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ANALYSIS OF THE JORDANIAN CONSTRUCTION SECTOR

Abo Sae'a, Amer ⁽¹⁾; *Fuentes Bagues, José Luis* ⁽²⁾; *Ferrer Gisbert, Pablo S.* ⁽³⁾

⁽¹⁾ University of Jordan, ⁽²⁾ Universitat Politècnica de València, ⁽³⁾ Dto Proyectos de Ingeniería (Univ. Politècnica de València)

The construction sector in Jordan is an important economic sector due to its contribution to GDP and employment. Regard to the GDP, it was ranked the sixth inms of the highest economic sectors contribution to GDP and accounted the 5% in 2018. About the employment, for the 2018, the construction sector represented about 5% of employed Jordanians.

Major and governmental projects are executed by registered contractors and classified according to the capital and executive capacity of the Ministry of Public Works. The secondary projects are implemented by skilled workers and contractors not registered in the union, which mostly includes finishing and electrical installations.

The objective of this communication is to describe and analyse the Jordanian construction through the statistics of production rates, employment, public procurement, licenses number, etc., that will give us a picture of the historical evolution of sector to the current situation.

Keywords: construction; Jordan; economic values

ANÁLISIS DEL SECTOR CONSTRUCCIÓN JORDANO

El sector de la construcción en Jordania es un sector económico importante debido a su contribución al PIB y al empleo. En cuanto al PIB, ocupa el sexto lugar entre los sectores económicos que más contribuyen al PIB y representaba el 5% en 2018. En cuanto al empleo, para 2018, el sector de la construcción representaba alrededor del 5% de los jordanos empleados.

Los proyectos mayores y gubernamentales son ejecutados por contratistas registrados y clasificados de acuerdo a la capacidad de capital y ejecutiva del Ministerio de Obras Públicas, mientras que los proyectos secundarios son ejecutados por trabajadores calificados y contratistas no inscritos en el sindicato, que en su mayoría incluyen instalaciones eléctricas y de acabado.

El objetivo de esta comunicación es describir y analizar la construcción jordana a través de las estadísticas de tasas de producción, empleo, contratación pública, número de licencias, etc., lo que nos da proporcionará idea de la evolución histórica del sector hasta la situación actual.

Palabras clave: construcción; Jordania; datos económicos

Correspondencia: Pablo Ferrer Gisbert pferrer@dpi.upv.es



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1. Introduction

The construction sector in Jordan is an important economic sector due to its contribution to the Growth Domestic Product (GDP) and employment. This sector is characterized by its broad interdependence with all other economic sectors. Its main activities are summarized as the construction of buildings, roads, and private utilities, construction works related to other civil engineering, electrical installations, air conditioning, mechanical works, infrastructure and completion and finishing of buildings (Jordanian Business Association, 2019).

With the evolving events in the area of the Arab countries, the revolution of the Arab spring, and steady increase in the arrival of refugees from neighboring countries (Al-Hashmi, 2019), Jordan must provide housing security commissioner for refugees, which led to three key questions, as follows:

1. What is the impact of the Jordanian construction sector on GDP?
2. What is the impact of the Jordanian construction sector on solving the problem of unemployment in Jordan?
3. How is the Jordanian government interested in the development of the Jordanian construction sector?

2. Methodology

The reports of the Jordanian Statistics Department and the Jordanian Engineers Association have been used primarily to the size of construction projects in Jordan and their impact on the Jordanian national economy.

From the academic perspective of the study and given its national focus, recent doctoral theses and academic works developed in Jordanian universities have been used primarily. Continuous research will afford up-to-date ratios and statistics related to the Jordanian construction sector, which will help researchers, academics, and experts in this field to generate ideas which will reduce the scientific gap achieving development in the field. From this more practical focus, it has been analyzed to what extent the Jordanian government has an interest in developing the future of the Jordanian construction industry according to plans and programs of investment.

Seeking to provide recommendations for the development of the sector, the reports of the Jordanian contractors Association have been reviewed.

2.1 General background on the methodology of the Jordanian construction sector

Over the first decade of the 21st century, the Hashemite Kingdom of Jordan witnessed many local, regional, global political and economic events, which made decision-makers in this sector draw up a methodology that organizes the mechanism of operation of construction organizations on the levels of public and private sectors. It is a group of factors and standards that work together to frame the methodology and apply it properly in managing public and private construction organizations.

The methodology of the Jordanian construction project includes a group of factors that affects the construction project, and is represented by the following:

- The culture, structure, and governance of the organization.
- Geographical distribution of utilities and resources.
- Standards of government or industry (lists of supervisory bodies, production standards, quality standards, and standards of work execution).
- Infrastructure (existent utilities and capital facilities).
- Human resources (skills, specializations, and knowledge).
- Management of workers' affairs (guiding principles for employment, keeping, reviews of workers' performance, training records, rewards polices, overtime, and following up working hours).
- Systems of works permit in the company.
- Market conditions.
- The degree of bearing risks.
- Political climate.
- Existent communication channels in the organization.
- Commercial databases in the organization.
- Project management information system.

There are four kind of requirements for the application of the methodology of Jordanian construction projects.

First, cognitive skills which are represented by the following:

- Phasic needs of the construction projects: Identifying all necessary needs to conform to the quality and size of the construction project.
- Predicting risks of the construction market conditions: It is a good understanding of the market's conditions, which helps draw up appropriate plans to avoid these risks and control them.
- Modern methodologies: The design of methodologies conforming to the client's requirements along with its correspondence with the international standards.

Second, scientific skills which are represented by the following:

- Training programs to manage construction projects: Preparing training programs to raise competence because experience alone is not sufficient to create managers for construction projects.
- Feasibility study: It is carrying out studies on all aspects of the construction project, which affect directly the project's success.

Third, technological skills which are represented as follows:

- Modern technology in the area of construction projects management: The ability of organizations to achieve the project to a successful degree depends on the ability of

project managers to plan the project in a way that is correspondent with the available technology.

- Management information system (MIS): It is a system which combines information technique and management, and it aims to build a technological system that helps construction organizations do their various works.
- Virtual work teams: It means work teams that work remotely, move permanently from one place to another, and do not meet together face to face.

Fourth: managerial skills which are represented by the following:

- Supporting senior management: Commitment to actual and positive participation by applying the methodology of construction projects.
- Construction projects management programs: Using new programs that help identify the activities to be done in addition to identifying the responsibilities during the execution process and measuring expectations and deviations in the construction project.
- Managerial competence: Using available resources (human, financial, technical, and technological) to achieve the construction project.

On the other hand, there are five kind of standards for applying the methodology of the Jordanian construction sector.

First: standards of building a work team for the construction project which are represented as follows:

- Professional (accredited) project manager: Accreditation through certificates from internationally recognized bodies, which qualify its holder for the position of the construction project manager.
- Sticking to the specified duties: Specifying the individuals responsible for each duty. Besides, the construction organization makes sure that those individuals know and understand their duties and responsibilities.
- Working with a team's spirit: Harmony in the orientations and the common goal along with deep understanding and awareness of the positive responsibility towards the general success of the construction project.

Second: standards of a thorough understanding of the internal environment of the organization, which are represented by the following:

- Organizational hierarchy of the construction organization: It is a system that explains leadership, identifies the responsibilities, and distributes works inside the organization.
- Diversity of cultures in the work environment: It is the existence of various nationalities inside the construction organization, which requires building a flexible managerial system that respects this cultural diversity.
- Communications plan: It is a secondary plan that explains the general approach to communicating with all construction project owners, and is listed in the overall plan of construction project management.

Third: standards of dealing with interest owners and their needs, and they are represented as follows:

- Interest owners: They are individuals and groups that are connected to the project directly or indirectly, and affect the execution of the construction project.

- Construction project reports: It is a crucial means through which the project's condition is described. Furthermore, information on performance and achievement rates, which have to be characterized by precision and discipline is published.

Fourth: standards of supervision and following the construction project which are represented by the following:

- Analysis and fault finding: It is the initiation of identifying problems and analyzing them to find out the reasons for fault and then drawing up a detailed plan for curing.
- Earned value: It is an effective system which is used to supervise the execution of the construction projects and control them, and it relies on three variables:
 - o Planned value (PV) of the project according to the time frame of the construction project.
 - o Earned value (EV) which is spent on the project monthly.
 - o Actual cost (AC) which is represented by what has been spent on the construction project during the month.
- Technical specifications: They are the main guide that explains the required properties of the materials or the product to be imported or executed as well as specifying the minimum acceptable quality.
- The time frame of the project: It is a technological method through which the activities and tasks of the project are compared with a measure, and is considered one of the important tools for the project manager to follow the execution plan of the project.

Fifth: standards of a competitive advantage which are represented as follows:

- Strategic plan to manage construction projects: It is a plan to integrate objectives and made them complete, whereby the set objectives of the construction organization are achieved along with rationalizing the resources and distributing them in a proper and applicable way.
- Market share: It is measuring the extent to which the organization has achieved a larger size of the projects in comparison with the competitors during a specific period.
- Making profits: It is a measure of the profits that the construction organization makes from the projects during a specific period.
- External projects: It is the ability of the construction organization to create new markets whether internal or external ones.
- The specified quality: It is the agreed-upon standards to identify the level of achieved results and to know the level of expected results.

2.2 Strategies for developing construction industry

First: the use of information technology in construction sector.

The advantages of using information technology in construction project management are represented as follows:

- Avoiding vagueness and complexity about responsibility and authority.
- Quickness to make managerial decisions and transferring information between various managerial levels.
- Easiness of performing the required duties and increasing follow-up and supervision on the implementation of works in various phases of construction project.
- Success of project managers, engineering divisions' managers, and companies' managers in making right decisions.

- Tackling problems with high speed especially in emergencies.

Second: vocational training for engineering cadres and constructional workers

- Developing training strategies to rehabilitate the staff working in the construction sector through establishing domestic, regional and international training centers which increase the staff`s competency in various engineering and constructional professions through offering specialized courses within the highest standards of qualification.

Third: Boosting the participatory relationship between investors in this sector through employing the best standards of international practices in this relationship.

Forming strategic partnerships helps develop the construction project clearly. Choosing the appropriate partnerships lead to achieving perfection. Therefore, it contributes to the construction project's success and guarantees the continuity to achieve the construction project's set objectives.

Fourth: Developing a system for quality insurance in construction projects management through:

- Following a construction project quality plan (PQP).
- Following a construction project detailed quality plan (DQP).
- Using key performance indicators (KPIs).
- Using concurrent engineering system (CE).
- Following the policy of quality vocational distribution.
- Following evaluating engineering to employ quality applications in construction sector.
- Following the system of basic building of quality matrix (HOQ).
- Following the pass system to evaluate contractors.

Fifth: Following International Federation of Consulting Engineers (FIDIC) system in constructional industry.

Sixth:Applying BIM systems through the following:

- Looking into the best strategy to apply BIM systems in a way that is compatible with adopted systems, regulations and rules.
- Looking into the effect of types of engineering contracts and ways to deliver projects that are most compliant with systems (Design Build, Design Bid Build and Construction Management at Risk).
- Studying the effect of BIM systems on the investment phase, building maintenance, and managing facilities and benefits accrued to the owner through six dimensional model (6D Model) (Cox et al., 2003), (Serpell et al., 2002), (Oztas et al., 2004), (Kamara et al., 2001).

3. Results

3.1 Methodology

Applying the methodology of construction projects management became not only an important thing but it may also be necessary as the main objective is to make this methodology a part of the daily work culture inside large, medium and small-sized organizations. This methodology includes FIDIC contracts, which necessitate the presence of three main parties working with this methodology in this sector and they are represented by employer, engineer and contractor. Each party has their own role and responsibilities in the construction project. This methodology makes flexible rules, which are derived from the

nature of construction project work, where this methodology is considered as a new and developed knowledge and art. The methodology is applied by the construction organization, depending on various flexible scientific principles and fundamentals to reach the desired objective, that is finishing the construction project on time, within the set budget and of high quality. (Cray et al., 2005) (Tang, 2005).

3.2 Macroeconomic stability

Table 1: Jordanian GDP value, GDP growth rate, and Construction contribution (Jordanian Engineers Association Report, 2018).

Year	GDP (JD million [*])	GDP Growth Rate (%)	Contribution to GDP (%)
2018	29.984	3.7	2.9
2017	28.903	3.9	3
2016	27.830	3.4	4.5
2015	26.925	5.2	4.4
2014	25.437	6.6	4.5
2013	23.852	8.6	4.4
2012	21.966	7.3	4.4
2011	20.477	9.1	4.3
2010	18.762	10.9	4.8
2009	16.912	8.5	5.3
2008	15.593	28.5	4.5

(*One Jordan Dinar is equivalent to 1.3 €)

3.2 Macroeconomic stability

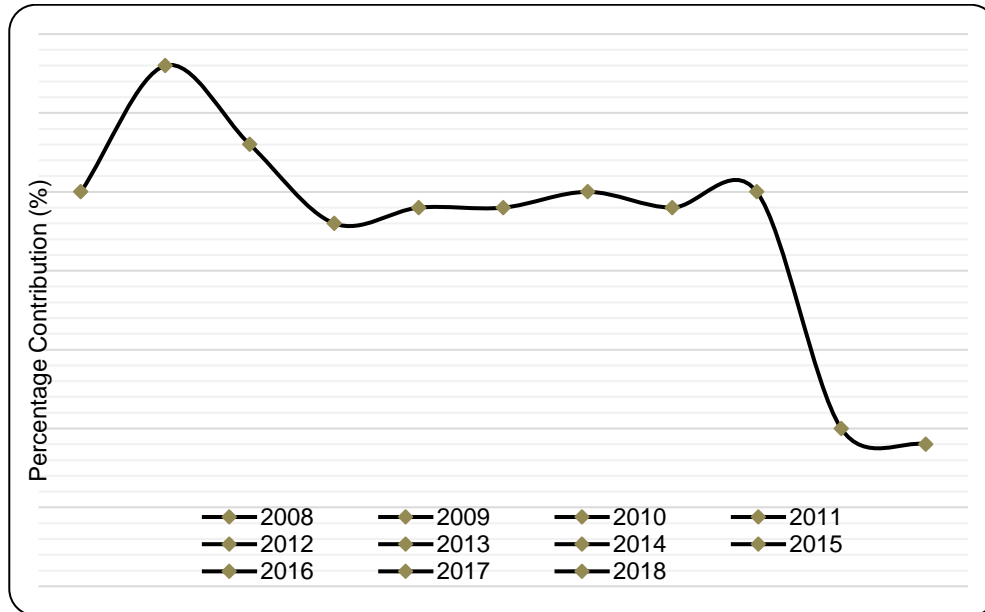
Jordan has displayed its ability to take hard and committed fiscal measures to bring down its debt-to-GDP ratio from 220% in 1990 to approximately 60% in 2008, on the onset of the global financial crisis. However, the external pressures of the past seven years and the global economic slowdown increased Jordan's debt-to-GDP ratio to 95%. Jordan has successfully implemented a Stand-by Arrangement program with the International Monetary Fund (IMF) during the period 2012-2015. In August 2016, Jordan and the international community agreed to a US\$ 723 million Extended Fund Facility (EFF) with the IMF with the objective of bringing down Jordan's debt-to-GDP ratio to 77% in 2021 (Al-Naimat, 2019),(Aldiri,2019).

Statistics in Table 1 indicate a decline in the GDP growth rate, which reflected negatively on all sectors of the Jordanian economy. In addition, the construction sector and its impact on the GDP decreased. These changes are a consequence of the austerity measures taken by the Jordanian government to face internal challenges such as poverty, unemployment, budget deficit and the public debt of the country or external and regional challenges caused by regional instability in the Middle East.

A stable impact of construction projects on the GDP is noticed between 2011 and 2016, where the change rates did not exceed 0.2% as shown in Figure 1. In 2017, there was a clear change in the growth rate, dropping by 1.5% to reach 3% of GDP. This is a shred of

evidence; the market is affected by external factors such as aid and grants from friendly countries and regional crises.

Figure 1: Percentage contribution of construction to GDP (Jordanian Engineers Association Report, 2018).



The last column in Table 1 shows that the rate of contribution of Jordanian construction sector decreased due to the fact that any developmental plan in Jordan is not free of confirming the priority and need to make change in the Jordanian economy in favor of goods production. On the one hand the focus was specifically on developing transformational industries, which contribute to make connection between the domestic economic sectors in order to fix faults in the Jordanian economy. On the other hand, the focus was on the tangible goods sector because of its ability to generate income, create job opportunities, achieve sectorial partnerships, and its contribution to diversify and broaden the production base which helps in reducing dependency on importing tangible goods necessities. Therefore, it reduces deficit in commercial balance and reduces dependency on the outside community (Al Tarawneh, 2005).

3.3 Employment

According to reports published by the Jordanian Association of Engineers in 2018, 153,338 engineers from various engineering disciplines have joined the association. This figure represents one engineer for every 50 citizens and far exceeds the needs of the Jordanian market. In fact, it is the highest ratio in the world above even that of Great Britain, which is one engineer for every 200 citizens (Al-Momani, 2019),(Shabari,2018).

According to the Jordanian Civil Service Department, there are more than 30,000 applications for engineering jobs and more than 20,000 Jordanian engineers working outside the country, mostly in the Arab Gulf countries (Al-Mahseer, 2019),(Amr,2019).

Table 2: Percentage employed and registered contractors number in Jordanian Contractor Association (JCA) (Jordanian Statistics Department Report, 2018).

Year	Percentage Employed in the Construction Sector	Contractors Registered in the (JCA)
2018	5.0	3168
2017	4.9	3169
2016	6.1	3170
2015	6.0	3171
2014	6.6	3172
2013	6.4	3173
2012	6.0	3174
2011	6.0	3175
2010	6.4	3176
2009	6.7	3177
2008	6.4	3178

On the other hand, there is no significant change in the number of contractors or in the ability of the Jordanian construction sector to create jobs. The variation in the ratio reached a maximum of 1.8% between the highest employment rate in 2008 and the lowest rate in 2017 as shown in Table 2 (Al-Shlol, 2018), (Shehada,2019).

3.4 Growth plan of the Jordanian construction industry

Strengthening the position and role of the construction, engineering and housing sectors is the key solution for economic driving and sets the sectors as engines of growth in favor of other sectors. The government's executive plan for the next ten years is to ensure the achievement of the desired objectives to make Jordan a regional center for architectural and engineering services in the Middle East (Al-Hashmi, 2019), (Al-Fara,2019), (Al-Shamh,2019).

The sector policy depends on several practices as shown in Table 3. Some to mention are introducing new international best practices; improving and developing the quality of engineer education and training; updating and developing procedures for submitting tenders; improving, organizing and developing housing and real estate development; developing legislative frameworks for the protection of investors and beneficiaries; and opening new export horizons for construction, engineering, and housing services, which include consultancy services. Moreover, actively participating in reconstruction operations in neighboring countries and enabling and strengthening the partnership between the investors of this sector in order to access global markets and create an Arab construction sector armed (Ghaban, 2019), (Isa,2018), (Faraj Allah,2018).

Table 3: Growth policy of Jordanian construction sector (Jordanian contractors Association Report, 2018).

AXIOMS	INTERVENTIONS
Employ new international best practices	<p>Introduce new international best practice standards and accreditation systems for engineers and other sector professionals (e.g. plumbers, electricians, stonemasons, etc.).</p> <p>Revise the contractor classification system in line with new standards of excellence.</p> <p>Strengthen monitoring and enforcement capabilities (through modification of the National Building Law): Increase the number of inspectors and site inspections of construction projects. Review & strengthen penalties under law for building code violations.</p>
Improve engineer education and training	<p>Introduce new degree programs that meet the needs of the industry.</p> <p>Establish and publish a national rankings system for engineering degree programs in Jordanian Universities.</p> <p>Consolidate and expand all vocational training for construction-related trades.</p> <p>Limit the number of exemptions into engineering degree programs and eliminate the 'bridging' by students in the engineering programs in Jordanian universities.</p>
Update and develop procedures for assessing and submitting tenders	<p>Mandate provision of audited financial statements for each tender.</p> <p>Strengthen the use of FIDIC (International Federation of Consulting Engineers) contracts and eliminate the use of special committees.</p> <p>Introduce new provisions requiring Jordanian company participation in all international contracts implemented in Jordan (for infrastructure projects) to increase Jordanian company participation to 50% by 2025.</p>
Put in place legislative frameworks that provide appropriate protection to investors and beneficiaries	<p>Develop a new action plan for the housing sector, focusing in particular on mid-market affordable housing solutions – underway at 50% completion with the support of World Bank experts.</p> <p>Update the building bylaw for Greater Amman and the rest of the country to include more specific density and zoning guidelines, and energy efficiency requirement.</p> <p>Introduce a new national home warranty scheme to provide new buyers with protection on the quality of their new home (to be implemented through the new law for regulating the housing sector and real estate).</p>
Open new export horizons	<p>Organize annual industry conferences and trade shows to encourage commercial networking and information sharing about international export opportunities.</p>

4. Conclusions

Based on the analysis of theoretical and applied studies issued by the Jordanian department of statistics, the study draws to three grand conclusions:

- The impact of the Jordanian construction sector on the GDP decreased due to the austerity procedures taken by Jordanian governments to face internal challenges like poverty, unemployment, budget deficit, and public debt, in addition to external and

regional challenges resulting from instability in the Middle East.

- The number of engineers registered in the Jordanian engineers association is 153,338. This number exceeds the needs of the Jordanian market. Based on this there is no change in ability of the Jordanian construction sector to create new job opportunities, which reflected negatively on the work environment of this sector.
- There is an interest on the part of the Jordanian government in developing and enhancing the position and role of this sector by setting an executive plan for ten years to ensure the achievement of the desired goals to place Jordan as a regional center for construction engineering services in the Middle East.

Moreover, the study recommends the establishment of a Jordanian Construction Council, comprising Jordan Engineers Association, contractors association and investors association in the construction sector, to achieve the following tasks:

- Discussing the issues and challenges related to the Jordanian construction sector, and knowing how to benefit from the advantage of opportunities associated with this sector. In this manner, revitalizing it in the light of events that Jordan has witnessed.
- Demanding the cancellation of all regulations that include harmful items with a negative impact on investment in the Jordanian construction sector.
- Providing support and encouragement for mergers between small and medium-sized construction enterprises in a manner that contributes to preserving capital, reducing costs, unification departments, enhancing confidence in banks and achieving the ability to develop potential markets.
- Investigating ways to finance the Jordanian construction sector.
- Organizing the employment of the Jordanian construction sector.
- Enhancing the capabilities of the workforce in terms of technical and productive specialization in this sector.
- Establishing a building research center in Jordan.
- Setting rules to guarantee quality and introducing quality standards in the Jordanian construction industry.
- Developing policies and strategies to promote export opportunities for the Jordanian construction sector.
- Encouraging specialization in the Jordanian construction sector.
- Adjusting the construction sector strategy to face sudden changes at all economic, political, environmental and social levels.
- Employing the concept of comprehensive project management, which constitutes an integrated system between tasks, laws, processes, and factors.
- Conducting extensive studies on the construction sector.

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