

A SWOT analysis of the construction and demolition waste management practices in Qatar

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Abstract

Due to the rapid economic growth, Qatar has recently witnessed a significant amount of construction waste. In comparison with other regions, relatively few studies have been carried out for investigating the construction and demolition waste management problems in Qatar. This paper contributes to this gap by providing insights into the current state of construction and demolition waste management practices in Qatar through application of the SWOT analysis method. Data and information for the SWOT analysis were derived from different sources including governmental reports, waste management related regulations, literature review, as well as structured and unstructured interviews with various stakeholders. The study avails information that can be used by relevant stakeholders to understand the internal and external conditions of construction and demolition waste management in Qatar for the purpose of improving waste management and positioning the current state of construction and demolition waste management towards sustainable practices. Based on the identified threats and weaknesses, seven strategies for improving the current state of construction and demolition waste management practices in Qatar were proposed and developed for implementation in Qatar.

Keywords: construction industry, construction and demolition waste, waste management, SWOT analysis.

1 Introduction

In recent years, the construction industry in Qatar has experienced many construction works as the nation continues its quest for fulfilling its development



strategy as specified in Qatar's Vision 2030 [1]. Consequently, a large number of building and road infrastructures have been expanded and many more construction projects are still ongoing. However, one of the major drawbacks for the construction industry in Qatar is a critical shortage of construction materials [2]. Although other countries have partially solved this problem through use of recycled materials for construction works, Qatar has taken its time to adopt this option. Of late the government in Qatar has decided to re-consider the use of recycled materials to mitigate current and future shortages. Consequently, the Qatari government assisted in the establishment of plants dedicated to the effective management of construction and demolition waste as well as the processing of them from the landfills [2]. In addition, Qatar Construction Standards (QCS) 2014 now allows using recycled materials in construction applications [3]. This development has brought market opportunities for recycling construction and demolition waste in the State of Qatar. The objective of this paper is to evaluate the current state of construction and demolition waste management (CDWM) practices in Qatar using a SWOT analysis method.

SWOT analysis is a business analysis tool that is used for strategic planning which is associated with products, services, and markets [4]. In this paper, SWOT analysis is used to evaluate the current state of CDWM practices in Qatar and identify issues of concern as well as propose strategies for developing sound CDWM practices that can effectively be used to reduce the effects of C&D waste generation and accumulation. The remainder of this paper is organized as follows: a brief literature review is provided in section 2, followed by a description of the research methods in section 3. Results are discussed in section 4 and concluding remarks are provided in section 5.

2 Related work

In comparison to other countries [5], the practices of CDWM in Qatar are very few and it is at its infancy since using the recycled C&D materials has been allowed in the QCS in 2014. Therefore, there is a big gap between the current practices in CDWM in Qatar in comparison to other countries and regions of the world. In addition, very little work is available in the public literature on CDWM practices in Qatar. Such as, stakeholders have little references for developing good CDWM practices and systems in Qatar. This paper contributes to this gap by providing some insights into the current state of CDWM in Qatar through use of a SWOT analysis.

SWOT analysis has been used extensively since 1960s to analyze the effectiveness of a business or a plan [6–9]. In the waste management fraternity, SWOT analysis has been used to identify strengths, weaknesses, threats and opportunities in waste management practices in various municipalities. In [10] SWOT analysis techniques were used to discover the potentials and ways for initiating and successfully implementing an effective municipal solid waste management program. In [11] SWOT analysis was used to prove the importance of implementing waste management to resolve environment concerns regarding the pollution and protection of natural resources.



In [12] SWOT analysis was used in environmental management in Greek mining and mineral industry to facilitate improving environmental performance. In [13] the authors used SWOT analysis to discuss the effectiveness of waste management in Romania. In [14], SWOT analysis was used as a basis for developing a waste management plan in the municipality of Paripiranga in Brazil. However, relatively little work in the public literature discuss the use of SWOT analysis in C&D waste management [15]. In [15] the authors used SWOT analysis to propose critical strategies for the city of Shenzhen in China to develop and promote its future construction and demolition waste management at the strategic level.

3 Current state of CDWM practices in Qatar

CDWM practices in Qatar lag behind both regional and international benchmarks. This lag can be attributed to a number of aspects. For example, Qatar lacks precise and detailed CDWM related regulations, directives and standards. Therefore, construction industry does not have adequate references and guidelines. Moreover, a recent study on green building rating systems used in Qatar [16] has shown that efforts and scores from CDWM sub-criteria in both GSAS and LEED are different appreciably. For example, for new building constructions LEED requires achieving a minimum of 50% of the construction and demolition waste management from the construction site, while in GSAS the sub-criteria related to C&D waste management require only submitting the plan for CDWM. As such, there are no rigorous requirements, neither are there any follow-ups to enforce the requirements. In addition, the sub-criteria related to CDWM only specify waste collection and removal from the construction site and there are no stringent requirements to recycle or re-use any of the total generated waste. There are no pre-requisites or mandatory requirements for CDWM that means the projects will not be evaluated. Therefore, considerations for environmental management issues that incorporate CDWM are not a priority with contractors when undertaking construction projects.

It is also highlighted in [16] that industry stakeholders (mostly at operational levels) are generally lack awareness about CDWM, construction waste minimization, environmental protection as well as lack of knowledge on low waste construction technologies. All these issues are compounded by the slow adoption and realization of the need to recycle construction and demolition waste (CDW), which is not synchronized to the rapid infrastructural developments in Qatar. Moreover, there is an inherent need for relevant stakeholders to initiate long-run programs and schemes that address construction waste disposal and landfilling policies. The current CDWM practices in Qatar can be represented by the diagram shown in Figure 1.



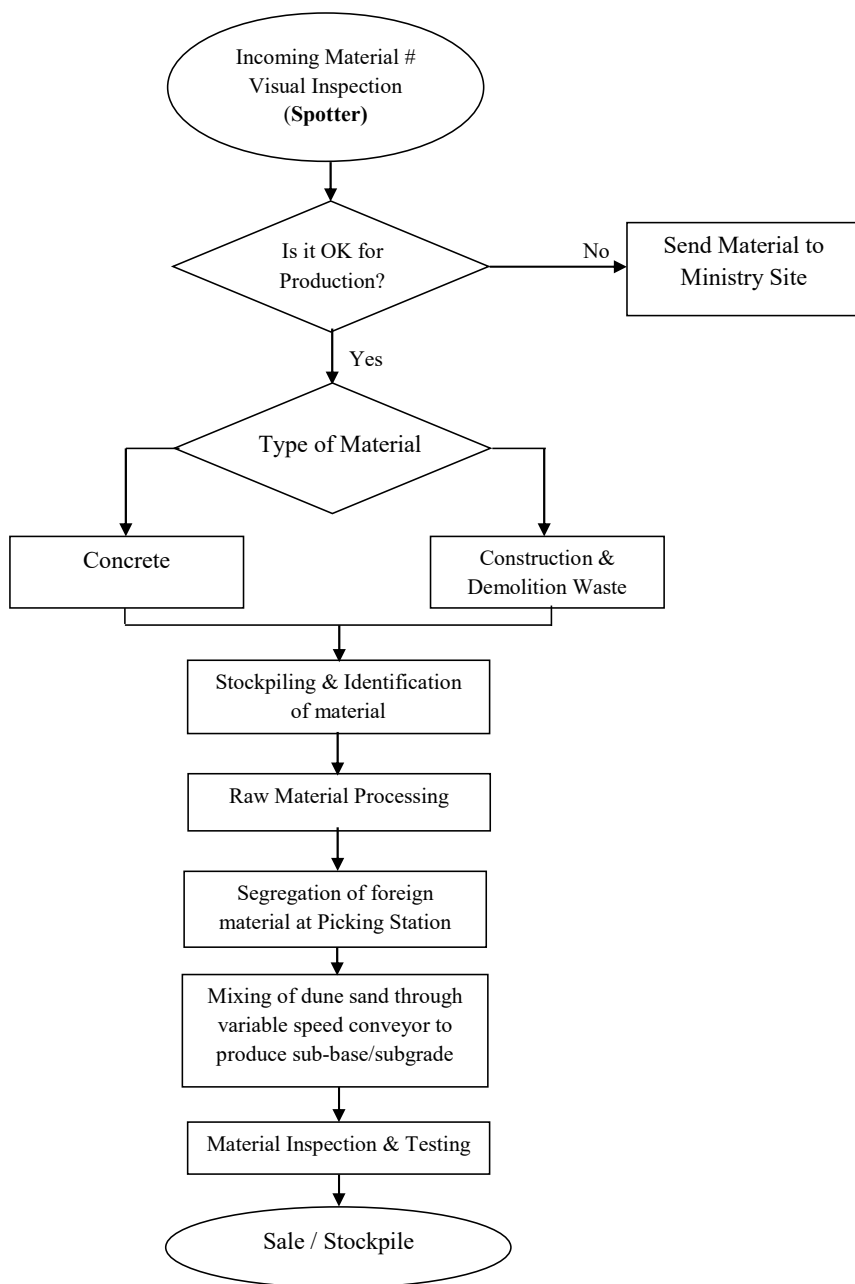


Figure 1: Current state of CDWM practices in Qatar [17].

4 Methodology

In order to evaluate the current state of CDWM practices in Qatar, the SWOT analysis method was used. The steps used in the SWOT analysis can be described as follows: collect and evaluate data and information from relevant stakeholders, classify the collected information into four SWOT factors: strengths, weaknesses, opportunities, and threats, develop a SWOT matrix, and develop strategies as defined in the SWOT matrix. The implemented SWOT matrix is shown in Figure 2.

		STRENGTHS	WEAKNESSES
		List strengths associated with the current CDWM practices in Qatar	List weaknesses associated with the current CDWM practices in Qatar
OPPORTUNITIES		DEVELOP STRATEGIES [Type I]	DEVELOP STRATEGIES [Type II]
1 . 2 N	List opportunities available for CDWM practices in Qatar	Apply identified strengths to develop strategies that leverage on available opportunities	Override weaknesses by developing strategies leverage on available opportunities
THREATS		DEVELOP STRATEGIES [Type III]	DEVELOP STRATEGIES [Type IV]
1 . 2 N	List threats to CDWM practices in Qatar	Apply identified strengths to develop strategies that mitigate the threats	Override weaknesses by developing strategies that avoid threats

Figure 2: SWOT matrix for the current CDWM practices in Qatar.

The SWOT matrix was used to link the various strengths and weaknesses (internal factors) of the current CDWM practices in Qatar to the threats and opportunities (external factors) in the regional and global environments [17–20]. This matrix was also used to identify and formulate suitable strategies for improving the state of CDWM practices in Qatar. Data was collected from public literature and from various stakeholders in Qatar through surveys, structured and unstructured interviews. Main stakeholders included construction industry in Qatar, Government authorities such as the Public Work Authority and the Waste Treatment Centre in the Ministry of Municipality and Urban Planning.



5 Results and discussions

5.1 Strengths

Successful development of a sound CDWM plan for the State of Qatar depends on many factors. These factors can be considered at different levels and from various perspectives, such as: geographical location, economical position, future urban planning, and future vision for the country. In this paper, four strengths were identified as follows:

Strength_1 Economical Position: Over the years, Qatar has become one of the countries with the best economy among the GCC countries. Such an achievement can help Qatar to develop and implement sustainable plans for managing and controlling CDW. Qatar should be able to mobilize resources and develop sustainable plans and mechanisms for seeing these plans through.

Strength_2 Future Urban Planning: For years, Qatar has been aspiring to be a developed nation. Based on evidence of the rapid expansions and growth in modern infrastructures around the country, it can be inferred that Qatar is intends to be among those countries questing for new and modern urbanization and have plans to move towards the concept of smart cities. This is evidenced by; new expressways, new and modern buildings, new and improved transport systems. However, these rapid developments are associated with an increase in CDW. Therefore, it is imperative that authorities in Qatar seriously consider investment and commitment to the development of sustainable CDWM plans.

Strength_3 Future Vision of the country: Recently Qatar has developed a comprehensive vision 2030 that maps the country's strategies for future developments. As documented in the National Vision 2030, managing the waste in sustainable manner is a unique and key component of Vision 2030. In addition, the authorities in Qatar have already demonstrated commitment to achieving this objective by engaging in a number of waste related activities for other streams of waste such as domestic solid waste management.

Strength_4 Strong Awareness from Local Authorities for promoting Waste Management. Since 2010, the government in Qatar has been promoting programs and projects to minimize all streams of waste throughout the country.

5.2 Weaknesses

Prominent obstacles for successful development of CDWM plans in Qatar hinge upon comprehensive set of regulations that govern the generation, accumulation and recycling of CDW. In this paper, four prominent weaknesses were identified as follows:

Weakness_1 Absence of CDW Regulations. Most of the interviewees in the construction industry emphasized the need for regulations for CDWM. In addition, other stakeholders expressed concern over the commitment and sustained support from local authorities on matters of CDWM.



Weakness_2 Low Percentage of on-site Waste Sorting. Some of the stakeholders revealed that currently, very little is being done to sort waste on generation sites, thus resulting in transfer of mixed CDW.

Weakness_3 No Implementation of 3R Strategies: There is a general lack of awareness from some decision makers and stakeholders on the benefits of implementing the 3R strategies for CDW (Reduce, Reuse, and Recycle).

Weakness_4 Lack of Waste Management Systems: Currently there are no integrated systems and mechanisms for CDW transfer stations, processing and recycling facilities.

5.3 Opportunities

Two prominent opportunities for developing sustainable CDWM plans in Qatar were identified as follows:

Opportunity_1 Urgent request for managing construction waste in Qatar: Due to the overwhelming facts and figures on the generation and continued accumulation of CDW in Qatar, stakeholders need to urgently consider the need to put in place techniques, methods and mechanisms for reducing CDW. Qatar can easily mobilize resources for the efforts required.

Opportunity_2 Government and industry associations Supports: Some stakeholders revealed that for a long period of time, CDWM problems have attracted the attention of the government in Qatar as well as the related industry associations.

5.4 Threats

A number of threats were identified in this paper. These include:

Threat_1 limited landfills for receiving construction and demolition waste. Statistics have shown that the total amounts of CDW generated in last three years are 7,056,350; 9,354,487 and 9,706,885 tons respectively. Since there is no significant recycling, these have been accumulating in the landfills. Some of the landfills have been closed and new ones opened.

Threat_2 No charge for disposing C&D waste to the landfills: Currently there are no charges for landfilling construction and demolition waste. Therefore, contractors are free to deposit their waste freely.

Threat_3 Undeveloped market for CDW recycled materials: Recently Qatar construction standards have started to allow the use of recycled materials in the construction industry. Therefore, the market for construction waste recycled materials in Qatar is undeveloped and that for the region is still under development. This offers little incentives for stakeholders to venture into CDW recycling projects.

Threat_4 Lack of research about CDWM in Qatar: Compared to other regions of the world, relatively little research has been done on CDWM in Qatar and the Middle East region. This leaves stakeholders with no reference point to initiate sound and sustainable CDWM plans for Qatar.



5.5 Proposed strategies for CDWM

In the previous sections, a number of prominent strengths, weaknesses, opportunities and threats related to the development and successful implementation of sound CDWM plans in Qatar were identified. In this section, a number of strategies that can be used to translate the weakness into strengths as well as overcome external threats using opportunities currently available in Qatar will be discussed.

Strategy_1 There is an inherent need to clearly define CDWM plans that engages all stakeholders from plan developments to implementation mechanisms. There is need to delegate and assign specific responsibilities, roles and accountability. These needs and requirements if properly met can influence the overall effectiveness of CDWM in Qatar.

Strategy_2 There is a need to establish and broadcast in different media detailed rules, directives and regulations governing CDWM and practices in Qatar. These should be supported by various methods of law enforcements and practical mechanisms for ensuring adherence and compliance of all stakeholders concerned.

Strategy_3 Currently reports data and information on CDW is sketchy and not properly documented. There is therefore an inherent need to establish effective reliable communication and coordination links among all stakeholders to avoid discrepancies and wide disparities of data and information on CDWM since currently these data differ depending on source thus creating uncertainty and lack of confidence in various players. Contractors and project planners should put in place reliable means of recording the amount of CDW generated from various projects in Qatar. This can help in terms of planning for effective waste management system and facilities.

Strategy_4 An important strategy would be to view CDWM plans through a life cycle approach.

Strategy_5 There is an inherent need to promoting, establish and develop a market of recycled construction materials in Qatar and region beyond.

Strategy_6 There is need to put in place facilities, mechanisms and incentives for promoting interest in research on CDWM.

Strategy_7 There is a need for the concerned stakeholders to increase the awareness about CDWM through education, training and promotion awareness and campaigns. Successful implementation of CDWM plans relies on engagement and involvement of various stakeholders including ordinary citizens.

The identified CDWM strategies were developed based on the following basic principle “maximizing strengths and opportunities, overriding weaknesses through strengths, mitigating threats through strengths, and overriding weaknesses by avoiding threats”. Based on the SWOT matrix shown in Figure 2, the proposed strategies can be classified as shown in Table 1.

It can be observed from Table 1 that mapping of strategies to the SWOTs can be one-to-one or one-to-many.



Table 1: Classification of CDWM strategies.

Type I	Type II
Strategy_1 { <i>Strength_1</i> <i>Opportunity_1</i>	Strategy_3 { <i>Weakness_4</i>
Strategy_7 { <i>Opportunity_1</i> <i>Opportunity_2</i>	Strategy_4 { <i>Weakness_2</i> <i>Weakness_3</i>
Strategy_6 { <i>Strength_1</i> <i>Strength_4</i>	Strategy_7 { <i>Weakness_2</i> <i>Weakness_3</i>
Type III	Type IV
Strategy_5 { <i>Threat_3</i> <i>Strength_3</i> <i>Strength_4</i>	Strategy_2 { <i>Weakness_1</i>
Strategy_5 { <i>Strength_2</i> <i>Threat_1</i>	
Strategy_6 { <i>Threat_4</i>	

6 Conclusion

The goal of this paper was to provide insights into the current state of CDWM practices in Qatar through application of the SWOT analysis method. The internal and external conditions of CDWM practices in Qatar were presented based on surveys and interviews conducted in the construction industry and related stakeholders. The results show that Qatar needs to maximize the identified strengths and opportunities in order to address the current weaknesses and threats facing the CDWM practices. Qatar need to promote the development of sound directives and regulations governing CDWM practices in order to proactively address issues and consequences of generated and accumulating CDW. Key issues in the proposed strategies include: active engagement and involvement of all relevant stakeholders, need to increase awareness and enforcement of rules, directives and regulations governing CDWM and practices in Qatar, need to establish effective reliable communication and coordination links among all stakeholders, need to view CDWM plans through a life cycle approach, and the need to promote establish and develop a market of recycled construction materials in Qatar and region beyond. The proposed strategies provide a starting point and reference for decision-makers in Qatar to plan the development and implementation of sound CDWM systems.



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