

"Barriers for integrating sustainability into public works in Jordan"

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Abstract

The construction industry in Jordan is considered one of the most important sectors to improve the economic growth and it is responsible for offering jobs, employment and wealth. Construction industry in Jordan has rapidly developed in the last few years due to the huge public investments and infrastructure projects.

These large projects utilize and consume vast amounts of resources in terms of materials, water, and energy. Also, they produce large amounts of products which are harmful to the environment and have long term impacts on economy and society. As a result, there is an increase interest from public sector to address sustainability into its projects due to several challenges which are facing public works. These challenges are the lack of funds towards public projects, population growth, scarce of water resources, environmental issues, climate change, greenhouse gases which occurred from several sectors and especially from the construction industry.

This paper presents some barriers facing the integration of sustainability into public works which were identified from the content analysis approach. These barriers were grouped and categorized into six categories and then discussed. The study concluded that these barriers need to be overcome by set of governmental programs and best practices which these barriers then need to be verified for future work.

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1. Introduction

Public works in Jordan seem to be the key factor to improve public facilities and social services in order to meet the requirements of people. Public works are the main part of the socio-economic growth in the country which reflects on the living standards of people in the future. They are considered as the main contributor to the economy by offering jobs and wealth [1]. Public works are rapidly developed in the last few years in Jordan with huge investments in infrastructure that worth a lot of money to the country [2]. These infrastructure projects are divided into large construction projects. They consume and utilize vast amounts of resources, money, materials, equipment and time [3]. These infrastructure projects are required to be addressed into the urban plan of the country to cope with the development of living standards of people which are essential to achieve sustainable development. The urban plan of country needs funding bodies to achieve and develop the living standards of people. In fact, Koppenjan [4] argued that, the public funding for urban infrastructure needs huge amounts of money in order to be delivered. As a result, the massive amounts of money towards the development of public infrastructure need to be estimated clearly as the expected benefits from these projects have to be identified during the operation of project's development [3].

The Ministry of Public Works and Housing (MPWH) in Jordan is the key agent for making a control of all public works and services [5]. This is essential in order to meet all the requirements of people and to improve the living standards of them [5]. The MPWH takes the role for funding all of these projects by the corporation and coordination with the ministry of finance which makes a problem to the ministry once the financial allocations are not available. In some cases it depends on the foreign sources of funding which are not available constantly. The government of Jordan is well aware about funding all the investment of these projects which will get the returned profit to improve the country. In some situations, the government of Jordan borrows money from the World Bank or other sources of funding in order to deliver public works and services and make an improvement of living standards of people [6]. The developing economy suffers from the limited of feeding sources which reflects on the development of the country. In addition, the financial situation, poverty, 'high unemployment rates and low private sector competitiveness' and high public debt, are considered as the most challenges that are facing the Jordan's economy which is classified by the World Bank as "a Middle-income country". [7, p1; 8]. Moreover, the population growth, environment pollution, rapid rates of urbanization, deep poverty, scarce of resources and the increase of the energy prices are considered as the main concern facing the developing countries including Jordan [9].

2. Jordan, the current situation

Jordan is a developing country facing many challenges as a result of limited availability resources, energy and water [10]. It imports 97% of its oil and gas needs from foreign sources [11]. In addition, it is considered as one of the fourth most water stressed countries in the world [12]. This is resulted from its location in an arid to semi-arid zone; many different weather conditions and variation in a hydrological elements such as rainfall, runoff, and evaporation are wide; which are different from day to another from summer to winter and from year to year [13].

The available per capita water resources are limited and continually to be dropped, due to the unexpected population growth as a result of unstable region during the last few years. This is going to increase the demand on water which is the major challenge for the country and make an impact on the Jordan's plan for balancing the demand and supply water. From this situation and by 2025 the Per capita available water is

expected to fall from 145 cubic meters per year to only 90 cubic meters per year [13]. However, the current situation of Jordan is a stable country in the Middle East and due to instability situation in the region in the last years especially Iraq, Palestine and Syria, this issue has caused an increase on the percentage of immigration particularly for safety issues [14, 15].

After the war of Iraq 2003, there are about 500,000 Iraqis came to Jordan. In addition, more than 1,600,000 Syrian refugees live in Jordanian territory who have moved to Jordan in order to escape violence in their country [15]. As a result, Jordan is currently suffering from the rapidly increased of population growth with an annual growth rate of 2.2% [14].

The population grows fast and the latest statistically report pointed out that the population growth has become the most concern to the public sector for offering the facilities to the people. The capital Amman has almost doubled over the last thirty years in area and since 2009; the construction industry has increased 2.8 percentages as a whole [16]. In 2014, and based on the recent estimates, the population of Jordan reached at 7,504,812 where in February 2015 reached to 7,625,408 [14]. Therefore, this will require from the public sector which is represented by the government of Jordan to meet all the requirements of people by improving the facilities, infrastructure and services.

3. Sustainability and sustainable development

According to the World Commission on Environment and Development WCED 1987 [9, p70] sustainable development was defined regarding to Bruntland report as “the development that meets the needs of the present generations without compromising the ability of the future generations to meet their own needs”. From this definition which is given by Bruntland report [cited in 17, p179] it can be noted that sustainable development places the responsibilities on the current generation to meet the needs for future generation. These needs could be related to the natural resources water, energy and land. Meeting these needs will ensure a better quality of life and meet the human needs through three pillars. Sustainable development is based on these three pillars which are environmental, social and economic.

Once these three pillars of sustainability are integrated sustainable development will be achieved. These pillars of sustainability are divided into several drivers in order to deliver construction projects under sustainability criteria to achieve sustainable development. Figure 1 shows the main three pillars and their integration in this research.

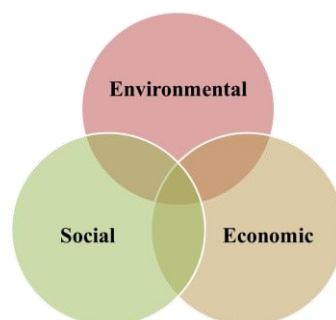


Figure 1. Sustainable Development Pillars

Firstly, the importance of environmental principle has been considered to be addressed during the construction action to improve the air quality, reduce the waste and minimise the use of energy and water [18-19]. As a result, the general consumption of water and energy will be dramatically cut and the greenhouse gases and carbon dioxide (CO₂) which are the major causes of the climatic change will be reduced too [19].

Moreover, during the international conference of sustainable construction in Tampa 1994, several efforts were made to discuss the environmental principle in order to be applied in construction to enhance the importance of protecting the environment and finding new methods to consume resources by reducing the consumption and maximizing the reuse and renewable resources [20, p23].

Secondly, the social principle can be included for improving the environment quality not for the final users only but also for the workforces who work during the development process of project [21]. These development processes include the process where the temporary workers working in, and the operation process where the final users working in. In addition, the design of the product must take into account the consideration of the disabled people and elderly [21]. Moreover, Hill and Bowen [22] stated that the social principle of sustainability includes improving the quality of life for people, making a provision for determination the social and cultural diversity in planning, protecting the human life by creating healthy built environment for workers and users, establishing training skills for people, satisfactory distribution of equitable cost, benefits of construction and addressing the importance of international equity.

Thirdly, the economic principle of sustainability has an impact on the development processes of project by improving the performance and the efficiency of the final project and reducing the life cycle costs [10]. The economic principle would reduce the operation and the maintenance costs and improve the performance of the project during the life cycle and enhance the occupants' productivity by creating healthy built environment which will finally reflect economically on whole life cycle of projects [10]. Moreover, William [23] added that sustainable construction needs long term view. Considering the initial cost of sustainable construction which is higher than traditional one; the payback period of time is the main important issue that need to be focused on; in order to recover the capital investment back during the operation phase.

Finally, and according to the Privatisation regulation 2008, it is required to take sustainability aspects into consideration for on-going projects [24-25]. In Fact, these aspects are usually absent in public-private projects which are essential to improve the living standards of people and the main driver to the economic growth [23]. Thus, it is essential to adopt new regulation towards sustainable practices within the construction industry which has increasingly become the new trend to both public and private sectors [23].

Therefore, the development plan in Jordan is being implemented to improve the quality of life for the Jordanians [26]. This would develop the relationship between both public and private sectors in Jordan and would increase the awareness of the importance of adopting sustainable practices [26]. As a result, the general public has started increasing the awareness about the importance of energy saving and water and the need to reduce the impact on the environment taking into account sustainable construction which has less impact on the environment [27, 10]. Therefore, adopting sustainability into public works may play a key role for improving the delivery capability of these projects in order to achieve sustainable development in those countries that suffer from limited in natural resources such as Jordan [10].

4. Sustainability in Jordan

According to Agenda 21 (Johannesburg Summit 2002); Jordan is a developing country suffers from two significant problems namely limited of natural resources such as water and the increasing of environment pollution. These problems cause by the construction activities in Jordan which are the main responsible for pollution and creating dust, waste and consuming energy [10]. In fact, Jordan imports 97% of its oil and gas needs from foreign sources [11].

This is evidence that Jordan does not have the adequate necessary resources to cope with the economic requirements of increased population [10, 27]. In the light of this situation, and due to the increase of energy prices and shortage of water, the government set a vision to drive towards sustainable construction to ensure the importance of natural resources for the development plan of Jordan and to improve the quality of life for the Jordanian [10].

4.1 Sustainability market in Jordan

The Jordanian government is well aware about the environmental issues which are considered as the most important issues for improving the government policies, laws and legislations to achieve sustainable development in Jordan [28]. In 1992 the national environmental strategy was considered the first step to be concerned about the environmental issues. This strategy was formulated by some of the Jordanian specialists and consisted of many recommendations and suggestions based on environmental issues [28]. In addition, in 1994 the environmental law was issued by the Jordanian parliament to protect the environment and conserve environmental resources.

This law revealed that the environmental problems had to be under control and this law gave an important framework about the environmental management and the sectorial legislation [28]. This will provide the basic objectives, the roles of institutions and the process for developing, adopting and monitoring the environmental standards [28]. Moreover, the Energy Efficient Building Code has been used for energy to overcome the energy challenges and recently, the Institute of Sustainable Development Practices has been established (ISDP) with the aim of taking sustainability issues into account [29].

In 2009 the Jordanian green building Council (Jordan GBC) was established to enhance the importance of environmental construction considerations, which was seen by the implementation of building codes to be within sustainable standards and specifications [29]. This is essential for delivering projects on the way to be environmentally friendly projects. According to the head of the green building council of Jordan, the numbers of environmentally friendly projects in Jordan have not exceeded 10 projects. The initial cost for these projects is more than 10% only from the traditional projects, where the main issue for this type of project is about the recovering cost throughout the operation and maintenance stages of project during the life cycle which will be less than 2% from the traditional type [30]. In 2015, 'Jordan 2025: A National Vision and Strategy' was launched as a 10-year socioeconomic blueprint to achieve national development goals designed by reviewing previous efforts of policies, strategies and recommendations, taking into account the current situation in Jordan [31].

In late 2016, the Ministry of Environment in Jordan launched the National Green Growth Plan to outline the country's strategy for sustainable growth [32]. The plan includes opportunities, targets and policies that Jordan anticipates to follow, in order to endorse its green economy [33]. In July 2017, the Jordan's Way to Sustainable Development was issued by the MPIC. The report is considered a roadmap for adopting the 2030 Agenda in Jordan [34]. Moreover, the report includes important goals for Jordan to focus on, in terms of water, energy, environment, poverty, equality between genders and unemployment.

From these projects in Jordan, it can be noticed that the most concern is about friendly construction which is kind of sustainable construction that seems to be friendlier to the environment than conventional construction and has an important role for achieving sustainable development in the countries. This is not only due to the effect on economic growth but also due to the impact of construction on the environment in order to have the high level of living standards through comfortable, durable and healthy construction [35]. Therefore, the development plan in Jordan is being implemented to improve the quality of life for the Jordanians in order to develop the relationship between both public and private sectors in Jordan and increase the awareness of the importance of sustainability [26]. As a result, the general public has recently started increasing the awareness of the importance of energy saving and water and the need to reduce the impact on the environment taking into account sustainable construction as the main part of environmental issues [10, 27]. This may play a key role in sustainable development in the countries which suffer from limited in natural resources [10].

5. Public procurement in Jordan

The most common method in public sector procurement is design-built contracts [29]. In Jordan it is clear that the most construction contracts for public projects are tendering to the lowest price of contractors whether they are fully qualified or not using competitive sealed bidding process [29, 36]. In this type of contract it is clear that the conventional/traditional type of contracts is the majority procurement option for delivering public projects in developing countries including Jordan. Odeh and Battaineh [36]; Khalaf, [37] argued that there are some of the disadvantages for using this type of procurement where the clients award the bid for the lowest tendering price. This can be noticed when the clients mostly award the bid to the lowest price wherever the contractor is fully qualified or not using the lowest sealed bidding. This route of procurement seems to be the most common use in Jordan for major projects. Also, this type of procurement focuses on the lowest price and the financial guarantees for the contractor rather than the technical support, skills and the expertise that need to be addressed on delivering public works or services [37]. There are four main procurement routes that are used for delivering public works and services which are the following [37-38]:

- Traditional procurement;
- Design build procurement
- Management procurement;
- PPP procurement

As mentioned before the most common procurement route which usually runs in Jordan is the traditional one [29]. Most of public projects and services are tendering to the lowest price which runs under the traditional procurement. Although the traditional route of procurement is the most common used in public projects in Jordan and the last procurement scheme which is PPP procurement run also in Jordan for the most large infrastructure investments when the financial allocations are not available.

6. Research method

In order to identify problems associated of integrating sustainability into public works in Jordan, a content analysis technique was used. It was examined a previous research studies and relating reports about sustainability and green building in Jordan. In fact, the content analysis is an approach can be used to study the research problem from documentary evidence [39 cited in 40; p443]. This method of content analysis can be used in social science widely [40]. Using this method for collecting data is an approach led to identify set of barriers associated of integrating sustainability into public works. These barriers are considered as the heart of this paper which then were formulated into groups and then categorized into six category as outlined on the findings.

7. Findings and discussion

Based on the reviewing of literature and other studies regarding to sustainability and associated problems, there are a number of problems which are facing sustainability in construction where these problems referred to the poor environment, lower skills and experience and inadequate economic levels [9]. The concept of sustainability is new in the Jordanian culture [41]. This means that there is a lack of adapting sustainable construction as the Jordanian's knowledge about the traditional methods more than what is available about sustainable construction. Moreover, The Jordanian engineers have a wide range of knowledge about traditional practices in construction and skills more than what they have about sustainable practices. These issues may have a negative impact on adopting sustainability in construction and finally on the successful of this kind of construction. A set of barriers can be outlined as follow [29, 42]:

- The current process of public procurement and contract development;
- Lack of regulations and government support;
- Higher initial cost and long term investment;
- Lack of professionals, expertise and knowledge;
- Lack of integrated strategy and public fund;
- Lack of incentives and demand.

7.1 Public procurement method and contract development

The most common method in public sector procurement is design-built contracts [29]. In Jordan it is clear that the most construction contracts for public projects are tendering to the lowest price of contractors whether they are fully qualified or not using competitive sealed bidding process [29, 36]. In the light of this situation, some contractors are willing to be within sustainable considerations where others seem to be not concern about these considerations which cost them a lot [29]. However, the implementation of these considerations and adoption sustainable solutions for construction projects in Jordan needs to be through designing, manufacturing or importing or choosing environmental friendly materials and recycled materials which are less impact on the environment [26]. In addition, these considerations include reduce the waste of construction, use friendly materials and techniques, minimise energy use and save water [26]. As a result, this needs higher initial cost which is not acceptable for contractors to bid and win the contract with the lowest price which means that less implementation of sustainability [29].

7.2 Lack of regulations and government support

According to Alkilani [29] a quantitative analysis was conducted of the main participants in construction projects in Jordan which are public- private participants and include owners, consultants and contractors. The

researcher reported that, there was a lack of governmental policies and legislation towards sustainability in construction whether these projects are public or private, which resulted in a major absence about the importance of preserving water, saving energy and protecting environment from the harmful construction impact. William [23] stated that the governmental regulations have a large effect on adoption sustainability within construction industry.

This needs from the government to enforce adoption of sustainability and enable all parties to follow the rules of sustainability and building codes [23, 43]. However, the private sector seems to be not concern within sustainability considerations and very little to enhance sustainable construction [23]. Therefore, this needs more encouragement from all parties at the industry and takes the cooperation into account between government institutions and private sector to enhance the importance of sustainability in construction industry [43].

7.3 Higher initial cost and long term investment

Wessels [44] argued that adopting sustainability in infrastructure development is considered as additional risk added to project rather than benefits gained. This can be formed by cost overruns, delays and other difficulties for project planning and control. De Plessis [45] stated that the lack of the interest from project owners or stakeholder make a problem for accept this practice in construction industry. This can be noted by the investors who are willing to get their projects with lowest initial cost rather than high initial cost [46]. In other words, the investors who are willing to adopt sustainability practices in these construction will cost them a lot for implementing, designing, constructing, importing and selecting recycled and friendly materials [29].

Therefore, in order for them to bid and win the contract they should apply the lowest price which means that less sustainability practices [29]. This means that the criterion for selecting who is the most appropriate bidder to be won is the lowest price bidder rather than its own skills and experience on sustainable projects. Furthermore, the developers who are not interested for long term investment during the operation stage of construction will not be practiced sustainability into their construction [19]. Moreover, the slow recovery of capital investment is considered as one of the big issues for adopting sustainability in construction [45]. Clients believe that the higher initial cost can be considered as a concern to practice sustainability where the financial status is not good enough. This is clear that the interest for all clients, contractors and stakeholder is in the recovering cost of investment rather than the worth which will be gained to the market [23].

7.4 Lack of professionals, expertise and knowledge

Other problems which referred to this can be pointed out by Matar [46] which referred to lack of technical support and knowledge. This can lead to the lack of professional skills, training and education about sustainable practices. In addition, many local designers are fully qualified to design traditional construction projects but for sustainable construction they are not fully abled to design which is the problem at present. Moreover, Matar [46] stated that there are not a well mature frameworks for adopting sustainability into construction while the efforts ongoing for individuals for the importance of enhancing environmental issues and built environment facilities.

From these point view it is important to consider the all stakeholders who participate in the industry to practice sustainability into their projects in order to have benefits form the integration of sustainability solutions into their construction which reflect finally on the country environmentally, socially and economically.

7.5 Lack of integrated strategy and private fund

Construction project in Jordan has an important role in sustainable development. This is not only for national economy but also for protecting environment from the impact of construction waste and materials to improve the quality of life for people [35]. The Initial cost of sustainable construction is more than conventional projects but in fact, and over the long term of project life cycle, the cost of sustainable construction will be recovered during the operation and maintenance stages of project's life [19]. For this reason, it is important to develop strategies for implementing feasibility studies during the initial phase of sustainable projects taking into account the massive amounts of expenditures on these projects in contrast with the expected benefits from these projects on the national economy [3, 19].

The economic feasibility study for a project is considered as the expected cost and profit of project and it can build a decision for the clients, decision makers and financial institutions based on the result of the feasibility study of project [3]. However, the governmental funding for this feasibility especially for sustainable construction is not enough and it could be considered as a significant challenge for adopting sustainability within industry [29]. This begun for hindering private sector efforts for innovation and adopting sustainability, where the reducing of funding for public projects seems to be the current problem that is facing sustainability within construction industry in Jordan [29].

7.6 Lack of incentives and demand

The cost of sustainable construction is more than traditional one which will not stimulate the high level of demand for adopt sustainable practices into public works in Jordan. In fact, the major benefit from sustainable construction can be obtained within the utilization and operation stages and the reduction of maintenance cost and in general, an improvement of building efficiency [23]. This means that at the short term of acquisition sustainable construction the cost will be high but the cost will be recovered for long run term during the operation and maintenance stages of construction [30].

For this reason, the government financial incentives should be implemented by offering, low tax or braking tax on imported sustainable materials, techniques and equipment [29, 43]. Furthermore the private sector has to offer low interest rate for loans in order to encourage the implementing of sustainability within construction in Jordan [29]. In addition to this, low registration fees for sustainable projects and low taxes for local manufacturers will be more attractive participants to apply sustainability within industry [43].

8. Conclusion

In conclusion, this paper has explained the concept of sustainability in construction which makes the balance between the three main dimensions of sustainability which are environment, social and economic to meet the needs for future generation as the same as what are existed now. The new trend for integrating sustainability into public works in Jordan has been increased in order to protect the environment form the negative impact of construction activities, reduce the use of non-renewable energy and improve the living standards of people.

However, there are a number of barriers facing the integration of sustainability into construction. An investigation of these barriers was carried out using a content analysis approach in order to identify set of barriers associated to integrating sustainability into public works. These barriers were grouped and then

categorized into six categories. These set of categories are the current process of public procurement, lack of regulations and government support, higher initial cost and long term investment, lack of professionals, expertise and knowledge, lack of integrated strategy and public fund, and lack of incentives and demand.

From the result, it is important to find best practices and programs to overcome these barriers associated with integrating sustainability into public works.

Finally, this paper recommends for future work to validate these findings through conducting quantitative method. In addition other set of solution to overcome these barriers need to be more and further investigation.

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