USERS' EXPECTATION ON EAST COAST RAIL LINK (ECRL)

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Abstract. This paper focuses on the role of the new East Coast Rail Links (ECRL) project in Malaysia and how it will improve logistics efficiency, economic development, and environmental friendliness to meet users' expectations. The ECRL project aims to enhance connectivity between East and West Coast regions to stimulate industrial, commercial, and tourism development. The ECRL is a large-scale and heavily constructed railroad construction project. ECRL has not been a smooth project, with the government proposing the program in 2016 and construction beginning in 2017. However, due to various factors, it was suspended in 2018 and continued with a new rail route in 2019. Users' expectations for ECRL are mainly to reduce traffic congestion problems on the road, reduce high road transport costs, reduce pollution to the environment, drive business development and promote employment in the surrounding areas along the route. Because all these problems are becoming severe in Malaysia now, we will study ECRL and collect data from the respondents to point out the users' expectations of ECRL in terms of improving logistics efficiency, economic development, and environmental friendliness. After analysing the data, our study concludes with the result that all three variables positively influence users' expectations of ECRL, which, as a new railroad in Malaysia, will play a crucial role in the future development of the East Coast of Malaysia and Malaysia as a whole.
Keywords: *ECRL, expectation, logistics, economic, environment*

Introduction

The East Coast Rail Link (ECRL) is a rail network that will connect the east coast (Pahang, Terengganu, and Kelantan) to the west coast of Peninsular Malaysia (Selangor), linking Kota Bharu in Kelantan and Port Klang in Selangor (MRL, 2022). It is a standard gauge double-track railway link infrastructure project with a total route of 665km focused on carrying both passengers and freight. It is a standard gauge double-track railway link infrastructure project focusing on carrying passengers and cargo. It is a form of China's "One Belt, One Road" initiative. This project aims to improve interstate connectivity to spur the industrial, commercial, and tourism sectors (Barrow, 2017). In March 2016, the proposed project of ECRL from the government and the finance deal and construction agreement estimated USD13.1 billion in November 2016. In August 2017, the construction of ECRL started, but the change of government led to the suspension of the ECRL project. Later, the evolution of the new alignment led to the project continuing in 2019. Currently, the project has reported completion of 21.4% in March 2021 and is estimated to complete the whole construction in 2026 and start operation in 2027 (IDEAS, 2020). ECRL is a large construction project which requires a considerable investment and plenty of time and effort to complete.

The development of ECRL has excellent potential for the east coast. First of all, the Strait of Malacca is very burdensome. All the ships are crowded from Singapore to queue up to pass through, and some big ships cannot even pass through because of the shipping lanes (World Ocean Review Official Portal, 2022). On the other hand, the east

coast faces the South China Sea and has much more relaxed channel restrictions. It would be a great advantage for China to get rid of the Malacca Strait once the rail link between the east and west coasts. Hence, we don't have to cross Singapore with thousands of troops. It would also be a big boost to the Malaysian economy itself. Secondly, Pahang is the largest state with mountains, forests, and resources; Genting Highland is in this state. Terengganu has the best beach resources in the Malay Peninsula, while Kelantan is the birthplace of Malay culture and has a strong ethnic flavor. All three states have considerable prospects for tourism development. If we only see the immediate national debt problem, on the one hand, it will indeed put an unknown burden on the Malaysian government. But we should also clearly see the development potential of Malaysia's east coast. Other than that, the development of ECRL also needs to address the current issues occurring in east coast regions. It is because the ECRL has excellent speed, capacity, and price advantages and is environmentally friendly compared to road transport. Thus, the development of ECRL can improve logistics efficiency, economic development, and environment friendly based on users' expectations.

Problem statement

This study will discuss three problem statements. The first issue found in the users' expectations on ECRL is the improvement of logistic efficiency. Currently, traffic congestion on roads has become a significant issue in Malaysia. According to the Malaysian Highway Authority report (LLM), there has been a high number of vehicles on the main routes of the east coast in recent months, especially when it comes to festival seasons (Malaymail Official Portal, 2021). The ports such as Kemaman port, Terengganu and Kuantan port, and Pahang in the east coast regions have significantly impacted the traffic congestion due to the ports having a sizeable economic activity daily (Aziz et al., 2012). It will cause the travel time spent on the road will become more by the road users and transporters and even slow down the process of delivering goods and transporting people.

Another user expectation of ECRL is the economic benefits. Although the project requires a lot of capital and several years of construction time, the ECRL rail project is more efficient than road transport, and the total amount of goods and passengers transported is far more than that of road transport. At the same time, for users, railroads are undoubtedly the most economical and convenient way to travel. Compared with road transportation, users do not have to drive themselves and do not have to bear the fuel costs and a series of expenses of the road toll. For those who prefer to travel by air, airplanes have no speed advantage over the high-speed rail for distances under 500 km. Because airline tickets are expensive and airports are almost always on the edge of cities, ECRL allows users to enjoy convenient and fast travel at a lower price.

In addition, the issue found in users' expectations on ECRL is environmentally friendly. Road transportation significantly impacts global air pollution (Lalive et al., 2018). According to the study, the most carbon dioxide emission is from road transport compared to other modes of transportation (Ritchie, 2020). Research showed that a typical passenger vehicle on roads would emit about 4.6 metric tons of carbon dioxide per year (EPA, 2016). Thus, the increased number of people using their vehicles will significantly increase pollution. The pollution will also impact the health problems of residents. Therefore, the transport industry is responsible for protecting the

environment, although the government needs to develop a new construction project such as the ECRL project.

Objective of the study

The study's general objective is to assess the current issues faced in the east coast regions of Malaysia and investigate the development of ECRL to solve these issues to achieve the users' expectations. The specific objectives are: (1) to investigate the improvement of logistics efficiency effect on the users' expectations of ECRL; (2) to investigate the economic development effect on the users' expectations of ECRL; and (3) to investigate the environment-friendly effect on the users' expectations of ECRL.

Literature review

ECRL

The East Coast Rail Link (ECRL) is a planned 665 km railroad line connecting the more developed west coast region of Peninsular Malaysia with the less developed east coast states (Railway Technology Official Portal, 2017). It is considered a large construction since it needed a lot of time, effort, and investment. The ECRL project is a form of China's Belt and Road Initiative (BRI). The government changed the project proposal many times due to different factors. For the original alignment, the project consists of 22 stations running along a 688km route with an estimated total construction cost of RM55 billion (Chok, 2017). The road started from Kota Bharu, Kelantan, to ITT Gombak, Selangor, in less than four hours (Bernama Official Portal, 2017). The estimated completion of the project is June 2024. Next, the first proposed alignment was due to the change of government in 2018, the number of stations decreased to 20, and the travel times increased to six hours (Malaysiakini Official Portal, 2019). Although there is an expansion of travel time, the alignment can reduce the total construction cost to RM50.27 billion and connect two ports from east to the west. It also stated the completion of the project would extend more than two years, December 2026 (Tan, 2019). Lastly, the second proposed alignment was due to the change of government in 2020. The entire route is 665km, with the additional 25km from Serendah to Port Klang with West and North ports as it can enhance the efficiency of rail services (Barrock and Choe, 2020). As a result, the development of ECRL is a vast construction project which takes a lot of effort by the government and authorities to ensure its completion.

User's expectation on ECRL

We define user expectations as the expectation of our users to meet their satisfaction with our products and services. In the ECRL project, the key points that created user expectations came from whether the rail line would provide relevant benefits to users, focusing on three main areas: (1) the improvement of regional logistics efficiency; (2) the impact on user travel costs; and (3) the effects on the surrounding environment. And for the user satisfaction survey, not just a single study of a single indicator or improvement, but the project itself should be a comprehensive review and investigation. Therefore, in this study, we need to investigate users' expectations of ECRL regarding logistics efficiency, economic development, and environmental friendliness.

Logistics

Logistics can be defined as the movement of cargo from the point of origin to the end customer. Generally, ECRL is mainly to improve the connectivity between the east coast to the west coast of Peninsular Malaysia, as no coastal railway is currently being developed to provide a faster land route to Kuala Lumpur. The development of ECRL can prevent traffic congestion issues on the road because it has a large capacity to carry a large volume of freight or passengers, which can replace numerous cars or motorcycles on the streets. ECRL is a high-speed rail. It provides a fast, comfortable, and safe travel option for the community from other road transportation. The main reason that caused the severe traffic congestion issue is the increase in the number of people nowadays using their transports from public transport. Statistics showed that the number of registered vehicles in Malaysia increased rapidly from 17,486,589 in 2020 to 17,728,482 in 2021 (CEIC Official Portal, 2021). Due to the increased population in Malaysia over the years, it needs more efficient transport to move from one to another as the demand increases. Other than that, it also can reduce the travel times on the road and thus improve mobility and accessibility in the east coast regions. However, the increase in traffic currently apparent by the rise in the number of vehicles on the road causes the traffic congestion problem to become more common (Bubelíny et al., 2021). Other factors as the ports such as Kemaman Port, Kuantan Port, and Port Klang have a sizeable economic activity daily. It impacts more time the road users and transporters spend on the roads and slows down the process of delivering goods and transporting people from one to another. Thus, ECRL as a high-speed rail drives time efficiency, encouraging more users to use rail transport than other vehicles.

Economic

An economy is a large set of interrelated production, consumption, and exchange activities that determine allocation of scarce resources. The ECRL project has built over 300 sites on the east coast, which has increased job opportunities and income for residents along the route. And because it will require a large number of technical and operational staff to maintain the railroad on an ongoing basis. Another benefit for users is the expansion and more equitable development of cities along the network. Connecting more areas to Kuala Lumpur through efficient and affordable transport means that more and more people working in Kuala Lumpur and the surrounding towns do not need to live in the urban areas of Kuala Lumpur. Instead, using rail as a daily commuter means that there will be high density and mixed-use real estate development around the city and the stations. Real estate development will also bring more jobs to the surrounding areas, and the establishment of the surrounding business districts and commercial facilities will provide more income opportunities for the locals. It helps locals to improve their income.

Besides, the properties have a price advantage compared to those within Kuala Lumpur. Users can buy better housing with a better location, quality, and space than in Kuala Lumpur at a lower price. It is more attractive to the users and leads to the population's migration to Kuala Lumpur along the railroad line. It directly contributes to the economic development of the second-tier cities along the railway line, which leads to a favorable situation in better job opportunities, and the labor market becomes more flexible. And for residents along the east coast, these improvements could help locals have more access to better infrastructure and related services. And since the east coast has always been a tourist-rich area, better infrastructure, and more accessible transportation will directly lead to more tourists and spending.

Environment

According to the definition given by ISO, being environmentally friendly can be defined as having no or minimal impact on the environment. The development of the ECRL project will reduce the local air pollution because the railroad has a high capacity to carry many goods or passengers, replacing many cars or motorcycles on the road. The ECRL is a high-speed rail line that provides communities along the East Coast with a fast, comfortable, and safe travel option for other road transportation. A study showed that after the opening of high-speed rail, intercity bus passenger traffic within 100 km dropped from 87% to 52% and 200-400 km from 84% to 54% (Guo et al., 2020). In short, the development of ECRL can replace the countless users of cars or motorcycles on the road to abandon their previous mode of travel and switch to rail as the best way to travel medium distances.

The increased rail investments could significantly reduce CO2 emissions from transportation and improve the country's air quality (IISD Official Portal, 2019). A report by the International Energy Agency states that global transit will expect to double, which means a 60% increase in car ownership. At the same time, air demand for freight and passenger transport will triple by 2070 (Ritchie, 2020). All this growth will undoubtedly increase gas emissions and cause severe air pollution. The efficiency of rail transport offers the opportunity to meet the growing demand for transport while avoiding the increase in transport emissions. ECRL has low-carbon and energy-saving features, which significantly reduces air pollution. It has clean energy through electric-powered rolling stock, eliminating the dust and smoke pollution caused by electric locomotives that consume less electricity. Therefore, the development of ECRL on the East Coast of Malaysia can reduce air pollution and increase the sustainability of the East Coast region.

Research framework

In this study, researchers developed the theoretical framework to investigate the relationship of users' expectations on ECRL as a dependent variable (DV) while improvement of logistics efficiency, economic development, and environment friendly as the independent variables (IV) (*Figure 1*).

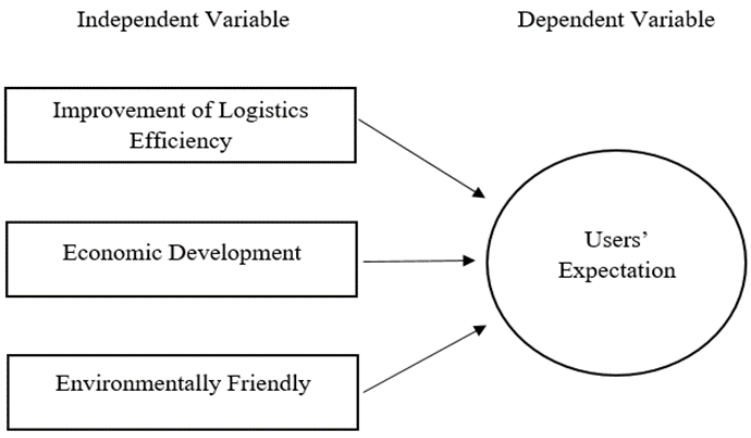

Figure 1. *Research framework.*

Research hypothesis

In this study, we used the hypothesis approach of the Associative and Causal Hypothesis, which refers to the association hypothesis defining that there is no interdependence between variables and that a change in one variable leads to a change in the other; the causal hypothesis proposes an effect on the dependent variable, This is due to the manipulation of the independent variable. The research hypothesis in the study are: (H1) There is a significant relationship between improving logistics efficiency and the users' expectations of ECRL; (H2) There is a significant relationship between economic development and the users' expectations of ECRL; and (H3) There is a significant relationship between environment-friendly and the users' expectations of ECRL.

Materials and Methods

In this study, the research design is the quantitative research design. It involves the participation of a researcher in the collection and analysis of numerical data and the implementation of statistical tests. The targeted population is the users in Malaysia, which has a size of 28.3 million. Each user is the population element in the study. The sample is the 384 users in east coast regions that were collected by researchers represented in the study's sample. The sampling method used by researchers is probability sampling which allows each population unit an equal opportunity to be selected. In this study, primary data such as surveys and secondary data, including publications, article journals, and internet cited information, are the two forms used in data collecting. Researchers will adopt a set of online questionnaires using a google form. Researchers created a google form that consists of well-structured questionnaires to collect the data. Researchers will send the questionnaire to an online platform for the respondents, the users in the east coast regions, to fill. Through online questionnaires, researchers can collect the data immediately as the respondents from the different states on the east coast of Malaysia are allowed to fill in the questionnaires simultaneously.

The questionnaire was conducted in English and divided into five sections, which are Section A, Section B, Section C, Section D, and Section E. Section A is the demographic of respondents, Section B is the question related to users' expectations on ECRL, Section C is the question-related to users' expectation on ECRL towards the improvement of logistics efficiency, Section D is the question-related to users' expectations on ECRL toward economic development and Section E is the question-related for users' expectations on ECRL toward environment friendly. The ranking scales, such as the nominal and interval scales, are applied in the questionnaire. The study used the Likert scale to measure the opinions of targeted respondents. After collecting the data from respondents, the Statistical Package for Social Science (SPSS) software is used in the study as it generates clear and readable data that is easier for researchers to analyze. Researchers have four types of analysis: descriptive analysis, reliability analysis, correlation analysis, and multiple linear regression (MLR) analysis.

Results and Discussion

Researchers applied data analysis for a total of 384 respondents in this study. The descriptive analysis showed that most of the respondents are female, 31-40 years old, Malay, Malaysian, with monthly incomes between RM2001-RM4000 and have more than three days per week using public transport. Other than that, the result of descriptive static showed the highest mean of the question among the three independent variables, which means that the question has a strong agreement for the users. For improve logistics efficiency, the highest mean is the expectation that ECRL can reduce the congestion that always occurs in road transport, with a mean of 4.52. The highest mean among the economic development is the expectation that using the more efficient transport modes requires a higher cost, with a mean of 4.40. The highest mean among the environmentally friendly is the expectation that they will always be concerned about the environmental issues caused by transport, with a mean of 4.43.

According to the Reliability analysis, the Cronbach Alpha values of all the independent variables are from 0.780 to 0.820. Economic development and environment friendly have a very good strength of association as their alpha values are 0.801 and 0.820, respectively. Another improvement in logistics efficiency has good strength of association as its alpha value is 0.780. It indicates that all the independent variables are consistent and reliable as the Cronbach Alpha values are more than 0.7.

Based on the correlation analysis in *Table 1*, the result showed a strong correlation of users' expectations on ECRL with all the independent variables because the correlation coefficients (r) of all the independent variables, which are improvement of logistics efficiency is 0.792, economic development is 0.729, and environment-friendly is 0.702, are between 0.7 to 0.89. Thus, all the independent variables are significantly related to the users' expectations of ECRL. Lastly, *Table 2* shows the summary of the multiple linear regression (MLR) analysis resulting in the study's correlation coefficient value (R) being 0.808. It means it has a positive correlation between the users' expectation of ECRL and the improvement of logistics efficiency, economic development, and environment-friendly. Besides, the R-squared (R^2) is 0.652, which indicates the three independent variables explaining about 65.20% of the variation for the users' expectations on ECRL. Thus, the model proves good as the R-squared has more than 0.3. *Table 3* shows the ANOVA Table's result that the F-statistics is 237.491, considered large. The corresponding p-value is highly significant at 0.001 or lower than the alpha value of 0.05. It proves a linear relationship exists between the users' expectations of ECRL and the improvement of logistics efficiency, economic development, and environment friendly. The coefficient table in *Table 4* also showed that all the independent variables which are improvement of logistic efficiency (β = 0.502 and the p-value is <0.01), economic development (β = 0.160 and the p-value is 0.005) and environment friendly (β = 0.107 and the p-value is 0.035) have a positive and significant relationship with the users' expectation on ECRL due to the p-value being below the confident level of 0.05. In short, it has clearly shown all the hypotheses developed for the research studies are acceptable. Based on *Table 5* has clearly shown all the hypotheses developed for the research studies are acceptable. All the independent variables, which are improvement of logistics efficiency (p<0.01), economic development (p=0.005), and environment friendly (p=0.035), have a p-value lower than 0.05. Thus, it shows a significant relationship between the dependent variable, users' expectations of ECRL.

Table 1. *Correlation analysis.*

		meanUE	meanLOG	meanECO	meanENVI
meanUE	Pearson correlation	1	.792**	.729**	.702**
	Sig. (2-tailed)	-	<.001	<.001	<.001
	N	384	384	384	384
meanLOG	Pearson correlation	.792**	1	.813**	.780**
	Sig. (2-tailed)	<.001	-	<.001	<.001
	N	384	384	384	384
meanECO	Pearson correlation	.729**	.813**	1	.839**
	Sig. (2-tailed)	<.001	<.001	-	<.001
	N	384	384	384	384
meanENVI	Pearson correlation	.702**	.780**	.839**	1
	Sig. (2-tailed)	<.001	<.001	<.001	-
	N	384	384	384	384

*Notes: ** means correlation is significant at the 0.01 level (2-tailed).*

Table 2. *Summary of multiple linear regression model.*

Model	R	R square	Adjusted R square	Std. Error of the estimate	R square change	F change	df 1	df 2	Sig. F change
1	.808[a]	.652	.649	.35477	.652	237.491	3	380	<.001

Notes: a. Predictors: (Constant), meanENVI, meanLOG, meanECO.

Table 3. *ANOVA table.*

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	89.672	3	29.891	237.491	<.001[b]
	Residual	47.827	380	.126	-	-
	Total	137.500	383	-	-	-

Notes: a. Dependent Varibale: meanUE; b. Predictors: (Constant), meanENVI, MeanLOG, MeanECO.

Table 4. *Coefficient table.*

Model		Unstandardized coefficient		Standard coefficient	t	Sig.
		B	Std. Error	Beta		
1	(constant)	.943	.125	-	7.523	<.001
	meanLOG	.502	.050	.551	10.080	<.001
	meanECO	.160	.057	.177	2.821	.005
	meanENVI	.107	.051	.123	2.110	.035

Notes: a. Dependent Variable: meanUE.

Table 5. *Hypothesis testing result.*

	Relationship	Result
H1	There is a significant relationship between improvement of logistics efficiency and the users' expectation on ECRL.	Accepted
H2	There is a significant relationship between economic development and the users' expectation on ECRL.	Accepted
H3	There is a significant relationship between environment friendly and the users' expectation on ECRL.	Accepted

Conclusion

In conclusion, the ECRL project can definitely enhance the efficiency of logistics and transportation, increase the local economic development and also the ecological environment. The quantitative research approach is applied in this study with a total sample of 384 residents in the east coast of Malaysia was surveyed through an online questionnaire. The data analysed showed the result that all the hypotheses are acceptable and there are positive relationships within the users' expectation on ECRL and the improvement of logistics efficiency, economic development and environment

friendly. As a result, this study successfully achieves the developed research objective (RO) and the research question (RQ).

The results of the study allow us to make the three recommendations. First, the results of our study show that the ECRL railroad has a positive effect on reducing congestion and improving the efficiency of logistics along the route. So for the ECRL railway line, it is imperative to choose the location of the railroad station. That is because it is related to the willingness of users to use this travel mode and the efficiency of their travel. Thus, the first recommendation is to choose the right location and improve the infrastructure of the railway station for the ECRL line. For European railroads, rail transport is far more capable and efficient than other modes of transportation. It requires that rail transit stations are chosen close to cities and need to be located in suitable locations around cities. Not too far from urban communities, which would increase passenger travel time, and far from cities, making it challenging to develop the surrounding areas along the rail line. As a combined mode of travel, passengers usually choose to travel by car and rail, so the accessibility and infrastructure around the railroad stations also determine the users' travel efficiency and willingness to travel to a certain extent.

Secondly, users around ECRL are mostly commuters with a high number of commutes and travel needs, so higher access costs are not conducive to users taking ECRL trains. High fares can lead to users using other, cheaper modes of travel, leading to user churn. Thus, the second recommendation is to provide reasonable fares for users. Foods should be cheaper than airplanes. For users, high-speed rail should be the best way to travel medium distances because the ride experience and ride service are better than car travel and the travel time is lower than the car. Compared with an airplane, high-speed rail is more efficient travel. There is no need to go to the airport in advance and wait for an aircraft, and the speed is about the same as the airplane, and the airport is usually far away from the city, so users can save time going from home to the airport. So users can accept that high-speed rail fares are cheaper than cars but not more expensive than planes.

Finally, we found that the ECRL project is one of the effective ways to improve the environment and reduce air pollution. Trains naturally have more efficient transportation capacity compared to road transportation. So for the ECRL project, the most effective way to protect the environment should be to improve technological development and further reduce trains' impact on the environment. Thus, the third recommendation is to improve technology and innovation in the development of ECRL, which is very good for the environment since road transport is undoubtedly one of the most polluting traditional modes of transportation. Therefore, as train traffic increases, ECRL needs to innovate technology and use cleaner fuel and electricity to power trains. Further reducing pollutant emissions and achieving a virtuous cycle, in addition to the government advocating for citizens to abandon their modes of travel and use public transportation more and as much as possible as their primary mode of travel is one of the most important ways to promote environmental friendliness. For the ECRL project, promoting the use of ECRL as the primary mode of travel will reduce the proportion of road traffic and directly reduce air pollution.

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Conflict of interest

The authors confirmed there is no conflict of interest with any parties or organizations involved in the study.

REFERENCES

[1] Aziz, Z.A., Yaacob, M.R., Ibrahim, M.D. (2012): Logistics development study of east coast region: early investigation. – Universiti Malaysia Kelantan 14p.

[2] Barrock, J., Choe, T. (2020): Newsbreak: ECRL could see change in alignment again. – The Edge Markets Official Portal. Retrieved from: https://www.theedgemarkets.com/article/newsbreak-ecrl-could-see-change-alignment-again

[3] Barrow, K. (2017): Malaysia breaks ground on East Coast Rail Link. – International Railway Journal Official Portal. Retrieved from: https://www.railjournal.com/regions/asia/malaysia-launches-east-coast-railway-construction/

[4] Bernama Official Portal (2017): ECRL Project A Game Changer For Malaysia: PM Najib. – Bernama Official Portal. Retrieved from: https://web.archive.org/web/20170821141859/http://www.bernama.com/bernama/v7/sp/newssports.php?id=1380220

[5] Bubelíny, O., Kubina, M., Varmus, M. (2021): Railway Stations as Part of Mobility in the Smart City Concept. – Transportation Research Procedia 53: 274-281.

[6] CEIC Official Portal (2021): Malaysia Number of Registered Vehicles. – CEIC Official Portal. Retrieved from: https://www.ceicdata.com/en/indicator/malaysia/number-of-registered-vehicles#:~:text=Malaysia%20Number%20of%20Registered%20Vehicles%20was%20reported%20at%2017%2C728%2C482%20Unit

[7] Chok, S.L. (2017): Najib witnesses signing of ECRL Phase Two construction agreement. – New Straits Times Official Portal. Retrieved from: https://www.nst.com.my/news/nation/2017/05/238867/najib-witnesses-signing-ecrl-phase-two-construction-agreement

[8] Environmental Protection Agency (EPA) (2016): Greenhouse Gas Emissions from a Typical Passenger Vehicle. – United States Environmental Protection Agency Official Portal. Retrieved from: https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F-

[9] Guo, X., Sun, W., Yao, S., Zheng, S. (2020): Does high-speed railway reduce air pollution along highways? Evidence from China. – Transportation Research Part D: Transport and Environment 89: 14p.

[10] Institute for Democracy and Economic Affairs (IDEAS) (2020): East Coast Rail Link (ECRL). – Institute for Democracy and Economic Affairs, Malaysia 21p.

[11] IISD Official Portal (2019): Boosting Railway Investments Could Reduce Emissions, Improve Air Quality and Access to Transport. – IISD Official Portal. Retrieved from: https://sdg.iisd.org/news/boosting-railway-investments-could-reduce-emissions-improve-air-quality-and-access-to-transport/

[12] Lalive, R., Luechinger, S., Schmutzler, A. (2018): Does expanding regional train service reduce air pollution? – Journal of Environmental Economics and Management 92: 744-764.

[13] Malaymail Official Portal (2021): Highway authority: Large number of vehicles east coast-bound despite MCO in KL. – Malaymail Official Portal. Retrieved from:

https://www.malaymail.com/news/malaysia/2021/05/08/malaysian-highway-authority-high-number-of-vehicles-east-coast-bound-despit/1972646

[14] Malaysiakini Official Portal (2019): Mahathir explains why ECRL realigned to the south. – Malaysiakini Official Portal. Retrieved from: https://www.malaysiakini.com/news/472331%20Malaysia%20Rail%20Link%20(MRL)%20(2022):%20Less%20Traffic%20Congestion%20For%20Port%20Klang

[15] Malaysia Rail Link (MRL) (2022): Less Traffic Congestion For Port Klang Residents Once ECRL Completed. – Malaysia Rail Link Official Portal. Retrieved from: https://www.mrl.com.my/en/less-traffic-congestion-for-port-klang-residents-once-ecrl-completed/

[16] Railway Technology Official Portal (2017): East Coast Rail Link (ECRL) Project, Malaysia. – Railway Technology Official Portal. Retrieved from: https://www.railway-technology.com/projects/east-coast-rail-link-ecrl-project/

[17] Ritchie, H. (2020): Cars, planes, trains: where do CO2 emissions from transport come from? – Our World in Data Official Portal. Retrieved from: https://ourworldindata.org/co2-emissions-from-transport

[18] Tan, D. (2019): East Coast Rail Link (ECRL) is back on, RM21.5b saved: Construction may start next month, 2026 completion. – Pautan Official Portal. Retrieved from: https://paultan.org/2019/04/15/east-coast-rail-link-ecrl-is-back-on-rm21-5b-saved-construction-may-start-next-month-2026-completion/

[19] World Ocean Review Official Portal (2022): The Strait of Malacca: A historical shipping metropolis. – World Ocean Review Official Portal. Retrieved from: https://worldoceanreview.com/en/wor-5/living-with-the-coasts/coastal-functions/the-strait-of-malacca-a-historical-shipping-metropolis/