,680 km
- Primary roads - 1,080 km
- Secondary roads - 1,840 km
- Tertiary roads - 2,830 km
- Total of 7,430 km

19. Recently, some of the major corridors of the Kingdom of Jordan have suffered from deteriorated conditions attributed to the lack of maintenance, which has resulted in severe operational and safety constraints along those corridors. Jordan ranks 68 out of 137 countries on road quality. In addition, transport-related inefficiencies account for at least 5 percent of national GDP yearly, and the economic cost of road traffic fatalities and injuries in Jordan is equivalent to 1.6 percent of GDP. The government has been investing in the past 5 years in reconstructing and rehabilitating many road corridors, with total investments amounting to US\$ 1.7 billion. Road projects in the pipeline include the Maan-Mudawarah Road, which is highly used by pilgrims and requires refurbishment and is expected to cost US\$100 million for rebuilding the road. The MoPWH is seeking funding for the project. Also, the Amman-Irbid Highway is now 27 years old, and some areas along the road are in risk of unpredictable landslides.

20. For most of its main and secondary roads network, Jordan's main highway network offers good coverage, has sufficient capacity to accommodate vehicle flows. The Government of Jordan is currently developing a new transport strategy for the next 20 years. However, the latest strategy for the years 2009–2011, highlighted the challenges facing the road and land freight sector and made distinctions between institutional restructuring issues and transport policy challenges. The strategy identified the need to review the existing institutional and organizational setup and analyze to which extent and how it would need improvements. This involves the MoPWH, the Ministry of Transport, and other governmental institutions with an interest in planning, maintenance, and operation of road infrastructure, including road safety and environmental requirements.

Figure 1.3. Road Network Growth – Data from MoPWH

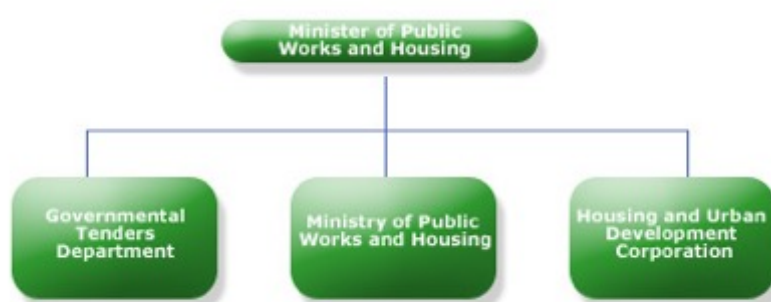


21. According to the Department of Statistics in the Kingdom of Jordan, the unemployment rate in Jordan in 2017 is at 18.1 percent, segregated to 15.8 percent of men (15+) being unemployed and 27.2 percent of women (15+) being unemployed. Unemployment in Jordan remains stubbornly high even during high growth years. Unemployment rates, especially among youth, have remained in the double digits over the last decade; labor 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.

1.2.1 Institutional Set Up

22. **The Ministry of Public Works and Housing.** The MoPWH was established with the creation of the East Jordan Emirate in 1923, at which time it was called the Useful Department. The name was derived from the tasks of this department. In 1939, the Useful Department was attached to the Ministry of Transportation and was considered one of the Ministry of Transportation's departments until 1954, when it was founded as a separate ministry under the name, the Ministry of Public Works. In 1982, the Government Central Tenders Department (GTD) was established as a department within the Ministry of Public Works and was responsible for all governmental tenders' affairs. In 1988, a Housing Department was established and linked to the Ministry of Public Works, which was renamed the Ministry of Public Works and Housing. The Department of Urban Development was later annexed to the ministry in 1989. Finally, in 1992, the Housing and Urban Development Corporation was established to replace the Housing and the Urban Development Departments. The current MoPWH is one of Jordan's leading development entities in terms of administrative organization, systems, and functions. Since the country was established, it evolved from a small department with a limited number of employees to a ministry that includes 20 main central directorates and 12 directorates, one in each of the country's governorates. Figure 1.4 presents the basic breakdown of the MoPWH.

Figure 1.4. General Structure of MoPWH



23. The MoPWH is responsible for the construction and development of the public roads network in the country. It is also responsible for linking cities, villages, agricultural and industrial production locations, tourism and antiquities sites. In addition, it has the task of linking the country to the neighboring countries. The MoPWH is also responsible for the road network's durability, maintenance, mobility, and traffic safety. In addition to the highway network, the MoPWH is responsible for the construction of governmental buildings and the development of the construction sector, as well as development of the technical manpower. A technical team comprising 30 engineers from the MoPWH coordinates the ministry's maintenance program. Routine evaluations and assessments are continuously conducted and periodic maintenance contracts are often awarded to local contractors. Nearly 70 percent of the maintenance contracts are done by private sector contractors, and the remaining 30 percent is conducted in-house.

24. According to the GTD's annual report for 2016, the numbers and values of road construction projects that were procured through them for the past three years is as shown in Table 1.2 (includes construction, rehabilitation, and maintenance contracts).

Table 1.2. Roadway Construction Tender Values in the Past Three Years

| Year | Number of Contracts | Value (JOD, millions) |
|------|---------------------|-----------------------|
| 2014 | 70 | 128.40 |
| 2015 | 19 | 25.46 |
| 2016 | 13 | 4.90 |

25. **The Ministry of Transport.** The Ministry of Transport was established in early 1965 where it was called the Ministry of Communications (Rail, Aviation, and Seaports). This ministry assumed its official status in 1971 when the Ministry of Transport Law No. 42 was issued and became a permanent law in 1972. The law

entrusted, to this ministry, the responsibility of organizing the transport sector in the Kingdom. The responsibility encompasses the task of organizing all means and vehicles of transport, fixed and movable equipment, personnel and associated services, as well as the tasks of drawing up the necessary plans and studies for determining the country's intermediate and long-term needs of transport means along with the responsibility of drafting and updating the sector's laws, bylaws, and instructions that regulate transport affairs and update those legislations to comply with the inbound and outbound transport mobility.

Study Approach

26. The **interdisciplinary research consultants (id:rc)** was contracted to assess the employment impact of road infrastructure projects (case studies) in Lebanon in 2016, and then Ecocentra of Lebanon was contracted to conduct a validation study. Furthermore, a similar study was conducted by **id:rc** in Jordan in 2018. The main purpose of both studies was to assess a number of projects as case studies by conducting detailed analysis of these projects to estimate the number of potential jobs created (direct employment), as well as the quality of these jobs. The case studies were to answer the following questions:

Figure 1.5. Overall Approach to Assignment



- **How many direct jobs would be created during construction, rehabilitation, and maintenance?** This covers jobs created by the main contractors and their subcontractors.
- **Who gets the jobs?** Characteristics of the workers that would receive employment (that is, educational requirements, age groups, gender, nationalities, and so on)
- **What kinds of jobs are created?** Characteristics of employment (for example, skilled, unskilled, permanent/temporary, benefits, and so on)
- **What can be done to increase the direct labor intensity in road sector investments?**

27. To meet the objectives of both the assignments, **id:rc** used a combination of data collection methods including

- **Key informants' interviews.** Interviews were conducted with the CDR in Lebanon and the MoPWH in Jordan, and other players involved in the road project construction in both countries, in addition to contractors and suppliers.
- **Site visits.** For some of the projects, site visits were made to support the assessment of the quality of employment and the progress of the work.
- **Analysis of documents.** This included the analysis of Bills of Quantities (BoQs) for each project, appraisal reports, design reports, site records, (physical and financial progress reports) where available and applicable.
- **Data analysis.** This included a detailed analysis of the quantitative employment data, and the qualitative employment policies and relevant information gathered, to respond to the key questions that the assignment attempted to answer.

28. The main stages of the study were as follows: Project Identification, Preparation of Data Gathering Tools, Structured Interviews with Contractors, Subcontractors, and Construction Supervision, Interviews with Suppliers, and Employment Data Analysis.

Project Identification

29. In 2016, the **id:rc** study team had planned on selecting a sample of representative road projects in Lebanon, and then, analyzing the employment-related aspects of them. However, it was later concluded that none of the recent, or ongoing projects in Lebanon, were similar to the components that would be included in the roads projects that will come out under the World Bank program. As a result, it was then agreed to prepare a 'mock' BoQ for a project that includes the four key components that would be included in the BoQs of the anticipated World Bank road infrastructure works. This mock BoQ was intended to be for a project valued at US\$10 million

in size, and most likely include a road length of 10–15 km. During the assignment, two actual road projects were added. Those were the Old Damascus Road and Saadiyat Ain el Hour Road. At a later stage, the World Bank and ILO found that this methodology did not result in sufficient data that can be used as a baseline for future monitoring activities in Lebanon. Therefore, for the validation assignment, three additional road projects were selected in Lebanon. The projects that were assessed in Lebanon, therefore are included in Table 1.3.

Table 1.3. Projects Included in the Lebanon Assessment

| | | | | | |
|-----------------------|----------------------------|----------------------|-----------------|---------------------------|--------------------|
| Project Name | Damascus Old Road- Hazmieh | Sadiyaat Ain el Hour | Nabatieh Doueir | Herbet el Maani - Baalbak | Edde Toula - Jbeil |
| Classification | Primary | Primary | Primary | Rural | Rural |
| Type | Rehabilitation | Rehabilitation | Rehabilitation | Rehabilitation | Rehabilitation |

30. In Jordan, projects were selected jointly with the MoPWH where the study team leader and a representative from the World Bank held a meeting with the Minister of the MoPWH and presented the objectives of the study and the proposed tasks for achieving those objectives. As a result, the MoPWH identified the projects listed in Table 1.4.

Table 1.4. Projects Included in the Jordan Assessment

| | | | |
|-----------------------|---------------------|------------------|--------------------------------|
| Project Name | Azraq-Omari Highway | Salt-Ring Road | ILO Roads Project ^a |
| Classification | Primary-Highway | Primary-Urban | Secondary and Rural |
| Type | Rehabilitation | New Construction | Rehabilitation |

Note: a. Two sample projects were selected in the Mafraq Governorate—one in Mansheyh and one in Balama.

Preparation of Data Gathering Tools

31. A number of data gathering tools were prepared that capture the needed information related to direct employment during construction of road projects were prepared. Those were based on the study team's accumulated experience in conducting similar assignments in the regions between 2013 and 2016.

Structured Interviews with Contractors, Subcontractors, and Construction Supervision

32. For each of the selected projects in Jordan and Lebanon, members of the study team held structured interviews with the contractors and their subcontractors to gather detailed information related to labor and employment during the construction of the selected projects. For the detailed tables related to employment, the study team explained those to the interviewees, who then worked on completing the tables and returning them to the study team.

Employment Data Analysis

33. Data were analyzed for each project individually to quantify the total labor generated (in terms of person-months for direct labor), and the other characteristics related to salary scales, educational backgrounds, gender breakdown, nationalities, and others. A key indicator that was calculated was the Labor Intensity, which was defined as the ratio of the total cost of labor to the total project cost.

Results and Findings

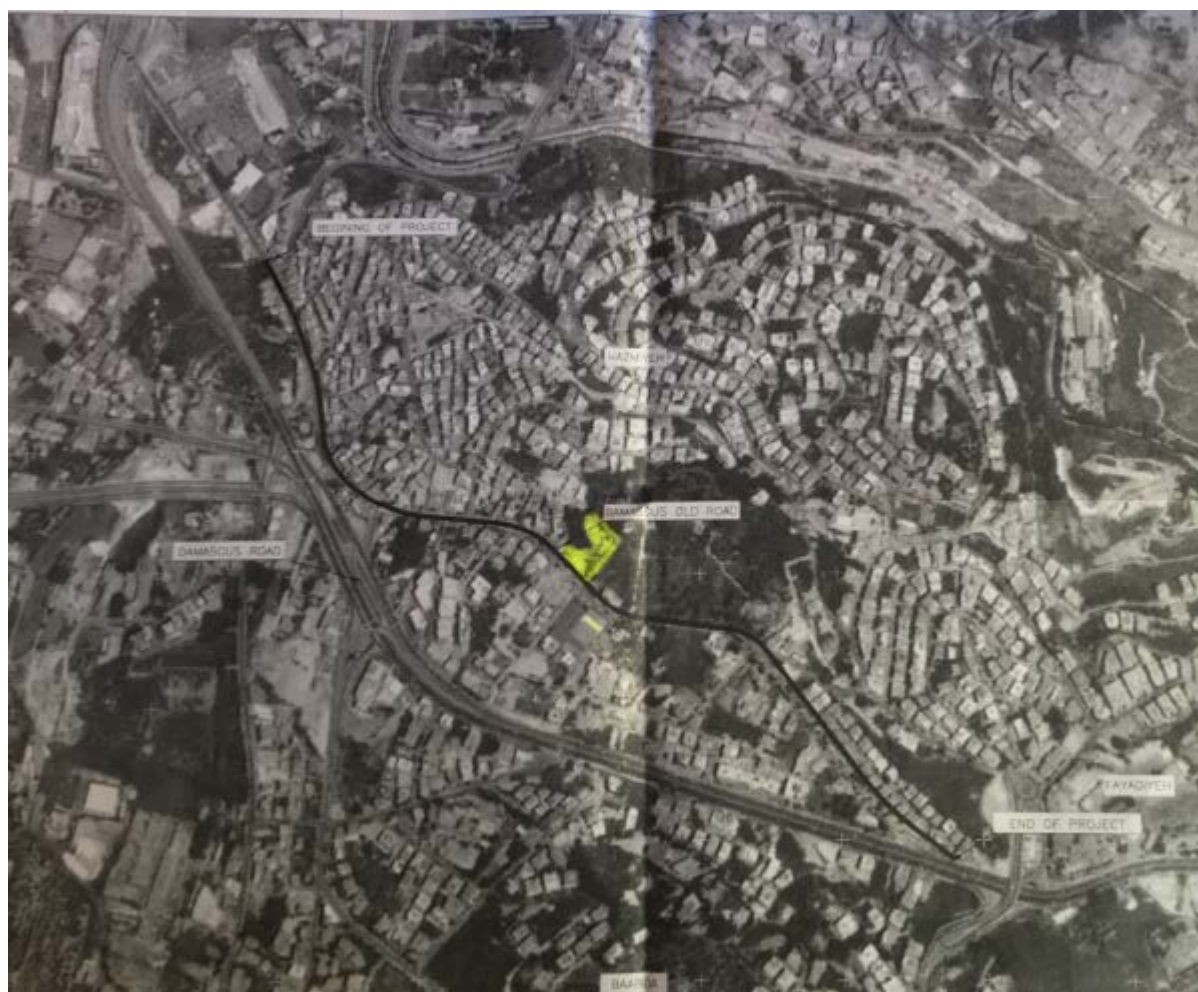
34. This section presents the results and findings for each of the projects included in both countries. For each project, the report presents a brief description of the project and the direct employment findings.

3.1 Rehabilitation of Old Damascus Road, Hazmieh, Mount Lebanon

3.1.1 Description of the Project

35. The project consists of upgrading the Damascus Old Road in the Hazmieh region by rehabilitating the road and the entire pavement along its sides. It also included adopting a modified profile and adjusting alignment—all within the existing right-of-way. Works also included providing new networks for storm water drainage, sewage, and road lighting with some rehabilitation works made to the potable water and telephone networks. The road is 1.7 km long, stretching from the main Hazmieh intersection at Jisr El-Basha to the Fayadiyeh area where it connects with the Damascus Road as indicated in the map in Figure 1.6.

Figure 1.6. Hazmieh Project



36. The project's total budget was about US\$3.08 million, including both construction and supervision contracts. The CDR considered the project as fast-track—one to be completed in six months; however, it was eventually concluded in eight months. The project was implemented by one contractor, who was contracted directly by the CDR, in addition to a construction supervisor. The CDR provided project management support throughout the project implementation period. Table 1.5 summarizes project duration, total budget, and breakdown of construction contract amount.

Table 1.5. BOQ Components, Hazmieh Project

| | | | |
|------------|----------------|------------------------------------|--------------|
| Start date | July 24, 2015 | Construction contract value (US\$) | 2,968,655.12 |
| End date | March 23, 2016 | Supervision contract value (US\$) | 110,000.00 |

| | | | |
|--|---|----------------------|--------------|
| Total duration (month) | 8 | Total (US\$) | 3,078,655.12 |
| Breakdown of construction contract value according to BoQ | | | |
| Description | | Amount (US\$) | |
| General requirements | | 47,251.25 | |
| Earthworks | | 137,441.00 | |
| Sub-base and base courses | | 176,874.60 | |
| Asphalt works and road works | | 1,129,923.80 | |
| Concrete works | | 52,257.60 | |
| Storm water and sewerage networks | | 845,803.75 | |
| Chain-link fences | | 2,760.00 | |
| Traffic signs and road marking | | 79,270.55 | |
| Electrical works | | 227,194.83 | |
| Total (excluding VAT) | | 2,698,777.38 | |
| Total (including VAT at 10%) | | 2,968,655.12 | |

Note: VAT = Value Added Tax.

37. The contractor utilized equipment-based construction technology justified by cost effectiveness and faster implementation given that the areas surrounding the project were residential, and therefore it was not possible to block the road for a long period of time. Excavation activities, in particular, would have extended over a long period of time if implemented manually, so equipment was used for excavation whenever possible. Additionally, budget allocated for construction of alternative detour roads was small; consequently, the contractor utilized smaller side roads to detour the traffic away from certain sections of the road while rehabilitation was taking place. This created traffic congestion and annoyed the residents who were eager for traffic to return, as quickly as possible, to the main road.

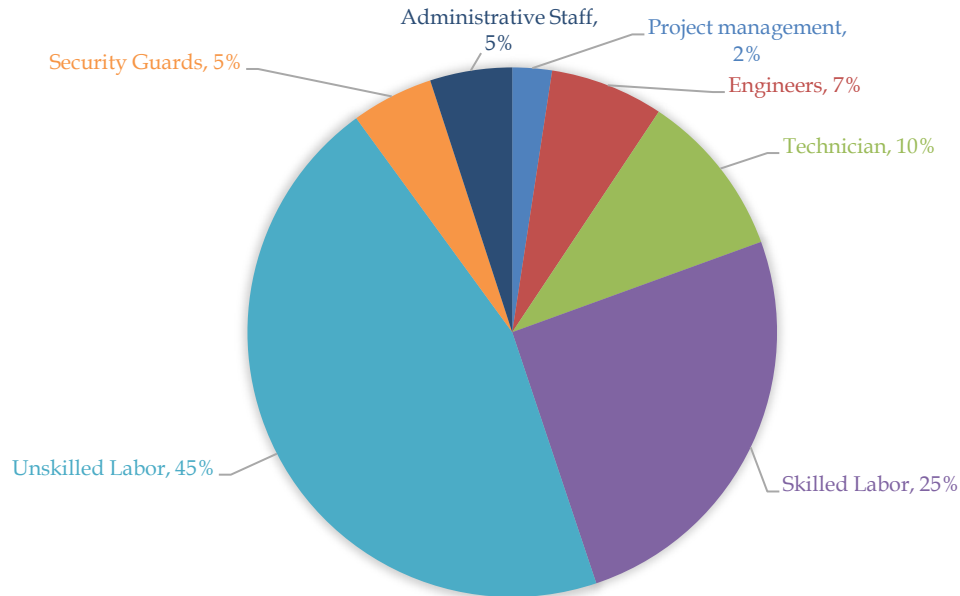
3.1.2 Direct Employment for Old Damascus Road

38. The study team managed to collect detailed data on employment from the contractor and the construction supervisor, which allowed for a detailed analysis of direct employment as will be presented in this section.

39. The total resulting direct employment from the Hazmieh Region Road Project was nearly 539 person-months including construction, engineering supervision, and project management, reflecting a labor intensity of 18.44 percent as summarized in Table 1.6. The overwhelming majority of direct employment was generated by the construction activities, while project management and supervision accounted for a mere 4 percent of the total direct employment generated. The number of person-days required for 1 km is 7,933 whereas making a US\$10 million investment generates about 43,805 person-days.

40. The overall wage bill was divided almost equally among the two groups of job categories. The first was the skilled labor, unskilled labor, and security guards with total wages of US\$303,012. The second was a group of job categories including project management, engineers, technicians, and administrative staff with total wages of US\$275,775. Nevertheless, the weighted monthly wage of skilled and unskilled labor was about 24 percent of that of project management and engineers.

41. The analysis of direct employment by job category was further aggregated into the seven key employment categories including project management at the CDR, supervision, and construction. The analysis indicates that the biggest single category of employment is unskilled labor, which accounts for nearly half of the direct employment created by the project. This is followed by skilled labor and technicians at 25 percent and 10 percent, respectively. Consequently, about 70 percent of the total person-days created directly by the project were for skilled and unskilled labor.

Figure 1.7. Aggregate Direct Employment by Category, Hazmieh Region Road

42. The characteristics of employees in terms of educational level, age, years of experience, nationality, and gender are summarized in Table 1.6. The table indicates that employment of females is limited in all employment categories with the exception of project management. In fact, the skilled and unskilled labor categories that accounted for 70 percent of the total direct employment as seen earlier, were dominated by male workers. Youth, represented by the age group between 16 and 19 years, are mostly employed in the unskilled and skilled labor categories, which require few years of experience. In terms of educational attainment, all of the employees in project management and engineering job categories possess at least a university degree. On the other hand, the majority of the employees in the skilled and unskilled labor job categories completed 10 to 12 years of schooling.

43. Most of the job categories are dominated by Lebanese nationals with the exception of skilled labor, unskilled labor, and security guards. In fact, all of the unskilled labor job opportunities went to foreign workers dominated mostly by Syrian nationals as indicated by contractors interviewed during data collection.

44. Employment characteristics vary between the different job categories as indicated in Table 1.6. With the exception of the skilled and unskilled who are hired on daily basis, workers are hired permanently for the project duration. Unlike workers who are hired on daily basis, permanent workers benefit from social security in addition to paid annual and sick leaves. Additionally, workers with an engineering degree benefit from health insurance through their syndicate. Nevertheless, accident insurance to all workers and third-party persons present on the project site is covered through a mandatory insurance policy that is part of the standard contracts issued by the CDR.

45. Although contractors advertise all permanent project jobs, about 70 percent of senior jobs such as project managers, engineers, and key technicians are usually occupied by the contractor's permanent staff who are continuously reallocated from one project to another. The contractors who were interviewed preferred to hire from the project locality nevertheless; and foremen usually assist the contractors in hiring all skilled and unskilled labor. One general foreman and three foremen provided the majority of the skilled and unskilled daily workers for the Hazmieh Project.

Table 1.6. Direct Employment of Hazmieh Region Road

| | Direct Employment | | | | Characteristics of the Workers | | | | Employment Characteristics | |
|------------------------------------|----------------------|--------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|--------------------------|----------------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Supervision | Project Management | 4.0 | 100 | 4,000 | 30–55 | 100% U | 35% M 65% F | L | AI, SS, AL, SL | P |
| | Engineers | 8.5 | 213 | 3200 | 22–50 | 100% U | 73% M 27% F | L | AI, SS, AL, SL | P |
| | Technicians | 9.5 | 238 | 1,150 | 25–60 | 34% C 66% S | 100% M | L | AI, SS, AL, SL | P |
| Construction | Project Manager | 9.0 | 225 | 4,000 | 30–55 | 100% U | 35% M 65% F | L | AI, SS, AL, SL | P |
| | Engineers | 28.8 | 720 | 2,281 | 22–50 | 100% U | 73% M 27% F | L | AI, SS, AL, SL | P |
| | Technician | 45.0 | 1,125 | 1,870 | 25–60 | 34% C 66% S | 100% M | L | AI, SS, AL, SL | P |
| | Skilled Labor | 136.8 | 3,420 | 1,082 | 21–40 | 10% U 90% H | 100% M | 64% L 36% O | AI | D |
| | Unskilled Labor | 243.0 | 6,075 | 560 | 18–30 | 100% H | 100% M | 100% O | AI | D |
| | Security Guards | 27.0 | 675 | 700 | 30–50 | 100% S–H | 100% M | 30% L 70% O | AI | P |
| | Administrative Staff | 27.0 | 675 | 800 | 25–46 | 100% U | 85% M 15% F | 100% L | AI, SS, AL, SL | P |
| Total | | 539.4 | 13,486 | 1,048 | | | | | | |
| Labor intensity^h | | | 18.44% | | | | | | | |

Notes:

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, O = Other.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.1.3 Pictures



Hazmieh Project - Surface works



Hazmieh Project - Road after rehabilitation



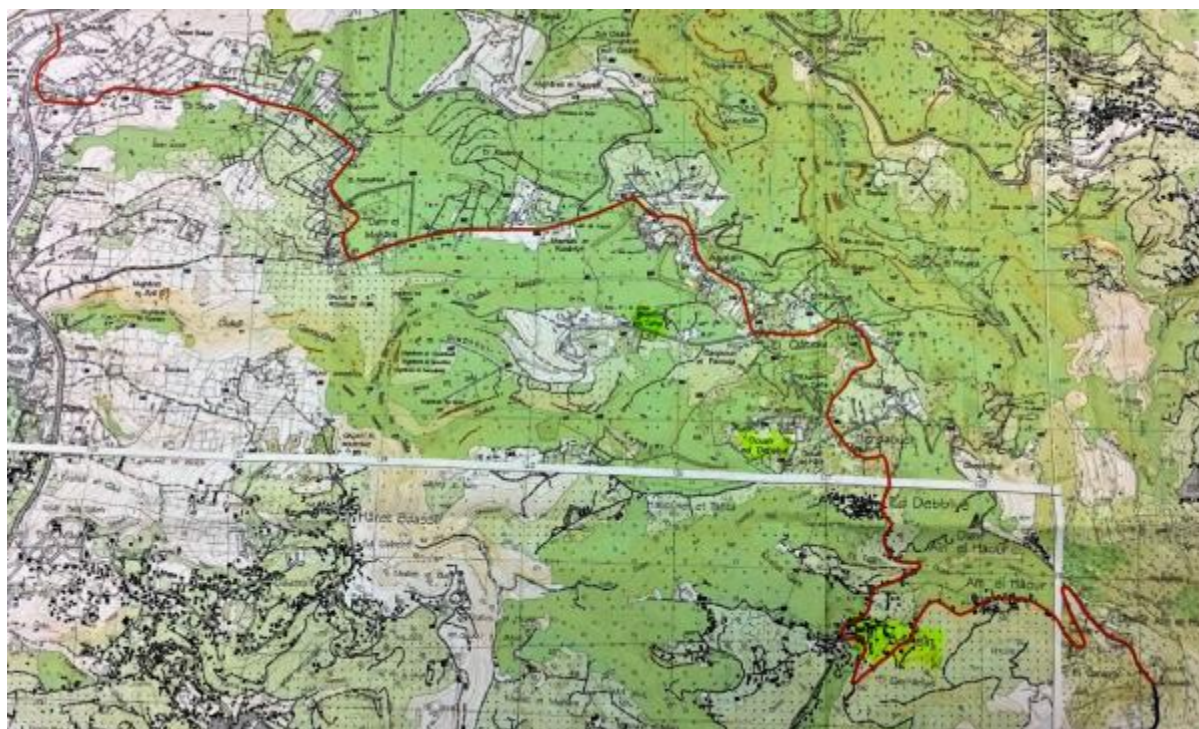
Hazmieh Project - Water and wastewater network

3.2 Saadiyat-Ain El Hour Road, Chouf District, Lebanon

3.2.1 Description of the Project

46. This project consists of the rehabilitation and widening of the road connecting Saadiyat to Ain El Hour stretching over 14.7 km in Chouf District.⁸ In addition to widening, the rehabilitation works included excavation and construction of retaining walls, building storm water drainage channels, construction of safety barriers, pavement reconstruction including sub-base, base course, and hot mix asphalt, and horizontal and vertical marking and signage. The work also included rehabilitation of the existing wastewater network and relocation of road lighting.

Figure 1.8. Saadiyat Project



47. The project total budget was about US\$14.8 million including both construction and supervision contracts and extended over 45 months. It was implemented by one contractor contracted directly by the CDR in addition to a construction supervisor. The CDR provided project management support throughout the project implementation period. Table 1.7 summarizes the project duration, total budget, and breakdown of construction contract amount.

48. Similar to the Hazmieh Project, the contractor utilized equipment-based construction technology, justified by cost effectiveness and faster implementation.

Table 1.7. Saadiyat Project Overview

| | | | |
|------------------------|-------------------|------------------------------------|---------------|
| Start date | January 28, 2010 | Construction contract value (US\$) | 14,429,309.75 |
| End date | December 16, 2013 | Supervision contract value (US\$) | 397,055.64 |
| Total duration (month) | 45 | Total (US\$) | 14,826,365.39 |

3.2.2 Direct Employment for Saadiyat-Ain El Hour Road

49. Estimation of direct employment for the Saadiyat Project was provided by the construction supervisor in terms of labor content for each component of the project's BoQ displayed in Table 1.8. Given that the BoQ was not shared with the study team, the estimation of the project's labor intensity could not be calculated using the information included in Table 1.8.

Table 1.8. Labor share of BoQ, Saadiyat Project

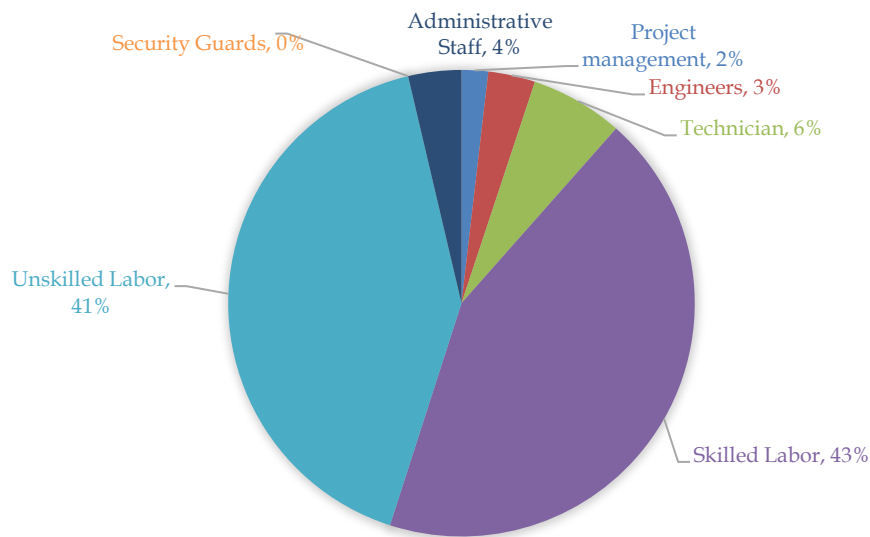
| Description | Materials % | Labor % |
|---------------------------|-------------|---------|
| Site works | 57 | 11 |
| Bitumen construction | 65 | 7 |
| Concrete and metal works | 68 | 14 |
| Incidental works | 6 | 13 |
| Street lightning | 62 | 11 |
| Power | 46 | 16 |
| Telephone | 62 | 13 |
| Drainage works | 43 | 24 |
| Water works (provisional) | 67 | 2 |

50. The study team was provided with two progress reports at peak period, including the daily labor record. These reports allowed the estimation of total person-days per month during the peak period. This analysis is summarized in Table 1.9.

Table 1.9. Direct Employment Categories (monthly, during a peak month), Saadiyat

| | Employment Category | Person-month | Person-day |
|---|----------------------|--------------|------------|
| Supervision and project management (CDR) | Project management | 1 | 25 |
| | Engineers | 0.55 | 13.75 |
| | Technicians | 1.25 | 31.25 |
| Construction | Project manager | 1 | 25 |
| | Engineers | 3 | 75 |
| | Technician | 7 | 175 |
| | Skilled labor | 46 | 1150 |
| | Unskilled labor | 45 | 1125 |
| | Security guards | 0 | 0 |
| | Administrative staff | 4 | 100 |
| Total | | 109 | 2,720 |

51. The total person-months created monthly during the project peak period reached 109 which is equivalent to a total person-days of 2,720. This analysis also indicates that skilled and unskilled labor constitute about 84 percent of total employment as indicated in Figure 1.9.

Figure 1.9. Employment by Category (based on one month during peak period), Saadiyyat Project

52. Utilizing the available data on employment at peak period, the study team estimated total direct employment for the Saadiyyat Project in Table 1.10 based on a number of assumptions. The first is that the peak period lasted for eight months, which was an estimate of the peak duration by the site supervision engineer. The second is that the employment during the remaining period was at 40 percent of peak. Third, wages for each labor category is similar to the wages of the Hazmieh Project. Based on these assumptions, the number of person-days required for 1 km is 4,219 person-months, at this rate, about 41,829 person-days would be generated from a US\$10 million investment. The labor intensity of the project is estimated at 17 percent.

Table 1.10. Direct Employment for Saadiyyat Project

| | Direct Employment | | | Characteristics of the Workers | | | | Employment Characteristics | | |
|--|------------------------------------|--------------|-------------------------|--------------------------------|------|------------------------------|---------------------|----------------------------|-----------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Construction, Supervision, and Management | Project manager | 45.6 | 1,140 | 4,000 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Engineers | 80.9 | 2,024 | 2,786 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Technician | 159.6 | 3,990 | 1,744 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Skilled labor | 1,077.3 | 26,933 | 1,082 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Unskilled labor | 1,026.0 | 25,650 | 560 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Security guards | — | — | 700 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Administrative staff | 91.2 | 2,280 | 800 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Total | 2,480.6 | 62,016 | 1,008 | | | | | | | |
| | Labor intensity^h | 17% | | | | | | | | |

Notes: n.a. = Not available.

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.2.3 Pictures

53. The following are selected photos taken for the project site.



Saadiyyat Project - Road after rehabilitation



Saadiyyat Project - Asphalting works



Saadiyyat Project - Masonry wall



Saadiyyat Project – Pouring wall

3.3 Rehabilitation of Nabatieh- Doueir Road, South Lebanon

3.3.1 Description of the Project

54. The Nabatieh-Doueir Road consists of the rehabilitation of 12 km in the south of the country and was implemented by the MoPWT. The project cost around US\$7.5 million and took almost three years to complete, from June 17, 2008 to August 31, 2011. The contractor responsible for the project, which has offices in Beirut, Sidon, and Nabatiyeh, employs around 90 permanent staff and also hires on a project basis. The permanent staff include engineers that work on the company's projects. Non-permanent employees include site engineers who are hired for the duration of the project only. The contractor has a roster of engineers and selects the most suitable candidates based on their location, education, and experience. The company has a five-star classification at the CDR and an annual turnover of US\$25 million.

Table 1.11. Nabatiyeh-Doueir Road Project Overview

| | | | |
|-------------------------------|-----------------|---|-----------|
| Start date | June 17, 2008 | Construction contract value (US\$) | 7,540,000 |
| End date | August 31, 2011 | Supervision contract value (US\$) | — |
| Total duration (month) | 26 | Estimated Total (US\$) | 7,540,000 |

3.3.2 Direct Employment

55. The project employed 54 people and an estimated US\$1.6 million was spent on wages throughout its three years. Wages per month ranged from US\$500 to US\$3,500; the weighted average of wage per month is US\$844. About 39 percent of the total wage over the three years was spent on unskilled labor, this was followed by the administrative staff (15 percent), technicians (14 percent), skilled labor (11 percent), engineers (10 percent), the project manager (8 percent) and the security guards (2 percent). The person-days required for each kilometer is 4,050 person-days. Based on this rate, every US\$10 million invested would yield 64,456 person-days. The labor cost per kilometer is approximately US\$136,800 and the labor intensity of the project was almost 22 percent. As can be seen in the Figure 1.10, more than half of the labor generation was for unskilled labor, followed by administrative staff. Details on gender, education, and the other characteristics of the labor on the project could not be obtained.

Figure 1.10. Labor Breakdown for Nabatiyeh-Doueir Road Project

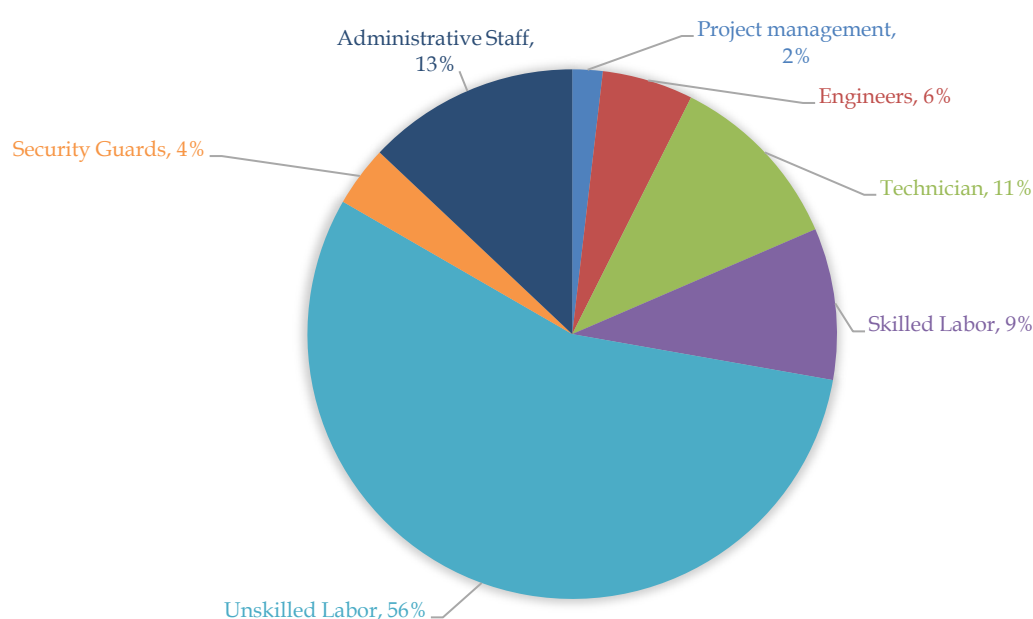


Table 1.12. Direct Employment of Nabatiyeh Doueir Road Project

| | Direct Employment | | | Characteristics of the Workers | | | | | Employment Characteristics | |
|--|------------------------------------|---------------|-------------------------|--------------------------------|------|------------------------------|---------------------|--------------------------|----------------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Construction, supervision, and management | Project manager | 36 | 900 | 3,500 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Engineers | 108 | 2,700 | 1,500 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Technician | 216 | 5,400 | 1,100 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Skilled labor | 180 | 4,500 | 1,000 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Unskilled labor | 1,080 | 27,000 | 600 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Security guards | 72 | 1,800 | 500 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Administrative staff | 252 | 6,300 | 1,000 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Total | 1,944 | 48,600 | 844 | | | | | | | |
| | Labor intensity^h | | 21.77% | | | | | | | |

Notes: n.a. = Not available.

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.4 Herbet El Ma'ani Road, Ba'albak, Lebanon

3.4.1 Description of the Project

56. The Herbet El Ma'ani Project consists of the rehabilitation of a 4.3 km rural road in Ba'albak and was implemented by Green Plan, a government entity responsible for rural development in Lebanon. The project took almost three years from June 2014 to April 2017 and cost a total of US\$370,000. The contractor for this project is based in Beirut and the City of Baalbak. The contractor has four permanent employees and is classified at the Ministry of Public Works but not at the CDR. The company hires employees on a project basis and also uses subcontractors to carry out their projects, such as this one. A summary overview of the project can be found in Table 1.13.

Table 1.13. Herbet El Ma'ani Road in Ba'albak - Project Overview

| | | | |
|-------------------------------|---------------|---|---------|
| Start date | June 6, 2014 | Construction contract value (US\$) | 370,000 |
| End date | April 4, 2017 | Supervision contract value (US\$) | n.a. |
| Total duration (month) | 34 | Estimated Total (US\$) | 370,000 |

3.4.2 Direct Employment

57. The project employed 26 workers with total wages throughout the project duration of US\$272,333. The engineers generated about 32 percent of the total wage, followed by aggregate labor (29 percent), project manager (13 percent), technicians (11 percent), skilled labor (8 percent), security guards (4 percent), cement labor (2 percent), and asphalt labor (1 percent).

About 1,849 person-days are required for 1 km and an investment of US\$10 million would generate 215,253 person-days. The total labor cost per kilometer is US\$63,310 and the labor intensity of the project was found to be extremely high, estimated at 69 percent. Details on gender, education, and the other characteristics of the labor on the project could not be obtained.

Figure 1.11. Labor Breakdown for Herbet El Ma'ani Road Project

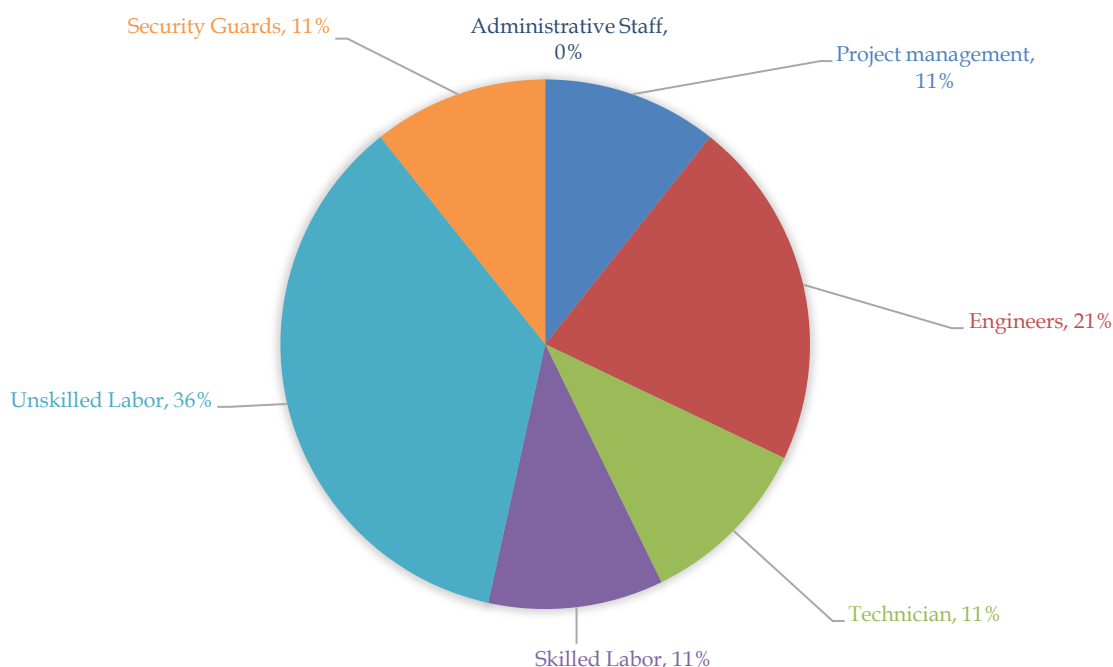


Table 1.14. Direct Employment of Herbet El Ma'ani Road

| | Employment Category | Direct Employment | | | Characteristics of the Workers | | | | Employment Characteristics | |
|--|------------------------------------|-------------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|--------------------------|----------------------------|----------------------------|
| | | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Construction, Supervision, and Management | Project manager | 34 | 850 | 1,000 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Engineers | 68 | 1,700 | 1,250 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Technician | 34 | 850 | 900 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Skilled labor | 34 | 850 | 600 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Unskilled labor | 114 | 2,850 | 750 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Security guards | 34 | 850 | 333 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Administrative staff | — | — | — | — | — | — | — | — | — |
| Total | 318 | 7,950 | 839 | | | | | | | |
| | Labor intensity^h | 72.25% | | | | | | | | |

Notes: n.a. = Not available.

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.5 Edde-Toula-Mayfouk Road in Jbeil District, Mount Lebanon

3.5.1 Description of the Project

58. This project comprises the rehabilitation of a 7.28 km road in Jbeil (Edde-Toula-Mayfouk Road), which is expected to be complete in January 2018. The total cost of the project was about US\$7.3 million. The contractor for this project is based in Beirut and with an office in Bcharre in North Lebanon. The company employs about 100 permanent employees and hires skilled and unskilled labor for their projects. The company has an annual turnover of around US\$15 million; however, this has fluctuated greatly over the past five years. The contractor has a five-star classification from the CDR. A summary overview of the project can be found in Table 1.15.

Table 1.15. Edde-Toula-Mayfouk Road Project Overview

| | | | |
|-------------------------------|------------------|---|-----------|
| Start date | October 11, 2012 | Construction contract value (US\$) | 7,300,000 |
| End date | January 1, 2018 | Supervision contract value (US\$) | n.a. |
| Total duration (month) | 63 | Estimated Total (US\$) | 7,300,000 |

3.5.2 Direct Employment

59. The project required 30 workers including a project manager and engineers, costing about US\$2.4 million for the duration of the project. The unskilled labor generated about 37 percent of the total wage, followed by the project manager and engineers (about 15 percent for each category), skilled labor (14 percent), about 8 percent for both administrative staff and technicians, and 4 percent for the security. About 8,190 person-days are required for 1 km making an US\$10 million investment produce 81,678 person-days. The labor cost per kilometer is around US\$330,659 and the labor intensity of the project is estimated at 33 percent. Details on gender, education, and the other characteristics of the labor on the project could not be obtained.

Figure 1.12. Labor Breakdown for Edde-Toula-Mayfouk Road Project

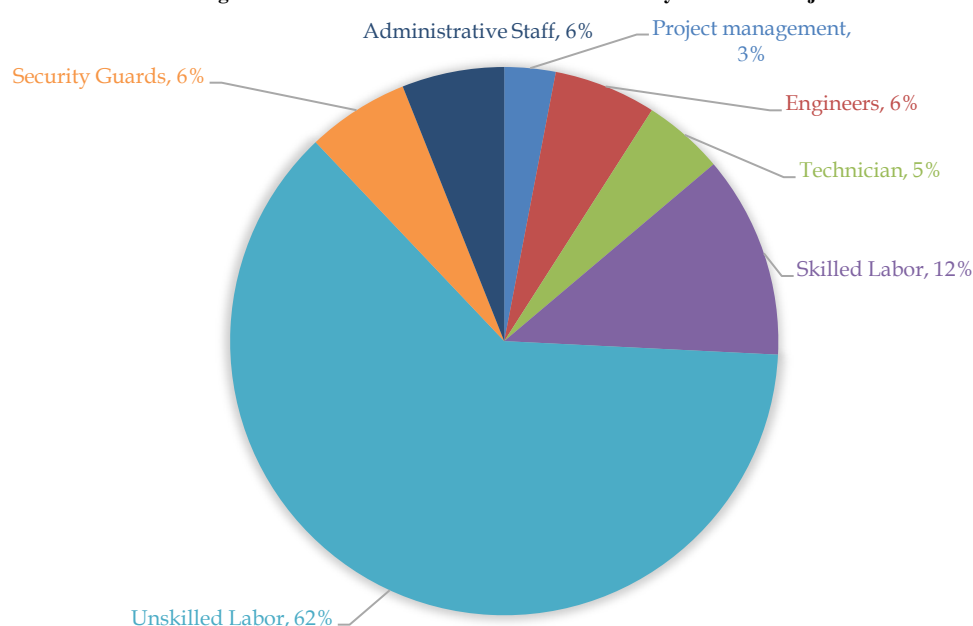


Table 1.16. Direct Employment of Edde-Toula-Mayfouk Road

| 1 | Direct Employment | | | Characteristics of the Workers | | | | Employment Characteristics | | |
|---|------------------------------------|---------------|-------------------------|--------------------------------|------|------------------------------|---------------------|----------------------------|-----------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Construction, supervision, and management | Project manager | 72 | 1,800 | 5,000 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Engineers | 144 | 3,600 | 2,500 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Technician | 114 | 2,850 | 1,600 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Skilled labor | 285 | 7,125 | 1,200 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Unskilled labor | 1,482 | 37,050 | 600 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Security guards | 144 | 3,600 | 600 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| | Administrative staff | 144 | 3,600 | 1,300 | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. |
| Total | 2,385 | 59,625 | 1,009 | | | | | | | |
| | Labor intensity^h | 32.98% | | | | | | | | |

Notes: n.a. = Not available.

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.6 Rehabilitation of Azraq Highway, Jordan

60. The Zarqa -Al-Azraq Omari Highway, which is also known as Highway 30, is an east-west highway in Jordan, extending from the borders with Saudi Arabia at Al-Omari and connecting to Al-Zarqa and the capital Amman. The highway then continues further west passing through Al-Salt City located in west-central Jordan and ending in the western end of the country in Dair Alla District, on Highway 65.

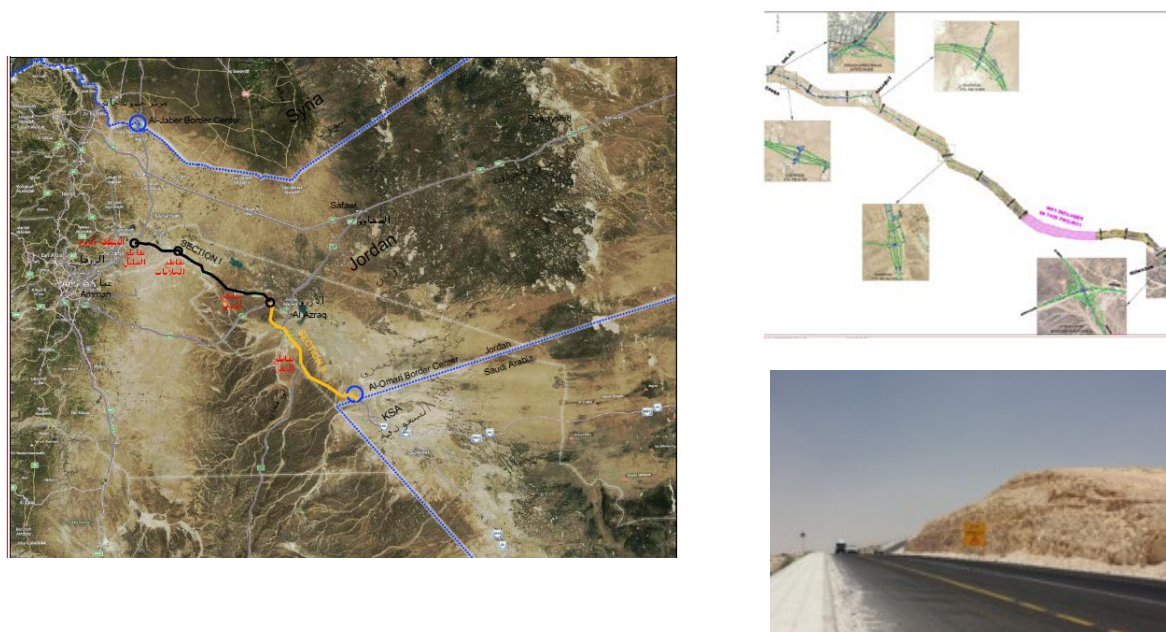
61. The economic significance of the road is that it connects the Free Zone in Al-Zarqa with the Al-Azraq region and the Saudi-Jordanian borders (Al-Omari), which is an important route for trade exchange and a major corridor for trade in addition to passenger traffic, between Jordan, Iraq, and Saudi Arabia. While the road is considered a gateway for the Gulf countries to the Levant region and Europe, minor maintenance and patchwork were carried out since it was constructed in 1974. It was a dual one narrow lane road with deplorable shoulders. Moreover, it has been the road of many fatal accidents over the past few years.

62. The MoPWH is undertaking the upgrade of the Al-Azraq-Omari Road. The project is financed by the Saudi Fund for Development (SFD) at a cost of US\$270 million. The project is being implemented in two sections—the first section includes the construction of a 47 km road from Al-Zarqa to Al-Azraq, and the second section includes the construction of a 63 km road from Al-Azraq to Al-Omari.

63. The project includes the construction of service roads and four main interchanges to Dhulail, Muwaqqar, Al-Azraq, and Al-Jafar. It also includes the construction of pedestrian walkways to serve the residential areas on the roadsides, and the installation of signage systems. It started in May 2015 and was scheduled to be completed by end of 2017. However, it has been extended until May 2018. The 110-km road will be two-sided with two lanes on each side separated by a concrete median and will be fully lit. The completion ratio of the project at the time of preparing this assessment is estimated at more than 95 percent.

64. The Zarqa-Azraq-Omari Highway Project was tendered in two sections. Because the team for the study intended to study the effect of road construction on employment for more than one project, it was decided to select only one section. Therefore, it will enable the team to include more than one type of transport projects with different nature and specifications for the detailed study of labor and employment generation. The study team selected the first section of the project, which is a 47.3 km road that connects Al-Zarqa'a (Freezone)/station 0+00 to Al-Azraq (Station 12/300).

Figure 1.13. Alignment of Azraq Omari Highway



65. Overall, the road will be a dual two-lane carriageway with a speed limit of (100 km/h) for passenger vehicles and 90 km/h for trucks. However, it is lower on the service road and at interchanges. The highway has

service roads on each side for about 4 km. It also has two fully directional interchanges and three overpasses, in addition to slip ramps, cross roads diversions, and tapers. The project includes construction of an existing dual carriageway to the four-lane divided highway with 2x3.75 m travel lanes in each direction plus 3.0 m outer shoulder and 1.8 m inner shoulders, and a central median of 2.0 m wide. Table 1.17 summarizes project's total budget and breakdown of the construction contract amount.

Table 1.17. BoQ Components, Azraq Highway

| | | | |
|---|-------------------|---|-----------------------|
| Start date | March 2014 | Construction contract value (US\$) | 146,784,837 |
| End date | May 2018 | Supervision contract value (US\$) | 2,000,000 |
| Total duration (month) | 50 | Total (US\$) | 148,784,837 |
| Breakdown of construction contract value according to BoQ | | | |
| Description | | | Amount (US\$) |
| General requirements | | | 5,428,160.14 |
| Earthworks, base courses, and asphalt works | | | 101,041,569.52 |
| Concrete, steel, and structures | | | 13,435,412.12 |
| Miscellaneous works | | | 28,282,328.29 |
| Grand total of bills (Including all provisional sums and prime cost) | | | 148,187,470.07 |
| Total contract | | | 146,784,837.43 |

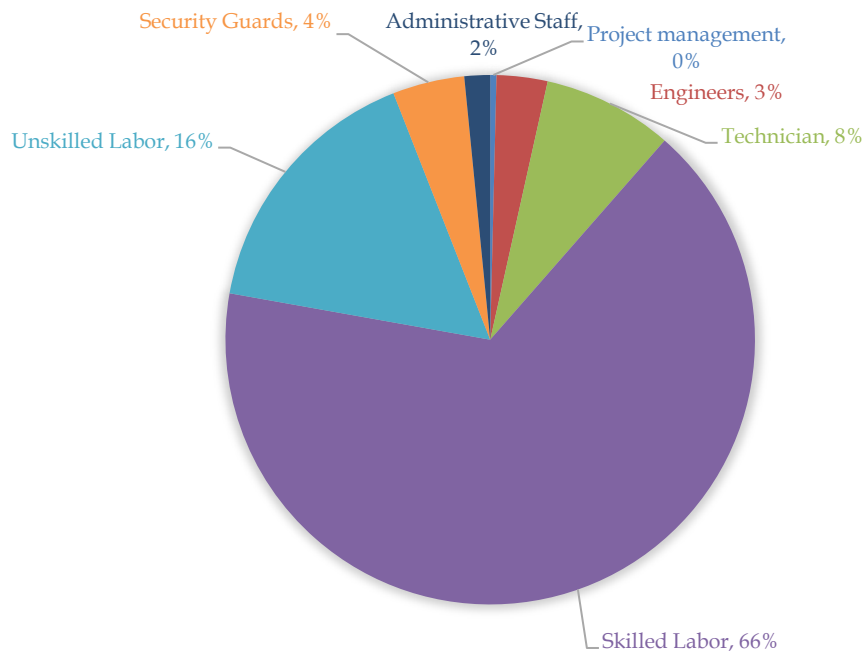
66. The 110 km road is financed by a grant and a soft loan from the Saudi Fund for Development (SFD) at a cost of US\$270 million. It is fully owned by the MoPWH. The road is executed by a coalition of Jordanian and Saudi contractors. The first 47.3 km section is executed by a Saudi contracting company called Shihb Al Jazira and two Jordanian contracting companies—at a cost of US\$140 million (Original Tender Value). The second section is executed by the Saudi Company Al Mobti Contracting and one Jordanian contracting company at a cost of US\$130 million (tender value).

67. Engicon is contracted to supervise the work of the 47.3 km section for US\$1,200,565 (original tender value) and the Consolidated Consultants for Engineering & Environment is supervising the second section for US\$1,247,458 (original tender value).

3.6.1 Direct Employment for Azraq Highway

68. Using the data and information provided by the contractors and their main subcontractors, in addition to the construction supervision consultants, the total generated labor is estimated at nearly 39,400 person-months. Data on project management consulting could not be obtained; however, they are not expected to significantly affect those figures. Figure 1.14 presents a breakdown of the generated person-months for each of the categories identified when reviewing the labor categories and classifications reported by the contractors and consultants.

69. As can be seen in the figure, the biggest single category of labor is the Equipment Operators category, which alone accounted for nearly 40 percent of the labor force. Such a trend is quite common on highway projects given the high need for specialized equipment, especially when the works include widening the cross section of a road to add lanes. The second largest category was skilled labor with 28 percent of the labor share, followed by unskilled labor at 16 percent. The remainder of the labor share was for engineers, technicians, and the other labor categories.

Figure 1.14. Direct Employment by Category, Azraq Highway Section 1

70. Similar to most construction projects, especially when they are in remote areas, the labor is dominated by male employees, with a very few exceptions in the administrative positions, and some of the engineering positions and draftsmen. In terms of education, project management and engineering positions were occupied by B.Sc. holders of engineering degrees, and most administrative positions were filled by university and community college degree holders. Other categories of labor had education levels of high school and less.

71. Given the nature of the project, one can see a larger mix of non-Jordanians in skilled and unskilled labor categories. Contractors reported employees in those two categories from Egypt, Palestine, and Syria with a few cases of Sudanese and Yemeni employees. Interestingly enough, all categories of labor were entitled to social security, annual leave, and sick leave.

Table 1.18. Direct Employment for Azraq Highway

| | Direct Employment | | | Characteristics of the Workers | | | | Employment Characteristics | | |
|---------------------|------------------------------------|----------------|-------------------------|--------------------------------|------|------------------------------|---------------------|----------------------------|-----------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Supervision | Project management | 48 | 1,200 | 3,531 | 68 | U | M | J | SS, AL, SL | P |
| | Engineers | 125 | 3,125 | 2,354 | 62 | U | M | J | SS, AL, SL | P |
| | Technicians | 251 | 6,275 | 1,196 | 58 | H-C | M | J | SS, AL, SL | P |
| | Skilled labor | — | — | — | — | — | — | — | — | — |
| | Unskilled labor | — | — | — | — | — | — | — | — | — |
| | Security guards | — | — | — | — | — | — | — | — | — |
| | Administrative staff | 47 | 1,175 | 685 | 36 | U | M | J | SS, AL, SL | P |
| Construction | Project management | 102 | 2,550 | 6,525 | n.a. | U | M | J | SS, AL, SL | P |
| | Engineers | 1,099 | 27,475 | 2,327 | n.a. | U | M | J | SS, AL, SL | P |
| | Technician | 2,885 | 72,133 | 1,637 | n.a. | H-C | M | J | SS, AL, SL | P |
| | Skilled labor | 10,818 | 270,462 | 715 | n.a. | H-D | M | J & O | SS, AL, SL | P |
| | Unskilled labor | 6,397 | 159,928 | 527 | n.a. | H-D | M | O | SS, AL, SL | P |
| | Security guards | 1,729 | 43,214 | 527 | n.a. | H-D | M | J | SS, AL, SL | P |
| | Administrative staff | 570 | 14,250 | 965 | n.a. | H-C | M | J | SS, AL, SL | P |
| Total | 39,398 | 601,787 | 819 | | | | | | | |
| | Labor intensity^h | 21.91% | | | | | | | | |

Notes: n.a. = Not available.
a. Person-month equals 25 person-days.
b. Weighted average of wages of each employment category.
c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.
d. Percentage of males (M) and females (F) in each employment category.
e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.
f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.
g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.
h. Total wages divided by project cost.

3.6.3 Pictures

72. The following are selected photos taken during the field visit to the project site.





3.7 Al-Salt Ring Road, Jordan

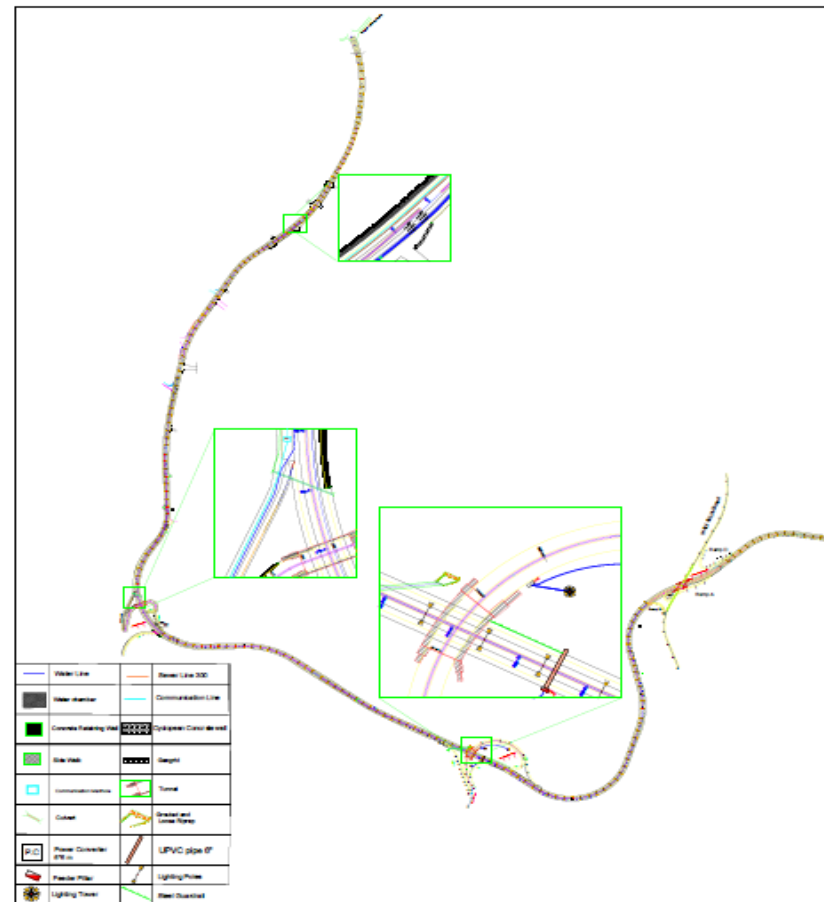
3.7.1 Description of the Project

73. Al-Salt Ring Road is a 22 km ring-road around the city of Al-Salt, which lies 35 km northwest of Amman. The project is divided into three sections, where each section extends for approximately 7 km. The first section extends for 8.2 km from Al-Ahlyah University to Zay Tunnel/Station. Section 2 extends from the south of Balqa Applied University, and ends after its intersection with Wadi Shu'aib road. The third section starts from Wadi Shu'aib Road back to Al Ahlyeh University. Figure 1.15 shows the three sections, and the main landmarks along the alignment.

74. The project was tendered in two lots. The second lot including sections 1 and 3 is in the tendering process. The first lot including section 2 of the road was assessed during this assignment. The project includes the construction of a new road, a number of intersections, bridges, tunnels, water drainage facilities, road safety structures and signage, lighting, and other necessary supplementary works. Project elements also include the provision of consultancy services to carry out the work.

75. Al-Salt, one of the larger cities near the capital, has an estimated population of 518,600. A significant proportion of the population of Al-Salt work in Amman and nearby cities, and therefore, the project aims at improving land transport services in the city of Al-Salt and the surrounding areas. It is found that there is a need to absorb and divert part of the increasing traffic in the city center and reduce traffic accidents and congestion. This would allow transit traffic to pass by the city without entering it.

Figure 1.15. Al-Salt Ring Road, Section 2



76. The second section of the road is 7.130 km of primary four-lane divided highway, with a 300 m link to Al-Salt Industrial City. It will have an interchange at the crossing with Wadi Shu'aib Road. This interchange consists of an underpass, ramps, and loops. The speed limit for the first 3 km of this road is (60 km/h) due to its location in an urban area, however, for the remaining 4 km it is (80 km/h).

77. The matrix in Table 1.19 summarizes the project's total budget and breakdown of the construction contract. The BoQ that was shared with the research team includes the breakdown of the original construction budget that was increased to about US\$49 million as indicated in Table 1.19. Estimation of direct employment was based on the modified project budget. Additionally, employment generation was estimated until project completion given that the project is in advanced stages of implementation.

Table 1.19. BoQ Components, Al-Salt Ring Road

| | | | |
|--|---------------|---|----------------------|
| Start date | November 2013 | Construction contract value (US\$) | 48,930,282 |
| End date | October 2018 | Supervision contract value (US\$) | 1,853,107 |
| Total duration (month) | 60 | Total (US\$) | 50,783,390 |
| Breakdown of construction contract value according to BoQ | | | |
| Description | | | Amount (US\$) |
| General provisions | | | 4,859,240 |
| Earthworks, sub-base and base course, bituminous construction | | | 19,479,568 |
| Concrete, steel, and structure works | | | 19,721,694 |
| Incidental construction and other works | | | 4,869,781 |
| | | Total | 48,930,282 |

78. The contractor is utilizing equipment-based construction technology such as hoisting equipment, motor graders, and rollers, which are justified by cost effectiveness and faster implementation. This is typical of most major road construction works in Jordan and is often dictated by the project owner. There are aspects that are implemented through manual labor; however, the majority of the activities are conducted utilizing modern equipment and machinery.

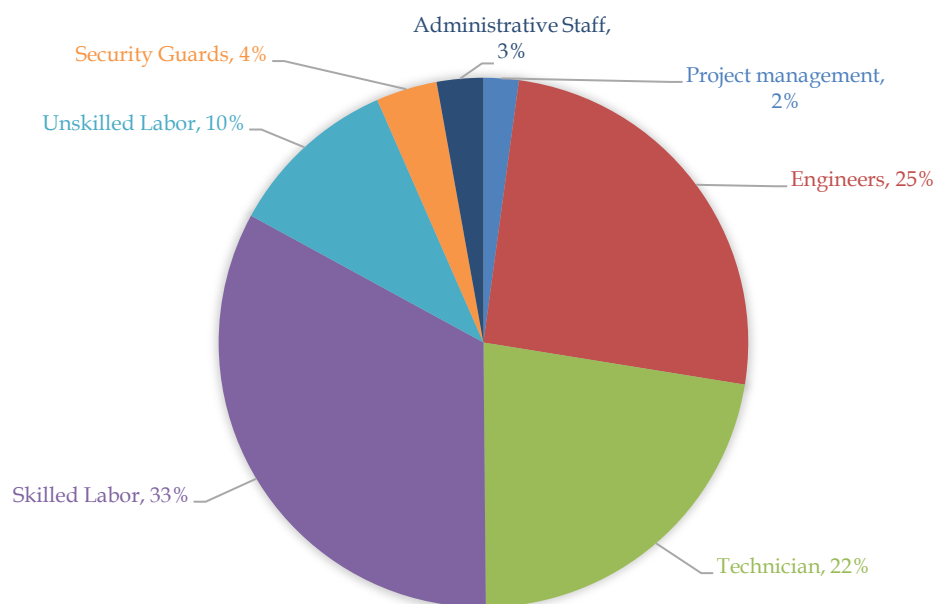
79. The 22 km road is financed by a soft loan from the Arab Fund for Economic and Social Development. The project is fully owned by the MoPWH and is executed by the Jordanian contractor Joint Venute of Ahamd Yousef Al-Tarawneh and Al Oun Contracting at a cost of US\$36.16 million (tender value) and is supervised by Dar Omran at a cost of US\$926,750 (tender value).

3.7.2 Direct Employment for Salt Ring Road

80. The total resulting direct employment from Al-Salt Ring Road Project was nearly 10,720 person-months including construction and engineering supervision, reflecting a labor intensity of 19.8 percent as summarized in Table 1.20. The overwhelming majority of direct employment was generated by the construction activities, while project management and supervision accounted for about 19 percent of the total direct employment generated.

81. Given that the project was implemented using heavy machinery, the technicians and skilled labor categories made up about 35 percent of direct employment generated in person-month, while unskilled labor accounted for 10 percent. Project management and engineering also made up a large share of the total employment generated, amounting to 28 percent of the total direct employment. The analysis of direct employment, in person-months, by job category is summarized in Figure 1.16.

Figure 1.16. Direct Employment by Category, Al-Salt Ring Road, Section 2



82. A large share of the overall wage bill, at 60 percent, was shared by the technicians and the skilled labor job categories, while project managers and engineers accounted for 28 percent of the wage bill. This was driven by the high salaries of technicians and skilled labor on the construction component of the project. In fact, the weighted average of monthly wages for technicians, skilled labor, and engineers hovered around US\$1,000 per month. Based on the direct labor created by the project, the overall direct labor intensity is about 20 percent. As expected, the labor intensity of the supervision at 62 percent, is higher than that of construction at 18 percent. About 1,530 person-months were created for each km of road constructed. The weighted average of the monthly wage for all job categories, across construction and supervision, is US\$938.

83. The characteristics of employees in terms of educational level, age, years of experience, nationality, and gender are summarized in Table 1.20. The table indicates that employment of females is very limited on the project as women were only hired in two job categories—engineers and administration. The share of women employment in these categories were 15 percent and 50 percent, respectively. Jordanians received the vast majority of employment on the project followed by Egyptians who were hired as unskilled workers and technicians.

84. Employment characteristics vary between the different job categories as indicated in Table 1.20. With the exception of the skilled and unskilled labor who are hired on a daily basis, workers are hired permanently for the project duration. Unlike workers who are hired on a daily basis, permanent workers benefit from social security in addition to paid annual and sick leaves.

85. Although contractors advertise all permanent project jobs, about 70 percent of senior jobs such as project managers, engineers, and key technicians are usually occupied by the contractor’s permanent staff who are continuously reallocated from one project to another. The contractors that were interviewed preferred to hire from the project locality nevertheless; foremen usually assist the contractors in hiring all skilled and unskilled labor.

86. The supervisor employed a large share of the workers from the project area, Al-Salt, including experienced engineers but also fresh graduates who received on-the-job training. The majority of the fresh graduates received wages equivalent to the market rates but for the engineers, their wages were in line with the minimum wages stated by the Engineers Association. The project supervisor believes that hiring from the project vicinity supports the local communities and reduces chances of tension between them and the project. It is also in alignment with the MoPWH guidance to increase the share of Jordanians working on construction projects especially those who reside in the areas benefiting from the project.

Table 1.20. Direct Employment of Al-Salt Ring Road, Section 2

| | Employment Category | Direct Employment | | | Characteristics of the Workers | | | | Employment Characteristics | |
|------------------------------------|----------------------|-------------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|--------------------------|----------------------------|----------------------------|
| | | Person-month | Person-day ¹ | Wage (US\$/month) ² | Age | Education Level ³ | Gender ⁴ | Nationality ⁵ | Benefits ⁶ | Contract Type ⁷ |
| Supervision | Project management | 50 | 1,250 | 2,542 | 63 | 100% U | 100% M | 100% J | SS, AL, SL | P |
| | Engineers | 1,250 | 31,250 | 576 | 30–60 | 100% U | 85% M 15% F | 100% J | SS, AL, SL | P |
| | Technicians | 400 | 10,000 | 508 | 30–60 | 100% C | 100% M | 100% J | SS, AL, SL | P |
| | Skilled labor | 100 | 2,500 | 212 | 20–25 | 100% H | 100% M | 100% J | SS, AL, SL | P |
| | Unskilled labor | 50 | 1,250 | 212 | 20–25 | 100% H | 100% M | 100% J | SS, AL, SL | P |
| | Security guards | 100 | 2,500 | 297 | 20–25 | 100% H | 100% M | 100% J | SS, AL, SL | P |
| | Administrative staff | 100 | 2,500 | 381 | 20–25 | 100% U | 50% M 50% F | 100% J | SS, AL, SL | P |
| Construction | Project management | 180 | 4,500 | 3,884 | 40–65 | 100% U | 100% M | 100% J | SS, AL, SL | P |
| | Engineers | 1,473 | 36,825 | 1,021 | 25–50 | 100% U | 100% M | 100% J | SS, AL, SL | P |
| | Technician | 1,992 | 49,800 | 1,081 | 20–50 | 100% C | 100% M | 70% J 30% O | 85% SS, AL, SL 15% SS | 85% P 15% D |
| | Skilled labor | 3,448 | 86,195 | 1,073 | 25–51 | 10% U 90% H | 100% M | 100% J | 30% SS, AL, SL 70% None | 30% P 70% D |
| | Unskilled labor | 1,074 | 26,845 | 494 | 20–40 | 100% H | 100% M | 95% J 5% O | SS | D |
| | Security guards | 300 | 7,500 | 353 | 25–50 | 100% S-H | 100% M | 100% J | SS, AL, SL | P |
| | Administrative staff | 204 | 5,100 | 1,024 | 25–50 | 100% U | 100% M | 100% J | SS, AL, SL | P |
| Total | | 10,720 | 268,015 | 938 | | | | | | |
| Labor intensity⁸ | | | 19.8% | | | | | | | |

Notes:

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.7.4 Pictures



3.8 Maintenance of Roads Project in Mafraq under EIIP, Jordan

3.8.1 Description of the Project

87. The EIIP for Jordanians and Syrian refugees was designed and is being implemented by the ILO to support the Government of Jordan in creating immediate jobs through employment-intensive public works in the governorates of Irbid and Mafraq. The program provides short-term employment for Syrian refugees and members of host communities including men, women, and persons with disabilities. The first phase of the program, which concluded in November 2016 included investment in 14 roads projects. Two projects were assessed in the Governorate of Mafraq because they include routine maintenance and construction and maintenance of drainage which were implemented using labor-intensive methods. On the other hand, all the projects in Irbid included a surface rehabilitation component that was implemented using equipment-based methods.

88. The ILO implemented all roads projects in cooperation with the MoPWH and its directorates in the governorates. The engineers of the MoPWH directorates provided the supervision for the projects within their relevant jurisdictions. Because employment-intensive techniques are new to Jordan, the ILO provided training to the MoPWH engineers and the contractors interested in implementing the public works projects. In addition to introducing labor-intensive methods, the ILO built the capacity of all parties to track employment on the projects and maintained a system that facilitates reporting on direct employment created by each project. For example, worker registration sheets were filled including names, identification numbers, and contact details of the workers. Additionally, muster rolls were filled on a daily basis by the contractor, checked by the MoPWH engineers and shared with the ILO on a monthly basis. The ILO aggregated the data to tally the number of work days created and the number of workers who received employment.

89. The first project is located in the subdistrict of Manshyeh and includes routine maintenance and construction of water drainage works for a number of roads of a total length of 57 km. The roads within the project, although include primary and secondary sections, are mostly secondary. Routine maintenance at US\$246,605 make up 90 percent of the total project budget as indicated in the matrix in this section. Routine maintenance works include removal, clearing, and grubbing of bushes, repairing of side slopes to ensure smooth drainage of storm water, clearing existing culverts, repairing and fixing of the road shoulder, and filling of surface cracks. Water drainage works include installation of gabion retaining walls, construction of new culverts, and laying of riprap (concrete and stone) on side ditches and drains.

Table 1.21. BoQ Components, Manshyeh

| | | | |
|---|----------------|------------------------------------|---------|
| Start date | June 2017 | Construction contract value (US\$) | 272,496 |
| End date | September 2017 | Supervision contract value (US\$) | — |
| Total duration (month) | 4 | Total (US\$) | 272,496 |
| Breakdown of construction contract value according to BoQ | | | |
| Description | Amount (US\$) | | |
| Routine maintenance works including clearing the sides of the roads, slope repair, shoulder repair, clearing culverts, and filling surface cracks | 246,605 | | |
| Water drainage works including installation of gabion retaining walls, construction of culverts, and construction of riprap on slopes | 16,934 | | |
| Additional labor expenses (engineer and social security contribution) | 8,958 | | |
| Total | 272,496 | | |

90. The second project, located in the subdistrict of Balama, includes routine maintenance and construction of water drainage works for a number of roads of a total length of 64 km. The roads within the project, although include primary and secondary sections, are mostly secondary. The works included in the project are similar to those included in the Manshyeh Project. The largest share of the project cost went to routine maintenance, which made up 94 percent of the total project budget. Water drainage works at US\$14,831 comprise 4 percent of the project budget. The breakdown of the Balama's Project BoQ is presented in Table 1.22.

Table 1.22. BoQ Components, Balama

| | | | |
|------------------------|----------------|------------------------------------|---------|
| Start date | June 2017 | Construction contract value (US\$) | 345,268 |
| End date | September 2017 | Supervision contract value (US\$) | — |
| Total duration (month) | 4 | Total (US\$) | 345,268 |

| Breakdown of construction contract value according to BoQ | |
|---|----------------|
| Description | Amount (US\$) |
| Routine maintenance works including clearing the sides of the roads, slope repair, shoulder repair, clearing culverts, and filling surface cracks | 324,136 |
| Water drainage works including construction of gabion retaining walls, construction of culverts, and construction of riprap on slopes | 14,831 |
| Additional labor expenses (engineer and social security contribution) | 6,302 |
| Total | 345,268 |

3.8.2 Direct Employment

91. Both projects, in Manshyeh and Balama were implemented using labor-intensive techniques and consequently, resulted in generating a large number of work days relevant to their budgets. The contractor created a total of 262 person-months on the Manshyeh Project and 325 on the Balama Project reflecting a labor intensity of 51 percent and 50 percent, respectively. Direct labor associated with supervision provided by staff of MoPWH Directorate in Mafraq is presented in Table 1.23, but was not included in the estimated labor intensity given that this labor was not part of the project budget.

92. The overwhelming majority of direct employment, on both projects, is concentrated in the unskilled labor work category which accounts for 84.7 percent and 87.7 percent of total direct employment in the Manshyeh Project and Balama Project, respectively. The breakdown of direct employment by category are presented in Figure 1.17 for Manshyeh Project and Figure 1.18 for Balama Project.

Figure 1.17. Direct Employment by Category, Manshyeh Project

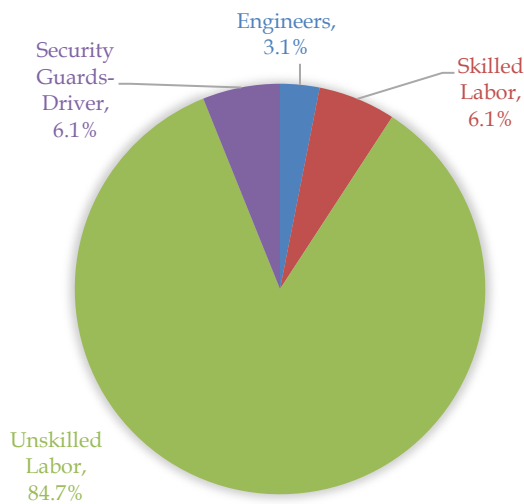
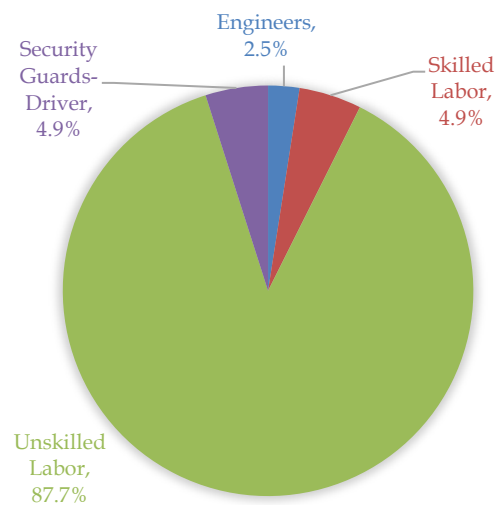


Figure 1.18. Direct Employment by Category, Balama Project



93. The wages paid for all job categories are close to each other and are close to the weighted average of US\$533 per month. This could be explained by the size of the project and the technology that was used. Given that most of the works are in routine maintenance and construction and maintenance of drainage, the contractor did not see the need to hire skilled labor nor technicians. Additionally, all the engineers that worked on the project were fresh graduates, and consequently, were paid a starting monthly salary that is close to the monthly wage of the workers.

94. The characteristics of employees in terms of educational level, age, years of experience, nationality, and gender are summarized in Table 1.23. The table indicates that the employment of females exceeded 10 percent in both projects reaching 14 percent in the Manshyeh Project and 33 percent in the Balama Project. Although the majority of work days that were occupied by females is among the unskilled labor employment category, it is important to highlight that all the engineers on both projects were females. Although, fresh graduates, the

engineers received training by the ILO on labor-intensive methods along with the contractors. The ability of female engineers to track progress, process data, and provide the MoPWH and the ILO with the regular reports on employment, is perceived positively by the contractors.

95. Given that the EIIP in Jordan is designed to support Syrian refugees and Jordanians in host communities, work days on the project were split between workers of both nationalities. Unlike the general practice in the sector where the majority of the unskilled workers are Egyptian nationals, Syrian workers received 66 percent of the total work days in the Balama Project and 54 percent in the Manshyeh Project. The Syrian workers were concentrated in the unskilled labor job category. It is also worth mentioning that both projects supported the employment of persons with disability who received 2–3 percent of the total work days on both projects.

96. Employment on the project included youth, mostly employed in the unskilled labor category that requires few years of experience. Nevertheless, the contractor and the engineers of the MoPWH indicated that workers of different age groups worked on the project and the majority of the workers had 10 to 12 years of schooling. Given that the project was implemented during the summer, it also attracted students enrolled in universities and colleges who worked on the project during their summer vacation.

97. All of the workers, with the exception of the drivers, were hired on a daily basis and did not receive annual nor sick leaves. On the other hand, workers were subscribed to social security whenever the total days worked within a month exceeded 16 work days. In compliance with Jordan's Labor Law, all Syrian workers obtained short-term work permits. The ILO facilitated the process of issuing the work permits for the Syrian workers for all contractors. Additionally, all workers signed a unified contract indicating the project duration, the daily wage, and the payment schedule.

98. Occupational safety and health requirements were defined in the contract between the contractor, the MoPWH, and the ILO. The requirements include wearing reflective vests, head covers, and provision of first aid kits on site. Additionally, separate washing facilities and toilets were provided to men and women in addition to drinking water and transportation to the project site, if needed.

99. The vast majority of the workers were hired from the project vicinity, the subdistrict of Manshyeh and the subdistrict of Balama. The engineers who supervised both projects indicated high interest among the residents in the job opportunities created on the project, especially among women and youth. This interest is driven by the lack of other job opportunities in the area and the vulnerability of their households. Many of the university and college students worked for the full project duration and utilized the wages to cover some of their study expenses. Women also did not shy away from the job opportunities mainly because they were not given hard tasks and given that the contractor provided transportation and washing facilities and ensured that women worked in groups. The daily wage of US\$21 is also attractive and results in a total monthly salary of US\$525, which is perceived as significant monthly income to many households.

Table 1.23. Direct Employment of Manshyeh and Balama Projects

| Manshyeh Project | Direct Employment | | | | Characteristics of the Workers | | | | Employment Characteristics | |
|--|-------------------------|--------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|--------------------------|----------------------------|----------------------------|
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Supervision - MoPWH | Engineers | 6.4 | 160 | 1,059 | 40–45 | 100% U | 100% F | 100% J | SS, AL, SL | P |
| | Technicians | 8 | 200 | 706 | 40–50 | 100% C | 100% M | 100% J | SS, AL, SL | P |
| | Security guards-drivers | 4 | 100 | 669 | 40–50 | 100% H | 100% M | 100% J | SS, AL, SL | P |
| Construction | Engineers | 8 | 200 | 565 | 22–25 | 100% U | 100% F | 100% J | SS | P |
| | Skilled labor | 16 | 400 | 565 | 25–40 | 100% C | 100% M | 100% J | SS | D |
| | Unskilled labor | 224 | 5,551 | 530 | 18–40 | 95% H & S 5% U & C | 86% M 14% F | 46% J 54% S | SS | D |
| | Security guards-drivers | 16 | 400 | 530 | 40–50 | 100% H | 100% M | 100% J | SS | P |
| Total (construction only) | | 262 | 6,551 | 533 | | | | | | |
| Labor intensity (construction only)^h | | | | 51% | | | | | | |
| Balama Project | Direct Employment | | | | Characteristics of the Workers | | | | Employment Characteristics | |
| | Employment Category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education Level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract Type ^g |
| Supervision - MoPWH | Engineers | 6.4 | 160 | 1,059 | 40–45 | 100% U | 100% F | 100% J | SS, AL, SL | P |
| | Technicians | 8 | 200 | 706 | 40–50 | 100% C | 100% M | 100% J | SS, AL, SL | P |
| | Security guards-drivers | 4 | 100 | 669 | 40–50 | 100% H | 100% M | 100% J | SS, AL, SL | P |
| Construction | Engineers | 8 | 200 | 565 | 22–25 | 100% U | 100% F | 100% J | SS | P |
| | Skilled labor | 16 | 400 | 565 | 25–40 | 100% C | 100% M | 100% J | SS | D |
| | Unskilled labor | 285 | 7,122 | 530 | 18–40 | 95% H & S 5% U & C | 78% M 22% F | 34% J 66% S | SS | D |
| | Security guards-drivers | 16 | 400 | 530 | 40–50 | 100% H | 100% M | 100% J | SS | P |
| Total (construction only) | | 325 | 8,122 | 532 | | | | | | |
| Labor intensity (construction only)^h | | | | 50% | | | | | | |

Notes:

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = Permanent through the project duration, M = Monthly, D = Daily.

h. Total wages divided by project cost.

3.8.4 Pictures



Key Findings and Recommendations

100. Table 1.24 includes the key indicators estimated for all projects assessed in Jordan and Lebanon, in addition to the breakdown of direct employment by category.

Table 1.24 Main Findings

| | Hazmieh | Saadiyat | Nabatieh | Baalbak | Jbeil | Azraq Highway | Salt Ring Road | Manshyeh | Balama |
|-------------------------------|-----------------|--------------|--------------|-----------------|--------------|-----------------|------------------|---------------------|--------------|
| Country | Lebanon | Lebanon | Lebanon | Lebanon | Lebanon | Jordan | Jordan | Jordan | Jordan |
| Classification | Highway/primary | | | Rural/secondary | | Highway/primary | | Rural/secondary | |
| Type | Rehabilitation | | | | | | New construction | Routine maintenance | |
| Project cost (US\$, millions) | 3.1 | 14.8 | 7.5 | 0.37 | 7.3 | 148.0 | 50.7 | 0.27 | 0.35 |
| Number of km | 1.7 | 14.7 | 12 | 4.3 | 7.28 | 47.3 | 22 | 57 | 64 |
| Direct PM | 539 | 2,480 | 1,944 | 318 | 2,385 | 39,398 | 10,721 | 262 | 325 |
| Direct PD | 13,486 | 62,016 | 48,600 | 7,950 | 59,625 | 601,787 | 268,015 | 6,551 | 8,122 |
| Direct LI | 18.4% | 17.0% | 21.8% | 72.3% | 33.0% | 21.9% | 19.8% | 51.0% | 50.0% |
| Direct PM per US\$, millions | 174 | 168 | 259 | 859 | 327 | 266 | 211 | 970 | 929 |
| Project management | 2% | 2% | 2% | 11% | 3% | - | 2% | — | — |
| Engineers | 7% | 3% | 6% | 21% | 6% | 3% | 25% | 3% | 3% |
| Technicians | 10% | 6% | 11% | 11% | 5% | 8% | 22% | — | — |
| Skilled labor | 25% | 43% | 9% | 11% | 12% | 66% | 33% | 6% | 5% |
| Unskilled labor | 45% | 41% | 56% | 36% | 62% | 16% | 10% | 85% | 87% |
| Security guards | 5% | - | 4% | 11% | 6% | 4% | 4% | 6% | 5% |
| Administrative staff | 5% | 4% | 13% | - | 6% | 2% | 3% | — | — |

Note: PM = Person-month; PD = Person-day; LI = Labor intensity.

101. The following analysis aims at answering the four main questions of this study:

1. How many direct jobs are created during construction, rehabilitation, and maintenance?

Figure 1.19 Direct Labor Intensity

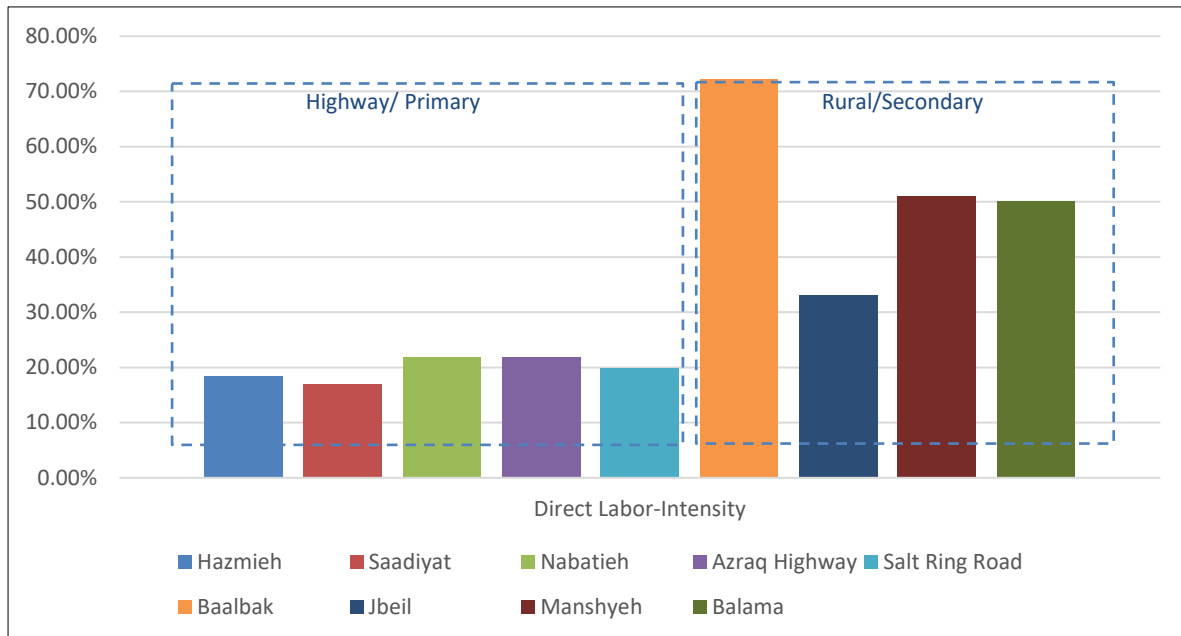
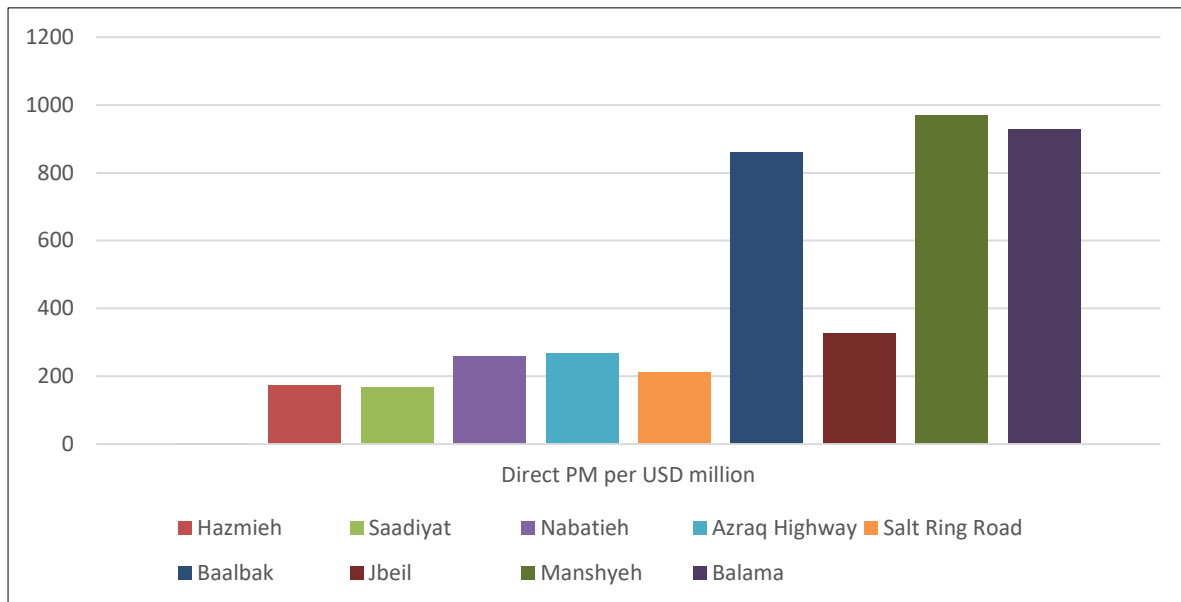


Figure 1.20 Direct Employment per US\$, Millions



102. Highway and primary road projects indicate a direct labor intensity of around 17 percent to 22 percent, which is in line with the international benchmark for job creation in road sector investments. The three projects in Lebanon (Hazmieh, Saadiyat, and Nabatieh) are road rehabilitation projects while in Jordan, one was a new construction (Salt Ring Road) and the other was a rehabilitation (Azraq Highway). The results were relatively comparable among the five projects. Labor intensity in new road construction is slightly higher than rehabilitation works given that new construction involves more civil works which are more labor intensive (retaining walls, drainage channels, road base and sub-base, utilities). Also, the Azraq Highway included the addition of nearly nine bridges which involve further civil works. It should be also pointed out that the Salt Ring Road, despite its short length, is in a very difficult terrain, which dictates the use of heavy machinery. Both Azraq and Salt Ring Road Projects are larger in size than the projects assessed in Lebanon and are complex projects including structural components such as bridges which require significant labor.

103. **Rural and secondary road projects indicate a direct labor intensity of around 33 percent to 73 percent.** The labor intensity highly depends on the type of works and type of road. The labor intensity of the Baalbak Project has an unusually high labor intensity. This could be due to the rural nature of the roads and the lack of proper documentation of labor data or because some of the labor, especially engineers and project managers may have been engaged on other parallel projects. The two projects under the EIIP, which are primarily about routine maintenance, generate similar labor intensities of around 50 percent. The project in Jbeil was a regular road rehabilitation/reconstruction project of secondary roads with labor intensity at around 33 percent. The higher labor intensity in secondary and rural works is due to the selection of smaller contractors and the use of less machinery and equipment.

104. Labor-intensive routine maintenance can create up to four times more person-months per million U.S. dollars invested than new highway construction. New road construction and road rehabilitation create around 170 to 250 person-months per million U.S. dollars invested. Secondary road rehabilitation creates more person-months per million U.S. dollars invested and can go up to 850 person-months. Routine maintenance of rural projects implemented using labor-intensive techniques can lead to a sharp increase in the labor intensity and can reach up to 1,000 person-months per million U.S. dollars. Direct employment per million U.S. dollars appears to be generally higher in Jordan, which could be explained by the lower wages paid in the country.

105. **It is clear that secondary roads and rural roads create higher labor intensities than primary roads and urban roads.** This can be due to the types of works but also due to the works methods. In primary roads, the contractor is required to complete the works as quickly as possible to open the roads to traffic, and therefore, has the incentive to use machinery and complete the works faster, while the construction of secondary and rural roads can be more flexible on time. In addition, primary roads are usually constructed by larger contractors who rely on the use of machinery more than small-to-medium size contractors who do not own as much large machinery.

2. Who gets the jobs (that is, educational requirements, gender, nationalities, and so on)?

106. Higher categories of employment require university graduates, while lower categories of employment require lower levels of education. Based on the results of the projects studied, the employed project managers and engineers are university graduates, most technicians hold community college degrees, and skilled and unskilled labor have a high school degree or 10 years of schooling with some of the skilled labor having community college degrees. The educational level of an all-road project is representative of the requirements set by the consultants and contractors.

107. Women are employed in very specific positions that represent 1 percent to 2 percent of the jobs created; this can be substantially increased in routine maintenance when some activities do not require difficult physical activity. It is evident that women are employed in the job categories of project management, engineers, and administrative staff and rarely as technicians, skilled labor, unskilled labor, or security guards. The only exceptions are the two projects implemented using labor-intensive techniques in Manshyeh and Balama, where women were employed as engineers but also as unskilled labor. These two projects were implemented by the ILO, which had the target of employing more women. In fact, women employment in these two projects accounted for 14 percent and 22 percent of total direct employment created. This is due to two factors: (a) some of the works do not require difficult physical activity such as removal, cleaning, and grubbing of bushes; and (c) ILO has exercised an important effort to attract women for these positions. It is also worth mentioning that employment of women by the construction supervisors tends to be higher than employment of women by the contractors.

108. Nationals are employed for higher category employment and non-nationals are employed mainly in the semi-skilled and unskilled categories. The direct employment is composed of some permanent jobs (project managers, engineers, and specialized technicians), and temporary jobs (other technicians, skilled labor, unskilled labor, security guards, and administrative staff). The Lebanese and Jordanian nationals are usually employed in the permanent jobs and a few in the temporary jobs such as technicians, a few skilled labor and administrative staff. The non-nationals (Syrians and Egyptians) are employed mainly in the temporary jobs. In Lebanon, and using the nationality breakdown of the Hazmieh Road Project, all of the unskilled workers were Syrian nationals. In Jordan, a large percentage of unskilled job opportunities went to Egyptian and Syrian nationals. This is due to the fact that nationals do not exercise jobs that require intensive physical activities. As for the EIIP projects, one of the requirements was to have half the labors as Syrian nationals. When looking at the breakdown of such labor, they were mostly assigned to the unskilled labor category, with lesser employees assigned to the skilled and semi-skilled labor categories. The rates that were paid to the workers also incentivized Jordanian labor to accept unskilled labor employment, which is not very common among Jordanians. If contractors are given incentives and requirements to hire Jordanians across all categories, they may tend to increase the overall benefits of positions

such as semi-skilled and unskilled labor, which could render attractive to Jordanians. The EIIP encouraged Jordanians to accept labor employment given the remuneration.

3. What kinds of jobs are created (skilled, unskilled, permanent/temporary, benefits, and so on)?

Table 1.25 Type of Jobs Created for Highways and Primary Roads

| | Hazmieh | Saadiyat | Nabatieh | Azraq Highway | Salt Ring Road |
|----------------------|---------|----------|----------|---------------|----------------|
| Country | Lebanon | | | Jordan | |
| Project management | 2 | 2 | 2 | s3 | 2% |
| Engineers | 7% | 3% | 6% | 3% | 25% |
| Technicians | 10% | 6% | 11% | 8% | 22% |
| Skilled labor | 25% | 43% | 9% | 66% | 33% |
| Unskilled labor | 45% | 41% | 56% | 16% | 10% |
| Security guards | 5% | — | 4% | 4% | 4% |
| Administrative staff | 5% | 4% | 13% | 2% | 3% |

Note: PM = Person-month; PD = Person-day; LI = Labor intensity.

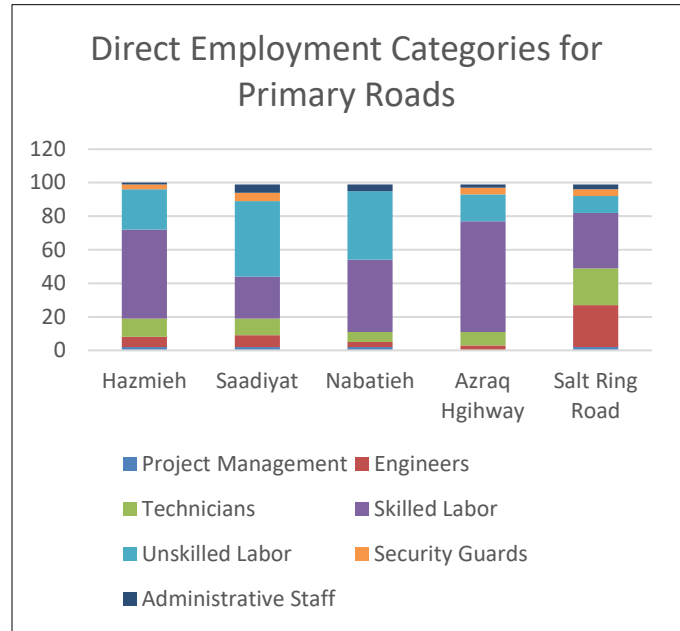
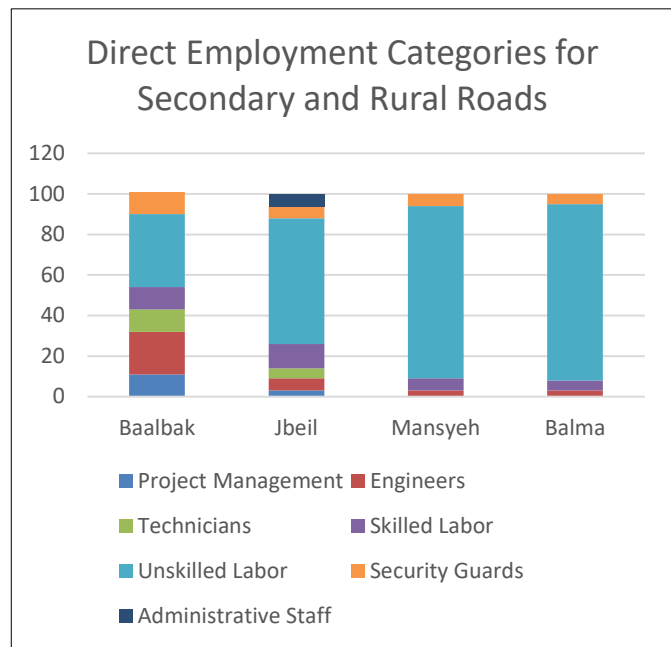


Table 1. 26. Type of Jobs Created for Secondary and Rural Roads

| | Baalbak | Jbeil | Manshyeh | Balama |
|----------------------|---------|-------|----------|--------|
| Country | Lebanon | | Jordan | |
| Project management | 11% | 3% | — | — |
| Engineers | 21% | 6% | 3% | 3% |
| Technicians | 11% | 5% | — | — |
| Skilled labor | 11% | 12% | 6% | 5% |
| Unskilled labor | 36% | 62% | 85% | 87% |
| Security guards | 11% | 6% | 6% | 5% |
| Administrative staff | — | 6% | — | — |

Note: PM = Person-month; PD = person-day; LI = Labor intensity



109. **Skilled and unskilled labor represent 75 percent to 80 percent of the jobs created.** In all projects, at the exception of the Salt Ring Road and Baalbak Projects, skilled and unskilled labor represent more than 75 percent of the jobs created. For the Salt Ring Road, it is important to note that as the project was implemented using heavy machinery, the shares of engineers and technicians are higher than regular projects. As for Baalbak Project, as mentioned earlier in this report, it is likely that some of the labor, especially engineers and project managers may have been engaged on other projects during idle times and may, therefore, be double-counted and/or posted here. The skilled labors are well-represented in highways and primary roads as these projects tend to be more complex than secondary road projects.

110. Temporary positions represent 60 percent to 80 percent of direct employment created depending on the type of project, while permanent jobs represent 20 percent to 40 percent of direct employment. The skilled and unskilled labor, security guards, and administrative staff tend to be temporary positions. Project managers, most engineers, and some of the technicians are employed as permanent employees and move from a project to another with the company. Administrative staff are also often permanent staff as they are usually based in the main office. Some very specialized engineers and/or technicians are employed on a temporary basis depending on the business needs. Most of the permanent positions are usually fulfilled by existing company employees. Meanwhile, unskilled staff are almost entirely recruited on a temporary (daily) basis. Investing in road construction and maintenance is particularly important during a downturn economy for both temporary and permanent as (a) it will employ a large number of unskilled labor reducing temporary the poor's unemployment, and (b) it will safeguard the permanent jobs of skilled employees who might find it difficult to find opportunities elsewhere during economic slowdown in the country and in the region.

111. Local residents are employed for the majority of the positions on the projects at the exception of managerial and engineering positions as well as a few highly specialized technical expertise. In Lebanon and Jordan, contractors employ Lebanese and Syrian nationals residing in the vicinity of the project as much as possible. This helps the contractor to integrate in the region and to reduce its transportation and/or housing allowance. This mainly applies to technicians, skilled and unskilled labor, as well as a few engineers. However, contractors and consultants use their in-house project managers and main engineers for quality assurance purposes and to keep their own staff busy with projects. For the highway and primary road projects in Jordan, the MoPWH had set targets for recruitment to be done from the local areas of the construction activities. This was dictated in the contract, and the interviewed contractors expressed no objections. Such targets included both labor, and fresh graduate engineers. Interviewed contractors indicated that often times, engineers that work on such specialized projects often continue with the contractor and are assigned to other projects when the original project they were recruited on finishes. The approach followed to recruit such candidates from the local communities was through close collaboration with the local governments (for example, governors, governorate councils, and other local councils) and according to interviewed contractor representatives, it seemed to work quite well. Local residents also benefit from servicing the project such as water delivery and delivery of raw materials.

112. **Wages tend to be similar in both countries and depend on the position and the complexity of the project.** When comparing the minimum and maximum wages of skilled and unskilled labor categories in both countries, wages in Lebanon are slightly higher than Jordan for most categories, reflecting the generally higher income levels and cost of living in Lebanon. Given that the minimum monthly wage in Jordan is US\$310⁴ and in Lebanon is US\$450⁵, it is clear that the wages paid for skilled and unskilled workers is above the minimum wage in both countries. The project management and engineering job categories appear to have higher wages in Jordan than Lebanon, but this might be explained by the fact that two projects assessed in Jordan (Azraq and Salt) are more complex projects with higher budgets than the projects that were assessed in Lebanon. In addition, most large engineering consulting firms in the region have their headquarters in Beirut and hence, some of their engineers might receive some form of mobility premium outside Lebanon. It is also evident that there is a large difference between the minimum and maximum wages paid for project management in specific. This difference is explained partially by the project size but also because this category includes project management staff from the project owner, which is usually a government agency, in addition to the supervision company and the contractor. Figures 1.21 through 1.23 include the minimum and maximum wages per job category in both countries.

⁴ Decision issued in 2017 specifying minimum monthly wage at JOD220. Available on <http://mol.gov.jo/Pages/viewpage.aspx?pageID=238>. Accessed on May 16, 2018.

⁵ The minimum wage in Lebanon as of 2012 is LBP 675,000. Available on <https://www.export.gov/article?id=Lebanon-Labor>. Accessed on May 16, 2018.

Figure 1.21 Minimum and Maximum Monthly Salary in USD per Job Category in Both Countries

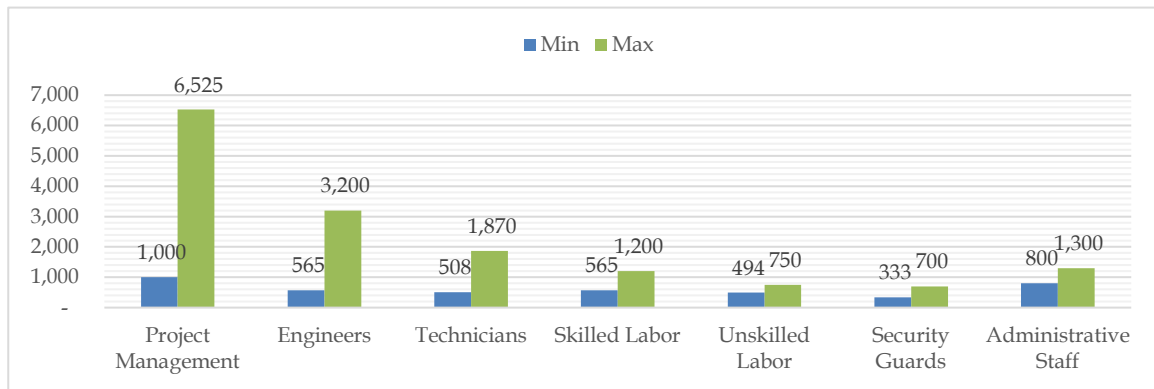


Figure 1.22 Minimum and Maximum Monthly Salary in USD per Job Category in Jordan

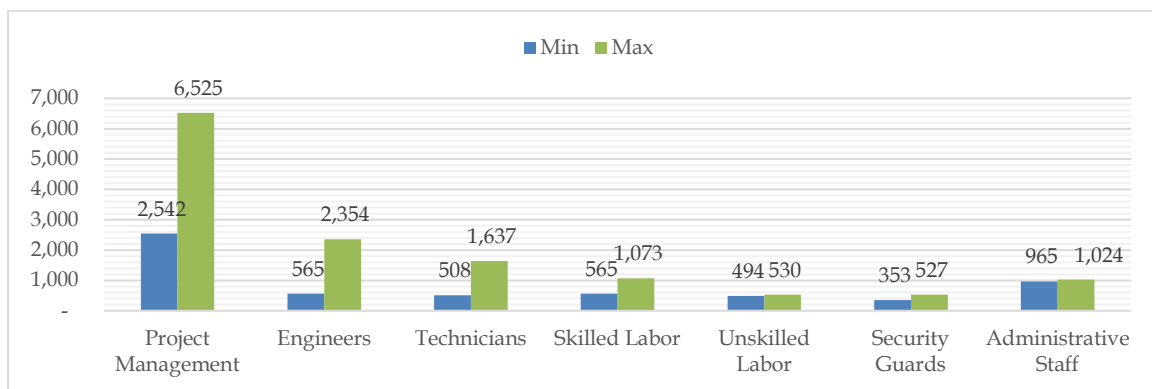
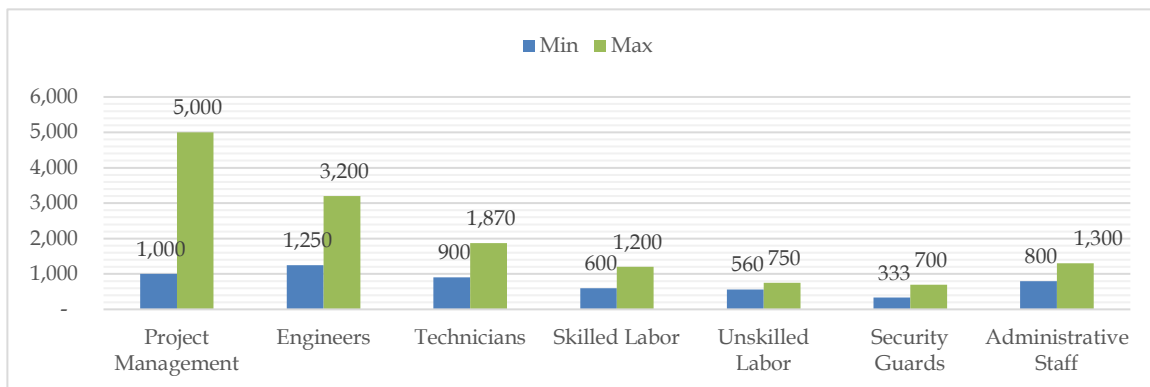


Figure 1.23 Minimum and Maximum Monthly Salary in USD per Job Category in Lebanon



113. **Higher category positions receive full benefits while lower category benefits are more limited.** In Lebanon, permanent positions receive full benefits while temporary positions only benefit from accident insurance. Project manager, engineers, technicians, and administrative staff benefit from health insurance, social security, paid annual leave, paid sick leave, and accident insurance. While skilled and unskilled labors as well as security guards only benefit from accident insurance. In Jordan, benefits seem to be provided to all the people employed on the project with some limitations of benefits for lower category positions. Also, in some cases, unskilled labor only benefits from social security such as under the ILO EIIP. The Jordanian Labor Law does not force the employer to provide health insurance, and therefore, most contractors do not provide it.

4. What can be done to increase the labor intensity in road sector investments?

114. While having very high labor-intensive projects is difficult in middle to upper middle-income countries like Lebanon and Jordan, given the existing modern construction practices and a large majority of paved roads, the labor content of construction projects could be increased if some key measures are introduced. It is therefore recommended to do the following.

Technical Considerations and Type of Work

115. **Increase routine maintenance activities to improve road quality while increasing the temporary and permanent employment benefits for nationals and non-nationals.** Routine maintenance is one of the main ways to create employment, over years, for people in the vicinity of sites. Labor-intensive routine maintenance work can create up to four times more man month per million U.S. dollars than new road construction. It is also a sound approach from an infrastructure asset management point of view. Maintenance has been long neglected and is vitally important in sustaining the flow of benefits from the asset. Building a maintenance system is a very long-term exercise. It is recommended that countries like Jordan and Lebanon give careful consideration to funding routine maintenance to preserve the value of the assets and generate opportunities for regular employment over an extended period of time. In addition, encouraging routine maintenance is a good road maintenance and asset preservation policy as it is estimated that for every US\$1 spent in routine maintenance, US\$3 to US\$4 are saved in road rehabilitation cost. There have been success stories (for example, Sao Tome e Principe Project) that could be replicated. Such experiences included targeting the following maintenance activities: (a) periodic maintenance of small drainage structures; (b) maintenance and upkeep of the stability of embankments along major highways; (c) planting native vegetation, removing invasive species, afforestation and re-forestation, building structures that reduce erosion around road project; (d) maintenance of guard rail, signage, and medians along major highways could be outsourced; and (e) outsourcing of basic periodic and preventative maintenance to sections of secondary and rural roads to small contractors, or groups of local entrepreneurs. However, this may require continued technical assistance and oversight by the national agencies over an extended period.

116. **Increasing the labor content of road projects benefit both the national and non-national labor force.** Increasing the labor content is generally at the expense of the use of more equipment. The over reliance on equipment in road construction and maintenance will reduce the overall number of jobs created and will substitute both the use of skilled national workforce (masons, welders, and so on) and unskilled non-national workforce. Increasing the labor content of projects at the expense of equipment and/or material where appropriate, especially on lower volume roads and for routine maintenance, will therefore increase the employability of both nationals and non-nationals.

117. **Increase the number of small- and medium-sized road projects as they create higher labor intensities than large-scale projects.** Throughout the world, experience has shown that labor-intensive work methods are more appropriate for improving access roads and streets rather than highways as smaller contractors require less machinery and equipment and utilize more local material for construction and maintenance. It is, therefore, recommended that clearly defined labor-intensive rural/municipal road works programs are initiated in the governorates with specific outputs for employment as well as physical works. Small-scale road rehabilitation projects include less civil works and therefore, result in higher labor intensity. In addition, lower grade smaller contractors, who usually bid for this size of projects rely more on labor as they usually do not own large fleets of equipment. Therefore, the promotion of labor-intensive techniques among such contractors should be less cumbersome.

118. **Employ local entrepreneurs for the small-scale maintenance works.** In the interim, and upon the completion of primary highways, there are project components that could be utilized for the creation of direct employment during the operation phase through the utilization of small-scale entrepreneurs from areas adjacent to the project. Those entrepreneurs could be identified and trained early on from local residents and hired during the construction/ maintenance phase. This has been effective in a number of countries where technical assistance programs were implemented to train small-scale entrepreneurs to partner with the Government in delivering public infrastructure and creating employment opportunities. For instance, the ILO's Regular Budget Supplementary Account funded a United Nations Development Programme (UNDP) activity in Sierra Leone where 20 road construction supervisors were trained and provided with access to finance to acquire equipment facilitated to enable them to partner with the local road authorities in the implementation of works using employment-intensive approaches. The effort resulted in creating over 20,000 person-days of employment.

119. **Where applicable, introduce intensive techniques in designs and tender documents.** At the design stage, design consultants should be asked to assess the impact of implementing labor-intensive techniques. There are two alternative procurement approaches to implementing employment-intensive works methods that can be adopted (a) the first method is to lay down the use of specific employment-intensive technologies and methods of construction/manufacture in the tender document; and (b) the second method is to offer tenderers the opportunity to choose the construction method and the construction materials which they wish to use to maximize the participation of labor in construction works and in so doing win bids.

120. **Support young entrepreneurs and/or small construction company owners** to (a) set up procedures for the recruitment of youth; (b) provide technical and business training for company directors, supervisors, foremen, and skilled workers; (c) work closely with municipalities to develop documentation, manuals, and procedures for implementing labor-based works for municipal road projects; and (d) design and create funds to equip trained contractors with light equipment on a revolving loan basis. Similar approaches were followed by the Moroccan National Office for Water and Electricity where after the completion of construction of new sanitation networks in a certain community, groups of labor from the local communities were given basic routine maintenance contracts for certain parts of the network. The size of the network outsourced depended on the number, capabilities, and the nature of any equipment that they possessed or were able to acquire. Another successful example of long-term employment creation through small-scale maintenance works is the Sao Tome & Principe GIME. GIMEs are rural civil society groups supervised by the Government body in charge of roads and funded directly by the state. They are composed from people living in the area of the road and are responsible for maintaining a section of road. Over 30 GIMEs provide work for 1,700 people—3 percent of the total population. The initiative has been highly successful in terms of road maintenance and rehabilitation and in generating employment opportunities for the very poor. It has also been found to be a very inexpensive way to maintain the roads. Aspects of road projects where such concepts may be applied after the completion of construction include the following:

- Periodic maintenance of small drainage structures such as culverts and drainage ditches through small outsourcing contracts to organized groups of local residents, provided they establish small businesses, and provided such groups are supported through proper capacity building.
- Maintenance and upkeep of the stability of embankments along major highways. This could be designed in such a way to impose contracts for stabilization of embankments using labor-intensive techniques (for example, gabion protection and riprapping to be done on-site rather than off-site).
- There have been success stories in many developing countries in activities such as planting native vegetation, removing invasive species, afforestation and reforestation, building structures that reduce erosion around road project that are highly labor-intensive and have the potential to create employment for the poor. The benefits of these programs accrue to poor and local communities and the income yielded by such beneficial environmental activities also eases pressures to exploit the environment.
- Maintenance of guard rail, signage, and medians along major highways could be outsourced.
- Outsourcing of basic periodic and preventative maintenance to sections of secondary and rural roads to small contractors, or groups of local entrepreneurs.

121. Initiative such as those are highly recommended, but can only be achieved through adopting a long-term horizon and giving attention to support routine maintenance for small-scale road projects. Long-term involvement is critical to building the capacity required for sustainability.

122. **Develop local guidelines and best practices for the design and the implementation of labor-based methods and technologies for employment-intensive construction works.** To allow for small-scale contractors to implement road projects through labor-intensive construction methods that are as effective as technology-based methods, it is recommended to develop local engineering guidelines for such contractors. Such practices would establish desirable and appropriate standards, processes, procedures, and methods relating to the design and implementation of labor-based construction technologies and methods for earthworks and for materials manufacture. A successful approach was followed by the Construction Industry Development Board in South Africa where technical manuals were developed to provide small-scale contractors and designers with technical guidance on the construction and upgrading of roads using labor-intensive methods. This would also require training of SME contractors and designers on the use of such methods. ILO is developing guidelines and SOP's in both Jordan and Lebanon for implementation of employment intensive infrastructure projects.

Training and Capacity Building

123. **The introduction of labor-intensive techniques should be coupled with the implementation of a proper training program for workers to strengthen their skills or acquire new skills.** The South African experience has shown that a properly established training program is an absolutely essential component of any successful labor-intensive construction initiatives, particularly in the face of the strength of the existing equipment-based sociotechnical system. This can be implemented through joint programs with

contractors to ensure that trainees are acquiring the skills that are actually needed in the field. Training has to be coupled with a proper certification program, where an unskilled or a skilled labor has to acquire certain preset measurable skills to excel in his or her career. There have been success stories in Jordan for certifying water operators and the program could be easily replicated for the construction sector. It is also advisable that training programs diversify the skills among workers. This helps increase their employment potential. For instance, an asphalt mixing labor who also has training in curb laying, or formwork assembly can secure more stable employment on construction projects. Therefore, training programs should aim to increase the number of skills of trainees. In Jordan, more structured training and vocational training is needed to encourage Jordanians to acquire construction-related skills and become able to claim a bigger portion of the skilled labor category in construction projects because it is the biggest category. When certain new technologies or equipment are used in a certain project, this helps create a group of Jordanians with unique skills in the region. Therefore, the contractors involved in such projects shall capitalize on this gained experience to enhance the chances of their companies and their employees in gaining more work in the region. This will help create both corporate and individual employment opportunities.

124. **Incorporate capacity building and apprenticeship of labor in large-scale projects.** This could be coordinated with national bodies providing technical and vocational education. This not only helps increase the labor intensity during construction, but also helps equip a generation of local skilled labor that could escalate in their career paths in the construction sector. This could target key professions such as carpentry, blacksmiths, surveying, laboratory technicians, and others.

125. **Work closely with Workers and Employers Organizations and associations of contractors and of workers to build capacity and disseminate new practices.** For instance, provide support to the Jordan General Federation of Trade Unions, under which construction workers would fall and which currently suffers from low membership as they could become more effective in strengthening skills and rights. They could also play a vital role in securing work permits for non-Jordanian workers. Similarly, it is important to work in Lebanon with trade unions and the association of contractors to discuss and mainstream new construction and maintenance methods.

126. **Ensure a continuous dialogue with employers and employers organizations to develop curricula that address the business needs.** Technical schools and universities often have curricula that are repeated year after year and are adapted every few years based on technological advancement and technical updates. However, it is rare to see curricula adapted based on the business needs, and especially for public universities and technical schools. The adaptation of such curricula will increase the employability of youth who would have already acquired the skills identified by the employers. This can also be reinforced by the development of mentoring programs between employers and students.

127. **Enhance youth employment through internship program.** Core skills are essential for employability, and these core skills are mostly acquired on the job. However, employers are not taking recruits without any core skills, and therefore, getting the first job is becoming very difficult. Thus, internships have become an important part of the transition from education to employment. This has demonstrated a very effective way of serving a bridge between education and paid work from conceptual knowledge to acquiring core skills through practice on the job. This can also be reinforced through the development of work study programs, which benefits both employers and students.

Policies and Planning

128. **Establish policies and/or procedures to encourage the use of labor-intensive methods especially for rural roads.** This can be developed in consultations between the technical ministries and the Ministries of Labor, Employer Organizations, and Workers Organizations. Relevant ministries in Jordan and Lebanon should encourage training on new methods and apprenticeship opportunities into project designs and procurement processes. This could be incentivized by giving bidders that provide for such items some sort of extra points in their technical evaluations on bids. This also requires the development of monitoring systems to ensure that contractors offering such opportunities are indeed complying with them and are rectified in case of non-commitment. Such initiatives would require the involvement of trade unions and other workers organizations. This can be particularly relevant for rural roads given that technological requirements are less and timeliness is less economically significant. ILO is developing and introducing guidelines and operational procedures for employment intensive infrastructure works for relevant line ministries in Jordan and Lebanon. Experience in Nicaragua has shown that for rural road rehabilitation, using labor-based methods instead of machine-based methods generated 17 times more employment, with an average of 30 percent of this employment being for women.

129. **Introduce a standardized data collection system on employment creation in road projects, which could be piloted in Jordan and Lebanon.** It is therefore recommended that contractors adopt a documentation system for each project that collects all relevant information related to labor issues including those requested for this study. This includes information such as the number and type of employees for each project, number of working days, wages and benefits, type of contract, and other information pertaining to labor issues and compensation. A proper monitoring and system needs to be in place to ensure that this data is accurate and timely.

130. **Encourage partnerships between Lebanon, Jordan, and agencies involved in labor-intensive infrastructure approaches.** These agencies have thorough experiences in implementing labor-intensive technique in projects around the world and can provide advice on the best practices and the most effective techniques based on each country's context. Strategic and structured partnerships can be done between road development entities, local municipalities, and agencies involved in labor-intensive infrastructure such as the ILO-EIIP either directly through local budgets or as part of larger operations funded by donors.

131. **Adapting the working conditions and communicating on gender stereotyping can enhance the employment of women.** Women's participation in the transport sector is low, and in the construction of roads, even lower due to two main reasons—work conditions and gender stereotyping. According to the ILO study on Promoting the Employment of Women in the Transport Sector, the work conditions that highly impact women are the working time, shift working, and distance from home. Adapting the working hours for women will enhance the attractiveness of jobs. In addition, women often cannot work in shifts especially afternoons and nights as they need to be present with their families. The development of policies to motivate the employment of women by addressing their key concerns can have an important impact on increasing their participation. In addition, enhancing the work condition should be coupled with a communication campaign targeting both the employers, and the employees to address gender stereotyping and showcase the importance of having women at the workplace. ILO has developed and is implementing such strategies in order to increase women's participation in the EIIP projects in Jordan and Lebanon.

132. **Promoting Decent Work principles.** Decent work principles include opportunities for work that are productive, equality of opportunity and treatment for all women and men, fair wage payment procedures and sufficient Occupational Safety and Health (OSH) measures amongst other. All actors involved in the implementation of construction projects in general and employment intensive projects in particular have a responsibility ensure compliance with the national labour law, core international labour standards and decent work principles.

ANNEX 2: MOCK PROJECT - LEBANON

133. For this project, the CDR prepared a BoQ for a project that resembles road projects that they believe will be the core of the World Bank road rehabilitation program. The mock BoQ developed was for a 15-kilometer road rehabilitation project with a width of 6 to 10 meters. Key components of the project were as follows:

- (a) General requirements
- (b) Earthworks
- (c) Sub-base and base course
- (d) Bituminous construction
- (e) Concrete, steel, and structures
- (f) Incidental construction
- (g) Streetlighting and electrical installation

Direct Employment for Mock Project

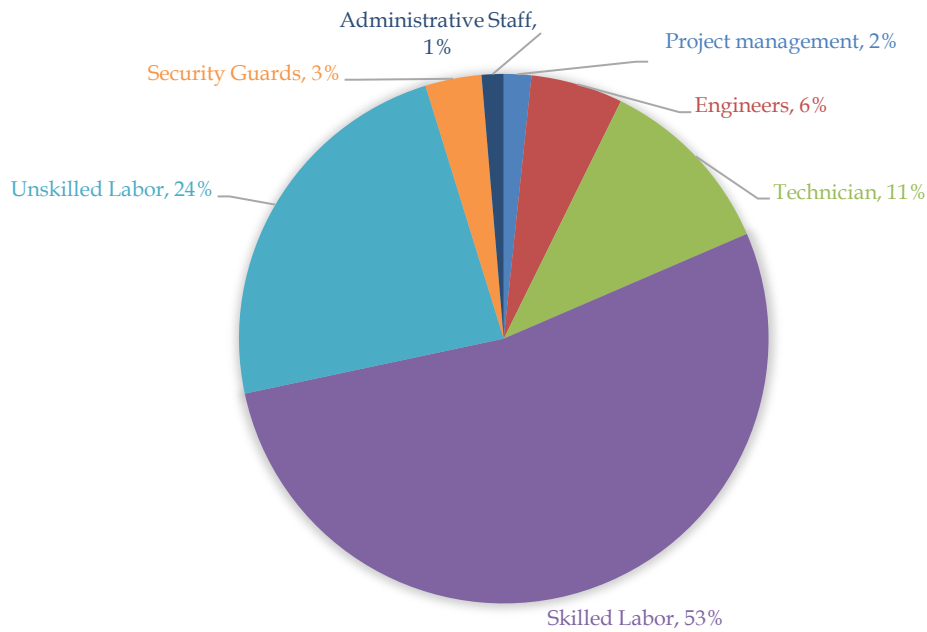
134. The study team received detailed bids from two contractors in response to the mock BoQ that was prepared by CDR. The BoQ was prepared to be inclusive of all construction components and aspects that would be typical of projects to be funded under the upcoming World Bank program. Based on the two quotations, and the corresponding labor details provided by the contractors, the study team was able to estimate the projected direct labor during the constructing period of the project.

135. The total resulting direct employment from the mock project was nearly 1,195 person-months. The figure includes engineering supervision and project management. Based on the figures provided by the contractors, the overall labor cost was nearly US\$1.6 million, with an average construction cost of nearly US\$7.1 million, resulting in a labor intensity of around 22 percent, as summarized in Table 2.1. It is typical of such projects that the majority of direct employment is generated by the construction activities, while project management and supervision accounted for 4 percent of the total direct employment generated. The construction of 1 kilometer would require 1,992 person-days, and a US\$10 million investment at this rate would produce 42,077 person-days.

136. It should be mentioned that when the CDR prepared the BoQ, the estimated project cost was US\$10 million. However, the mock cost breakdowns received from two Lebanese contractors had an average total cost of US\$7.1 million. Therefore, and for the purposes of calculating labor intensities, the estimated project costs provided by the contractors were used.

137. The overall wage bill was divided between two groups of job categories. The first was the skilled labor, operators, unskilled labor, and security guards with total wages of US\$1.03 million. The second was a group of job categories including project management, engineers, technicians, and administrative staff (both from the contractor, the project owner, and the construction supervisor) with total wages of US\$618,844. The weighted average of salaries for the first category was US\$2,589, while the corresponding weighted average salary for the second group was US\$1,028 (that is, nearly 40 percent of the first category).

138. The analysis of direct employment by job category was further aggregated into the eight key employment categories, including project management at CDR, supervision, and construction. The analysis indicates that the biggest single category of employment is skilled labor, which accounts for nearly 40 percent of the direct employment created by the project. This is followed by unskilled labor and operators at 24 percent and 15 percent, respectively. Consequently, nearly 62 percent of the total person-days created directly by the project were for skilled and unskilled labor.

Figure 2.1. Aggregate Direct Employment by Category, Mock Project

139. The table indicates that employment of females is limited in all employment categories, with the exception of administrative work. In fact, the operators and unskilled labor categories that accounted for over 60 percent of the total direct employment, as seen earlier, were dominated by male workers. Youth, represented by the age group between 16 and 29 years, are mostly employed in the operators and unskilled labor categories, which require few years of experience, in addition to some administrative positions. In terms of educational backgrounds, all project management and engineering staff are university degree holders. On the other hand, the majority of the employees in the skilled labor job categories completed 10 to 12 years of schooling while all of those in the unskilled labor job categories had less than 10 years of schooling.

140. Most of the job categories are dominated by Lebanese nationals with the exception of skilled labor and unskilled labor. According to the contractors, the majority of, if not all, the unskilled labor job opportunities are assigned to foreign workers, dominated mostly by Syrian nationals.

141. Employment characteristics vary between the different job categories as indicated in Table 2.1. With the exception of the skilled and unskilled who are hired on daily basis, workers are hired permanently for the project duration. Unlike workers who are hired on daily basis, permanent workers benefit from social security in addition to paid annual and sick leave. Additionally, workers with an engineering degree benefit from health insurance through their syndicate. Nevertheless, accident insurance to all workers and third-party persons present on the project site is covered through a mandatory insurance policy that is part of the standard contracts issued by CDR.

142. Although contractors advertise all permanent project jobs, most senior jobs such as project managers, engineers, and key technicians are usually occupied by the contractor's permanent staff who are continuously reallocated from one project to another. Both contractors that participated in the mock project indicated that they preferred to hire from the project locality.

Table 2.1 Direct Employment of the Mock Project

| | Direct employment | | | | Characteristics of the workers | | | Employment characteristics | | |
|---------------------|----------------------|------------------------------------|-------------------------|--------------------------------|--------------------------------|------------------------------|---------------------|----------------------------|-----------------------|----------------------------|
| | Employment category | Person-month | Person-day ^a | Wage (US\$/month) ^b | Age | Education level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract type ^g |
| Supervision | Project Management | 8 | 200 | 4,000 | 50–60 | 100% U | M | L | AI, SS, AL, SL | P |
| | Engineers | 16 | 400 | 3,209 | 30–40 | 100% U | M and F | L | AI, SS, AL, SL | P |
| | Technicians | 20 | 500 | 1,150 | 25–35 | C-S | M | L | AI, SS, AL, SL | P |
| Construction | Project Manager | 12 | 300 | 7,100 | 50–60 | 100% U | M | L | AI, SS, AL, SL | P |
| | Engineers | 51 | 1,275 | 3,800 | 30–40 | 100% U | M and F | L | AI, SS, AL, SL | P |
| | Technician | 114 | 2,850 | 1,750 | 25–35 | C and S | M | L | AI, SS, AL, SL | D |
| | Skilled Labor | 450 | 11,250 | 1,250 | 30–40 | 64% S, 36% D | M | O | AI | P |
| | Operators | 184 | 4,600 | 1,250 | 25–45 | C and S | M | L | AI | D |
| | Unskilled Labor | 281 | 7,025 | 575 | 20–30 | 100% D | M | O | AI | P |
| | Security Guards | 41 | 1,025 | 700 | 20–30 | 100% D | M | L | AI, SS, AL, SL | P |
| | Administrative Staff | 16 | 400 | 1,625 | 20–30 | C, S, and U | Mostly F | L | AI, SS, AL, SL | P |
| Total | | 1,195 | 29,875 | 1,336 | | | | | | |
| | | Labor intensity^h | 22.12% | | | | | | | |

Note:

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social Security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category P = permanent through the project duration, M = Monthly, D = daily.

h. Total wages divided by project cost.

Indirect Employment for Mock Project

143. Based on the BoQ that was developed for the mock project exercise, the original study team identified the key components in the BoQ that accounted for most of the costs of supplied materials. This was based on a detailed review of the BoQ and a detailed review of the mock quotations that were presented by the two Lebanese contractors.

144. Then, and also based on discussions with the contractors, the study team identified a number of suppliers for the various materials being sampled and held structured interviews with the managements of those suppliers, also using a predesigned interview guide.

145. The interviews helped extract information from the suppliers on the quantities, and types, of labor associated with unit quantities and/or unit costs of materials supplied. Those included, for example, numbers, categories, and durations of labor to deliver a ton of steel or a certain amount of money's worth of fuel and so on.

146. Using those rates, the study team triangulated and estimated the indirect labor generated from the mock project being evaluated.

Table 2.2. Main Supplies Mock Project

| Breakdown of main supplies | | | |
|-----------------------------------|-------------|------------------------|--------------------------------------|
| Description | Unit | Number of units | Total cost^b (US\$) |
| Aggregate | Cu.M | 22,000 | 671,703 |
| Steel | Ton | n.a. | 543,878 |
| Bitumen | Ton | n.a. | 321,671 |
| Concrete | Ton | 1,584 | 335,616 |
| Total | | | 1,872,868 |

Note:

a. Weighted average or range.

b. Based on BoQ if available.

147. After analyzing the given data for the 'mock project', it was found that the labor intensity of construction based on the wage bill of direct employment is higher than the labor intensity based on the wage bill of indirect employment, where it was 23.2 percent for direct and 11.4 percent for indirect relevant to the project cost. Combining the wage bills of direct and indirect employment and dividing that by the total project cost, the labor intensity of the project including direct and indirect employment could be estimated. The overall labor intensity including direct and indirect employment was estimated to be 34.6 percent for the mock project.

148. Usually, projects that have high traditional construction content have the largest employment effects, due to having high employment multipliers that often generate many more indirect and induced jobs than direct jobs. Referring to this, the highest degree of labor intensity is for steel and formwork, where the lowest is for cement, tires, fuel, and aggregate.

149. For example, and as mentioned before, the process of supplying the steel mainly entails handling and transport of steel bars; the labor involvement starts at the port of unloading; then transport into warehouse; handling (bundling, tying, and so on); and finally, delivery to the construction site. Meanwhile, the labor intensity in the cement production is among the lowest of the key materials found in the BoQ, being a process that involved mass production using large-scale continuous process technology and automated machinery; thus, a limited amount of skilled labor is required to achieve this job.

150. Therefore, the degree of labor intensity varies among the suppliers of the same project, according to employment categories, project time, skill degree, and the level of automation.

Table 2.3 Indirect Employment of Mock Project

| Material | Indirect employment | | | | Characteristics of the workers | | | Employment characteristics | | |
|--|------------------------------------|--------------|-------------------------|------------------------------|--------------------------------|------------------------------|---------------------|----------------------------|-----------------------|----------------------------|
| | Employment category | Person-month | Person-day ^a | Wage US\$/month ^b | Age | Education level ^c | Gender ^d | Nationality ^e | Benefits ^f | Contract type ^g |
| Aggregate | White Collar | 6.8 | 171 | 1,250–7,000 | 20–60 | U | 40% F, 60% M | L | Full | P |
| | Blue Collar | 93.4 | 2,334 | 750–1,750 | 20–45 | S-D | M | 85% O | Full | P |
| | Total | 100.2 | 2,505 | 750–7,000 | | | | | | |
| | Labor Intensity^h | 22% | | | | | | | | |
| Steel | White Collar | 10.6 | 234 | 1,500–4,500 | 30–50 | U | M-F | L | Full | P |
| | Blue Collar | 53.3 | 1,171 | 850–1,000 | 30–60 | S-D | M | 87% O | Full | P |
| | Drivers | 35.5 | 780 | 850–1,000 | 30–60 | S | M | L | Full | P |
| | Mechanics | 106.4 | 2,341 | 850–1,000 | 30–60 | S | M | L | Full | P |
| | Total | 205.8 | 4,526 | 850–4,500 | | | | | | |
| Labor Intensity^h | 39% | | | | | | | | | |
| Bitumen | Management | 4.8 | 106 | — | — | U | M | L | Full | P |
| | Technical | 19.2 | 422 | 1,500–3,500 | — | C-U | 30% F, 70% M | L | Full | P |
| | Blue Collar | 65.3 | 1,436 | 1,300 | — | S-D | M | L | Full | P |
| | Total | 89.3 | 1,964 | 1,300–3,500 | | | | | | |
| Labor Intensity^h | 37% | | | | | | | | | |
| Concrete | Management | 0.005 | 1 | 1,500–3,500 | 40–60 | U | 20% F, 80% M | L | Full | P |
| | White Collar | 0.003 | 8 | 1,500–3,500 | 40–60 | U | 50% F, 50% M | L | Full | P |
| | Blue Collar | 0.266 | 70 | 475–2,000 | 40–60 | S-D | 5% F, 95% M | L | Full | P |
| | Total | 0.3 | 79 | 475–3,500 | | | | | | |
| | Labor Intensity^h | 1.49% | | | | | | | | |
| Direct and Indirect Labor Intensityⁱ | 34.6% | | | | | | | | | |

Notes: NA = Not applicable.

a. Person-month equals 25 person-days.

b. Weighted average of wages of each employment category.

c. Percentage of each of the following categories within each employment category: U = University degree, C = Community college degree, H = High school degree, S = 10–12 years of schooling, D = less than 10 years of schooling.

d. Percentage of males (M) and females (F) in each employment category.

e. Percentage of each nationality within each employment category where J = Jordanian, S = Syrian, Eg = Egyptian, P = Palestinian.

f. Benefits assessed including HI = Health insurance, SS = Social Security, AL = Paid annual leave, SL = Paid sick leave, AI = Accident insurance.

g. Percentage of each contract within each employment category: P = permanent through the project duration, M = Monthly, D = daily.

h. Total wages divided by project cost.

i. Project labor intensity including direct and indirect employment