

An analysis study of COVID-19 pandemic impact on transport system

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Abstract. Covid-19 has impacted the world at a devastating level, with many sectors had been damaged quite badly, especially the transport sector. Transport provides basic movement that connects people and goods. With the lockdown and travel restriction, this sector has been hit badly. The travel and mobility pattern in Malaysia are changed as well. This paper studies the impact of various mode of transportation in Malaysia due to the lockdown which was implemented since March 2020. Results show that air transportation and land public transportation (such as LRT and bus) are impacted badly.

1 Introduction

In Malaysia, the first COVID-19 case that was confirmed to reach the country was in late January 2020 in Johor where it was brought by one of the travellers from China via Singapore after the outbreak in Hubei, China [1]. At first, the confirmed case was relatively low when the government took major precautions to prevent the spreading of the virus. However, the emergence of “Tablighi” cluster in Sri Petaling, Kuala Lumpur, had caused the spike in confirmed cases throughout the country. By the end of March 2020, Malaysia recorded the highest number of confirmed cases among the Southeast Asia countries [2]. Subsequently, the Prime Minister announced the implementation of Movement Control Order (MCO) starting from 16th of March 2020 and it continues until late of April 2020 [3], before the government eased the MCO to Conditional Movement Control Order (CMCO). Starting from 1st of May 2020, most businesses were allowed to operate under strict Standard Operating procedures (SOP) [4]. However, the situation worsened at the end of September 2020, especially in the Klang Valley region, which made the government to announce the re-implementation of lockdown.

The major control during MCO is mobility restriction. Residents are asked to “stay at home” and reduced their movement. Only one (1) person of a family is allowed to go out for important cores, such as to buy food or necessities, within 10 km of radius from his house. In addition, restriction on district and state crossing is imposed to discourage movement. These restrictions are relaxed when the country entered into different phases of MCO depended on the number of covid-19 confirmed cases.

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The MCO restriction on mobility has affected the travel behaviour and pattern of travellers. In one of the research studies conducted in Santander, Spain, it was revealed that the number of public transport's users had declined by 96% which leads to a decrease of 76% in overall mobility [5]. In the Netherlands, an identical pattern was witnessed. Due to the preferences of using individual transport compared to public transport or shared vehicles, over 90% of trips have been decreased for the public transport modes [6]. Another similar pattern was found in Budapest, Hungary. The public transport ridership had declined greatly and due to the restriction, cycling or bike-sharing are in decreasing trend as well. [7]. This is mostly due to the reason that people need to keep their distance from each other and try to prevent contact. This also leads to the reason why people travel lesser or avoiding any public transportation and might preferably choose to use their own transport.

The objective of this study is to investigate the impact of Covid-19 pandemic on transport system in Malaysia. In this study, all modes of transport including air, land, and maritime transport are investigated. It is shown that air transport was the worst hit sector, followed by land public transport. Due to the increase of e-commerce, maritime transport is facing huge demand in terms of cargo transport and thus, impacted the freight transport at the same time. By learning the impact, mitigation strategies could be proposed brace the impact.

2 Review of impact on worldwide transport system

The implementation of lockdown all around the world, in order to reduce the possible infection of Covid-19 virus, has impacted the life of people and also economy. Even the traffic and mobility has changed throughout the time lockdown was implemented. In a study done by Nižetić (2020), the researcher found out that the mobility of air transport in European region has been reduced by more than 89%, while some selected airports in Croatia such as in Zagreb and Split had reduced by more than 95%. Nevertheless, the pandemic had little effect on cargo traffic, and in certain cases, it even grew due to the need for medical supplies in the fight against the illness [8]. Another study done by Gkiotsalitis and Cats (2020) on the impact of this pandemic on public transport services around the world. Researchers found out that, the ridership has dropped by more than 80% in some major cities in China, USA, Iran and UK. This was probably due to the changes in travel behaviour following the guidelines set by the government on social distancing. In order to adjust their operations in the face of a severe drop in ridership and at the same time fulfil regulatory rules, public transport operators throughout the world have opted to reduce their service span, cancel specific services, and shut certain stations. To limit the risk of viral transmission, government has encouraged citizen to keep a safe distance. Among all of the measures implemented, this is perhaps the most vital and consequential for public transport operation [9].

The implementation of lockdown also changes the traffic and mobility pattern on the road. With fewer vehicles on road and low traffic volume, the number of traffic accidents is reduced. In a study done by Barnes, Beland, Huh and Kim (2020) in Louisiana, researchers found that the total traffic accident has reduced by 47% last year. They also found out that mobility has decreased all across Louisiana including trips related to groceries, pharmacies, workplaces as well as public places like recreational parks, public stations, malls and others [10]. This was probably due to the fact that non-essential trips or travelling were not allowed, hence, people chose to only stay or took a walk or even exercised nearby their houses. In another study done by Winchester, Peterson, Carter and Sammel (2021), the researchers studied the traffic, mobility as well as the NO₂ pollution in 22 cities of US during the lockdown and 'social-distancing' policies (SDPs) were implemented. The researchers found out that at the time when the SDPs was the strictest, the average daily

congestions were reduced by 23.47% compared to before the SDPs and the same trend were shown by the average daily mobility where it was reduced by 13.48%. all these reductions, surprisingly, has caused the average daily NO₂ to be decreased as lesser movements of vehicles and people were found outside [11].

Ho, Xing, Wu and Lee (2021) reported that there was significant increase in China's freight transport during the lockdown. The researchers found out that due to the lockdown, people started to panic buying and stockpiled the necessities and foods at home. However, they chose to buy the necessities online rather than to go to supermarket physically. The fear of infection along with the lockdown and social-distancing policy caused them to shopping the necessities online which directly impacted the freight transport, in a positive way [12]. However, it differs in some places and one of it is Colombia. Arellana, Márquez and Cantillo (2020) reported in their study that the first three weeks in March, the freight transport was not affected due to the fact that mandatory quarantine was not yet implemented, but then after it was implemented, the cargo trips were reduced by 38%. The researchers assumed that the reduction was due to the reason that most non-essential factories were closed down during the mandatory quarantine phase [13].

All these reductions in percentage directly affected the economy, worldwide. United Nations Conference on Trade and Development (UNCTAD) reported on June 2021 that global economy will possibly lose more than \$4 trillion due to the impact of this pandemic brought to the tourism sector, which is also closely to transport system, especially the aviation transport [14]. This means that the world GDP is at risk as long as this pandemic is ongoing. In a study done by Vidya and Prabheesh (2020), they reported that the GDP of advanced economies, Emerging and Developing Economies (EMDEs) and the world is forecasted to be decrease by 7%, 2.5% and 13%, respectively, in 2020 where this projection was done by the World Bank in 2020 after the pandemic hit [15].

3 Impact on transport system in Malaysia

Due to the restrictions in travelling, interstate or abroad as well as the movement in public places, the impact on transport sector is hit quite hard, with not many people can be seen in the public places. This also caused changes in traffic and mobility for quite some time, especially at the area with high population density.

3.1 Impact on rail transport system

Figure 1 shows the ridership comparison of year 2019 and 2020 for various rail transport system in Klang Valley area. It is observed that the KLIA Express and KLIA Transit service which provide the direct transport connection between KLIA Airport and city centre is most hit by the pandemic. The ridership has reduced by 67% in year 2020 as compared to year 2019. This is followed by Kelana Jaya LRT (60% reduction), Intercity train (55% reduction) and KTM Commuter train (53% reduction). The reduction of train ridership has impacted the revenue and operating sustainability of these train services. This happened most probably after the first lockdown was implemented where citizens were not allowed to go out and need to stay at home during this phase as per instructed by the government authorities. Other than that, other reason also can be due to the fact that people were very scared of the infection when using the public services. Up to this day also, the behaviour can be seen anywhere.

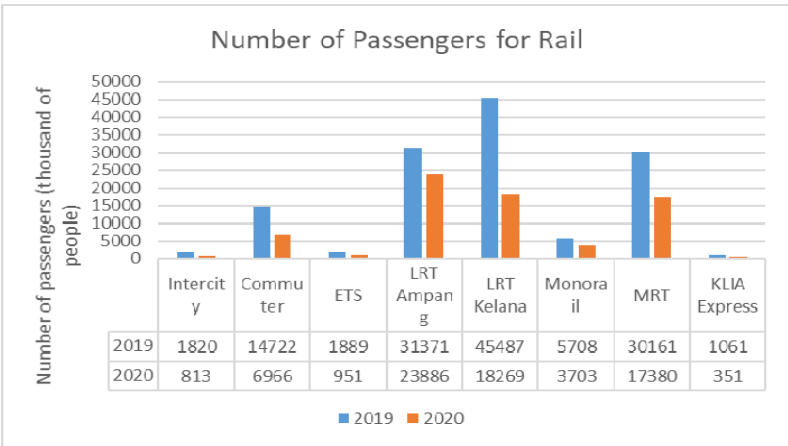


Fig 1. Ridership of various train services in Klang Valley 2019-2020 [16].

3.2 Impact on air transport system

Air transport system and tourism industry are the most hit industry in the country. According to the published annual report by MAHB [17], the passenger traffic has reduced by 98% for the international flight comparing April 2019 and April 2020. In annual comparison of year 2019 - 2020, it was seen that the reduction is about 45% for KLIA airport. In terms of KLIA 2, the reduction is even significant at 99.7% (April 2019-April 2020) and 49% (year 2019 vs 2020). This is understandable as many of the international and domestic flights have been cancelled due to MCO. Besides, the airlines are required to follow the Covid-19 Standard Operating Procedure (SOP) in handling passengers. This means that the load ratio of the aircraft needs to be reduced to ensure sufficient space or distance among the passengers. As such, the reduction of aircraft capacity could indirectly increase the travel cost as the airline would need to sustain in their operation. Table 1 shows the passenger ridership data extracted from the annual report.

Table 1. KLIA Main & KLIA2 Passenger Traffic ('000) Snapshot as of April 2020.

Airport	2020 2019			2020 2019			2020 2019		
	April		% YOY	Year- to-date		%YOY	LTM		%YOY
KLIA Main Total	49	2,440	-98.0%	5,171	9,412	-45.1%	24,965	28,257	-11.6%
International	37	1,954	-98.1%	4,064	7,607	-46.6%	19,869	22,901	-13.2%
ASEAN	10	753	-98.6%	1,472	2,896	-49.2%	7,669	8,880	-13.6%
Non-ASEAN	27	1,201	-97.8%	2,592	4,711	-45.0%	12,200	14,021	-13.0%
Domestic	12	486	-97.5%	1,107	1,806	-38.7%	5,096	5,356	-4.8%
klia2 Total	8	2,821	-99.7%	5,592	10,993	-49.1%	27,729	32,063	-13.5%
International	3	1,836	-99.8%	3,597	7,186	-49.9%	17,932	20,760	-13.6%
ASEAN	1	1,069	-99.9%	2,149	4,159	-48.3%	10,411	11,995	-13.2%
Non-ASEAN	2	767	-99.7%	1,448	3,028	-52.2%	7,521	8,765	-14.2%
Domestic	5	985	-99.5%	1,995	3,806	-47.6%	9,797	11,303	-13.3%

Source: MAHB 2020 [17]

3.3 Impact on freight transport system

The freight transport system is less impacted by the pandemic. Instead, due to the change of travel and purchasing behaviour, the freight transport in some countries might experience growth in their traffic. When people are encouraged to stay at home and reduce

contact with others, many families have sourced online websites and mobile apps to buy their necessities. E-commerce has increased tremendously in year 2020 as compared to year 2019. According to the Department of Statistics Malaysia, the income for e-commerce has increased 32.7% in year 2020 as compared to year 2019 with total income of RM 896.4 billion [18]. This indirect spur the growth of freight transport system as e-commerce is heavily depended on delivery and import activities. People even changed to online food delivery last year during the MCO. According to the survey done by Rakuten Insight, until June 2020 last year, out of ten thousand respondents, approximately 58% of them chose to order food online rather than go out to buy food during MCO and 75% of them using Foodpanda food delivery app [19]. As such, it was reported by Ministry of Transport Malaysia that the cumulative total goods vehicles on road in year 2020 have increased by 2.33% compared to that in year 2019 [16].

In terms of import/export activities, it was found that there is significant drop in air cargo (51.5% reduction) transport in year 2020 while maritime freight has marginal increase of 0.96% as compared to that in year 2019. This shows that maritime transport is more favour compared to air transport as the service charge is cheaper if compared to air transport despite longer waiting time is required. Besides, air cargo has restriction on the type and weight of cargo that could be sent. The marginal increment in maritime cargo might be due to capacity constraint of the port as the port operation might be affected if the workers in the port are infected. Restriction of number of workers working in the port due to pandemic SOP could have some impact on the port operation. Table 2 shows the cargo traffic at airports and ports.

Table 2. Numbers of cargo and contena handled at the airports and ports.

Weight of Air Cargo (Kilogram)				
TYPE OF CARGO	2017	2018	2019	2020
International	168,709,870	166,516,196	146,407,165	70,973,602
Domestic	235,375,877	260,360,397	283,290,816	137,396,082
TOTAL	404,085,747	426,876,593	429,697,981	208,369,684
DROP/INCREASE FROM PREVIOUS YEAR	-	5.34%	0.66%	-51.50%
Total Contena Handled at Ports Across Malaysia (TEUs: Twenty-Foot Equivalent Units)				
TYPE OF CARGO	2017	2018	2019	2020
EXPORT	4,144,914	4,437,160	4,607,125	4,595,180
IMPORT	4,069,581	4,347,454	4,583,855	4,473,007
TRANSshipment	15,569,293	16,156,788	17,230,598	17,609,592
TOTAL	23,783,788	24,941,402	26,421,578	26,677,779
DROP/INCREASE FROM PREVIOUS YEAR	-	4.64%	5.60%	0.96%

Source: Ministry of Transport, 2020 [16]

3.4 Impacts on traffic and mobility

With fewer people at the public area and fewer vehicles on the road during the MCO period, the traffic and mobility has changed. The Average Daily Traffic (ADT) at the selected location in both Kuala Lumpur and Selangor area went down by 17% last year compared to year 2019 as reported by the Ministry of Transport [16]. Also, it was reported by TomTom that there were 126 days of low traffic in Kuala Lumpur City Centre, in which most of these days were in between middle of March until end of May, during the period of the first phase of MCO was implemented [20]. The congestion level of the road traffic has reduced by 24% compared to year 2019 while the most congested month of the same year is February, from the same year, which was before lockdown. Besides changes in the road

traffic, people mobility pattern has changed as well, especially the working travel pattern. TomTom portrayed in graphs how the working day travel pattern has changed last year in Kuala Lumpur, especially amid the first MCO [20], which is shown in Figure 2 below. It could be seen that before the implementation of MCO, the traffic for January to March are about the same for both years (2019 and 2020). However, the traffic volume reduced abruptly in April 2020 to June 2020 before it gone back to “normal” again in July 2020.

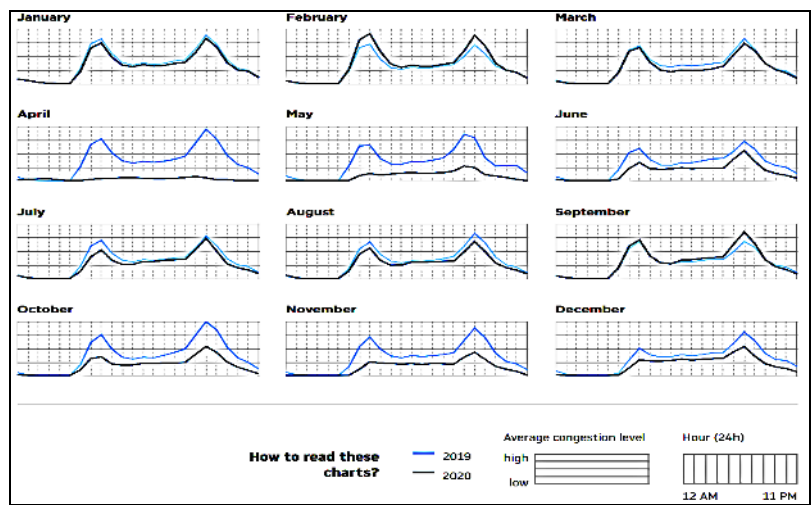


Fig 2. Working Day Travel Pattern in 2020 [20].

In Penang, a study published by the Penang Institute found that the mobility for pharmacies and groceries has been reduced by 50% while in other places like transit stations, parks, retail and recreations places has decreased by more than 50%, in between February and November 2020. After entering the CMCO phase, the mobility in Penang and Malaysia started to back on track again [21]. With all the changes in traffic and mobility during the MCO, this directly contributed to the decreased in road traffic during that phase. A report by the Bukit Aman Traffic Investigation and Enforcement Department (JSPT) stated that traffic accident has reduced by 36.1% and road fatality reduced by 32.7% in between mid-March to mid-November 2020 as compared to the same timeline in year 2019 [22].

4 Measure taken by Malaysia government

With all those impacts affecting the transport sector, government has introduced an initiative, known as Economic Stimulus Package, to help lessen the burden and strengthen back the economy. Few of these include import duty and tax exemption for the port operators in purchasing machineries either locally or internationally for the use of port operations for three years starting from 1st April 2020. Next, discount on electricity bill for tourism sector, commercial, industrial, agricultural and also household sector. The discount allocated are 15% for tourism sector and 2% for other sectors mentioned, starting from 1st April 2020, in Peninsular region. Other than that, Malaysia Airport Holding Berhad also provides rebate for rental at the airports and premises. There is also some discount given to the airlines for the charges on landing and parking of aircrafts. The government allocated a fund of RM 500 million as the tourism discount voucher in order to promote local tourism. This can help the tourism sector and boost the local economy. A one-time cash assistance of RM500 is allocated for e-hailing drivers and RM600 for active taxi, tour bus and trishaw.

drivers as well as the tour guides in April 2020, who has been registered since 31st December 2019. These initiatives are some of the overall initiatives created by the government in reducing the impact on transport sectors [23, 24]. For now, Malaysia is now establishing more measures for the sectors which are greatly impacted by this pandemic, especially the tourism sector in making it more resistive and resilient towards crises.

5 Conclusion

The sudden occurrence of Covid-19 Pandemic has not been expected by Malaysia and the world. The existence of the virus and its spreading mechanism requires people to reduce contact and stay a safe distance. Air transport system is one of the most hit sectors in the country where many of the international and local flights are cancelled. The utilization of the airport has reduced drastically by more than 90% affected by the movement restriction order. The second worst hit sector is the rail transport/ public transport system. Due to less movement and scared of contact, public transport ridership has reduced tremendously. However, this pandemic has become a major push factor to promote the growth of online purchase (e-commerce) and delivery. Freight transport and delivery have increasing importance in the daily life. The government has taken swift action by introducing various stimulus packages to assist the impacted sectors/industries. It is anticipated that these packages could help the related sectors in bracing the impact. A lesson learnt from the pandemic is that business has to improve their capability and resiliency in facing new challenges in order to stay competitively in the market.

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