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Engineering Procurement Construction in the Context of Belt and Road Infrastructure Projects in West Asia: A SWOT Analysis

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Abstract: Engineering procurement and construction (EPC) is a normative practice globally approved since China has been engaging in international cooperation under the Belt and Road Initiative (BRI) infrastructure development. EPC has been adopted in the delivery of BRI infrastructure projects in other countries. Compared to the domestic method of contract, EPC remains at a low level in management practice, such as a lack of coordinating diverse project stakeholders, high cost of information communication, and risk in complex environments in West Asia (WA). However, no research has conducted a strategic analysis of the current situation of EPC for BRI infrastructure projects in West Asian countries. This study aims to understand the current status quo of EPC for BRI projects in WA by performing a strength, weakness, opportunity, and threats (SWOT) analysis and with the support of data collected from the literature review and semi-structured interviews with EPC stakeholders. The study brings awareness along which internally and externally circumstances of the EPC for BRI infrastructure projects can be perceived by major stakeholders participating. The four critical strategies presented based on the SWOTs identified could help EPC firms develop and promote EPC to implement BRI infrastructure projects in WA at the strategic level.

Keywords: Belt and Road Initiatives; SWOT analysis; West Asia; infrastructure; engineering procurement construction

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1. Introduction

The transcontinental Belt and Road Initiative (BRI) was announced by the Chinese government in 2013. The link of people and economic infrastructure has changed enterprises' historical realities based on this initiative (Wang et al. 2020a). BRI is aimed at reinforcing the economic rise of China (Liu 2017). BRI is a prioritized policy coordination of infrastructure connectivity, trade, finance, and people-to-people ties (State Council 2017). Liu and Dunfor (2016) posit that the BRI infrastructure project promotes poverty reduction and inclusive growth. The BRI infrastructure projects have also been interpreted as the manifestation of China's grand economic and geopolitical ambition to challenge existing regional and world powers (Mendes 2018). Since then, BRI has received significant attention from partner countries in terms of infrastructure development. It allows Chinese companies to become engineering, procurement, and construction (EPC) partners locally in West Asia (WA) and internationally (Miu et al. 2017; Wijeratne et al. 2017). The Chinese companies had mainly penetrated WA's infrastructure construction market using turnkey contracts (Chen and Orr 2009; Du et al. 2016). However, as infrastructure projects become problematic, the turnkey contract has evolved in many ways, and currently, EPC has become the more commonly used turnkey contract among Chinese companies (Wei 2017). In EPC projects, more creative variations of design and procurement strategies need to be developed and tested by the key

contractors to find the best balance in the profitability-risk tradeoff and address more severe logistical difficulties in cost-effectively buying and delivering equipment and materials (Dainty et al. 2001; Pal et al. 2017).

Using the EPC approach, the Chinese companies act as the single-contracting entity responsible for designing, procuring, and constructing infrastructure projects in other countries (Du et al. 2016; Yang et al. 2019). Due to integrating the design, procurement, and construction processes, the companies are more likely to achieve shorter project duration and lower cost for clients (Back and Moreau 2000). However, compared to domestic EPCs contracts remain at a low level in terms of the management practice in the international construction market, due to such things as a lack of coordinating diverse project stakeholders (Du and El-Gafy 2015), lack of accurate information on the management of EPC, and the high cost of information communication (Corkin 2012; Liu and Wu 2008). Due to time limitations, EPC is often awarded based on conceptual design without clearly elaborating on all the requirements and technical specifications in detail (Ozdas and Okmen 2004). As a result, concurrent engineering (detailed design), procurement, and construction become challenging for EPC contractors in practice (Shen et al. 2017). They cannot manage their inter-organizational differences, impairs project performance, such as delays, cost overruns, low quality, and disputes (Shokri et al. 2016). In addition to the lack of awareness of risk and proper risk management, including political affiliations, economic imbalances, legal misinterpretations, human rights implications, religious demands, and the natural landscape (Du et al. 2016; Andrić et al. 2018; El-Sayegh and Mansour 2015).

Chinese construction companies generally engage in EPC contracts; thus, they are primarily known to bring in their equipment, materials, and labor (Corkin 2012). Chinese construction companies have historically focused on the lower-value, labor-intensive part of the construction value chain, lacking the consulting expertise for higher-value services (Liu and Wu 2008). In general, local employment and local value addition in the infrastructure construction sector internationally regarding Chinese companies are fragile. Due to of their cheaper offerings compared to industry rivals, Chinese companies are increasing attention. This expense is still an essential ability, which suggests early on that Chinese firms are less involved in locating their employment. These problems illustrate the pressing need to enhance current EPC practices for better implementing BRI infrastructure projects in West Asia.

Prevailing studies have to focus on the implementation of EPC contracts in terms of proper management of design (Wang et al. 2016), procurement process (Shen et al. 2017), risk analysis (Yang et al. 2019), EPC cost and schedule performance (Habibi et al. 2018), enhancing high-performance teams (Chen 2002), and construction cost controls (Back and Moreau 2000). Despite the availability of literature addressing several aspects of EPC projects' implementation, the scientific community has missed a comprehensive SWOT analysis of EPC in high-profile infrastructure projects (Du and El-Gafy 2015; Du et al. 2016). The limited research has impaired construction companies' opportunities to leverage lessons for EPC implementation in international markets for BRI infrastructure projects. Hence, this knowledge gap is significant to the BRI project's ambition because the Chinese companies may be in the dark when implementing EPC for infrastructure project delivery in other countries. This could lead to many problems, such as poor project delivery, loss of capital, lack of technological transfer, country dispute, but mostly derailing the BRI ambition globally. Organizational management needs to have strategies and actions in place, for example, workforce up-skilling and policymaking and, in the long run, address the national needs that are integral to its future financial and social well-being (Jiang et al. 2018). We argue that the BRI infrastructure projects' success would mean construct significant seaports, roads, bridging, gas and oil pipelines, airports, and industrial parks by the Chinese and international EPC companies. To this end, this study aims to develop a thorough depiction of EPC implementation for the delivery of infrastructure projects in WA by conducting a SWOT analysis that leverages a comprehensive literature review and semi-structured interviews.

This study contributes to the EPC for BRI infrastructure projects in WS from three aspects. First, the study will help all construction industry stakeholders and the government understand EPC's contract and its status quo for BRI infrastructure projects. Second, it enables recognizing the critical challenges faced by EPC contractors working for BRI infrastructure projects development programs internationally, besides which effective measures can be presented for improvements. Third, in the formulation of the relevant platform, the empirical findings will provide a useful reference to help boost both short- and long-term contracting trends in the field. Therefore, this study aims to analyze the EPC contract for BRI infrastructure projects internationally and in specific WA; a SWOT (strength, weakness, opportunity, and threat) analysis approach is employed to suggest the growth and promotion of its management in West Asian countries to address vulnerabilities and deal with the SWOT study's challenges.

The primary objectives of this study are as follows: (1) Evaluating the current status quo of the EPC in BRI infrastructure projects; (2) conducting a SWOT overview of the EPC in BRI infrastructure projects based on the findings of the comprehensive literature review; and (3) recommending strategies for enhancing EPC for future BRI infrastructure projects. The rest of the paper is structured as follows: Section 2 presents the background literature, followed by the description of research methods in Section 3. Then, Section 4 describes the findings of the SWOT analysis, followed by discussions in Section 5. Section 6 presents the conclusions of the research, and Section 7 refers to the limitations and future research directions

2. State of Play

2.1. Overseas Infrastructure Projects for the BRI

The BRI intends to achieve policy coordination goals, facilities connectivity, unimpeded trade, financial integration, and people-to-people bonds among the partner countries (State Council 2017; Shao et al. 2018). Preponderances of the existing treatises examined the BRI infrastructure projects from the following perspectives. For instance, Huang (2016) discussed that successful infrastructure growth is significant to more economic integration. Many Chinese firms have made investments in other countries, including high-speed railway, mining, coal, and energy construction in countries along the route with Chinese funding institutions such as the Silk Road Fund, the World Bank, and others. Teo et al. (Teo et al. 2019) explored infrastructure construction under BRI to evaluate the extent, and types of environmental impacts and how social, economic, and political influences can affect these impacts. It also outlines the composition for the impacts of BRI scopes. It describes how impacts cross boundaries and communicate across spatial and temporal scales, additionally discussing how policymakers and corporate interests shape economic growth incentives and how these incentives shape infrastructure development. The results indicate that the environmental policies aligned with BRI are becoming more successful, although questions persist about implementation complexity. The diverse and multi-scaled environmental problems of the BRI must be tackled. Di Stefano et al. (2021) investigated how the intensity of exchange increases as countries achieve progress in their infrastructural structures by evaluating BRI partners countries as a holistic set of countries, emphasizing particular countries involved around the route based on the gravity model's particular specification. His results indicated that BRI countries' bilateral preferences would intensify since they have coordinated their infrastructural projects. Due to a lack of proper international environmental knowledge, most overseas nations' projects are deemed low benefit and high risk (Huang 2016; Zhi 1995). Du et al. (2016) include challenges and complexities in evaluating, contracting, design, machinery and material procurement, construction, economic, and political conditions, technical problems, and management strategies to execute international EPC projects. Overseas projects generally involve participants with different norms and cultural backgrounds (Lei et al. 2017). Wang et al. (2018) discussed communication problems due to highly complex interconnections and complexities in offshore outsourcing projects. Moreover, Pal et al. (2017) conclude that foreign contractors

frequently face significant difficulties in managing project activities carried out by several subcontractors, getting approval from several local agencies, and balancing the priorities of equipment and materials procurement such as lead time, distribution, and expense. High levels of ambiguity and difficulty mainly mark regions along the BRI. Duan et al. (2018) investigate the potential risks, including political risk, investment environment, constraints, and bilateral relations, of international energy investment projects for 50 countries along the BRI. Cheng (2016) reiterates that currency fluctuations for early advantages, such as oil and metals, will make it more challenging to implement BRI infrastructure projects. Furthermore, difficulties in the procurement of resources and suppliers' coordination in a foreign environment have a severe impact on overseas projects' success are discussed.

Scholars agreed that contractors would pay careful attention to overseas projects' procurement possibilities and resolve logistical hurdles in acquiring and transporting equipment and materials (Pal et al. 2017).

As Lu et al. (2013) indicate, Chinese EPC firms embrace procurement creativity to get stronger and compete with other companies internationally. Most Chinese contractors have not yet established sufficient capabilities to obtain and align services internationally, such as supplies, workforce, and machinery. Pal et al. (2017) identified the partnership between the supplier, the subcontractor, and risk factors that affect outcomes of IEPC. Horizon Research Consultancy Group (HRCG 2007) states that Chinese companies usually go through three stages for exporting their goods and services directly from China to the host country. They invest in local industrial chains where the parts of the goods and services are still imported from China and complete the localized procurement and development. In case they have to export their goods and services from China, there are three general phases: (1) Exporting the goods and services they have developed locally; (2) give up on the manufacturing and development mechanism through which the items are widely bought in China itself, but still manufactured from China; and (3) making the final production and procurement method relatively entirely originated from China (Osabutey et al. 2014).

2.2. International EPC Project

The EPC approach in global construction markets has progressively received acceptance (Shen et al. 2017). As a fast-track project delivery, the EPC helps a contractor experience early participation concurrently, expense saves, and a shortened lifetime to execute planning, procurement, and maintenance activities (Hale et al. 2009). Nevertheless, more challenges exist in the EPC method than the traditional design-bid-build (DBB) method, which may place EPC projects at risk, especially for contractors (Du et al. 2016; Ozdas and Okmen 2004; Pal et al. 2017). Multiple actors engage in implementing an EPC method, particularly in global markets' dynamic social and economic environment (Du et al. 2016; Pal et al. 2017; Park et al. 2009). Stakeholders involving both team members, participants, and stakeholders involved in the project with these stakeholders are essential to the project's progress. (PMI 2013). EPC contracts provide that the contractor shall plan, conduct, and conclude the project as a united party, enabling the manufacturer, designer, contractor, and subcontractor to create a project team to meet the EPC goals (FIDIC 1999). EPC contracts also control contractor partnerships with third parties, such as stating contractors shall make attempts to comply with customers and take all appropriate measures to protect the environment that is close important to governments' acceptance and local people's interests. In general, EPC contractors should properly cooperate with their partners (e.g., clients, consulting engineers, designers, suppliers, and subcontractors) in the project delivery (Tang et al. 2009; Zhao et al. 2017). Additionally, it is also critical for EPC contractors to cooperate with involved social-political entities (e.g., central government, local authorities, and residents/communities), who provide resources, approval, and support for enabling the project's success (PMI 2013).

The preceding literature synthesis provided insights into the aims, strategies, and importance of EPC project management research and EPC project management features in construction enterprises. Overall, there is still a need to explore how EPC entrepreneurs

develop management strategies to balance cost constraints and performance benefits, allowing EPC contractors to enhance activity rationally. A SWOT analysis is necessary to understand the EPC contract for BRI infrastructure projects in West Asia with the issues mentioned above.

3. Research Methodology

3.1. Research Framework

The most potent instrument deployed for the strategic analyses of EPC contracting in BRI infrastructure projects is the SWOT analysis, a useful tool for the strategic planning process. SWOT analysis is known and provides a required way of analyzing a circumstance and developing potential behavior to affect a condition. The SWOT analysis has been widely used in different fields to analyze construction practices, technologies, and innovations from a scientific viewpoint (Jiang et al. 2018; Tezel et al. 2020; Zhao et al. 2011). The investigation follows the following steps: (1) Conducting a systematic search as a common practice to find the most relevant papers in the field (Sepasgozar et al. 2020a, 2020b) and investigating the state of the paly for the development EPC for BRI infrastructure projects; (2) revising the research question and designing the survey interview questions in line with the SWOT framework; (3) processing the interview data and conducting a SWOT analysis; and (4) proposing a corresponding platform and discussing the outcome.

Figure 1 shows the methodology adopted for the analysis in this study. The current EPC contract model under BRI infrastructure projects is presented in detail by analyzing collected data in the first step. These materials are collected from the literature review and semi-structured interviews with Chinese stakeholders involved in EPC contracting for BRI infrastructure projects in the international construction market. The semi-structured interview approach is adopted since it allows the investigator to collect more in-depth data compared to a survey that is a recommended and common approach in construction (Sepasgozar and Davis 2018; Sepasgozar and Loosemore 2017).

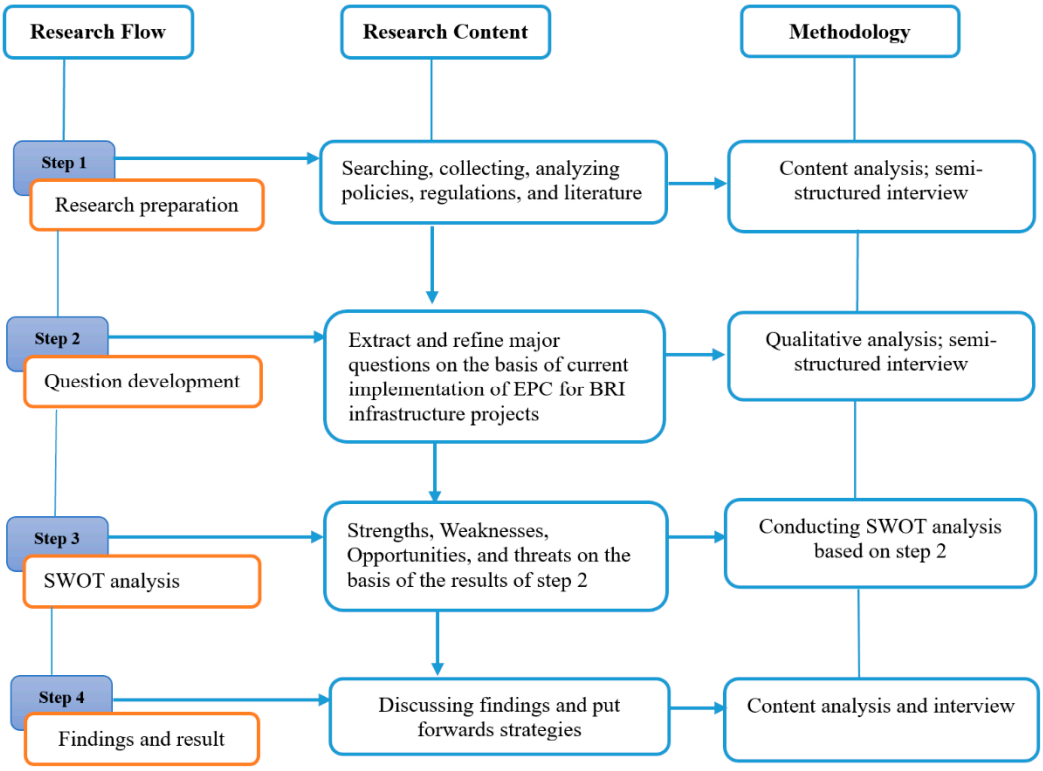

Figure 1. A methodological framework of the study.

In the second step, research questions are designed to investigate the SWOT of the EPC in BRI infrastructure projects. Third, a comprehensive SWOT analysis is performed based on the developed research questions. The answers to the study questions were formulated based on the review of data gathered from semi-structured interviews with multiple interested stakeholders, including supervisors, contractors, engineers, consultants, and two department heads. Each semi-structured interview lasted between 45 and 50 min in phases 1 and 2. The profile of interviewees and stakeholders can be seen in Table 1.

Table 1. Profile of the selected participants for the semi-structured interviews.

N	Position	Company	Years of Experience	Types of Projects	Projects Location
1	Consultant	China Civil Engineering Construction Corporation	10 years	Bridges	East Asia
2	Contractor	China Railway International Co., Ltd.	11 years	Tunnels	Central Asia
3	Manager	China Railway Group Limited	8 years	Railways	South Asia
4	Engineer	China Railway Design Corporation	13 years	Seaports	Southeast Asia
5	Contractor	SINOHYDRO Corporation Limited	10 years	Airports	Middle East
6	Professor	Northeastern University	15 years	Academic	China
7	Professor	Shenyang Architectural University	16 years	Academic	China

The semi-structured interview with multiple stakeholders from Chinese EPC companies was selected; these stakeholders, including three managers, six contractors, five engineers, two consultants, and two department heads who had worked on projects in the related areas (PMI 2013), were carried out. The main reason for interviewing these stakeholders was that Chinese contractors have rich experience delivering international EPC projects and become more active in the international market (Baniya et al. 2019). They have extensive experience in every EPC contract process for BRI infrastructure projects internationally. These stakeholders are well informed on the current EPC contract implementation for the BRI infrastructure projects in WA. Hence, considering that this study's key objective is to examine the EPC contract for BRI infrastructure projects in WA from a strategic perspective, precast EPC contracts for BRI infrastructure project-related issues from a broader perspective should be placed the pivot. Fourth, based on the identified SWOTs, suggestions to improve the EPC contract for BRI infrastructure projects are proposed following the principle of "transforming weaknesses to strengths, and minimizing threats".

3.2. Questions Formulation

The primary research questions developed for the semi-structured interviews are explained and presented as follows. The questions aim to determine the EPC contract's internal and external strengths for BRI infrastructure projects in West Asia. For example, this question may deal with EPC contractors' benefits from EPC contract use to better implement future BRI infrastructure projects.

Q1: What are the EPC contract's strengths for BRI infrastructure projects in WA?

Q2: What are the weaknesses of implementing EPC contracts for BRI infrastructure projects in WA?

Q3: What opportunities can EPC contract for infrastructure projects in BRI infrastructure projects in WA?

Q4: What threats could the BRI infrastructure face when improving the EPC contract for WA's infrastructure projects?

4. SWOT Analysis of EPC Contract BRI Infrastructure Projects

The SWOT analysis describes the key issues that affect construction projects in overseas markets, leading to a more in-depth view of both the internal and external circumstances in reality. Internal conditions lead to strengths and weaknesses while external conditions apply to the opportunities and threats; a specific account of SWOTs resulting from the literature review (LR), semi-structured interviews (SI), are shown in Table 2.

Table 2. Matrix of the SWOT analysis based on the interviews verified by the literature.

SWOT Factors (Jiang et al. 2018; Porter 1981; Shen et al. 2006)	Main References	Identified EPC SWOT Factors	Analysed by
	Strengths-Weaknesses (S + W) factors		
S + W Factors: Management Ability Technological ability Financial ability Organisation Operation	Awad (2010), Yan (2017)	S1 = Comparative Cost Advantage	LR, SI,
	Wei (2017)	S2 = The Advantages of Integration	LR, SI,
	Tian (2018)	S3 = The Extension of the Enterprise Value Chain	LR, SI,
	Pal et al. (2017)	W1 = Poor Management Level	LR, SI,
	Wei (2017)	W2 = The lack of standard Design & Technology	LR, SI,
	Wei (2017), ENR (2018), Getty (2010)	W3 = lack of International Experience	LR, SI,
	Opportunities-Threats (O + T) factors		
O + T Factors: Political and social Environment Economic Environment Markets opportunities Competition Mechanisms	NDRC (2015), Qian and Fulton (2017), Wei (2017)	O1 = Partnership in The Belt and Road Initiative	LR, SI,
	Wijeratne et al. (2017), Cai (2016)	O2 = Supplying Equipment and Machinery	LR, SI,
	Xia and Yu (2015)	O3 = Sustainability and Technical Support	LR, SI,
	Ruparathna and Hewage (2015)	T1 = Political Environment	LR, SI,
	Wei (2017)	T2 = Financial services	LR, SI,
	El-adaway et al. (2019)	T3 = Market Competition	LR, SI,

4.1. Strength

4.1.1. S1 = Comparative Cost Advantage

Due to the widespread use of foreign labor in West Asian countries, labor costs are low (Awad 2010), and China's ordinary labor services have no advantage. However, skilled workers still have particular cost and efficiency advantages, mainly reflected in technicians' price. There is no significant gap between the capabilities and level of engineering and technical personnel in China and the engineering and technical staff in developed countries (Yan 2017). Still, there is a considerable gap in wages compared with engineers and technicians in economically underdeveloped countries. Chinese engineers and technicians have no advantage in fees, but they have certain benefits in terms of ability and position. Chinese EPC contractors have high-quality technical and managerial talents at relatively low cost. They can organize scientific and technical personnel to carry out scientific and technological research and provide technical support for the project at a low cost, which can avoid project technical decision mistakes and management errors. At the same time, by applying domestic mature and capable technologies, it is possible to reduce costs and improve efficiency, as well as recover the investment as soon as possible.

4.1.2. S2 = The Advantages of Integration

The Engineering (Design), Procurement, and Construction are combined to make the whole project, such as planning organization, implementation, and management, in a unified framework. The general contractor can reduce the budget from design to give full play to design optimization and quota design. "Procurement" indicates that the procurement of engineering materials and engineering equipment is undertaken by the EPC

contractor (Wei 2017). Simultaneously, the EPC contractor has achieved Win-Win results in terms of quality and cost by using a deep cross-integration of design and construction.

4.1.3. S3 = The Extension of the Enterprise Value Chain

The EPC model has promoted design-oriented enterprises to extend the enterprise value chain backward. Construction-led enterprises can extend the enterprise value chain forward, and the enterprises' internal advantages continue to expand (Tian 2018).

4.2. Weakness

4.2.1. W1 = Poor Management Level

The organization of most international EPC contracting enterprises in China is not advanced enough. The corporate governance structure and the system operation are not perfect, and the decision-making ability is not reliable. Project management has more loopholes in cost and quality management, and the degree of intensive control is relatively low. The current contract management lacks advanced and practical means, and network information management technology is insufficient.

In the EPC contract of international markets, contract management is the source and core of project management (Pal et al. 2017). Since general contracting is the stipulation of the scope, the total price, and all the project documents, it guides the contractor's actions. EPC project contracts in international projects are mainly written by standard global terms such as FIDIC (FIDIC 1999) and international Project Management (PMI 2013). Therefore, this makes the international EPC contractor relatively late, and international projects have a certain degree of deficiency in contract management compared with developed countries.

4.2.2. W2 = The Lack of Standard Design and Technology

When it comes to EPC projects, both contractor's participants are much more dedicated to a common aim of finishing the project's construction effectively, forcing them to function collectively in tandem to accomplish EPC goals. Moreover, in this sector, Chinese companies are still in the initial stage of development. They cannot deal with European and American companies and Japanese and South Korean companies. While China's overseas contractors have been expanding overseas for 30 years, producing impressive results, China's technological standards have not yet been recognized in the West Asian infrastructure construction industry. Currently, West Asian countries generally adopt European and American standards. However, Chinese enterprises have mastered British standards rather than the European Union and French standards (Wei 2017). For example, Algeria's engineering requirements derive from the French standard; many of their standards are copied directly from France; during the projects' construction, China's enterprises are subject to significant restrictions. Simultaneously, the upstream industry of the contracting construction industry is in the design consulting business. Due to the uncompetitive development of the Chinese design consulting industry, Chinese businesses have to collaborate with European companies to engage in the bidding of large-scale EPC projects and construction design. On the other hand, European companies typically increase the design quotation or ask for binding contracts that dramatically decrease Chinese companies' revenues and production space (Wei 2017).

4.2.3. W3 = Lack of International Experience

The average internationalization index for the top 100 non-financial companies worldwide was 64.6 percent in 2014, although the average internationalization index for the top 100 Chinese mainland businesses was 28.2 percent. None of the Chinese firms achieved the average amount of the internationalization index. The average internationalization index of the top 100 non-financial companies from developed countries and transition economies was 54.2 percent in 2014, although the average index of 12 Chinese mainland businesses in 2014 was 19.9 percent. Only the COSCO Group and the Lenovo Group indexes were similar to the average amount (ENR 2018). By contrasting this, a report shows that China's

transnational companies' internationalization indexes are still low in general (Wei 2017). The data from China International Trust Investment Corporation (CITIC) and Group China Ocean Shipping Company Cooperation (COSCO) Group show that these two companies' indexes declined in 2014. A China railway company designed Saudi Arabia's Mecca light rail project. Limited culminated in the significant loss of more than 4.1 billion yuan, owing to a large increase in the amount of engineering quantity, which completely revealed the pitfalls of the Chinese engineering contracting industry, i.e., the lack of expertise the overseas activities (Wei 2017; Getty 2010).

4.3. Opportunity

4.3.1. O1 = Partnership in the Belt and Road Initiatives

With China's significant growth, China's transition from a regional economic superpower to a global powerhouse, a strong economy with human growth, and substantial economic success have become well established in the united nations (Khan et al. 2018). In recent years, China has achieved impressive enthusiasm to reinforce its economy and political collaboration with neighboring countries through dynamic interprovincial connectivity projects together under a more comprehensive BRI framework. Their existence has spread out to West Asia. On the one hand, the West Asian countries gradually recognize China's product quality, technology, service, and cost advantages. On the other hand, the Arab states also hope to balance the East and West by strengthening China (NDRC 2015; Qian and Fulton 2017). Especially in the context of the BRI. China and Qatar, Saudi Arabia, the United Arab Emirates, and other countries in energy cooperation projects are increasing, providing many opportunities to enter the refining and chemical engineering market in these countries. Simultaneously, several domestic banks have set up offices in WA by providing substantial financial support for Chinese contractors' foreign contracted engineering business. These have provided unprecedented opportunities for Chinese construction contractors to develop in WA. According to the World Bank report, spending on infrastructure construction in the Middle East and North Africa accounts for only 5% of its total GDP, far below the world average (10%). In the BRI context, China has many infrastructure projects in West Asia, involving the United Arab Emirates, Oman, Kuwait, and many other countries. The project areas include transportation, water conservancy, and electricity (Wei 2017).

4.3.2. O2 = Supplying Construction Equipment and Machinery

Chinese EPC contractors have already been working closely with foreign MNCs on BRI projects, especially those who possess global expertise in manufacturing technologically advanced equipment and solutions. Suppliers of machinery and technologies will finance Chinese firms' foreign infrastructure and manufacturing ventures in the same way they have helped Chinese customers' projects in China over the past decades. General Electric, which procures construction equipment to Chinese EPC firms, reported that its total orders from Chinese EPC firms—40% of equipment will be manufactured in China—have increased threefold from a year ago. Their presence and collaboration with Chinese SOEs are also growing from the supply of equipment to an integrated service provider for finance and corporations (Wijeratne et al. 2017). The most recent order from General Electric was to supply the Chinese-Pakistan Economic Corridor with machinery, including steam turbines, boilers, and generators. According to a joint venture report for this initiative, General Electric was chosen for its 'national experience in constructing key coal-fired power plants' and 'tested track record in Pakistan (Cai 2016). As mentioned above, collaborations with Chinese customers outside China may also support foreign companies inside China.

4.3.3. O3 = Sustainability and Technical Support

The idea of life cycle management advocated by BIM technology is in line with the EPC projects' characteristics. Meanwhile, all parties participating in the same platform can coordinate their efforts to promote efficient and convenient communication and coordina-

tion (Xia and Yu 2015). Figure 2 shows that the literature mainly emphasized economics, sustainable development, and greenhouse gases. This visualization is recommended for identifying key themes in the literature (Sepasgozar et al. 2020a, 2020b; Wang et al. 2020b). The project investigated in the present paper may enhance the performance in these areas. EPC also helps the practitioners and the project to save materials by optimizing the design. Both designers and the main construction contractor are involved in the design process to manage construction waste.

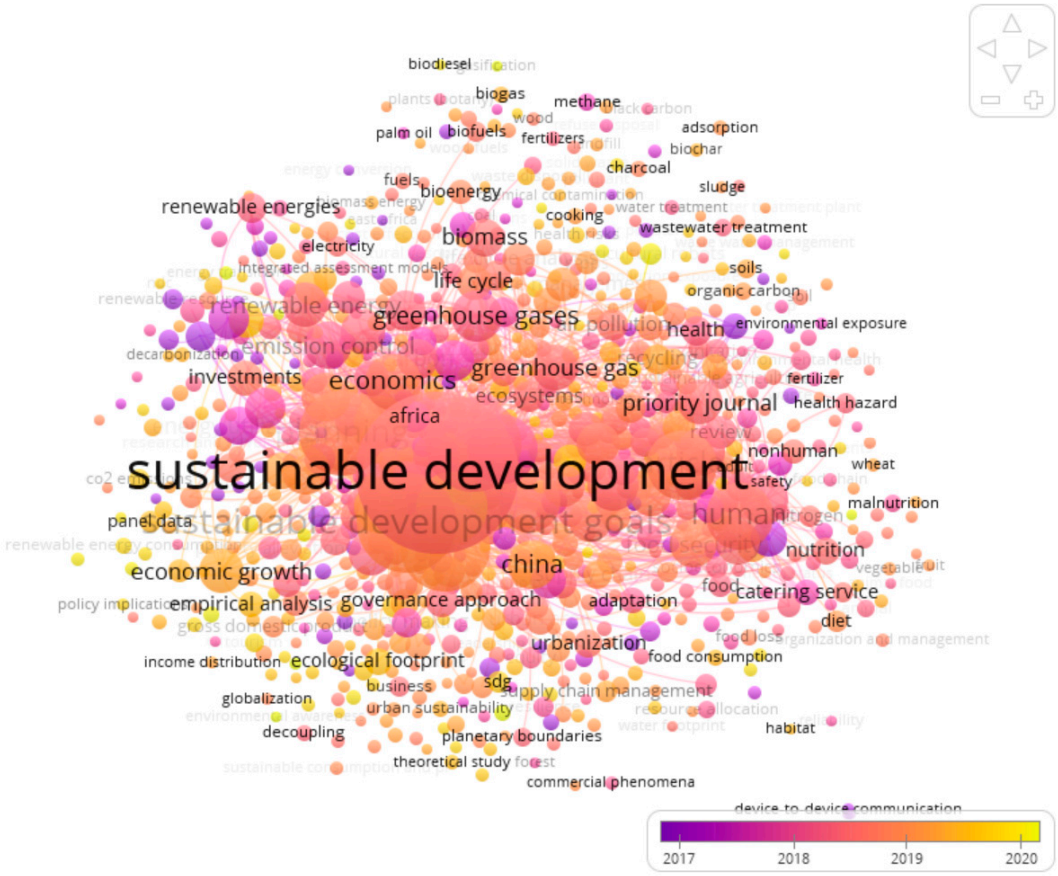

Figure 2. Key themes and topics highlighted in the literature.

4.4. Threat

4.4.1. T1 = Political Environment

In recent years, affected by the international anti-terrorism and security situation in West Asia, the political situation in individual West Asian countries is unstable, and there may be unfavorable factors such as market irregularities and unpredictable social order (Ruparathna and Hewage 2015). Therefore, risks need full consideration. Enterprises must keep abreast of political and economic information in the region and avoid risks.

4.4.2. T2 = Financial Services

In the last five years, the concept of EPC, with financing, has become the standard of project management in the foreign project contracting market. Many Chinese companies are involved in BRI construction projects in EPC, BOT, or PPP. The EPC contractors need help from international institutions to ensure the project can be completed on time with no cost overruns. Compared with the permit operation and franchise business in contractual entry modes, the West Asian infrastructure construction market has a high capital investment, high risk, and high return. Therefore, financing coordination at the beginning of the project

and the absorption of funds from multiple parties have become the main problems for Chinese enterprises in infrastructure construction.

4.4.3. T3 = Market Competition

The competition in the engineering contracting market in WA is fierce. To support local contractors and increase the barriers to entry for foreign companies, many countries in WA have implemented a series of protective policies to significantly increase the difficulty and risk of international engineering contracting companies. For example, the UAE government stipulates that foreign companies in the UAE contracting projects do not enjoy the project advance payment must be contracted. As a result, external contractors have undoubtedly increased their fixed assets and liquidity inputs for a more extended payback period, especially for the first project. The contractors' pressure is not small (El-adaway et al. 2019).

5. Discussions and Recommendations

5.1. Establishing a Project Management Office (PMO)

The SWOT analysis identified an EPC contract's essential issues in the West Asian construction markets, including low management ability and high information communication cost (Corkin 2012). In terms of contracting, the cost-profit is crucial to achieving a competitive edge at international competitiveness. Chinese construction companies have historically focused on the lower-value, labor-intensive part of the construction value chain, lacking the consulting expertise of higher-value services (Liu and Wu 2008).

However, the continuing decline of China's low-cost labor increasingly growing constraints on the requirements for the construction and recruitment of EPC contractors in China. The EPC contractor shall conduct cost management of the EPC method in the current and future of BRI infrastructure projects in and other countries by formulating a more scientific and reasonable cost management plan, improving the project management level of EPC projects, rationally managing the control period, and carrying out process management.

The Project Management Office (PMO) appeared in the early 1990s and has initially been proposed in software engineering project management. The increasing demand for project management level was caused by software engineering projects' agility and the restrictive resource allocation (Andersen et al. 2007). According to PMBOK, the PMO is not only at the project level but at the organizational level to conduct project management (PMI 2013). PMO is a management organization that standardizes the project practices, processes, and operational forms of the entire organization, rationalizes resource allocation, develops rationalization processes in conjunction with the organization itself and project conditions, develops project managers, and provides project support, and organizes internal consulting.

International EPC companies worldwide should not lose technologies and facilities to the world's best contractors and professional subcontractors. However, there is a considerable gap at the management level. Therefore, through the PMO, starting from the project, company, and industry, gradually forming a project management framework and management norms suitable for itself. The single project market as the starting point is the inevitable path and the best choice to improve Chinese EPC contractors' management level and obtain competitiveness.

5.2. "Pool Project" Model to Decentralise Risks

With the ease of management, assignment of resources, and comprehensive benefits, the EPC model is preferred in engineering contracting (BRI 2018). With the BRI preference for the EPC, the Chinese construction companies are employing the EPC to cooperate in other countries to procure infrastructure (Yang et al. 2015). However, the EPC does not risk preventing Chinese construction companies from successful cooperation and infrastructure provision in other countries. Complex factors, such as political affiliations, economic imbalances, legal misinterpretations, human rights implications, and religious demands,

and the natural landscape in the countries (Du et al. 2016; Andrić et al. 2018; Guo et al. 2010; El-Sayegh and Mansour 2015) have introduced risks in Chinese construction companies' attempts to cooperate and procure infrastructure (Yang et al. 2015) successfully. Chinese companies experienced these risks throughout the entire project delivery process from the start to project completion in other countries (Lin 2016). Other project-based problems arise, like the lack of organized planning and reduced risk response strategies resulting in poor performances (Lin 2016). Chinese companies can cooperate with internationally renowned contractors to minimize the risk and to make up for the shortage of technology, market development, and recognition of Chinese engineering companies, and enter the general contracting market as soon as possible.

With the intensification of competition in WA's engineering market, international engineering companies' situation is increasing. It is the internal need to complement each other and reduce risks and one of the strategies of large-scale project owners under mass project efficiency. Chinese EPC companies can adopt various forms and flexible policies, and cooperate with international and local enterprises, patent merchants, engineering companies, syndicates, and construction enterprises. In Saudi Arabia, UAE, Qatar, Kuwait, Oman, and Bahrain, the Chinese EPC companies have sufficient funds, sound laws and regulations, strict rules and regulations, and many engineering construction projects. In particular, Western countries are in a monopoly position. To this end, we should unite with European and American companies and take the road of subcontracting. For large-scale projects, it is recommended that many enterprises should cooperate in all aspects of raw material supply, market sales, capital operation, engineering construction, management operations, and undertake development, investment, or financing.

The "project joint venture" approach helps enterprises cope with the fierce competition in the West Asian contracting market and diversify enterprises' business risks. It will enable enterprises to complement each other's qualifications, complement each other's strengths, enhance their comprehensive competitiveness in the market, and reduce Chinese EPC companies' lousy competition in the international market (Liu et al. 2020). During the project's implementation, each company will exert its advantages and specialties, superimpose the positions of management, technology, capital, and experience of all parties to enhance its comprehensive competitiveness (Yang et al. 2019). It will effectively pool funds, optimize resource allocation, and solve the prevalence of enterprises. The lack of funds will also play an important role. By establishing cooperative relations with enterprises in related industries in the country, the integration of foreign investment, consulting design, labor export, and other aspects will be realized, and a large engineering contracting group will be formed to seek full advantages. For example, when bidding for the Gulf Project, alliances with other domestic companies can enhance its overall competitiveness and compete with international engineering companies on the same stage while avoiding the disorderly competition of Chinese-funded enterprises in the global market (Wei 2017; Qian and Fulton 2017). The consortium's successful operation can superimpose the management advantages, experience advantages, technical advantages, resource advantages, and capital advantages of all parties to produce the effect of "1 + 1 > 2".

5.3. Localization Strategy

Leverage local contractors, engineers' experience, capabilities to reduce costs, and non-technical difficulties in engineering are contracting. Through cooperation with them, Chinese EPC contractors can get familiar with local laws, regulations, technical specifications more quickly, keep abreast of engineering information, grasp market development frontiers, and share project bidding offers with local partners. They can also effectively bridge the relationship with government and institutions that maximize the community's cooperation and support. Collaboration with local companies can take joint ventures, build model houses, provide equipment, technology, and management, give full play to both parties' advantages, strive for more market share, mutual benefit, and achieve a win-win situation (Carrillo 2014). Today, with the deepening of economic globalization, the localized

management strategy's implementation is conducive to allocating resources. It is beneficial to Chinese EPC contractors to explore further the West Asian market and find new profit growth points. Simultaneously, strengthening localized operations and management can absorb local labor resources in different proportions according to the market and project actualities of different West Asian countries and employ managers and workers familiar with local laws, regulations, technical specifications, and construction techniques. This approach is consistent with the target government's policies to appease people's livelihood, solve employment, and promote social stability and economic development.

5.4. Formulating Manageable Guidelines

In 2016, the Ministry of Housing and Urban-Rural Development put forward several technical standards to promote and guide general contracting projects (Guo et al. 2010; Wang and Zhang 2013). The state vigorously promoted the establishment of the general contracting model along with the BRI. These standards are subject to the construction industry's characteristics at the regional level, and therefore need to be specified in the international market. Besides, most EPC companies and design professionals may hesitate to involve in an EPC project due to a lack of skilled people and practical knowledge. The current literature shows that many researchers are active in the sustainability area, and recently there is a new trend to focus on the BRI concept (Huan et al. 2021).

6. Conclusions

EPC is a popular contracting method in the construction industry that has gained considerable BRI prominence for overseas construction markets. Several external and internal factors in the EPC contract were listed as possible causes for BRI infrastructure projects in West Asia. This study sought to explain existing EPC contract problems through a systematic analysis of the literature and semi-structured interview and by employing SWOT analysis.

The findings suggest that further developing EPC contract West Asian countries need to strengthen their engineering contracting expertise and enhance the construction industry's EPC contract strengths. Several weaknesses were found in executing the EPC contract for BRI infrastructure projects in West Asian countries include low management level, low foreign experience, and lack of standard design and technology. These weaknesses inhibit the further advancement of EPC for BRI infrastructure projects.

This study's findings also provide insights into the opportunities that Chinese EPC firms can leverage and threats that it needs to address. In general, West Asian countries face unstable political situations and market irregularities, thereby necessitating the decentralizing of risk and proper risk management need full consideration for better implementation of EPC contract for BRI infrastructure projects in West Asian countries. The strong appeal for reducing financing coordination and the absorption of funds from multiple parties for the entire construction project from start to close up offers another opportunity to promote EPC contract implementation for BRI infrastructure projects in West Asian countries. Furthermore, the local government and EPC stakeholders' extensive support work for BRI infrastructure projects and a concrete foundation better-implemented EPC contracts for BRI infrastructure projects in West Asian countries.

In conclusion, The SWOTs identified four critical strategies for improving the EPC contract for BRI infrastructure projects: (a) Establishing a project management office PMO, (b) 'Pool Project' model for decentralizing risks, (c) localization strategy, and (d) formulating manageable guidelines. The identified SWOTs are critical in contributing to the successful implementation of the EPC contract for BRI infrastructure projects. They may also be useful references for EPC firms to implement better EPC contracts for future BRI infrastructure projects in WA or other countries.

7. Limitations and Future Research Direction

This paper presents an insight into the EPC contract types used for BRI infrastructure projects from the Chinese construction firms' perspective. Nevertheless, this study's theories have built upon the experiences of selected stakeholders. However, various stakeholders can be approached, or different project delivery methods can be examined, and the outcome can be compared to the literature. The data was relatively small (theoretically and practically) compared to many international EPC projects under the BRI infrastructure projects' background.

In light of the findings and limitations of this study, further studies should be carried out. We recommend undertaking the following potential future research: (1) Investigate specifically and technically how the EPC contract and scope of EPC projects can be defined; (2) systemically established a conceptual model of EPC contracts for BRI infrastructure projects; and (3) similar studies could be performed in specific types of EPC contracts under the background of BRI infrastructure projects, such as highways, pipelines, hydropower, and others. Additionally, project stakeholder management, which is also closely related to the EPC method, should be studied in the future. Another suggested direction is utilizing the database management systems or information modelling technologies, such as GIS (Shirowzhan et al. 2020b; Visvizi et al. 2019; Shirowzhan et al. 2021) or BIM (Shirowzhan et al. 2020a), to learn from the EPC contracts in BRI infrastructure projects.

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