

**Increasing Employment Levels in Infrastructure Development
Projects**

زيادة مستويات التشغيل في مشاريع تطوير البنية التحتية

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Abstract

A new approach is suggested to be applied to increase employment in infrastructure development projects. The proposed approach moderates the usually capital-intensive (equipment-based) infrastructure development to make it more responsive to short-term employment needs. The proposed higher labor-content project cycle emphasizes stronger project planning, preparation, and participation of the involved community in all project phases, including the design phase, and reconsiders, inter alia, the basis for awarding contracts so as to increase employment levels (labor content) in infrastructure development projects. The proposed approach also introduces new reporting requirements and enhances learning through emphasizing project final evaluation.

Keywords: Infrastructure Development, Construction Management, Labor Focused Construction Practices, Project Management, Employment.

ملخص

يقترح البحث أسلوباً جديداً من أجل زيادة مستويات التشغيل في مشاريع تطوير البنية التحتية، و الأسلوب الجديد يعدل أسلوب تطوير البنية التحتية القائم على استعمال المعدات، ليجعله أكثر استجابة لاحتياجات التشغيل قصيرة الأمد، و تركز دورة مشاريع البنية التحتية بمستويات أعلى من التشغيل المقترحة بالتالي على التخطيط والإعداد للمشاريع، و على مشاركة المجتمع المحلي في كل مراحل مشروع البنية التحتية، بما يشمل مرحلة التصميم، و تعيد دورة مشاريع البنية التحتية المقترحة النظر في أساس منح وترسية عقود المقاولات، بهدف زيادة مستويات التشغيل، كما أنها تعرض متطلبات جديدة لتقارير الإنجاز المطلوبة، و تحقق الاستفادة من التجارب الناجحة في مجال مشاريع البنية التحتية بمستويات أعلى من التشغيل، من خلال التركيز على تنفيذ تقييمات نهائية للمشاريع.

Background

Since 1994, the year of establishment of the Palestinian National Authority (PNA), donors in Palestine have been unequivocal supporters of infrastructure development, and have contributed to enhance the dilapidated Palestinian infrastructure which has undergone decades of Israeli negligence, and more recently direct Israeli military action. The outbreak of the Intifada on 28th September 2000 put the donor community in an unenviable situation in which long-term development could not be pursued under the dire economic and social hardship accompanying Israeli measures against Palestinians. These measures resulted in a substantial increase in unemployment and poverty rates, as shown in table 1.

Table (1): Unemployment and Poverty Rates 2004-2007 ⁽¹⁰⁾

Rate	2004	2005	2006*	2007*
Unemployment (% of Palestinian Workforce)	27	25	29	31
Poverty (% of Palestinians)	46	45	48	50

Based on figures and estimates by the Palestinian Central Bureau of Statistics (PCBS).

* Years 2006 and 2007 are estimated figures

In an attempt to reconcile (infrastructure) development agenda with harsh economic realities on the ground, donors have expressed more interest in increasing labor employment in infrastructure development projects. In light of the experience that many donor agencies have gained in implementing infrastructure development projects in Palestine, many have become to consider infrastructure development as a more accessible tool of economic policy. However, higher labor content infrastructure development is a short-term strategy that would enhance effectiveness of responses to economic and social emergencies, but not a “cross-cutting” objective.

Introduction

One facet of appropriate construction technology is the use of less equipment and more labor through labor-based or labor intensive construction ⁽⁷⁾. Labor based technology as described by the International Labor organization (ILO) is "a technology that applies a labor/equipment mix that gives priority to labor, supplementing it with appropriate equipment where necessary for reasons of quality or cost" ⁽²⁾. While producing or maintaining infrastructure to a specified standard in a cost-effective manner, people are employed under fair working conditions. It is in this respect important to distinguish between an optimum and efficient use of labor, as opposed to a maximum underutilization of labor⁽⁴⁾.

Proper utilization of intensive employment in construction projects can result in a significant increase in labor employment generated per unit of expenditure. Labor-intensive construction projects can be financially competitive with conventional (equipment-based) construction and can produce the same quality of product within the same time schedule ^(5,7). From a development perspective, there are additional socio-economic benefits to be gained such as the development of individual skills, institutional capacities and a contribution to the alleviation of poverty ⁽⁹⁾.

Investment in infrastructure such as access roads, water, dams, drains, irrigation, housing and schools accounts for as much as 50% to 70% of national public investment in most developing countries ⁽³⁾. In addition to the impact of the infrastructure produced on economic growth and on the generation of productive employment opportunities, infrastructure also have direct social impact through creating access to basic social services such as education and health, as well as – through the building of productive facilities – to long-term employment in other sectors such as agriculture or manufacture ⁽³⁾. A study by the Development Academy of the Philippines (1998) showed that between 126,000 and 230,000 additional jobs could have been created in the various infrastructure sectors, if labor-based methods had been adopted and more widely used in the construction sector ⁽³⁾. The study also confirmed that, for the type of infrastructure concerned, the quality and costs of the assets would have been similar to that having been produced by methods heavily involving equipment usage.

Characteristics of Infrastructure Development Projects with Higher Labor Content

High-labor-content infrastructure development projects can be described in terms of the following aspects, which differentiate them from ordinary infrastructure development projects:

1. High labor content: the usual goal of high-labor content projects is to maximize the use of labor through implementing infrastructure projects.

2. Labor-focused infrastructure design and technology: infrastructure design for higher labor content infrastructure development projects builds on the capabilities of the “human” workers. In-situ production and construction material processing is encouraged, in an attempt to redistribute the benefits of off-site production and construction material processing to on-site workers.
3. Inherent non-sustainability: sustainability in this context refers to the provision of continued employment opportunities. Higher labor content infrastructure development projects are not sustainable on that scale, at least in the Palestinian context ⁽¹¹⁾.
4. Infrastructure development projects as a tool to job creation: The main objective of higher labor content infrastructure development projects is to create direct jobs. The development of these infrastructure projects is however considered as a byproduct of the process of creating jobs.

The High-Labor-Content-Moderated Project Cycle

Higher labor content moderates the normal project cycle through a number of policies. The project cycle continues to provide for infrastructure design and implementation, but the cycle is moderated by labor content policies that shift the primary goal of the project cycle from mere provision of infrastructure to increased labor content, with infrastructure resulting as a byproduct. Higher labor content policies affect most of the project cycle phases, however, their impact is greater in the initial phases (Project Preparation, Project Selection, Project Design and Tendering and Awarding). The most important policies are given in Table 2.

Table (2): Infrastructure Development Project Phases and Moderating Labor content Policies.

Project Phase I - Project Preparation

1. Identifying beneficiaries.
 2. Identifying local suppliers and contractors.
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Project Phase II - Project Selection

1. Limits on Project Size.
 2. Infrastructure Development Local Scope.
 3. Beneficiary / Laborer Selection.
 4. Preferable Infrastructure Development Sectors.
 5. Project’s Relationship to Other Plans.
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Project Phase III - Project Design

1. Labor Wage Rates to Be Used.
 2. Higher Use of Local Materials.
 3. Project Approval Criteria.
 4. Managing Conflicting Interests (Max. Profit vs. Max. Labor).
 5. Fabrication on Site.
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Project Phase IV - Tendering and Awarding

1. Bid Evaluation Criteria and Criteria Weights.
 2. Project Advertising to Beneficiaries and Contractors.
 3. Contractor Short-listing Criteria.
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Project Phase V – Implementation

1. Maximum Limit on Requests for Payment (RFP).
 2. Progress Reporting Requirements.
 3. Bulk Purchases of Raw Materials.
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Project Phase VI - Operation and Maintenance

1. Financial Provisions for a Community Maintenance Fund.
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Project Phase VII - Final Project Evaluation

1. Mandatory Evaluation.
 2. Third-Party Evaluation.
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The Higher-Labor-Content Project Cycle Guidelines

The guidelines proposed to be followed in each of the project phases (preparation, selection, design, tendering and awarding, implementation, operation and maintenance, and final evaluation), are to increase labor content in infrastructure development projects as summarized in the following:

1. Project Preparation

Project preparation in higher-labor content infrastructure projects is more involved than usual infrastructure development projects. First, there is a need to coordinate the activities of the various local government units (municipalities or village councils) functional organizational units, so as to obtain consistent project-level data and project monitoring metrics which will enhance management and learning. In addition, targeting the unemployed poor properly on the local level will require that sufficient and updated information to be available concerning their spatial distributions within Local Government Units (LGUs), poverty and unemployment levels. Furthermore, the availability of information on local suppliers, producers and contractors is vital in acquiring the ability to enhance local employment and consequently local economic conditions through infrastructure development. It would not be feasible to encourage the use of local materials and suppliers and contractors if information on what is locally-available of these resources is not attainable.

It is also important to obtain information by the local government units on all on-going infrastructure projects as well as planned future ones in the targeted areas. This is to prevent duplicated targeting of beneficiaries by donor agencies. While such reporting arrangements might seem stringent, this is the norm in conditions of emergencies, during which management is usually under higher pressure levels.

Prior to project initiation, engineers and contractors involved in labor intensive projects need to be trained by experienced consultants in the field or international institutions with prior similar experience. The training should provide the local government units design and

supervision engineers with the knowledge concerning labor-intensive technologies, design for maximum local material usage, and bottom-up planning procedures with emphasis on community participation. For contractors, the training should provide them with the skills required to manage large workforces and to get accustomed to labor-focused reporting requirements.

2. Project Selection (Identification and Prioritization) Procedure

The proposed procedure can be summarized in the following:

Identify needs and prepare project proposals: need identification can be either centralized or decentralized. For higher labor-content projects, the decentralized approach in identifying needs is preferred. A comparison between the two approaches is given in.

Limit maximum proposed project size: smaller project sizes are more conducive to higher labor content. Limiting the size of the development project will encourage smaller contractors to get involved. The smaller the contract value, the less likely the contractors will use heavy machinery (i.e. graders, backhoes, excavators, etc.), consequently, the higher the potential for a higher labor content. This is provided that contractors are not allowed to lease equipment from larger contractors after the awarding of the contract as stipulated in the bidding documents.

Maintain local development scope for proposed infrastructure: the proposed projects should be limited in focus to their respective communities (proposals should be limited to secondary roads and should not address arterial or main roads). In other words, project stakeholders should work on the community level to the extent possible. This is to avoid leakages with regard to jobs and more importantly leakages related to the resulting infrastructure ⁽¹¹⁾. Furthermore, there are “political” benefits to work on the community level in cases where increasing labor content becomes more pressing, or emergencies. Links with the public should be solidified during emergencies so as to demonstrate their commitment and role in the socio-economic prosperity. In cases where it is not feasible to work on the local level, due to more-pressing LGU level

needs, project selection is to be done through a development project selection procedure ⁽⁸⁾. The development project selection procedure is a screening process, in which infrastructure development projects are prioritized based on expected project outputs in relation to predetermined LGU policies, one of which being creating job opportunities.

Table (3): Comparison between Centralized and Decentralized Approaches to Identify Needs and Preparing Project Proposals.

The Centralized Approach	The Decentralized Approach
<ol style="list-style-type: none"> 1. LGU engineers check priority areas of intervention based on guidelines set in the pertinent master plans and LGU-level development priorities. There may be community input, but community input is of less priority. 2. Based on LGU engineers' estimates and their review of information available, the following data are obtained: <ul style="list-style-type: none"> ❖ Need Identification /Description. ❖ Immediate Measurable Objectives & Deliverables. ❖ Project location. ❖ Project Prerequisites. 	<ol style="list-style-type: none"> 1. Forming community committees. Community committees must be composed of volunteers who enjoy social acceptance and must be non-political in nature ⁽¹⁾. They need to be informed and trained of the nature of Higher labor content infrastructure development projects, and that community committee subsequent proposals should serve that goal. 2. Community committees prioritize their community needs internally. The process for identifying and prioritizing community needs can be summarized in the following steps: <ol style="list-style-type: none"> 2.1 Statement of problems and opportunities. This step includes identifying urban issues of concern and understanding the community context. 2.2 Documentation of key information. This step includes

... Continue table (3)

The Centralized Approach	The Decentralized Approach
<ul style="list-style-type: none"> ❖ The expected number of beneficiaries. ❖ LGU service sectors that are to be addressed by the project. ❖ A rough estimate of the project cost, based on a rough Bill of Quantities. ❖ Potential donors. ❖ An estimate of the project duration. ❖ Project organizational structure. ❖ Potential obstacles and strategies for dealing with them. <p>3. The afore-mentioned data are compiled in a project proposal.</p>	<p>review of information and documentation of physical and non-physical urban elements, and mapping impact and community-level prioritization of urban programs.</p> <p>2.3Preparing community map. This step entails combing problems mentioned in step (2.1) in one multi-thematic community-level area of intervention.</p> <p>2.4Prepare set of actions and related tasks. This entails identifying and prioritizing actions needed in order to solve the community-level problem identified previously.</p> <p>2.5Prepare proposed plan for implementation. This entails identifying responsibilities of parties concerned and a suitable implementation timeframe. The output of this step will be a solid community-level project proposal.</p>

Select infrastructure development sectors: since some infrastructure sectors offer higher labor content than others, those infrastructure development sectors that are inherently conducive to higher labor content should be selected. As a very general guide, Table 4 shows a comparison between the employment impact of equipment-based and labor based technologies by infrastructure / development sector ⁽¹¹⁾.

Table (2): Potential Labor Content by Infrastructure Sector: Comparison between Labor-Based and Heavy Equipment-Based Technologies ⁽¹¹⁾.

Infrastructure Development Sector	Labor-content (%) in equipment-based works	Labor- content (%) in labor-based works
Social (Schools, hospitals, etc...) Buildings	20-30	25-35
Water Reticulation	5-15	25-35
Sanitation	5-15	25-35
Low-cost building	25-30	30-40
Electrification	10-15	35-45
Surface drainage	5-15	40-50
Secondary roads	5-15	30-70
Dams	10-20	50-70
Irrigation	15-25	30-70
Forestry	25-35	30-70

Verify compatibility of project proposals with development plans: although higher labor content infrastructure development projects are principally intended to serve short term development goals through providing urgent job opportunities, however, it is important to try to ensure that these infrastructure development projects can also fit within the local government units development plans to serve a longer-term goal.

Prioritize project proposals: projects within LGUs can be prioritized based on one or all of the following variables:

- a. Poverty rate;
- b. Unemployment rate;

- c. Number of beneficiaries;
- d. Previous job-creation projects within the past 12 months in the targeted district;
- e. Project Availability (Whether project is available for implementation within the time span of the decision-making process);
- f. Level of damage to infrastructure that is imposed by Israelis. This requires the availability of records of damages and damage assessment of infrastructure in the respective LGUs⁽³⁾;
- g. Public Application/Complaint registry entries for the respective community, if any.

Determine how to select labor: a few number of alternatives are available for labor selection, which are shown as follows:

Community Led Approach Alternative:

The project is advertised in the project area stating in the advertisement that the project's primary goal is to generate employment. The Community Committees are then invited to do labor selection based on pre set criteria. Some of the proposed criteria include place of residence, dependency ratio of the labor, and job-creation employment in the past 12 months among others. The contract documents to be prepared should state clearly that the project is a higher labor content infrastructure development project and the contract form will be that of Unit Price. In the implementation phase, the Community Committees monitor the attendance of labor. Finally at the evaluation stage, the utilization of Community Committees to select labor should be evaluated whether it has been effective or corrective actions should accordingly be taken in future projects.

LGUs Led Approach Alternative:

The project is advertised in the project area stating in the advertisement that the project's primary goal is to generate employment. Local residents are encourage in advertisement to take advantage of this opportunity. The contract documents to be prepared should state clearly

that the project is a higher labor content infrastructure development project and the definition of higher labor content infrastructure development should be stated. In evaluation of bids, it should be ensured that most contractors employ laborers from their areas of residence. Hence, evaluate contractors in part on their place of residence. In this approach, the contractor do laborer selection himself. In the implementation phase, the LGU supervision monitors the attendance of laborers. In the project evaluation stage, the contractor's use of place of residence as a targeting mechanism should be evaluated if it has been effective. If not, corrective actions should accordingly be suggested for future projects.

3. Project Design Procedure

The proposed design procedure can be summarized in the following:

Demand estimation: this includes verifying the number of beneficiaries mentioned in the project proposal in addition to identifying expected future demand for a given planning horizon. Care must be taken to ensure that current demand levels are not exaggerated so as to make project proposals more attractive, as this will make it more difficult to attain sustainability of the proposed infrastructure and to respond to unemployment in other areas, as job-creation capital becomes over-allocated in one LGU district at the expense of others.

Economic project size / project utilization percent: project size is more of a problem in new developed areas within LGUs, where demand (or population distribution) is not currently high, but expected to become so in the future. In already-existing (built-up) areas, utilization percentage is expected to be high. The importance of maintaining high utilization levels is to facilitate sustainability of the project's resulting infrastructure. Usually, lower utilization levels result in public infrastructure as design engineers extend the planning horizon during which the resulting infrastructure is to perform its functions. In other words, they increase the design capacity of the infrastructure project so as to respond to all expected demand over the extended planning horizon.

This results in very low infrastructure initial utilization levels that tie-up capital that is initially intended to create as many jobs as possible.

Contract form selection: contract form is a function of project size (cost, complexity, activities, etc.), urgency, duration, local procurement regulations, and the capacities available to the parties involved in the design phase. Table 5 shows a comparison between contract types (forms) along the above-mentioned variables.

Table (5): Contract Forms Comparison.

Contract Type (Form)	Characteristics	Project Relative Size	Project Urgency	Party Responsible for Project Design	LGU Capacity Required	Project Duration
Competitive Bidding	The tender is awarded in most cases to the least-cost responsive bid (Price Quotation).	Larger	Less urgent	Contractor(s)	Project Supervision	Longer
Direct Hire	The project owner can directly hire the services of a contractor if the project owner can justify the selection.	Smaller	Urgent	Contractors/ LGU	Project Supervision	Shorter
Force Account	The project owner can use their own resources or directly employ labor to execute the project activities.	Smaller	More Urgent	LGU	All project management skills	Shortest

Probably the most important factor that determines contract form is the perceived project urgency (emergency) by the project management staff. Enhanced response to emergencies however, comes at the expense of competition and lower prices. In addition, and as a minimum, all contract forms must provide for minimum subcontracting (to minimize mercantile leakages), an explanation of the nature of higher labor content infrastructure development, and laborer safety (since there will be a higher overall probability of accidents, because of more laborers being on site).

Another factor that determines the contract form is the implementing agency's ability to manage conflicting interests (maximum profit for contractors and maximum labor content for project management). An option to using competitive bidding, in cases where it is difficult to manage conflicting interests, would be to change the contract form from Competitive Bidding to Force Account.

Address environmental concerns: this is to ensure that sustainability is not compromised by the short-term job creation needs.

Design criteria determination: all efforts must be exerted by the design staff to ensure that the functional requirements of the proposed projects are clearly understood and that the project features are not over-designed. For example, for road projects on the community level (local roads) the main function of roads is to provide accessibility rather than mobility (high-speed commuting). Consequently, higher-grade design that is more suitable for mobility is not to be used for local roads intended for low traffic volume.

Design limitations assessment: assess physical and other constraints that limit the number of design alternatives that can be developed. For example, road width may limit the number of potential courses for wastewater pipe placement.

Relationship of proposed project to other infrastructure elements of the LGU is assessed: the purpose of this step is to ensure that the proposed project will not create additional problems to the respective LGUs. Because higher labor content infrastructure development projects

are of a smaller size, hence greater in number for a given budget, there will be higher probability that mismatches materialize between project-introduced infrastructure and already-existing infrastructure. Consequently, remedial actions taken, especially with regard to design that will eliminate negative impacts of the proposed infrastructure on other LGU assets, must be determined.

Design alternatives development: a number of conceptual design alternatives should be developed if deemed necessary. If the community committees are involved in the project proposal preparation phase, they should then be consulted with regard to the design alternatives proposed in the conceptual phase to get their feed back, specifically for measures related to higher labor content activities, the use of local materials, cost of various alternatives, assumptions, and constraints

Infrastructure economic and financial sustainability: standard evaluation methods should be used in assessing economic and financial sustainability of the resulting infrastructure. Furthermore, as a guiding criterion, the cost of creating a workman-day should be used to approve or reject project proposals.

Specifications and bills of quantities (BOQs) preparation: BOQs items should include detailed cost items (direct labor costs, direct material cost and overhead costs) instead of one general cost item. In addition, specifications in-force should be revised so as to encourage the use of local materials. While this needs time to be accomplished, immediate specification (and BOQ) changes are provided in Table 6 ⁽¹¹⁾. In cases where the design engineers are unable to directly specify construction methods leading to high labor (employment) requirements in BOQs, an option would be to prepare the BOQs along the better-known capital-intensive guidelines, and after that design engineers pursue a refinement of the BOQs, so as to increase their labor content requirements.

Table (6): Immediate Proposed Changes to Higher-Labor Content Project Specifications and BOQs. Source: World Bank ⁽¹¹⁾, with adaptations.

Manufactured Building, Electrical and Mechanical Materials, Fixtures and Fittings

Preference is to be given to Palestinian (local) manufactured goods and materials with automatic adjustment to the basic specifications to accommodate any foreseen difficulties with technical standards and costs.

Excavation and Earthworks

To the extent possible, excavations and earth works should be performed using manual labor taking into consideration safety measures. Should manual labor be used to excavate for depths greater than 1.2 m, then a shuttering system should be used.

Concrete Works

- Specifying greater use of small or medium sized mobile rock crusher plants for on-site aggregate production.
 - Pre-cast elements should be kept to a minimum. In-situ production of building components and Curbs should be encouraged to the maximum level possible.
 - Where feasible, ready-mix concrete should be replaced by laborers feeding mobile concrete mixers.
 - Concrete mixing should be done mainly by machines.
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Retaining Structures

Specifying the use of gabions filled with local stones wherever feasible.

Water and Power Reticulation

Specifying labor-based methods as being preferred for all trenching operations.

Cut Stone

Adjusting specifications so that actual local sources may be utilized.

Road Works

- Sub-grade and base course compaction is to be done by machines only.
 - Specifying greater use of cement stabilization of sub-grade materials where appropriate, to reduce the design depth and cost of imported base course.
 - Whenever possible, Sub-base material is to be crushed on site.
 - Encouraging the use of locally-crushed demolition waste as a “local” substitute to imported base course.
 - Alternatives to bituminous surfacing should be provided for in specifications. Interlocking tile or concrete block pavements should become more of the “norm” and based on recent successful experience. This is acceptable provided that the tile source is local. Rigid concrete pavement is also suitable for narrow roads.
 - The use of pre-cast Curb Stones should be kept to a minimum. On-site fabrication is to be used instead.
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Culverts

In-situ fabrication of box culverts or concrete pipes should be provided for.

Rip-rap Works

Stone grouted protection works should be used wherever there is an abundance of locally suitable stone.

Traffic Signs

Where applicable, locally-fabricated road signs should be used.

Street Lighting

- Where applicable, locally-fabricated light poles should be used.
 - Where locally-fabricated light poles are not available, the simplest form of light poles should be used (Simpler cross-section, discrete-multi-section poles instead of continuous-section among others). This is to encourage local replication later on and in other projects.
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Wastewater Networks

- To the extent possible, manholes should be fabricated on site.
 - To the extent possible, locally-manufactured pipes should be used in the networks.
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Contractor Reports and Progress Claims

Provision should be made for all contractors to report on actual employment generated vs. targets per each progress payment claim so that there can be improved monitoring of employment generation data.

General Specifications and Bills of Quantities

New sections are needed on labor activities, employment conditions and labor productivity guidelines. Bills of quantities need to be modified to indicate workdays per item or activity.

4. Project Tendering and Awarding Procedure

Where applicable, representatives of the local community should be involved in bid opening and bid evaluation. The following tendering and awarding procedure builds on the Palestinian Local Government Procurement Regulation in effect in Palestine and can be adapted to respond to circumstances elsewhere.

Advertise project to contractors: the project is to be advertised in Arabic in local newspapers for two consecutive days in the case of National-Competitive-Bidding (NCB) type of Contract. In case of Direct-Hire (DH) or Force-Account (FA) type of contract, no such newspaper advertisement is required.

Advertise project to beneficiaries / laborers in target Area: irrespective of contract form through which the services of the contractor are to be solicited, higher labor content infrastructure development project advertisement should be carried out in the targeted community. In cases where local committees are involved in the project process, they can be made responsible for this activity.

Short-list contractors: a bid opening committee, representing key stakeholders in the LGU concerned, short-lists contractors, based on the following criteria:

- a. Contractor classification schemes, schemes that are followed by the Contractors Union. Second and third class contractors, should be the ones to be short-listed;
- b. Contractor’s Place of Residence;
- c. Size of labor force managed previously;
- d. Size of similar contractual works implemented;
- e. Heavy equipment available;
- f. Availability of raw material storage facilities;

Solicit and open bids: the bid opening committee solicits bids from short-listed contractors, and upon the receipt of bids, ensures that the bidding documents presented are complete. In addition, documentation of bid information must be kept.

Evaluate bids: in order to expedite the awarding process, bid evaluation should be done immediately after the bid opening, and according to regulations in force. The criteria that should be used in selecting the contractor who will be awarded the contract are:

- a. Price quotation;
- b. The number of workdays proposed by the tenderer;
- c. The direct labor cost, as proposed by the tenderer;

In addition, 70% of the total scoring weight will be allocated to the price quoted by the tenderer, 20% to the number of workdays proposed and 10% to the percentage of direct labor to the total project cost, as proposed by the tenderer. The bid evaluation score is calculated as follows:

$$BES = \left[70\% \times \frac{P_{Min}}{P_{Bid}} \right] + \left[20\% \times \frac{N_{Num}}{N_{Max}} \right] + \left[10\% \times \frac{L_{Cost}}{L_{Max}} \right] \dots\dots\dots (1)$$

Where:

BES = Bid Evaluation Score;

P_{Bid} = Bid Price;

P_{Min} = Minimum Price amongst Contenders;

N_{Num} = Number of Workdays;

N_{Max} = Maximum Number of Workdays amongst Contenders;

L_{Cost} = Direct Labor Cost;

L_{Max} = Maximum Direct Labor Cost amongst Contenders.

5. Project Implementation Procedure

Since the labor content (man working-day and labor cost) is already stated in the BOQ as a requirement for implementation, very little can be expected in terms of increasing labor content in the project implementation phase than proposed. The role of the supervising engineer is to ensure adherence to the implementation of policies stipulated in the contract documents. Consequently, the following steps represent all that is required from the supervising engineer at this phase as related to insuring use of higher labor content.

Revision of Project plan presented by contractor: the time-bar schedule presented by the nominated contractor will be reviewed and approved by the supervising engineer. In addition, all resource plans will need to be checked and approved prior to the commencement of physical works.

Organizational structure preparation for project (who reports to whom): determine the names of the staff to be working on the project and their job titles. To facilitate the management of labor, where there are a large number of labor expected to be on site, assign senior labor who

usually do the physical work as a leading group manager in addition to supervising his labor group.

Raw materials inventory monitoring: to ensure continuous supply of construction materials, especially during conditions of political instability, the contractor should be allowed to purchase materials in bulk through facilitating rapid financial reimbursement. The supervising engineer should monitor the inventory through daily visual inspections of materials and their quantities, and reporting on problems in weekly progress reports.

Monitoring progress of physical works and updating the weekly plan: weekly plan updating should include achievement (percentage completion) with respect to the time schedule, and resource usage (number of labor man-days) and associated costs up to date. In addition, consistent records of project implementation delays and their causes should be kept by the supervising engineer.

Updating bill of quantity as physical works progress: a Bill of Quantity detailing item costs into direct labor costs, direct material cost and overhead costs should be used in this step. Of special importance to BOQ updating is monitoring the actual use of labor through the daily logs of labor, materials quantities take off and the percentage of works actually fabricated on site.

Monitoring labor attendance. Since this can be a cumbersome task, a foreman responsible for, inter alia, recording laborer attendance could be appointed. The foreman is to be made responsible before and paid by the implementing agency / LGU, and not the contractor and this is to avoid conflict of interest. An alternative to appointing a foreman would be to train community committee members on monitoring laborer attendance reported by the contractor, and possibly on preliminary site supervision tasks as well ⁽¹⁰⁾. This may become even more necessary in light of limited manpower available to LGUs to perform site supervision tasks, especially when project sizes are limited, hence there are more projects to supervise for a given budget.

Monitoring laborer productivity: to help the stakeholders better estimate labor requirements for future projects, standard labor performance norms should be developed by the supervising engineers of LGUs. This can be done through visual inspection of workers performance and simple measurements. Daily site report can be used to log the number of labors per tasks achieved. The weekly and monthly average can accordingly be determined for the same tasks of different projects under similar conditions.

Monitoring requests for payment (RFP): the supervising engineer should monitor the maximum limit imposed on the request-for-payment sums as well as retainage presented by contractors in tandem with maximum time limit for forwarding them. This is to ensure that labor wages are disbursed quickly.

Monitoring safety conditions at site: the afore-mentioned foreman can also ensure that site safety measures are followed as per the best practice possible. A pre prepared forms with instructions and check list of points of concern can be used by the supervising engineer to monitor the safety measures.

6. Project Operation and Maintenance Procedure

Very little can be expected in terms of increasing labor content in the project operation and maintenance phase, as the duties of operation and maintenance are observed by the LGUs. Since most LGUs do not have the financial capacities necessary to carry out maintenance activities on a regular basis, it is suggested that a percentage of the contract value to be deposited in a community committee maintenance fund to cover the routine maintenance activities.

7. Project Evaluation Procedure

Evaluation in higher labor content infrastructure development projects is important, because very little is known in local project management circles of characteristics of higher labor content infrastructure development projects. One might even question the

effectiveness of some of guidelines proposed herein. However, without proof obtained from the scene, one cannot verify, or negate the effectiveness of these guidelines. Consequently, evaluation of higher labor content infrastructure development projects should be mandatory and preferably done by a third party, in order to ensure objectivity. The following issues should be addressed in the evaluation:

1. Project start delays, end delays, duration extensions and their causes.
2. Actual project cost vs. maximum project size policy.
3. Actual project cost vs. planned costs.
4. Actual scope (volume) of physical works vs. planned scope of works.
5. Actual workdays vs. planned workdays and the reasons behind any discrepancies.
6. Actual number of workers vs. the planned number of workers.
7. Wages earned by laborers and their distribution in relation to project area.
8. Local contractor performance.
9. Actual use of local materials vs. the planned use.
10. Actual costs / quantities of imported raw materials stored vs. the planned stocking of imported raw materials.
11. Actual percentage of works fabricated on site vs. the planned percentage.
12. Adherence to maximum limits imposed on RFPs.
13. Comments / observations concerning labor productivity (Labor Productivity Norms).

Additional evaluation aspects can include a qualitative comparison between work achievement rates in higher-labor-content projects vs. heavy-equipment-based projects, and comments on the cost of administering a higher labor content infrastructure development project, as it is very likely that the cost of administering higher labor content

infrastructure development projects will be higher than the ordinary infrastructure development projects.

Conclusion

The paper presented an approach to be applied to increase employment in infrastructure development projects to make them more responsive to short-term employment needs. The proposed approach identified closely the requirements of the higher - labor projects at each phase so that the project cycle becomes coherent, comprehensive, and responsive. More emphasis on project planning / preparation phase was demonstrated in the requirements to ensure the applicability of the approach at implementation. The role of the community in all project phases, including the design phase, is emphasized. A new formula for awarding contracts to incorporate the need to increase employment levels in infrastructure development projects is proposed. The proposed approach also introduces the reporting requirements and enhances learning through emphasizing project final evaluation.

This approach requires implementation by trained staff so as to become adaptable smoothly and feed back can be gained to refine the project stages.

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