

Employment Intensive and Infrastructure Programme in Lebanon (EIIP)



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Assessing the Employment Effects

January 2019



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Abbreviations

BoQ	Bills of Quantities
CBO	Community Based Organization
EmplA	Employment Impact Assessment
FTE	Full Time Equivalent
HDPE	High-density polyethylene
ILO	International Labour Organization
KII	Key Informant Interviews
km	Kilometre
LBP	Lebanese Pound
LHSP	UNDP's Lebanon's Host Communities Support Programme
LI	Labour Intensity
LM	Linear Meter
LRBT	Local Resource-Based Technology
OSH	Occupational Safety and Health
PD	Person-Day
PM	Person-Month
SAM	Social Accounting Matrix
UNDP	United Nations Development Programme
USD	United States Dollar

1. Study background

Employment Intensive Infrastructure Programme in Lebanon (EIIP) was designed to create decent short to medium-term work opportunities for displaced Syrians and members of host communities in Lebanon through infrastructure improvement. The programme utilized Local Resource-Based Technology (LRBT) including labour-intensive approaches to rehabilitate and improve rural roads, drainage and irrigation canals, water catchment cisterns, etc. EIIP is implemented by the ILO in partnership with the Ministry of Social Affairs, the ministry of Labour and UNDP. Funding for the programme is provided by the Federal Republic of Germany through KfW.

Infrastructure measures were complemented by building the capacity of local contractors and public institutions in using LRBT for infrastructure development. Between October 2017 and December 2018, EIIP Lebanon, implemented 10 infrastructure projects with a total value of USD 6,445,000.

The main purpose of this study is to assess the employment impact of four projects implemented under EIIP Lebanon to answer the following questions:

How many jobs are created during the construction by the contractors? This includes defining the number of jobs (in person-month¹) created during the construction and the number of people who actually worked on the project.

Who gets the jobs? This includes defining the characteristics of the workers receiving employment such as age, sex and level of education.

What kinds of jobs are created? This includes defining the characteristics of employment such as wage levels, benefits and duration.

¹ Whilst the definition of a Job for EIIP Lebanon is counted for people working 40 days or more, the terminology of person-month is used in this study are captured in Full Time Equivalent (FTE) expressed as person-month, person-day or person-year to compare with similar studies done previously in Lebanon and in other countries

2. Study approach

As indicated in the background section, the main purpose of this study is to assess the employment impact of constructing public infrastructure in Lebanon using a case study approach to answer four main questions as indicated below.

How many jobs are created during the construction by the contractors? This includes defining the number of jobs (in person-month) created during the construction and the number of people who actually worked on the project.

Who gets the jobs? This includes defining the characteristics of the workers receiving employment such as age, sex and level of education.

What kinds of jobs are created? This includes defining the characteristics of employment such as wage levels, benefits and duration.

There are three types of employment effects that are usually captured in employment impact assessment studies. The first is **direct employment**, which refers to the employment generated during the construction stage by the construction contractor, subcontractor(s), construction supervisor and project manager.

The second is **indirect employment** which refers to the employment generated at the suppliers that provided materials and services to the construction project.

The third is **induced employment**, which refers to the employment generated elsewhere in the economy as a result of consumption of those who worked on the project directly or indirectly. Induced employment is usually estimated through a simulation exercise using Input-Output tables and Social Accounting Matrix (SAM), which is beyond the scope of this assignment.

All three types of employment are captured in Full Time Equivalent (FTE) expressed as person-month, person-day or person-year. For direct employment, other indicators could be estimated including Labour Intensity (LI) and employment per million USD of investment. Direct LI refers to the LI of construction, and is calculated by dividing the labour wage bill by the total construction cost. While employment per million USD is calculated by dividing direct employment in FTE by the total construction cost in USD million. Indirect LI refers to the LI in the local supplies provided to the construction project and is calculated by dividing the labour wage bill in the supplies by the total cost of the supplies.

This report includes detailed findings on direct employment and indirect employment. Indirect labour intensity were considered for major items including cement, steel, aggregate, bitumen, equipment rental, HDPE pipes in addition to trees and shrubs. However given the multiple types of supplies used in the projects, it was not possible to estimate indirect employment for each supply.

This research used a case study approach to assess direct employment impact. It used multiple sources to capture data and estimate direct employment created accordingly. The approach was implemented in the following four stages.

1. **Defining the projects.** At this stage, the researcher worked with the management team of EIIP Lebanon to define the projects that were assessed. Five projects were selected in different areas of Lebanon and across several infrastructure subsectors. Once data was collected and analysed, one of the projects was dropped because of data limitations. This particular project used a vast number of local supplies to which employment intensity was not available.

2. **Developing the data collection tools.** The researcher developed semi-structured interview guides which was used during the meetings with the contractor, sub-contractor(s) and supplier(s). The data collection tool also included tables to capture detailed data on direct employment, in addition to supplies and materials used during the construction.
3. **Data collection through interviews and document review.** The researcher conducted Key Informant Interviews (KII) with the contractors implementing the projects. The interviews were used to collect qualitative and quantitative data and were also used to explain the detailed tables related to employment and materials/supplies to the interviewees. The interviewees then worked on completing the tables and returning them to the research team. Unfortunately, the vast majority of the suppliers who were contacted during the field visit including steel, concrete, cement tiles and products, and crushers were not cooperative.

EIIP Lebanon management team also provided the researcher with project documents such as Bills of Quantities (BoQ) and project reports, in addition to detailed data on employment generated during the construction. BoQ were used to understand the scope of each project and to define the construction cost. Materials and supplies used during construction were collected during KII with the contractors.

Employment at the suppliers was based on estimations available in a previous study supported by data collected during this study for supplying of shrubs and trees and HDPE pipes.

4. **Data analysis and report writing.** Qualitative and quantitative data collected was then analysed using spreadsheets (MS Excel) by the researcher and presented in this report to answer the three main questions indicated above in relation to direct and indirect employment.

3. Findings

3.1 Construction of agricultural roads in Tal Abbas

Description

The project is located in Tal Abbas municipality in Akkar and consists of construction of 5 km of agricultural roads and drainage structures. The road works include site clearing and removal of top soil, excavation and repair of side drain, transport, filling and level road sub-base by soil and transport, filling and level road base and surface by gravel. Road drainage structures include excavation for foundation of road concrete side drain and culverts, construction of reinforced concrete side drain along/on the road, and installing concrete pipes culverts and construction of concrete head walls and wing walls.

The construction of agricultural roads in Tal Abbas started in January 2018 and was completed and handed to the Municipality in August 2018. The total contract value is USD 551,153 as indicated in Table 1 below, that also summarizes the project’s Bills of Quantities (BoQ).

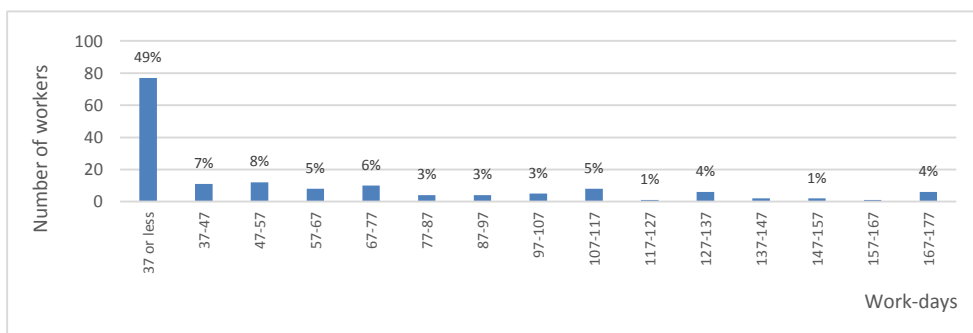
Table 1: Cost breakdown of construction of agricultural roads in Tal Abbas based on BoQ

Item description	Value (USD)
General items including mobilization, insurance, OSH, material testing, site survey, work permits	16,900
Site clearance works	11,276
Earth works	130,735
Road pavement and surface	169,042
Structure, drainage and retaining wall	164,982
Furniture works (signboards)	3,600
Total	498,535
Total (including VAT)	551,153

Direct Employment

About half of the workers (77 workers) worked for less than 37 days, while fewer than 30 workers worked for more than 100 days as indicated in Figure 1 below. The few workers who worked for more than 150 days over the project duration were the project manager, the accountant, a surveyor, a truck driver and three daily workers.

Figure 1: Construction of agriculture roads in Tal Abbas, breakdown of workers by number of days worked over the project duration



Utilizing the employment data provided by EIPP Lebanon and the interview conducted with the contractor, the construction of agricultural roads in Tal Abbas resulted in creation of 8,525 person-days split between 157 workers and reflecting a labour intensity of 36.1% as indicated in Table 2 below.

The estimated average of daily wages is USD 23, which is slightly higher than the minimum daily wage paid by EIPP Lebanon to unskilled workers given that the estimated average include wages paid to project management and engineers, administrative staff in addition to subcontractors providing topography and site survey services. Skilled labour employment category included drivers of heavy earth moving equipment, which were used to a limited extent on the project, in addition to drivers of trucks that transported the main supplies from the suppliers/resellers warehouses to the construction site. Additionally, the contractor classified supervisors as skilled workers given that they were supervising unskilled and semi-skilled workers to ensure the quality of the tasks they perform.

Table 2: Direct employment of construction of agricultural roads in Tal Abbas municipality

	Direct employment						Characteristics of the workers				Employment characteristics	
	Employment category	Person-day	Person-month ¹	Number of workers	Wage ² (USD/day)	Total wages (USD)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Construction of agricultural roads in Tal Abbas	Project managers and engineers	800	32.0	9	36	28,428	25-40	20% F, 80% M	V, U	100% L	SS, PA, PS, HI, TA, RI	P
	Technicians	24	1.0	3	80	1,920	45	100% M	V, U	100% L	PA, PS, TA, RI	P
	Skilled labour	1,532	61.3	26	27	41,179	30-50	10% F, 90% M	B	40% L, 60% S	RI	T, C
	Semi-skilled labour	1,739	69.5	36	20	34,770	25-30	10% F, 90% M	B	40% L, 60% S	RI	T, C
	Unskilled labour	3,734	149.4	74	20	74,680	22-30	10% F, 90% M	B	40% L, 60% S	RI	T, C
	Administrative staff	697	27.9	9	26	17,892	22-35	30% F, 70% M	V, U	100% L	PA, PS, RI	P
	Total	8,525	341.0	157	23	198,869					Labour intensity⁸	36.1%
<p>1: Person-month equals 25 person-day. 2: Weighted average of wages of each employment category. The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Bacca-laureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, S: Syrian.</p>							<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by project cost.</p>					

The largest share of direct employment, in person-days, went to skilled, semi-skilled and unskilled labour who jointly made up 82.2% of the workdays created by the project as indicated in Figure 2 below. The average daily wage for skilled labour was USD27 and that of unskilled and semi-skilled labour was USD20. The daily wage paid for unskilled and semi-skilled workers is equivalent to the daily wage paid for men by the agricultural sector in the project vicinity. In fact, the project provided work opportunities to Lebanese and Syrian workers who usually work as casual workers in agriculture. Given that the project was implemented during the low season of agricultural production, it provided the workers with opportunities to generate income during that period. It also offered a fair wage for female workers who usually get one third of what their male counterparts when working in agriculture². When considering the breakdown of total wages paid by the project, about three quarters (75.7%) of the total wages were paid to labourers as indicated in Figure 3 below.

Figure 2: Breakdown of direct employment (person-day) by category for construction of agricultural roads in Tal Abbas municipality

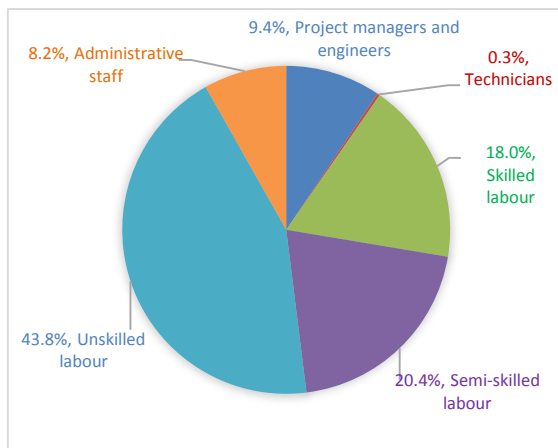
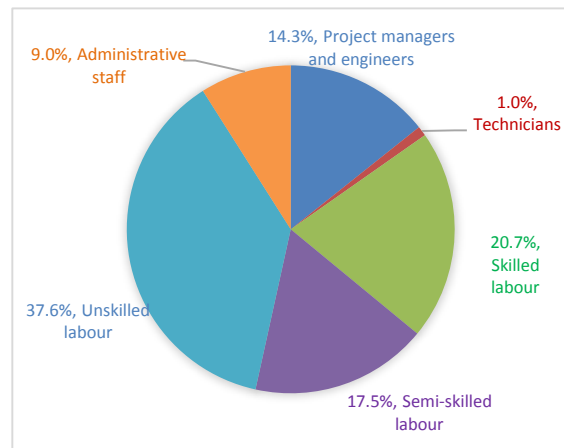


Figure 3: Breakdown of direct employment (wages) by category for construction of agricultural roads in Tal Abbas municipality



A large share of employment went to workers aged between 22 and 30 years who have 10 or less years of education. Engineers, project managers, administrative staff and technicians aged between 22 and 40 years are either university or college graduates.

Engineers and project managers received better benefits than the remaining employment categories including social security, transportation benefits and health insurance. Skilled, semi-skilled and unskilled labour benefited from an all-risk insurance policy provided by the contractor for the construction site. In addition to the 'all risk insurance' covering risks on the construction site, the construction contract included special provisions on occupational safety and health. EIIP Lebanon staff observations indicates good compliance with wearing of self-protective equipment. The contractor also provided transportation to the workers, from main points in their villages to the construction site, on daily basis.

Women, based on the employment data provided by EIIP Lebanon project team, occupied about 10% of the total direct employment, in person-days, generated during the construction. The share of women in each employment category ranged between none among technicians to 30% among administrative staff as indicated by the contractor (Table 2). The contractor indicated that paying men and women equally, unlike the prevailing practise of paying women one third of men when working in the agricultural sector in the project vicinity, was attractive to women. Nevertheless, women had

² Source: interview with contractor.

to overcome cultural barriers to work in the construction sector since the local communities are used to women working in agriculture but not in construction.

Indirect Employment

Given that the contractor was unable to provide sufficient data on the supplies used during construction, EIIP Lebanon project team estimated the main supplies used during construction as indicated in Table 3 below. Gravel makes up the largest share of supplies used during construction, and is produced locally. The contractor used its own vehicles to transport the gravel to the project location from a nearby crusher.

Table 3: Main supplies of construction of agricultural roads in Tal Abbas

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	Source
Cement	Tonne	221	100	221,075	Domestic
Sand and gravel	m ³	9,388	23.7	222,500	Domestic
Steel	Tonne	53	500	26,660	Domestic
Formwork wood	m ²	1,864	10	18,640	Domestic
Fuel	All	1	25,000	25,000	Imported
				Total	314,908
				Value of domestic supplies	289,908
				Domestic supplies as share of total	92.1%

In order to estimate indirect employment, gravel and sand were grouped into one category given similar labour intensity for both. Labour intensity of cement, steel, aggregate, bitumen and equipment rental were based on previous EmPIA study conducted by the ILO in 2016 (Assessing Employment Impacts of Roads Sector Investments in Lebanon). The LI and breakdown of employment categories by wage based on the same study is included in Annex 1. Wages, employment characteristics and characteristics of employees are the same for each type of supply and are also included in Annex 1.

Table 4: Indirect labour intensity of construction of agricultural roads in Tal-Abbas

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	LI	Wages in supply (USD)
Cement	Tonne	221	100	221,075	1.49%	3,315
Aggregate	m ³	9,388	23.7	222,500	22.00%	9,724
Steel	Tonne	53	500	26,660	39.00%	8,622
				Total		21,661
Indirect labour intensity (total wages in supplies/total cost of supplies)						%6.9
Wages of direct employment (USD)						198,869
Wages of direct and indirect employment (USD)						220,530
Construction contract value (USD)						551,153
Direct labour intensity (direct wages/contract value)						36.1%
Direct and indirect labour intensity (total direct and indirect wages/construction contract value)						40.0%

The labour intensity of the supplies used in the construction of agricultural roads in Tal-Abbas is 6.9% as indicated in Table 4 above. This results in a labour intensity of 40.0% for the project when considering direct and indirect employment.

3.2 Construction of water reservoir and supply network in Hammama

Description

The project consists of construction of 500m³ ground reservoir, the construction of water treatment and control station and the construction of 300m of gravity water supply line. The project is located in Hammama municipality at Bekka governorate. The works were organized in three lots, started in December 2017 and were concluded in September 2018, with a total contract value of USD 613,952 as indicated in Table 5 below.

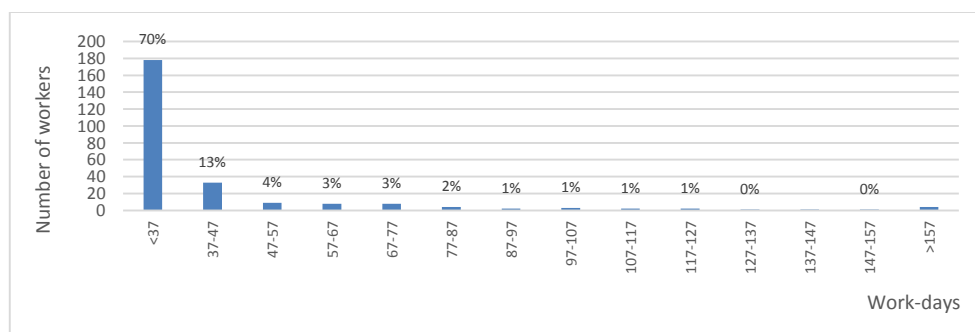
Table 5: Cost breakdown of construction of water reservoir and supply network in Hammama municipality based on BoQ

Item description	Value (USD)
Lot A: Construction of 500m³ ground reservoir including:	204,967.05
– Demolition of existing ground reservoir and valves chambers	
– Excavation for foundations	
– Construction of blind concrete for foundation	
– Construction of reinforced concrete for the reservoir	
– Supply and installation of joint water stop for the ground slab and lateral walls	
– Plastering of internal walls	
– Construction of stone cladding for the external wall	
– Backfilling of reservoir and valve chambers surroundings.	
Lot B: Construction of water treatment and control station including:	69,252.90
– Excavation for foundation of the water treatment and control station	
– Construction of blind concrete for foundation	
– Construction of reinforced concrete for the control station	
– Plastering and painting the walls of the control station	
– Backfilling of reservoir and valve chambers surrounding	
– Supply and installation of water treatment system and electrical system	
Lot C: Construction of 300m of gravity line including:	339,732.15
– Excavation of trench and removal of existing gravity lines	
– Supply and installation of ductile iron pipes	
– Supply and fix of gate valves, air released valves and accessories	
– Supply and fix of gravity line to the water treatment station	
– Backfill the gravity line	
Total (including VAT)	613,952.10

Direct Employment

About 70% of the workers (178 workers) worked for less than 37 days, while 78 workers worked for 37 days or more as indicated in Figure 4 below.

Figure 4: Construction of water reservoir in Hammama, breakdown of workers by number of days worked over the project duration



Construction of the water reservoir and supply network in Hammama municipality created 6,855 person-days of direct employment that were shared among 256 workers as indicated in Table 6 below.

Table 6: Direct employment of construction of water reservoir and supply network in Hammana municipality

	Direct employment						Characteristics of the workers				Employment characteristics	
	Employment category	Person-day	Person-month ¹	Number of workers	Wage ² (USD/day)	Total wages (USD)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Construction of water reservoir and supply network in Hammana	Project managers and engineers	1,034	41.4	9	78	80,788	28-45	20% F, 80% M	U	100% L	SS, PA, PS, HI, TA, RI	P
	Technicians	29	1.2	4	53	1,540		100% M	V, U	100% L	PA, PS, TA, RI	P
	Skilled labour	319	12.8	22	44	14,150	28-30	9% F, 91% M	B	27% L, 73% S	RI	T, C
	Semi-skilled labour	1,292	51.7	36	29	36,985	20-35	9% F, 91% M	B	27% L, 73% S	RI	T, C
	Unskilled labour	3,735	149.4	179	20	74,705	19-50	9% F, 91% M	B	27% L, 73% S	RI	T, C
	Administrative staff	446	17.8	6	64	28,396	22-30	30% F, 70% M	V, U	100% L	PA, PS, RI	P
	Total	6,855	274.2	256	35	236,564					Labour intensity⁸	38.5%
<p>1: Person-month equals 25 person-day. 2: Weighted average of wages of each employment category. The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Bacca-laureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, S: Syrian.</p>							<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by project cost.</p>					

The contractor provided the daily wage for each position/job on the project. The muster-roll was used to estimate the average wage at USD 35 and the project’s labour intensity of 38.5%. With the exception of unskilled labour, all labour categories received a daily wage that is higher than USD 20. Semi-skilled workers, for example, received a daily wage of USD 29 while the skilled workers received a daily wage of USD 40. The contractor included a number of jobs/functions under the skilled labour category including carpenters for formwork, skilled concrete workers, electricians, steel and aluminium workers in addition to drivers of heavy earth- moving equipment.

Skilled, semi-skilled and unskilled workers made up 78% of the total workdays created by the project in Hammana (Figure 5) but their wages accounted for 53% of the project’s labour wage bill (Figure 6). The workers are residents of the project area, usually seek casual work, and work in services supporting the residents and tourists visiting the area during summer.

Figure 5: Breakdown of direct employment (person-day) by category for construction of water reservoir and network in Hammana

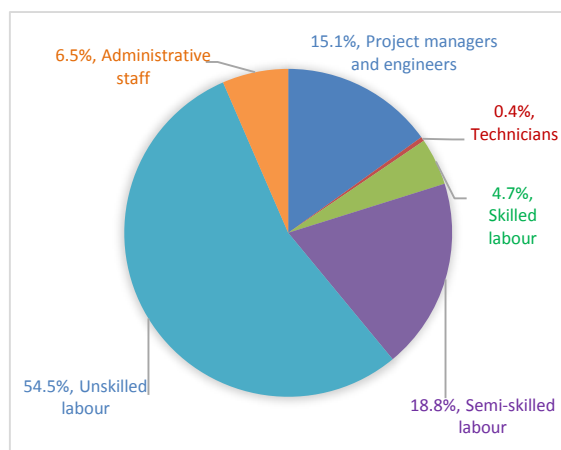
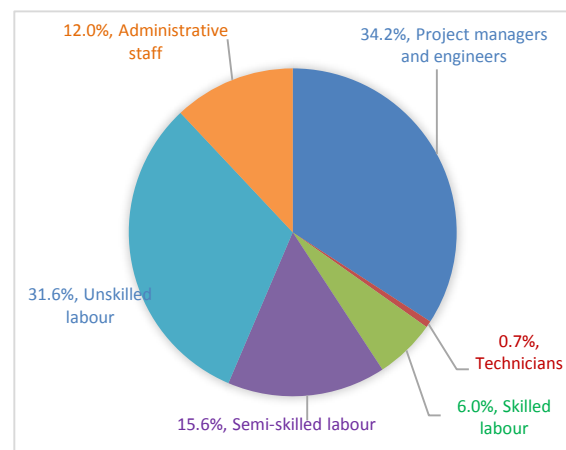


Figure 6: Breakdown of direct employment (wages) by category for construction of water reservoir and network in Hammana



Some of the unskilled workers were above 40 years of age, seeking employment to support their families given the lack of other job opportunities and were grateful that their rights were protected³. Nevertheless, the largest share of direct employment generated during construction went to workers aged between 19 and 35 years, who have 10 or less years of education. Similar to the project in Tal Abbas, engineers, project managers, administrative staff and technicians were Lebanese nationals and are university or college graduates.

Engineers and project managers received a package of benefits including social security, transportation benefits and health insurance. On the other hand, skilled, semi-skilled and unskilled labour only benefited from an all-risk insurance policy provided by the contractor for the construction site. The contractor also provided transportation to the workers who live far from the project location. Similar to all projects under EIIP Lebanon, the construction contract included special provisions on occupational safety and health that were adhered to during the construction.

Women took about 9% of the total workdays created during the construction of the project. In addition to limiting social norms, female workers lacked previous experience and skills in construction which limited their participation in the project. Consequently, women were given tasks in digging and

³ Source: interview with contractor.

planting of trees but not as workers on concrete works or pipe installation. The contractor believes that orientation and skills development could have been provided to women if the project duration was longer.

Indirect Employment

The contractor provided data on the supplies used during the construction of the water reservoir and supply network in Hammana municipality as indicated in Table 7 below. The vast majority of the supplies used during the construction were imported including filters, valves, switches and pipes. It is important to mention that steel is also imported but indicated as domestic given that local transportation make up a good share of the its unit cost as estimated in a previous study conducted in Lebanon⁴.

Table 7: Main supplies of construction of water reservoir and supply network in Hammana municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	Source
Cement	Tonne	66.7	120	8,004	Domestic
Concrete mix	m ³	542	80	43,360	Domestic
Aggregate	m ³	60	20	1,200	Domestic
Sand	m ³	30	30	900	Domestic
Steel	Tonne	40	700	28,000	Domestic
Filters, valves and other	All	-	-	230,000	Imported
Total				311,464	
Value of domestic supplies				81,464	
Domestic supplies as share of total				26.2%	

In order to estimate indirect employment for ready mixed concrete, the amount of cement and aggregate were calculated based on a ratio of one to five (cement to aggregate). Aggregate and sand were also grouped into one category given similar labour intensity of both. Labour intensity of cement, steel, aggregate and equipment rental were based on previous EmplA study conducted by the ILO in 2016 (Assessing Employment Impacts of Roads Sector Investments in Lebanon). The LI and breakdown of employment categories by wage based on the same study is included in Annex 1. Wages, employment characteristics and characteristics of employees are the same for each type of supply and are also included in Annex 1.

Table 8: Indirect labour intensity of construction of water reservoir and supply network in Hammana municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	LI	Wages in supply (USD)
Cement	Tonne	279	120	32,244	1.49%	480.44
Aggregate	m ³	795	20	15,900	22%	3,498.00
Steel	Tonne	700	700	28,000	39%	10,920.00
Total				76,144		14,898.44
Indirect labour intensity (total wages in supplies/total cost of supplies)						4.78%
Wages of direct employment (USD)						236,564
Wages of direct and indirect employment (USD)						251,462
Construction contract value (USD)						613,952
Direct labour intensity (direct wages/contract value)						38.53%
Direct and indirect labour intensity (total direct and indirect wages/construction contract value)						40.96%

⁴ ILO (2016), Assessing Employment Impact of Roads Sector Investments in Lebanon.

The labour intensity of the supplies used in the construction of water reservoir and supply network in Hammana is 4.78% as indicated in Table 8 above. This results in a labour intensity of 40.96% for the project when considering direct and indirect employment.

3.3 Construction of traffic control features in Ghobeiry

Description

The project is located in Ghobeiry municipality in Mount Lebanon Governorate. It consists of the constructing 24 traffic control features over 24 road intersections including the construction of one roundabout, construction and rehabilitation of sidewalks, construction of concrete curbs stone, street marking, landscaping and signage. The project started in April 2018 and was concluded in December 2018. The total value of the construction contract is USD 502,203 as indicated in Table 9 below.

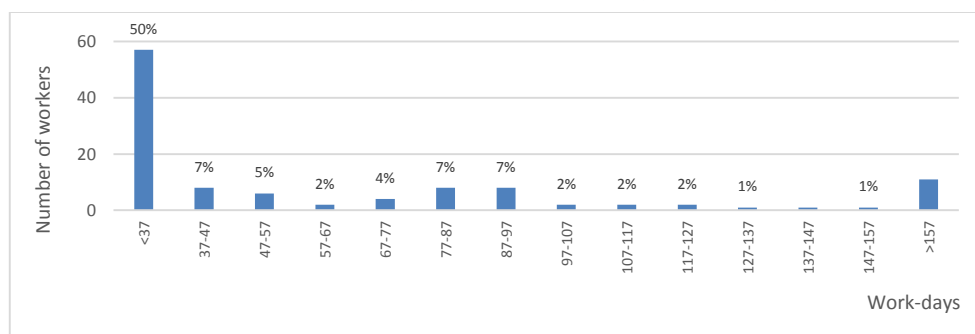
Table 9: Cost breakdown of construction of traffic control features in Ghobeiry municipality based on BoQ

Item description	Value (USD)
General items including mobilization, insurance, OSH, as is drawings, work permits	21,500
Removal of pavement, structures and obstructions	53,757
Bituminous construction	16,160
Incidental works including <ul style="list-style-type: none"> – Pavement strips and marking delineators and road studs for traffic – Concrete curbs, gutters, tiles and landscape – Traffic signs and sign boards – Landscaping 	331,368
Irrigation works	13,000
Storm water drainage works	8,000
Concrete block pump house	8,000
Project signage	650
Total	452,435
Total (including VAT)	502,203

Direct Employment

As indicated in Figure 7 below, half of the workers worked for less than 37 days, while the other half worked for 37 days or more. There are 11 workers who worked for more than 157 days over the project's construction period including a civil engineer, site supervisor and nine workers.

Figure 7: Construction of traffic control features in Ghobeiry, breakdown of workers by number of days worked over the project duration



The construction of traffic control features in Ghobeiry Municipality employed 115 workers for a total of 6,275 person-days as indicated in Table 10 below. The average daily wage received across all employment categories is USD 25 which was estimated based on the daily wages of each position/job that was provided by the contractor. The daily wages, in fact, are higher than USD20 for all categories with the exception of unskilled labour.

Table 10: Direct employment of construction of traffic control features in Ghobeiry municipality

	Direct employment						Characteristics of the workers				Employment characteristics	
	Employment category	Person-day	Person-month ¹	Number of workers	Wage ² (USD/day)	Total wages (USD)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Construction of traffic control features in Ghobeiry	Project managers and engineers	558	22.3	4	36	20,002	25-50	18%F, 82% M	U	100% L	SS, PA, PS, HI, TA, RI	P
	Technicians	15	0.6	2	45	675	25-50	100% M	V, U	100% L	PA, PS, TA, RI	P
	Skilled labour	678	27.1	8	45	30,499	30-50	4%F, 96%M	B, D	22% L, 78%S	RI	T, C
	Semi-skilled labour	1,139	45.5	27	25	28,463	22-27	4%F, 96%M	B, D	22% L, 78%S	RI	T, C
	Unskilled labour	3,862	154.5	69	20	77,245	18-25	4%F, 96%M	B, D	22% L, 78%S	RI	T, C
	Administrative staff	23	0.9	3	40	920	22-35	30% F, 70% M	V, U	100% L	PA, PS, RI	P
	Total	6,275	251.0	113	25	157,803					Labour intensity⁸	31.4%
<p>1: Person-month equals 25 person-day. 2: Weighted average of wages of each employment category. The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Baccaulaureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, S: Syrian.</p>							<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by project cost.</p>					

About 90.5% of the workdays created during the construction of traffic control features in Ghobiery went to skilled, semi-skilled and unskilled workers as indicated in Figure 8 below. The same group of workers consequently received about 86.3% of the total wages paid by the project as indicated in Figure 9 below. Workers of both nationalities (Lebanese and Syrian) were residents of the municipality or the nearby areas. Skilled workers who had worked previously with the contractor were mostly recruited to fill this category while unskilled and semi-skilled workers were applying for a job based on word of mouth. Furthermore, the majority of workers who filled the semi-skilled and unskilled labour categories, were unemployed when the project started and usually work as casual labour.

Figure 8: Breakdown of direct employment (person-day) by category for construction of traffic control features in Ghobiery

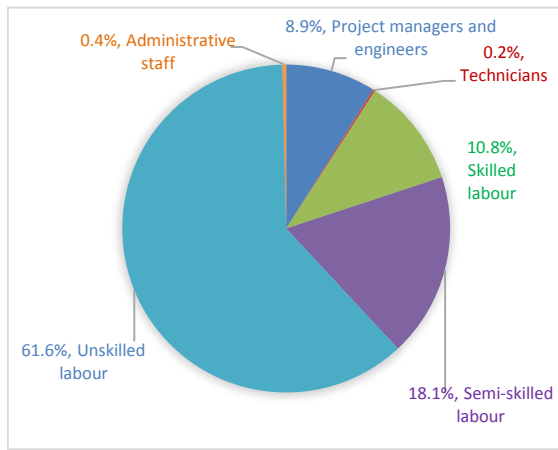
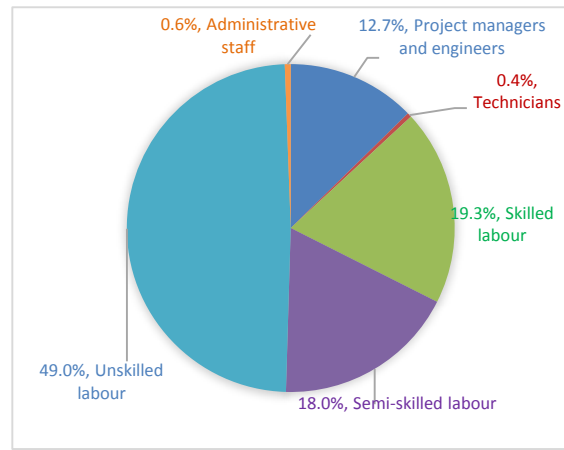


Figure 9: Breakdown of direct employment (wages) by category for construction of traffic control features in Ghobiery



Project managers, engineers and technicians are all Lebanese and aged between 25 and 50 years. They received multiple benefits including social security, health insurance and paid annual and sick leaves. Administration staff are also Lebanese but were younger than the project managers and engineers. They are permanent workers of the contractor and received annual and sick leaves. Project managers, engineers, technicians and administration staff are university or college graduates.

The majority of the skilled, unskilled and semi-skilled workers were employed as casual workers or for longer duration over the project implementation period and benefited from an all-risk insurance policy provided by the contractor for the construction site. Similar to all projects under EIIP Lebanon, the construction contract included special provisions on occupational safety and health that were adhered to during the construction.

Indirect Employment

The construction of the traffic control features Ghobieri municipality required the use of different supplies and services as indicated in Table 11 below. A great share of the supplies were locally produced including cement, gravel and sand in addition to shrubs and trees. The contractor also rented equipment for the transport of supplies and demolition and for limited works on the site.

Table 11: Main supplies of construction of traffic control features in Ghobieri municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	Source
Cement	Tonne	75	105	7,875	Domestic
Sand and gravel	m ³	289	20	5,780	Domestic
Steel	Tonne	5	750	3,375	Domestic
Bitumen	m ³	808	12	9,696	Domestic
Cement and interlock tiles	m ²	4,963	11	52,112	Domestic
Concrete curbs and gutters	LM	4,339	7-9	33,021	Domestic
Concrete tree grates	Piece	99	40	3,960	Domestic
Shrubs and trees	All	1	4,000	4,000	Domestic
Agricultural soil	m ³	380	20	7,600	Domestic
Equipment rental, material transport, large truck	Load	61	150	9,150	Domestic
Equipment rental, material transport, medium truck	Load	20	100	2,000	Domestic
Equipment rental, demolition transport, small truck	Load	460	35	16,100	Domestic
Equipment rental, other	All	1	21,000	21,000	Domestic
Posts, sign plates and board	All	1	13,575	13,575	Imported
Marking paint	US Pail	107	200	21,400	Imported
Irrigation material	All	1	9,500	9,500	Imported
Manhole cover	Piece	12	150	1,800	Imported
Total				221,944	
Value of domestic supplies				175,669	
Domestic supplies as share of total				79.2%	

In order to estimate indirect employment in cement and interlock tiles, concrete gutters, curbs and tree grates, the amount of cement and aggregate used to manufacture them were calculated by EIIP Lebanon Project Engineers⁵. The gravel and sand were grouped into one category given similar labour intensity for both. Labour intensity of cement, steel, aggregate, bitumen and equipment rental were based on previous EmPIA study conducted by the ILO in 2016 (Assessing Employment Impacts of Roads Sector Investments in Lebanon). The LI and breakdown of employment categories by wage based on the same study is included in Annex 1. Wages, employment characteristics and characteristics of employees are the same for each supply and are also included in Annex 1. Labour intensity in nurseries supplying trees and shrubs was calculated based on data collected during this study from a local nursery in Tripoli. Wages, employment characteristics and characteristics of employees in the nursery are included in Annex 1 as well.

Table 12: Indirect labour intensity of construction of traffic control features in Ghobieri municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	LI	Wages in supply (USD)
Cement	Tonne	338	105	35,443	1.49%	528
Aggregate	m ³	1,426	20	28,520	22.00%	6,274
Steel	Tonne	5	750	3,750	39.00%	1,463
Bitumen	m ³	808	12	9,696	37.00%	3,588
Equipment rental	All	1	48,250	48,250	14.00%	6,755

⁵ The supplier of these materials was not willing to share employment data with the researcher, consequently the project engineers estimated the amounts of raw materials (cement, aggregate and sand) required to produce the amount of supplies used during construction.

Trees and shrubs	All	1	4,000	4,000	49.80%	1,992
			Total	129,659		20,600
Indirect labour intensity (total wages in supplies/total cost of supplies)						9.3%
Wages of direct employment (USD)						157,803
Wages of direct and indirect employment (USD)						178,403
Construction contract value (USD)						502,203
Direct labour intensity (direct wages/contract value)						31.42%
Direct and indirect labour intensity (total direct and indirect wages/construction contract value)						35.52%

About one tenth (9.6%) of cost of supplies included in Table 12 above went to wages of workers producing these supplies or services. This increased the project overall labour intensity to 35.5% (direct and indirect) compared direct labour intensity of 31.4%.

3.4 Construction of water transfer and irrigation network in Deir El-Ahmar

Description

The project of construction of water transfer and irrigation network in Dier El-Ahmar union of municipalities was divided in two lots, each includes similar works as indicated in Table 13 below. The works include excavation of trenches and supply and installation of irrigation pipes and valves for a total length of 25 km. The construction started in July 2018 and nearly concluded in December of the same year with a total value of USD 1,456,487. The breakdown of the project works in the two lots as indicated in Table 13 below.

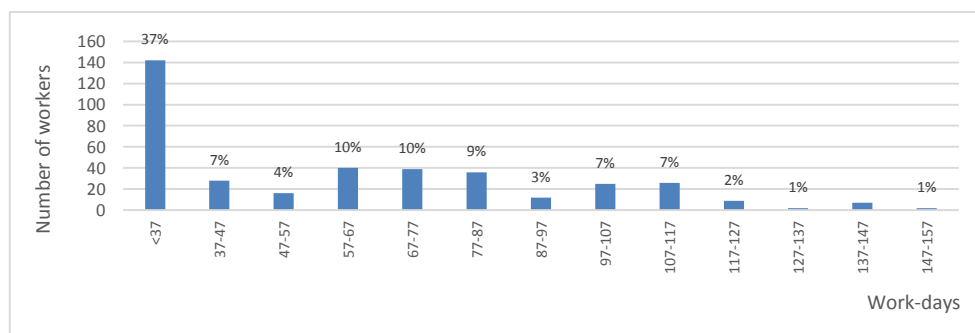
Table 13: Cost breakdown of construction of water transfer and irrigation network in Dier El-Ahmar municipality based on BoQ

Item description	Value (USD)
Lot A: Construction of water transfer and irrigation network of 12.357 km including:	722,751
– Excavation of trenches for network	
– Backfilling and compaction the installed irrigation pipes	
– Cut and removal of asphalt for laying irrigation pipes	
– Reinstatement of the asphalted road for normal bore	
– Supply and lay of irrigation pipes	
– Supply and install of gate valves for the irrigation pipes	
– Supply and install of washout valves	
– Supply and install of pressure reduce valves	
Supply material and construct concrete valve chambers	
Lot B: Construction of water transfer and irrigation network of 12.618 km including:	589,399
– Excavation of trenches for network	
– Backfilling and compaction the installed irrigation pipes	
– Cut and removal of asphalt for laying irrigation pipes	
– Reinstatement of the asphalted road for normal bore	
– Supply and lay of irrigation pipes	
– Supply and install of gate valves for the irrigation pipes	
– Supply and install of washout valves	
– Supply and install of pressure reduce valves	
– Supply material and construct concrete valve chambers	
Total	1,312,151
Total (including VAT)	1,456,487

Direct Employment

About two third of the workers (242) worked for 37 days or more as indicated in Figure 10 below while about one third of the workers (142) worked for less than 37 days.

Figure 10: Construction of water transfer and irrigation network in Doer El-Ahmar, breakdown of workers by number of days worked over the project duration



Based on the data collected from the contractor and provided by EIIP Lebanon, the direct employment created by the project was estimated and summarized in Table 14 below. The construction of water transfer and irrigation network in Deir El-Ahmar resulted in creating 21,438 person-days split among 484 workers. Utilizing the daily wages provided by the contractor for each position/job, the labour intensity of the project was estimated at 37.8%. With the exception of unskilled and semi-skilled labour, workers received a daily wages that is higher than USD20 as indicated in Table 14 below.

Table 14: Direct employment of construction of water transfer and irrigation network in Deir El-Ahmar municipality

	Direct employment						Characteristics of the workers				Employment characteristics	
	Employment category	Person-day	Person-month ¹	Number of workers	Wage ² (USD/day)	Total wages (USD)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Construction of water transfer and irrigation network in Deir El-Ahmar	Project managers and engineers	1,369	54.7	14	71	97,568	22-50	20% F, 80% M	U	100% L	SS, PA, PS, HI, TA, RI	P
	Technicians	218	8.7	2	55	11,990	30-40	100% M	V, U	100% L	PA, PS, TA, RI	P
	Skilled labour	787	31.5	16	42	33,052	35-40	21% F, 79% M	B, D	14% L, 86% S	RI	T, C
	Semi-skilled labour	456	18.2	4	30	13,680	30-40	21% F, 79% M	D	14% L, 86% S	RI	T, C
	Unskilled labour	18,255	730.2	345	20	365,090	18-40	21% F, 79% M	D	14% L, 86% S	RI	T, C
	Administrative staff	353	14.1	3	42	14,700	22-35	40% F, 60% M	U	100% L	PA, PS, RI	P
	Total	14,524	857.5	384	25	536,080					Labour intensity⁸	37.8%
<p>1: Person-month equals 25 person-day. 2: Weighted average of wages of each employment category. The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Bacca-laureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, S: Syrian.</p>							<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by project cost.</p>					

The vast majority of work days created during the construction of the water transfer and irrigation network in Deir El-Ahmar were for the skilled, unskilled and semi-skilled labour. Jointly, these three categories make up 91% of the total workdays (Figure 11 below) and 77% of the total wages paid by the contractor (Figure 12 below). The vast majority of the workers are residents of the project area but given the difficult typography of the project site, these workers were transported on daily basis from points close to their places of residence to the project site. The workers knew about the employment opportunities through word of mouth and some were relatives and neighbours given the tribal structure of their communities.

The workers who benefited from skilled, unskilled and semi-skilled work opportunities on the project, usually work as casual labour in the agricultural sector which is dominant in Deir El-Ahmar. For most parts, the project was implemented during a period when casual work in agriculture is lacking. Consequently, waged-employment on the project smoothed the incomes of the workers during low agricultural season. Nevertheless, the contractor faced some issues with the labour supply during the month of September given that workers preferred employment in agriculture during that month.

Figure 11: Breakdown of direct employment (person-day) by category for construction of water transfer and irrigation network in Deir El-Ahmar

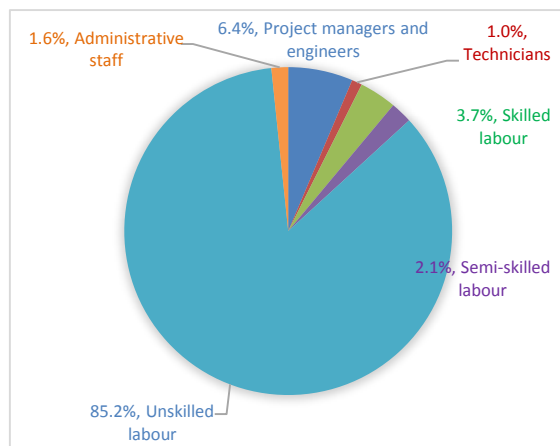
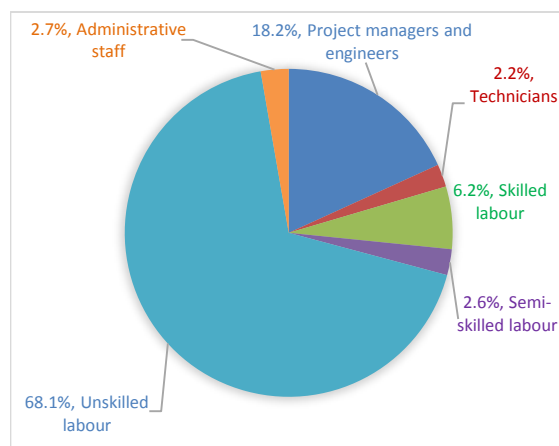


Figure 12: Breakdown of direct employment (wages) by category for construction of water transfer and irrigation network in Deir El-Ahmar



Project managers, engineers and technicians and administrative staff are all Lebanese nationals, and are permanent staff of the contractor while the largest share of the skilled, unskilled and semi-skilled workers were Syrians as indicated in Table 14 above who were hired on daily basis. About one fifth of the workdays occupied by skilled, semi-skilled and unskilled workers went to women, who worked in manual excavation work just like their male counterparts. The contractor indicated that women preferred to work in the same team as their relatives, such as a spouse or a son.

Similar to the previous project assessed, daily workers usually benefit from the all-risk insurance provided by the contractor, in addition to the occupational safety and health measures implemented as part of the contract. Other employment categories received a better set of benefits, associated with permanent employment, including paid annual and sick leaves.

Indirect Employment

The contractor utilized a number of suppliers and services during the construction of water transfer and irrigation network in Deir El-Ahmar including HDPE pipes, ductile iron pipes, cement, steel, sand and gravel, valves and manhole covers as indicated in Table 15 below. The contractor also rented equipment for the transfer of the supplies to the project site and rented a jack hummer for limited works in areas where manual excavation was not possible.

Table 15: Main supplies of construction of water transfer and irrigation network in Deir El-Ahmar municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	Source
Cement	Tonne	98	112	10,976	Domestic
Sand and gravel	m ³	20	1,650	33,000	Domestic
Steel	Tonne	30	766	22,980	Domestic
Pipes HDPE - 110	LM	3,525	9	31,725	Domestic
Pipes HDPE- 125	LM	11,088	10	110,880	Domestic
Pipes HDPE- 180	LM	3,860	18	68,515	Domestic
Equipment rental, transport of valves, manholes and ductile iron pipes	Load	21	340	7,140	Domestic
Equipment rental, material transport, cement	load	154	200-275	41,838	Domestic
Equipment rental, jack hummer	Day	20	500	10,000	Domestic
Water tank	load	90	33.3	3,000	Domestic
Ductile iron pipes, valves, manhole covers	All	1	293,199	293,199	Imported
Total				633,253	
Value of domestic supplies				340,054	
Domestic supplies as share of total				53.70%	

In order to estimate indirect employment, gravel and sand were grouped into one category given similar labour intensity for both. Labour intensity of cement, steel, aggregate and equipment rental were based on previous EmplA study conducted by the ILO in 2016 (Assessing Employment Impacts of Roads Sector Investments in Lebanon). The LI and breakdown of employment categories by wage based on the same study is included in Annex 1. Wages, employment characteristics and characteristics of employees are the same for each supply and are also included in Annex 1. Labour intensity of HDPE pipes was calculated based on data collected during this study from a local factory that provided the pipes to the project site. Wages, employment characteristics and characteristics of employees in the nursery are included in Annex 1. Consequently, the labour intensity of the vast majority of local supplies used on this project was either available or obtained during the course of the fieldwork. It is important to mention that the HDPE pipes were transferred from length in meters as indicated in Table 15 to weight, as indicated in Table 16 below, using a transfer table provided by the manufacturer.

Table 16: Indirect labour intensity of construction of water transfer and irrigation network in Deir EL-Ahmar municipality

Description	Unit	Number of units	Unit cost (USD)	Total cost (USD)	LI	Wages in supply (USD)
Cement	Tonne	98	112	10,976	1.49%	164
Aggregate	m3	20	1,650	33,000	22.00%	7,260
Steel	Tonne	30	766	22,980	39.00%	8,962
HDPE pipes	Tonne	105	2,000	210,711	16.40%	34,557
Equipment rental	All	154	200-500	61,978	14.00%	8,677
Total				339,645		59,619
Indirect labour intensity (total wages in supplies/total cost of supplies)						9.41%
Wages of direct employment (USD)						536,080
Wages of direct and indirect employment (USD)						595,699
Construction contract value (USD)						1,418,072
Direct labour intensity (direct wages/contract value)						37.8%
Direct and indirect labour intensity (total direct and indirect wages/construction contract value)						42.0%

The local supplies used for the construction of water transfer and irrigation network in Deir El-Ahmar had a labour intensity of 9.41% which increased the project's direct and indirect labour intensity to 42%.

4. Summary of findings and recommendations

Summary of findings

The total value of the construction contracts of the four projects assessed within this research is USD 3.08 million, and jointly created 43,092 person-days of direct employment. Overall, each million USD invested in these projects created an average of 13,990 person-days of direct employment. The four projects are of different types, where the project in Tal-Abbas included the construction of agricultural roads, the project in Hammana included the construction of water reservoirs and supply network. An overview of each project's type, value and main employment indicators are included in Table 17 below. The same table allows the comparison between the employment effects of each of these projects.

The largest share of workdays, between 78% and 91% went to skilled, semi-skilled and unskilled workers. The direct labour intensity ranged between 31.4% and 38.5%, indicating that at least one third of the value of each project went to wages of workers employed by the contractor and the subcontractors working on the project site. When considering the indirect employment effects, which was not calculated in full given limitations of data, direct and indirect labour intensity increased to 35.5% to 42.0%. Given that labour intensity is a proxy to induced effects (workers usually spend their incomes locally on basic needs), it is safe to assume that these projects had positive effects on the local markets around them.

It is evident from this study that labour intensity was highest in the water transfer projects of Hammana and Deir El-Ahmar. It is too early however to draw absolute conclusions or to assess what the actual employment impact of different types of projects is for a number of reasons.

- (i) For instance while the two projects mention above have the highest labour-intensity, the employment generated for the different categories of worker differ significantly, with the irrigation network in Deir el Ahmar employing a much larger share of unskilled or semi-skilled workers.
- (ii) The direct labour intensity is relatively close between the projects under assessment, and it would be useful with a larger sample to draw conclusions.
- (iii) With regards to employment impact, there will be induced and spin-off effects, which were not assessed in this study.
- (iv) Finally, it should be noted that all projects responded to needs identified by the communities in each municipality and that the citizens and businesses will utilize the new infrastructure which is expected to result in longer term economic benefits. Other research conducted by Lebanon EIIP can shed more light on some of these benefits.

Table 17: Summary of findings across the four projects

	Tal-Abbas	Hammana	Ghoeri	Deir El-Ahmar
Project type	Agricultural roads	Water reservoir and supply network	Traffic control features	Water transfer ad irrigation network
Project value (USD million)	0.55	0.61	0.50	1.42
Direct person-day	8,525	6,855	6,275	21,437
Direct wages (USD)	198,869	236,564	157,803	536,080
Direct labour intensity (Direct wages/ project value)	36.1%	38.5%	31.4%	37.8%
Number of direct person-day per USD million	15,500	11,238	12,550	15,096
Indirect wages in local supplies (USD) (only when LI of supply is available)	21,661	14,898	20,600	59,619
Direct and indirect wages (USD)	220,530	251,462	178,403	595,699
Direct and indirect labour intensity	40.00%	40.96%	35.52%	42.01%
Breakdown of direct employment by category (based on person-day)				
Project managers and engineers	9.4%	15.1%	8.9%	6.4%

Technicians	0.3%	0.4%	0.2%	1.0%
Skilled labour	18.0%	4.7%	10.8%	3.7%
Semi-skilled labour	20.4%	18.8%	18.1%	2.1%
Unskilled labour	43.8%	54.5%	61.6%	85.2%
Administration	8.2%	6.5%	0.4%	1.6%
Breakdown of direct employment by category (based on wages)				
Project managers and engineers	14.3%	34.2%	12.7%	18.2%
Technicians	1.0%	0.7%	0.4%	2.2%
Skilled labour	20.7%	6.0%	19.3%	6.2%
Semi-skilled labour	17.5%	15.6%	18.0%	2.6%
Unskilled labour	37.6%	31.6%	49.0%	68.1%
Administration	9.0%	12.0%	0.6%	2.7%

Comparing the share of women employed on each project, it is clear that projects located in rural areas (Tal-Abbas and Deri El-Ahmar) employed a larger share of women than the project located in urban settings (Ghobeiry). Both Tal-Abbas and Deir El-Ahmar are agricultural areas where women are usually involved in casual work in agriculture. Thus, working as casual labourers in construction might not have been as hard as in urban settings. The contractor in Ghobeiry indicated that social norms prevented women from working on the project with the exception of office staff (administrators and engineers) and some workers in planting trees and shrubs.

Practical recommendations

Tracking of supplies used during construction could facilitate the estimation of indirect employment. EIIP Lebanon may consider requesting a report of supplies (materials or services) used by the contractors on monthly basis. This report should include the supplies used to date, indicating the number of units used and the cost per unit. This regular reporting could be used to estimate indirect employment effects of each project.

Assessment of indirect labour intensity of main supplies before the beginning of the next project phase. EIIP Lebanon project engineers could define the main supplies that are likely to be used in the projects planned for next phase. A data collection tool on employment could then be sent to a number of local producers of the main supplies to assess their labour intensity, which consequently could be used to estimate indirect employment.

EIIP Lebanon could offer short skill development programs for women to increase the share of women employed on the projects. Although the largest share of employment created on the projects went to unskilled and semi-skilled workers, the majority of men who took these jobs worked as casual workers in construction previously. Women, on the other hand, did not work in construction and were only given tasks that does not include any skill. A couple of contractors mentioned that they would have liked to involve women in tiling but some skill development was required and could not have taken place given the short implementation period.

EIIP Lebanon could work with local community groups to address social norms and expand the participation of women especially in urban settings. Combined with the skill development mentioned above, local community groups or Community-Based Organizations (CBO), could be engaged to encourage more women, especially in urban area, to participate in the project. These CBOs could also provide, in collaboration with the contractors and Lebanon EIIP, onsite washing and toilette facilities for women.

Improve the project database to allow the categorization of direct employment and calculation of labour intensity. EIIP Lebanon is tracking the direct employment diligently by collecting weekly data from the contractors. Two improvement could be suggested. First, adding the employment category to the registration and/or tracking sheets, to facilitate the breakdown of direct employment into these categories. Second, including the daily wage of each worker, especially for functions/jobs receiving a daily wage higher than the daily worker wage of USD 20. These changes will allow EIIP Lebanon management team to track the share of direct employment going to daily workers and assess the labour intensity on regular basis.

Compile findings of different research activities to capture the effects of each project. The findings included in this report did not capture the effects of the projects once the operation of the infrastructure started. The projects assessed created local infrastructure assets that are expected to generate local benefits. For example, the number of farmers who are likely to benefit from the new irrigation network in Deir El-Ahmar could be significant and they are likely to create additional agricultural product as a result. These benefits are usually captured in the project closure workshop and report. Furthermore, the workers' survey would capture and quantify the benefits of waged employment on the households of the workers. Combining the findings of these different research exercises, around each project, will certainly provide EIIP Lebanon and local governments with valuable knowledge on the effects of investment in infrastructure using labour-intensive methods.

Expand the use of local supplies, starting with project design, but maintain the focus on quality and community needs. The findings of this study indicated different labour intensities for the assessed projects, which could be increased by expanding the use of local supplies whenever possible. The design of the projects should take that into account but maintaining the quality of construction. Given that all projects were responding to community needs identified by the relevant municipalities, this criteria should remain a critical element of selecting future projects.

5. References

ILO (2012). Study on Enhancing Labour Intensity in the Expanded Public Works Programme: Road Infrastructure Projects. Geneva.

ILO (2016). Towards a Better Understanding of Employment Effects of Infrastructure: EmplIA Indicators Guide

ILO (2016). Assessing Employment Impacts of Roads Sector Investments in Lebanon.

This Study was implemented by Mrs. Shereen Abbadi who was contracted by the EIIP Lebanon team.

6. Annex 1: Labour intensity of supplies

The table below includes the labour intensity of main supplies as estimated by an EmPIA study conducted in 2016 by the ILO (Assessing Employment Impacts of Roads Sector Investments in Lebanon).

Table 18: Employment and labour intensity of supplies based on ILO (2016) study including cement, steel, aggregate, bitumen, equipment/machinery rental

	Employment			Characteristics of the workers				Employment characteristics	
	Employment category ¹	Wage range ² (USD/month)	Share of total wages (%)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Cement	Management	1,500-3,500	3.58	40-60	20%F, 80%M	U	100% L	SS, PA, PS, HI	P
	White collar	1,500-3,500	2.15	40-60	50% F, 50% M	U	100% L	SS, PA, PS, HI	P
	Blue collar	475-2,000	94.27	40-60	5% F, 95%M	D, H	100% L	SS, PA, PS, HI	P
	Total	475-3,500							LI⁸of cement
Aggregate	White collar	1,250-7,000	7.28	20-60	40% F, 60% M	U	100% L	SS, PA, PS, HI	P
	Blue collar	750-1,750	92.72	20-45	100% M	V, D, H	15% L, 85% O	SS, PA, PS, HI	P
	Total	750-7,000							LI⁸of aggregate
Steel	White Collar	1,500-4,500	14.97	30-50	20%F, 80%M	U	100% L	SS, PA, PS, HI	P
	Blue Collar	850-1,000	23.22	30-60	100% M	V, D, H	13% L, 87% O	SS, PA, PS, HI	P
	Drivers	850-1,000	15.46	30-60	100% M	D, H	100% L	SS, PA, PS, HI	P
	Mechanics	850-1,000	46.35	30-60	100% M	D, H	100% L	SS, PA, PS, HI	P
	Total	850-4,500							LI⁸of steel
Equipment rental (including for transport of supplies)	White Collar	1,000-1,200	35.38	24-45	40%F, 60%M	U	100% L	SS, PA, PS, HI	P
	Blue Collar	700-900	64.62	18-55	100% M	V, D, H	10% L, 90% O	SS, PA, PS, HI	P
	Total	700-1,200							LI⁸of equipment rental
Bitumen	White Collar	1,500-3,500	41.42%	-	33% F, 67% M	U, V	100% L	SS, PA, PS, HI	P
	Blue Collar	1,300	58.58%	-	1% F, 99M	H, B	100% L	SS, PA, PS, HI	P
	Total	1,300-3,500							LI⁸of bitumen
<p>1: Employment categories varies between the different supplies. 2: The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Bacculaureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, O: Other.</p>						<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by supply cost.</p>			

The table below includes the labour intensity of suppliers of shrubs and trees (nurseries) and HDPE pipes

Table 19: Labour intensity of supplies including trees and shrubs and HDPE pipes

	Employment			Characteristics of the workers				Employment characteristics	
	Employment category ¹	Wage range ² (USD/month)	Share of total wages (%)	Age (years)	Gender ³	Education level ⁴	Nationality	Benefits ⁶	Contract type ⁷
Nurseries (shrubs and trees)	While collar	800	7.41	30-35	M	V	100% L	PA, PS	P
	Blue collar	500	92.59	20-45	70% F, 30% M	B, D	50% L, 50% O	-	C
	Total	500-800						LI⁸ of shrubs and trees	50%
HDPE pipes	While collar	750-3,000	28.60	-	20% F, 80% M	V, U	80% L, 20% O	PA, PS	P
	Blue collar	750-1,500	71.40	-	100% M	B	25% L, 75% O	PA	P
	Total	750-3,000						LI⁸ of HDPE pipes	17%
<p>1: Employment categories varies between the different supplies. 2: The exchange rate used 1 USD=1,500LBP 3: Percentage of male (M) and female (F) workers in each employment category. 4: Actual educational attainment within each employment category: U: University, V: Vocational or technical education, H: Bacculaureate Lebanese (High school), B: Brevet or less (10 years of schooling or less), D: Illiterate or hardly reads and writes. 5: Percentage of each nationality within each employment category where L: Lebanese, O: Other.</p>					<p>6: Benefits assessed including SS: Social security, PA: Paid annual leave, PS: Paid sick leave, HI: Health insurance, TA: Transportation provided or transportation/fuel allowance, RI: Risk insurance. 7: Percentage of each contract type within each employment category P: Permanent through the project duration, T: Temporarily, D: Casual/daily 8: Total wages divided by supply cost.</p>				