

Environmental Scanning for Train Development and One Belt, One Road Project

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Abstract

Chinese President, Xi Jinping has globally announced One Belt, One Road (OBOR) project. It aims to develop new infrastructure especially in railway sector. Thereafter, High-Speed-Rail (HSR) and East Coast Rail Link (ECRL) trains have been proposed to participate in OBOR project. These circumstances will most likely improve the train industry because this infrastructure development will stimulate Malaysia nation industrial revolution. OBOR project faces many challenges. The elements that influence the train industry towards OBOR project need to be identified to reduce the risks and uncertainties of this project. Therefore, the first objective of the study is to identify the important macro environmental factors affecting the train development with OBOR project by using PESTELS analysis. The second objective is to prioritize the most dominant macro environmental factors which influence the train development with OBOR project by using Analytical Hierarchy Process (AHP). These research is using PESTELS analysis to determine the main criteria and the sub-criteria of macro environmental factors. The closed-ended survey was applied to collect data from experts in Malaysian Land Public Transport Commission (SPAD). After that, the subjective evaluation results are converted into numerical value and processed to rank each alternative on a numerical scale by using AHP analysis. The result of the analysis shows that environmental factors are the most significant main criteria in PESTELS followed by legal (0.1720), technology (0.1687), safety and security (0.1603), economic (0.1539), social (0.0893) and political (0.0647) factors. It can be concluded that most of the respondents have given high priority to the main factors of environment, because Malaysia has a true goal of developing an environmental sound and sustainable development.

Keywords: OBOR Project, PESTELS Analysis, Train Development, AHP Analysis, Macro Environmental Factor

INTRODUCTION

China has announced its intentions to stimulate and boost trade through a trillion dollar project called “Belt and Road” initiative. One Belt, One Road (OBOR) project is a natural extension of the famous Silk Road, introduced in 2013 by President Xi Jinping.

Moreover, it seems that the idea of developing the OBOR project is supported by the Ex-Malaysian Prime Minister, Dato Seri Najib Bin Abdul Razak in the hope that it will have revolutionizing effects on the nation, higher levels of safety, and greater savings in cost and time. Malaysia has agreed to come out with the two projects which are High-Speed-Rail (HSR) and East Coast Rail Link (ECRL). These circumstances will most likely improve the train industry because this development will stimulate Malaysia industrial revolution.

However, these project faces many challenges, risk and uncertainties. Thus, environmental scanning was proposed to study the train development towards OBOR project. The first objective of this research is to identify several important macro environmental factors that affect the train development towards OBOR project in Peninsular Malaysia by using PESTELS analysis. The second objective is to prioritize the most dominant macro factors which influence the train development towards OBOR project by using Analytic Hierarchy Process (AHP) analysis.

LITERATURE REVIEW

One Belt, One Road (OBOR) makes reference to a trade infrastructure corridor in two different parts, which are The Silk Road Economic Belt and The 21st Century Maritime Silk Road. Silk Road Economic Belt contains Northern Corridors, Central Corridors, Southern Corridors and Secondary routes (Jinchen, 2016). While, OBOR project is a catalyst for transforming Malaysia into regional logistic hub for ASEAN and Southern gateway to overland logistic rapid freight system for China and Europe (Singh, 2017).

There are also projects that creates opportunities for local developers in developing real estate projects along the corridor (Ashraf, 2017), for example, HSR and the ECRL, which will connect ports on the east and west coasts of Peninsular Malaysia. Moreover, Chief Minister of Terengganu, Ahmad Razif Abdul Rahman referred the ECRL as a mega project that was intended to help out the sagging economy which is threatening the livelihood of its people (David,

2016).

Rail services have become significant mode of public transportation in the world when engineers and planners were not able to reduce congestions in cities (Syahriah et al, 2013). The rail transportation in Malaysia started as a commodity transporter and later developed into an intercity train service (Nordin et al., 2014). It is also aimed to become an integration agent by providing reliable, fast, easy and cheaper transportation system if compared to air, road and water transportation system (Vukan, 2005).

PESTEL

The first criteria in PESTEL analysis is politics, and the sub-criteria are political parties, LTA (Singapore Land Transport Authority) and SPAD (Malaysian Land Public Transport Commision). Malaysia is a democracy country and the government is built from political parties, which have won in the election. SPAD was established on 3 June 2010, following the passing of Land Public Transport Act 2010 [Act 715] by the Parliament in May 2010. Under the acts and regulations of railway transport, there is the parent and subsidiary Act which included in Railways Act 1991 [Act 463]. HSR is a mega project between the Governments of Malaysia and Singapore that aims to facilitate the trasportations travel between two capital cities. As a results, this project can enhance business linkages, and connect the people of both countries to get closer together (“KL-HSR”, 2017). The LTA has formed a wholly-owned subsidiary, which is to implement the Kuala Lumpur-Singapore HSR project.

The second criteria is economic, and the sub- criteria consist of goverment spending, cost of living and transportation cost. It is expected that all phases of ECRL project can be completed in seven years. The project costs up to RM55 billion, which is not solely used for the railway track construction alone. The arrangement with the government of China will also demand a financial framework arrangement of up to RM55 billion. This cost number is considered based on very favourable terms to Malaysia and is via a 20-year low-interest soft

loan by the Export-Import Bank of China (Exim) and a bond raising exercise (“Malaysia HSR Ticket”, 2015). The HSR plan from Jurong East in Singapore to the Malaysian capital Kuala Lumpur is expected to shorten travel time to 90 minutes only in average. There will be seven stops in Malaysia. The 340 km line is estimated to cost RM40 billion to build (“Malaysia HSR Ticket”, 2015). These projects will provide major economic benefits such as opportunities for growth in the tourism and construction industries, and food and retail sectors (“ECRL Serve as Alternative”, 2016).

Th third criteria is social, and the sub-criteria are employment opportunity, connectivity and accesibility, and alternative mode of transport. ECRL would serve as an alternative mode of transport for the people, whereby they could have the benefit of comfortable and shorter time of travel compared to land transport. ECRL would boost up growth centres for new towns in the district. Dungun, as Terengganu's learning and higher education hub will capitalise on this opportunity to further rejuvenate the economic and tourism sectors, which will indirectly create more employment opportunities (“ECRL Serve as Alternative”, 2016). There, HSR is one of the most important infrastructure project that would improve connectivity and accessibility for people living near the stations.

The four criteria is technology, and the sub-criteria are green technology, technology transfer and life cycle of technology. These projects would also assist in the transfer of technology in railway industry. Getting the technology and the new system in railway construction will improve our train industry (“Malaysia-China Sign Contract”, 2016). Nevertheless, LTA and MyHSR Corporation Sdn Bhd MyHSR are inviting companies specialising in Ticketing & Fare Collection (TFC) to share the latest ticketing (“Kuala Lumpur-Singapore High Speed Rail”, 2017).

The five criteria is environment, and the sub-criteria are habitant, residential and vechicles emission. HSR systems require a straight alignment, which means many bridges and tunnels will have to be constructed in Malaysia, where 335 km of the 350 km line will be sited (Lim, 2016). Next, the existing

railway alignment will not be used for the Seremban station, said Chief Minister of Negeri Sembilan Datuk Seri Mohamad Hasan. This is to avoid more residential areas from being acquired for the purpose (“Existing alignment not to use”, 2017). So the new alignment from Melaka will pass mainly oil palm plantations, namely the Jimah area (Port Dickson) onwards to Sendayan, Gadong Jaya and to Labu (Seremban) and that is where our HSR station will be built (“Existing alignment not to use”, 2017). So, this project will reduce the environmental pollution from vehicle emissions (“ECRL Serve as Alternative”, 2016).

The six criteria is legal, and the sub-criteria are Malaysia Railway Act 1991, Malaysia Land Transport Act 2010 and Singapore Cross-Border Bill 2017. Singapore had proposed to Malaysian Parliament about supporting the building and running of two future rail links between Singapore and Malaysia (Lim, 2016). The Cross-Border Railways Bill provided for the licensing of operators to run train services and maintain railway assets (Lim, 2016). It will also empower the Government to suspend cross-border train services if there are about to happen risks to commuter safety, such as a malfunction or terrorist act (Lim, 2016).

The seven criteria are safety and security, and the sub-criteria are system safety, system security and personal security. System safety encompasses dangers presented to the public traveling as a result of the operation or operational failures of the transport system itself (Small et al., 2006). System security refers to deliberate malicious attempts to harm people using the system or to use the system as an instrument to harm the public. Personal security refers to the safety and protection of passengers from each other (Small et al., 2006).

RESEARCH FRAMEWORK FORMULATION

Figure 1 has shown the research framework for the main criteria and sub-criteria for PESTELS analysis, seven main criteria and twenty one sub-criteria which have been justified from the literature review. Thereafter, the main criteria and sub-criteria of macro environmental factors are evaluated with pilot study. From the initial result, these macro environmental factors will affect the OBOR

project.

Moreover, this research have two types of variables which are dependent and independent. Dependent variable is the train development towards OBOR project. Independent variables is the macro environment which is used to identify external factors by using PESTELS.

METHOD PESTELS analysis will be used together with the AHP method in addressing the research objective by using standard elements from PESTELS, are Political, Economic, Social, Technology, Legal, Environment, and Safety and Security.

However, the elements of “Safety and Security” are not reflected in the theory of PESTEL analysis. Lack of these elements has weakened the theory and made it not strong enough to persuade operational experts of its application in decision making processes. The idea of PESTEL theory that includes the elements of “Safety and Security”, called as PESTELS analysis (Rahman et al, 2016).

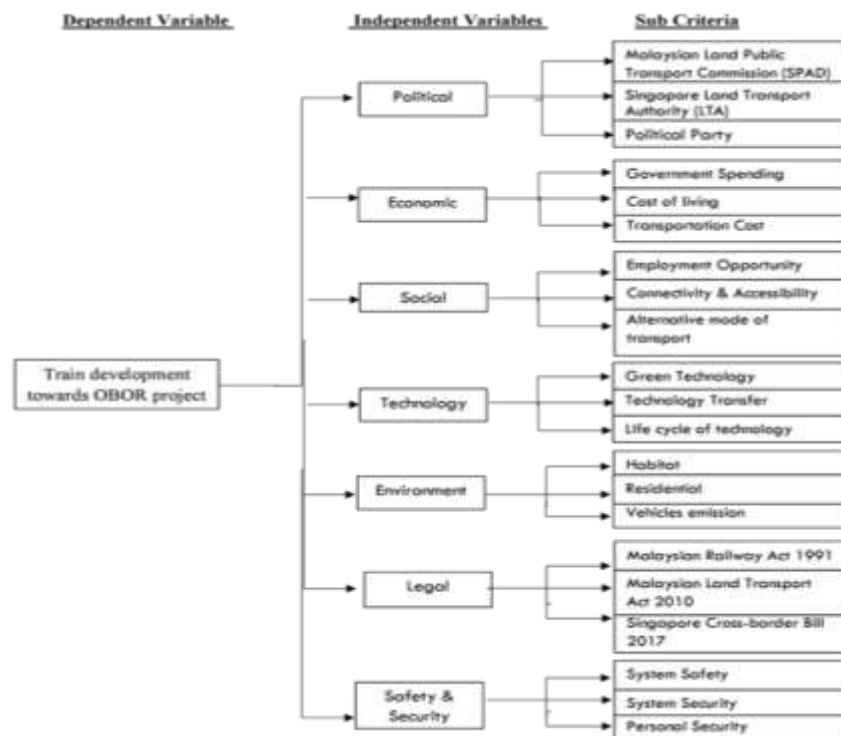


Figure 1 Research Framework for Macro Environmental Factors

PESTELS ANALYSIS

These research is using PESTELS analysis to determine the main criteria and the sub-criteria of the macro environmental factors, which are determined by secondary data and pilot study to select the factors that influenc the project.

A qualitative method is used to analyze the macro environmental factors, and questionnaire is constructed from the research framework. Twenty experts from Malaysian Land Public Transport Commission (SPAD) are targeted as respondents to answer the questionnaire.

AHP METHOD

AHP analysis is used to analyze the results. AHP analysis is applied to rank the order which is influencing the OBOR project. The subjective evaluation is converted into numerical value and processed to rank each alternative on a numerical scale by (Saaty, 1980). AHP analysis were conducted using software in excel.

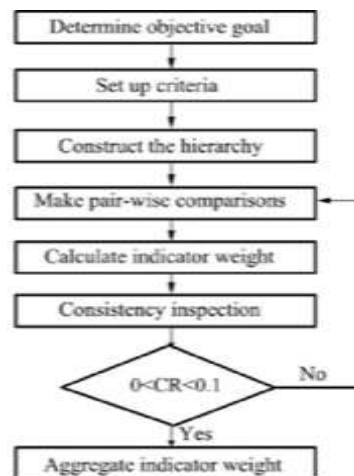


Figure 2 AHP flow chart

Figure 2 shows the flowchart of research method for AHP analysis. The first step is factor identification for external environment of train development. Secondly, the data will go through with the hierarchical structure which makes a criteria for the factors that have been selected before. Then, the third step is about the data analysis pair wise comparison. It will analyse all of data through survey activities and data collection from the SPAD which is related with research

objective to analyse the train development. If the CR in is between 0 and 0.1, the result is acceptable and aggregate indicator weight is determined.

RESULT

Based on Table 1, the weight of environmental factor is calculated as (0.1911) followed by Legal factor (0.1720), Technology factor (0.1687), Safety and Security factors (0.1603), Economic factor (0.1539), Social factor (0.0893) and Political factors (0.0647). The initial results for main factors and sub-factors are acceptable because the CR value are in between 0 and 0.1.

From the global weights result, it is shown that the most significant sub-criteria is residential (0.0719), the second and third significant sub-criteria are system safety (0.0718) and green technology (0.0708). The followingsub-criteria are habitant, Malaysia Land Transport Act 2010, cost of living, Singapore Cross-Border Bill 2017, life cycle of technology, vehicle emission, Malaysia Railway Act 1991, government spending, personal security, transportation cost, system security, technology transfer, employment oppoturnity, connectivity and accesibility, transportation cost, Malaysia Land Public Transport Commision (SPAD), political party, and Singapore Land Transport Authority (LTA).

Table 1. Results of Weight Values and Consistency Ratio for Main Criteria and Sub-criteria

Goal	Main Criteria	Weights	Sub-criteria	Local Weights	Global Weights
	Political	0.0647	Malaysia Land Public Transport Commission (SPAD)	0.4188	0.0271
			Singapore Land Transport Authority (LTA)	0.2520	0.0163
			Political Party	0.3293	0.0213
			CR	0.0090	
	Economics	0.1539	Government Spending	0.3251	0.0500
			Cost of living	0.3884	0.0598
			Transportation Cost	0.2865	0.0441
			CR	0.0471	
	Social	0.0893	Employment Opportunity	0.3197	0.0339
			Connectivity & Accessibility	0.3460	0.0309
			Alternative mode of transport	0.3343	0.0299
			CR	0.0127	
	Technology	0.1687	Green Technology	0.4195	0.0708
			Technology Transfer	0.2564	0.0433
			Life cycle of technology	0.3241	0.0547
			CR	0.0792	
	Environment	0.1911	Habitat	0.3433	0.0656
			Residential	0.3760	0.0719
			Vehicles Emission	0.2807	0.0536
			CR	0.0024	
	Legal	0.1720	Malaysian Railway Act 1991	0.3049	0.0524
			Malaysian Land Transport Act 2010	0.3639	0.0626
			Singapore Cross-Border Bill 2017	0.3312	0.0567
			CR	0.0249	
	Safety & Security	0.1603	System Safety	0.4477	0.0718
			System Security	0.2705	0.0434
			Personal Security	0.2819	0.0452
		CR	0.0744	CR	0.0249

DISCUSSION

As the main criteria, environmental factor is counted as 0.1911, because Malaysian have a true goal of development an environmentally sound and sustainable development. **Next**, legal factor is counted as 0.1720, because judiciary of Malaysian is heavily influenced by the English common Law and Islamic Law. Technology factor is counted as 0.1687, because it will alter the way people live, connect, communicate and transact with extremely effects on economic

development.

In the sub-criteria, residential area is counted as 0.0719, because Malaysian are aware of the formidable consequences of environmental degradation. System safety has been found as 0.0718, because this system helps the train driver to have a good knowledge on how to operate the train safely. Green technology is counted as 0.0708, because Malaysia really concerns about the environment technology which can preserve the environment from aggressive impacts.

The dominant political's sub-factor is Malaysian Land Public Transport Commission (SPAD), followed by political party and Singapore Land Transport Authority (LTA). SPAD stands as the main sub-factors because there are the enforcement authority for all land public transport matters in Peninsular Malaysia.

The dominant economic's sub-factor is cost of living, followed by government spending and transport cost. Cost of living is considered as the main sub-factors because the cities in Malaysia will become a corresponding metropolitan area compared to other country.

The dominant social's sub-factor are connectivity and accessibility, followed by alternative mode of transport employment opportunity. Connectivity and accessibility stand as the main sub-factors because the train transportation enables trade between people. It is essential for the development of civilizations.

The dominant technology's sub-factor is green technology, followed by life cycle of technology and technology transfer. Green technology is considered as the main sub-factors because Malaysian really concerns about the environmental technology which can preserve the environment from aggressive impact.

The dominant environment's sub-factor is residential, followed by habitat and vehicles emission. Residential stands as the main sub-factors because Malaysian are aware of the formidable consequences of Environmental Degradation. Malaysian knows the benefits of an environmentally friendly business. Running an environmentally friendly business helps you to reduce our impact on the environment and preserve natural resources.

The dominant Legal's sub-factor is Malaysian Land Transport Act 2010, followed by Singapore Cross-Border Bill 2017 and Malaysian Railway Act. Malaysian Land Transport Act 2010 is considered as the main sub-factors because it is the main Act to provide the regulation for land public transport which comprises of road and rail transport mode.

The dominant safety and security's sub-factor is system Safety, followed by personal security and system security. System safety is considered as the main sub-factors because this system helps the train driver to operate the train safely. Conversely, system safety also takes into account the effects of the system on its surrounding environment. Thus, a correct definition and management of interfaces become very important. Broader definitions of a system are the hardware, software, human systems integration, procedures and training.

CONCLUSION

Based on the results, it can be concluded that most of the respondents give highly priority to the main factors of Environment. All variable in the main factor (Environment) have been the top ranking of the lowest-level factors which are Residential, Habitat and Vehicle Emission rather than other factors.

Environmental factor is the main factor, followed by legal factor, technology factor safety and security factors, economic factor, social factor and political factors. From the global weights results, it is shown that the most significant sub-criteria is residential, the second and third significant sub-criteria are system safety and green technology.

As a conclusion, the ranking orders of the macro environmental factors have been identified to adapt the train development towards OBOR Project in Peninsular Malaysia. Furthermore, the important factors have also been analysed from macro environment factors which is related to this topic. Therefore, this research is able to contribute: 1) to advise SPAD on the potential factors that intimidate OBOR project, 2) to construct public awareness for OBOR project and 3) to gain knowledge that will be archived during the phase of OBOR project.

Thus, it is expected that this research will help the government and SPAD to identify the factors that will influence the project. Last but not least, Malaysia government believes that China's Belt and Road Initiative may bring transformative effects on the local train industry over the long term.

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