

The Impacts of COVID-19 on Port Operations and Supply Chains: The Case of Sarawak Ports

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Abstract— In the era of digitalisation, the disruptions, such as operational issues, posed by the outbreak of the coronavirus disease 2019 (COVID-19) on port operations have been witnessed worldwide. To explore the current issue in detail, particularly the COVID-19 ramifications on port operations and supply chains, the current study aims to appraise key stakeholders' perspectives regarding specific COVID-19 impacts posed on the port operational processes within the areas of Kuching Port Authority, Miri Port Authority, and Rajang Port Authority in Sarawak. This study adopted the qualitative research methodology by conducting in-depth interviews and the software Archive for Technology, Lifeworld, and Everyday Language text interpretation (ATLAS.ti) to systematically extract and analyse emerging data trends. This research revealed that Sarawak ports were significantly affected in terms of scheduling and resources, namely finance, manpower, equipment, and spare parts. This study contributed to the existing body of knowledge by highlighting the COVID-19 impacts on port operations and supply chains. The findings could be applicable in benchmarking and guiding future port management systems.

Keywords— port operations; COVID-19; supply chain; port management systems; qualitative

1.0 Introduction

The Chinese government announced to the World Health Organisation (WHO) at the end of December 2019 about an unprecedented virus outbreak, which was, the coronavirus disease or COVID-19 in Wuhan, China [1]. The pandemic, which began in China, has been disseminated across the globe before engendering innumerable deaths.

Owing to the alarming situation of the rapid COVID-19 outbreak, virtually every government in the world has declared a state of emergency by ceasing non-essential enterprise operations, restricting commercial activities in different industries and sectors, and mandating a shelter-in-place order [2]. The world is presently at a critical juncture at which the subsequent public health approaches are dependent on the contingency measures of WHO. The detrimental pandemic has posed a significant impact on the global economy where a consequential drop in consumption and output is predicted to occur since 1990 [3]. The impact scale was also more far-reaching than that of the Ebola outbreak which majorly affected West Africa in 2014 [4][5]. To counter the pandemic repercussions, afflicted countries implemented numerous initiatives to contain the virus, including total lockdowns, partial lockdowns, and movement restriction orders although the containment policies were demonstrated to not be fiscally sustainable [6]. As such, this study aimed to investigate the impacts of the COVID-19 pandemic on developing nations, such as Malaysia. The current study concentrates on and differentiates the impacts during and after the outbreak of the COVID-19 pandemic. Given Malaysia's high reliance level on port industries, the study researchers postulate that the pandemic would produce significant consequences on relevant individuals and organisations.

Figure 1.0 depicts a research overview of the current study. The COVID-19 epidemic is still looming large on all walks of life, multiple organisations, numerous individuals, and different enterprises that subsequently transform the world permanently. Pandemic-induced global result in the loss of up to 25 million jobs globally [7]. The 5.3% unemployment rate as of May 2020 was anticipated to rise further after the government enforced the movement control order (MCO) to restrict various economic and social activities in curbing the accelerating circulation degree of the COVID-19.

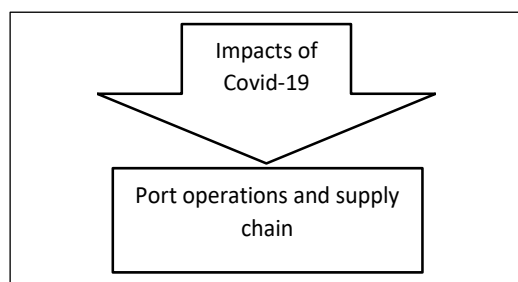


Figure 1.0 Research Overview of the Current Study

1.1 Port industries in Malaysia

The Malaysian industrial sector is manifested to grow rapidly during the 1990s by propelling the country to the forefront of international trade, subsequently generating a significant influence on the development of Malaysian ports and shipping, vigorous stimulation of the growth of domestic and foreign investment and, the burgeoning of different infrastructures to facilitate booming business establishment on par with the developed nations [8]. Within several decades, a significant augmentation in the number of ports and shipping activities, which are acknowledged as critical contributors to enabling Malaysian businesses and providing successful economic upshots, has been observed [9]. The strategic location with shores lining the country's borders is perceived as a vital asset to Malaysia's expeditious establishment and achievement of flourishing seaborne trades before emerging as a premier maritime nation [10]. Furthermore, the proximity to one of the most essential global trade routes and the finest international maritime connectivity level has catapulted Malaysia into metamorphosing as a dominant player in refining and exporting gas and oil, including liquefied natural gas (LNG), to four corners of the world from the first erected floating LNG infrastructures and the largest palm oil terminal. Summarily, Malaysia accounted for 70 per cent of cargo container throughput in 2018 with a complete output of 24.9 million twenty-foot equivalent units (TEUs) [11].

In Figure 2.0, Sarawak is amongst the top three states which have contributed the highest gross domestic product (GDP) degree to Malaysia in 2019 [12]. Meanwhile, Department of Statistics Malaysia (DoSM) chief statistician Datuk Seri Mohd Uzir Mahidin delineated that Sarawak, one of the states impacted the most by the ongoing pandemic, was discovered at a negative growth rate of 7.1 percent [13]. The deteriorating economy in Sarawak has motivated the study researchers to conduct the current study by assessing the COVID-19 impacts on three main ports administered by the state government of Sarawak, namely, the Kuching Port Authority (KPA), Miri Port Authority (MPA), and Rajang Port Authority (RPA) to seek amelioration of the current circumstance before contributing to the Malaysian economy.

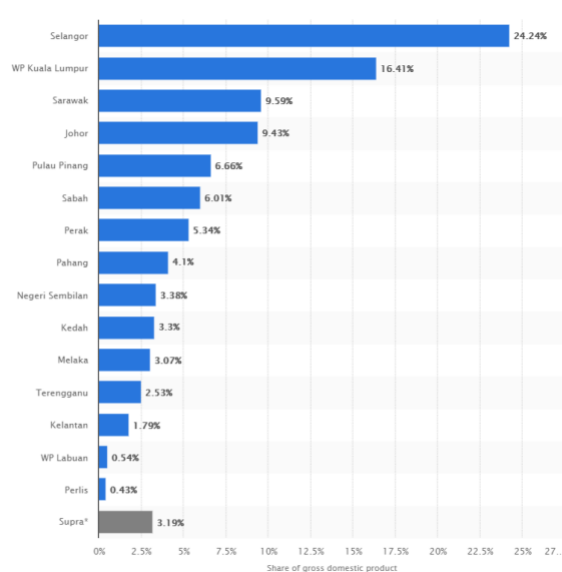


Figure 2.0 Share of Gross Domestic Product in each Malaysian state [12].

2.0 Sarawak: A State of Malaysia

With the possession of a landmass practically equivalent to that of Peninsular Malaysia, Sarawak, situated in North Borneo by neighbouring Sabah, one of the 13 Malaysian states, and the border countries of Kalimantan Indonesia and Brunei, is the largest state in Malaysia with abundant natural resources. Simultaneously, Sarawak is located at the epicentre of the Asia-Pacific route and has frequently been recognised as an emerging investment hub, which offers excellent economic production through efficient transportation links [14]. Notably, Kuching is the capital city of Sarawak that holds great importance in terms of economic and political influences on the state [15].

Apart from that, three other major cities and towns, including Sibul, Bintulu and Miri, also possess significant economic values in the state.

The Sarawak economy could be comprehended thoroughly with division into three ecoregions. The first region is the coastal zone, namely Bintulu and Miri Ports, as the most appropriate site to establish and operate oil rigs and ports. The second region is the hilly regions several miles inshore where a majority of cities are located with more than half of the total population surrounded by quarries and palm oil plantations [16]. The third is the mountainous region beside the Sarawak-Kalimantan border with a high notoriety level on the region's accessibility [17].

Various villages, namely Long Akah, Bario, and Long Bedian, exist in the third region by indulging in local agriculture and ecotourism. Concurrently, various streams of rivers flow through the state, with the Rajang River being the longest in Malaysia stretching up to 563km and hence, leading to water transportation as the key means of conveyance and logistics. Following the formation stage of Malaysia, Sarawak's GDP has improved significantly and influenced 9.6 per cent of the nation's overall GDP mainly through the service, manufacturing, and mining sectors [18]. Despite the slowdown in the natural gas extraction process, the recent discovery of oil columns in Miri suggests equitable growth and growing dependence on the mining sector in the subsequent years [19].

Moreover, 12.1% of Sarawak's GDP is estimated to be generated from the rising production in the agriculture sector and 3.3 per cent is revenues from the construction sector. On the other hand, the education sector has undergone remarkable growth upon responding to the digital initiatives implemented by the state government. Before the COVID-19 pandemic, the tourism sector was manifested to experience an upward trend of 5% growth in terms of the substantial number of arrived tourists in Sarawak. Sarawak is contemporarily the fifth-highest GDP contributor per capita to the country at RM 53,358 but the existing huge economic inequality between the city dweller and countryside population has triggered numerous rural development efforts by the government [18][20].

2.1 Sarawak Ports

Three major ports under the jurisdiction of the Sarawak government, namely KPA, MPA, and RPA has been discussed in this paper. Traditionally, the interconnected rivers of Sarawak have facilitated logistic routes for agricultural commodities and timbers transported to the key ports by the shores [21]. Before the outbreak of the COVID-19 pandemic, all Sarawak ports, vital to support the state's economy by acting as important focal points between land and sea transportation, demonstrated positive growth in cargo throughputs except for Tanjung Manis [22]. The migration of

containers inland has transformed into a major trend when seaports adapt and extend their services and components into the interior of the state [23]. To keep pace with the globalised trading trend, the State Budget 2020 allocated RM 78.5 million to the upgrading of state-administered ports by applying innovative technologies to improve the effectiveness and attractiveness in serving both local and international markets [16].

2.1.1 Kuching Port Authority (KPA)

By serving as the capital city in the southwest of the state, the KPA is home to Sarawak's second in-demand port after Bintulu Port. Established as early as 1961, the KPA has been endorsed as a premier port that supplies intercontinental shipping lines with integrated connections to regional hub ports. The port produced an annual cargo throughput of 8.5 million tonnes, including 238,000 TEUs [24]. As of 2019, 3,274 foreign ships and 704 foreign vessels were berthed at the KPA with cargoes generated by numerous industrial parks, including the Sama Jaya Free Industrial Zone [25]. Meanwhile, the location of the port alongside the Sarawak River has restricted access by a low draught of 7.5 metres, aided by a tidal range factor of up to 6 metres during King Tide.

2.1.2 Miri Port Authority (MPA)

Situated on the northwest coast of Sarawak, Miri is the second-largest city with a thriving oil and gas industry. Established in 1983, the multipurpose MPA possesses a cargo throughput of 5.1 million tonnes and hosts various multinational offices, both offshore and onshore [26]. The MPA, positioned at Kuala Baram, serves as a commerce hub for the northern zone of Sarawak. Alongside the banks of Baram River and Miri River, multiple docks, jetties, and shipbuilding wharves are established to convey main goods, such as oil barrels, fisheries products, and timber products, with an anchorage zone established 6km north of Miri River mouth. Due to the shallow draft, the MPA proposes a dredging programme to elevate the port capacity in the future [13].

2.1.3 Rajang Port Authority (RPA)

Locating in the central region of Sarawak, the RPA is situated along Malaysia's longest river and the town of Sibul, 113km away from the seashores, is the main operating centre of the five Rajang ports which transport containerised and conventional freights via the Sibul route while conventional cargoes for local consumption and timber products through Sarikei. With the commenced operations in 1971, the RPA consists of a 448-metre wharf which is 8.5km deep.

In 2019, the RPA recorded an annual cargo throughput of 1.3 million tonnes comprising 60,000 TEUs [27]. The Pan Borneo Highway project and

various rural development programmes executed by the government entail the RPA as the crucial linkage into the immense hinterland of Sarawak [19].

2.2 The COVID-19 Pandemic and Port Operations

On 30th January 2021, Malaysia witnessed a severe increase in daily COVID-19 confirmed cases at an average infection rate of 5,728 with daily variations [28]. Correspondingly, the pandemic posed a major impact on the Malaysian port industries from the major spike in Malaysia's daily COVID-19 confirmed cases owing to the Sabah state election in September 2020, as announced by then Prime Minister Muhyiddin Yassin [29]. Concurrently, the Malaysian government debt reached the height of over 60 per cent of the country's GDP in September 2020, while the fiscal deficit of the nation was predicted to grow from 3.4 per cent to over 6 per cent when the National Economic Recovery Plan was adopted. Although Malaysia suffered from the rapid increase in the COVID-19 confirmed cases, the government was grappling with the necessity to implement any further lockdown or MCO as the COVID-19 prevention actions would produce significant negative economic impacts. The Malaysian government effectively managed the considerable fiscal expenditures in terms of rapid reactions to health and economic stimulus packages for the benefit of families and companies [30].

To effectively enhance the public knowledge of COVID-19, a list of frequently asked questions (FAQs) was published by the Ministry of Human Resources during the MCO period as the government only allowed essential businesses to conduct their operations as usual by applying the required standard operating procedures (SOPs) [31]. Port industries were categorised under the list of essential businesses and allowed to perform necessary operations during the pandemic with a minimised number of employees at a 50 per cent capacity rate. The SOPs were established to circumvent the 3Cs, namely, crowded places, confined spaces, and close conversations. Nevertheless, a reduced rate of employee capacity at work engendered a huge impact on the efficiency level of port performance.

3.0 Methodology

Based on the study objective, the researchers employed the qualitative research methodology by garnering primary data sources from in-depth interviews with key stakeholders amongst the three Sarawak ports, namely, KPA, MPA, and RPA, to determine the perspectives of key stakeholders from three respective Sarawak ports regarding the

specific COVID-19 impacts on port management. Therefore, the research design employed was an exploratory approach with hypothetical questions to be scrutinised and evaluated. The study participants were selected via the purposive sampling method by referring to rationale wherein the purposive sampling possessed the highest tendency to produce the most appropriate and instrumental data [32]. The targeted respondents were senior management teams from KPA, MPA, and RPA, due to their higher levels of knowledge and information contribution to the study requirements. Summarily, a total of 21 respondents were recruited with seven senior management employees from each port. The software ATLAS.ti was administered to analyse the collected data.

4.0 Discussion

4.1 The COVID-19 Impacts on the KPA

According to the KPA senior management, several COVID-19 impacts were experienced on the port. First and foremost, the KPA respondents indicated that the main element facilitating the port operations – the shipping schedule was disrupted with negative repercussions on the port productivity, subsequently resulting in significant berthing delay of at least two days. KPA mitigated the delay by allocating berth on the principle of "first come, first served" basis in terms of scheduling as a response to the chaos. The port continued to operate on a 24/7 basis throughout the MCO period. However, containers encountered severe disruption on the regular sailings when the timeliness of liner schedules was upended. The disruption was the decrease in the turnaround time of containers thereby causing temporary container congestion at the primary loading ports, such as Port Klang. During the emergence and outbreak of COVID-19 in March 2020, all shipping processes were disrupted. Until July 2020, cargo volume decreased at KPA.

While shipping companies devised a system to efficiently ship containers, the affected ports in West Malaysia and Kuching remained congested due to vessel bunching. Consequently, the containers turnaround time also decreased due to various factors, including the delays in importers warehouses and shortage of hauliers and manpower in the logistic industry generally. The cargo volume rebounded with a surge of demand-consumption after lifting the lockdown measures, which further contributed to port congestion issues. Furthermore, the increased expenses of maritime shipping also resulted in further exacerbation of the issue. Besides, maritime shipping was the only viable option during the pandemic because airlines were mandated to cease operations.

Although a significant decline in cargo volume was observed in March, April, and May 2020, the volume rebounded in the third quarter of the year. Consequently, the workload at ports was highly compressed because the operation was categorised as one of the essential services. In terms of manpower,

no labour shortage was experienced at the port but the daily routines had been altered as the administrative workforce was encouraged to work from home in preventing the COVID-19 outbreak. The work roster was designed and planned by applying the rotation basis for employees who were required to attend the port operation 24/7. The staff were also not allowed to participate in any forms of physical training or meeting. Online meeting platforms such as Zoom was the main option to conduct the aforementioned activities. In addition, biometric fingerprinting for work attendance was temporarily suspended due to possible source of Covid-19 contagion factor. Social distancing was practiced and seating arrangements in the canteen were re-arranged as mass gatherings were prohibited.

The senior management also mentioned that the additional operation cost was incurred due to required expenses in purchasing personal protective equipment, including medical masks, sanitisers, gloves, fogging devices, atomisers and thermal body temperature scanners. Furthermore, KPA also provided health supplements, such as Vitamin C, for their employees to boost immunity. Due to the application of hygiene practices, minimal number of Covid-19 cases were reported amongst KPA employees. KPA employees demonstrated the ability in controlling the outbreak at workplace. Subsequently, the COVID-19 outbreak precipitated the KPA senior management to gradually transform any existing manual system into a computerised or automated system. Although a higher cost would be incurred for this transformation, it will result in improvement of port productivity.

In addition, the COVID-19 outbreak created a significant spare parts supply shortage for equipment, particularly the quay cranes, rubber-tyred gantries, and reached stackers. Due to the KPA's dependency on heavy equipment, the shortage resulted in low vessel and haulage productivity. Accordingly, whenever possible, certain spare parts were stocked up to prevent delays in shipping from overseas suppliers. Meanwhile, preventive maintenance was carried out to avoid major breakdown of equipment from the disruptions of repair and maintenance work at the port due to the implemented MCO that beget unavailability of contractors and their workers.

4.2 The COVID-19 Impacts on the MPA

According to the MPA senior management, the COVID-19 pandemic also significantly influenced the port schedules where multitudinous stipulated shipping timetables and procedures were forfeited with the presence of various uncertainties. The MPA handled a wide variety of cargoes with 80 per cent of containers including consumable products, supermarket goods, furniture, and daily consumables, while the remaining two per cent

were construction materials, steel plates, iron bars, and timber exports. Due to the low demand for consumable items amongst Miri residents during the pandemic, the cargo volume of cargo experienced a 30 per cent decrease compared to previously after the engendered panic buying behaviour and fear of uncertainty. In addition, due to the closure of retail and entertainment industries, a plethora of cargoes were discovered to expire in the port warehouse as claims were not feasible to be conducted. The MPA disposed of the unclaimed cargoes according to the custom requirement wherein unclaimed cargoes were mandated to be discarded after 90 days.

The COVID-19 outbreak has also impacted the MPA financially from the observed declined cargo volume owing to the fixed cost which was required to be continuously paid regardless of a high or a low number of activities. For example, the salary, building, wharf, repair and maintenance, computerised system, and electricity charges were the fixed costs in administering a port. Despite the pandemic ramifications, the MPA ensure employee welfare by maintaining the existing salary figure and providing bonus at the end of the year 2020. Simultaneously, the MPA implemented the transformation from the manual operation of cargo handling to an automated version in reducing delays and adapting to digitalised port management on account of the stipulated COVID-19 SOPs by the government. Although the operation cost witnessed a substantial increase in the budget with a 30 per cent decrease in the port revenue, numerous initiatives were executed by MPA to protect the employees and their families from the COVID-19 outbreak by providing personal protective equipment in the following months of the initial lockdown date and supplements, such as Vitamin C, to strengthen the immunity levels.

Similarly, the MPA manpower was also hugely impacted, especially operational workers with daily wages, such as stevedores, as their salaries were based on the cargo volume which was significantly reduced in 2020. As a token of appreciation, the MPA contributed several household items and groceries to assist them in tackling this challenging phase. Subsequently, the working days were rescheduled by implementing the rotation method to reduce the crowd and allocate appropriate worker numbers to handle the declined cargo volume.

4.3 The COVID-19 Impacts on the RPA

According to the interview responses from the RPA senior management, the COVID-19 pandemic impacted them moderately in terms of the operational process. When the first MCO was implemented on 18th March 2020, logistic players, such as hauliers, lorry drivers, and other transporters, were restricted. As the logistic workers were unable to perform routinised deliveries at a usual speed before arranging the incoming vessels with tremendous shipments, the RPA was subsequently congested. Consequently, the

ensuing schedules of vessel arrivals were not capable of being complied with due to multiple uncertainties posed by the COVID-19 situation. To counter the congestion issue, the government authorised both essential and non-essential cargoes to be retrieved from all ports, including the RPA. Circular seven-day free storage was announced by the RPA on the requisite that the relevant cargoes be claimed within the timeline before charges of additional storage days were eventually imposed.

The RPA imparted that the mission of the implemented efficient responses of cargo handling was to constantly provide pertinent customer values in remaining the top choice of consumers continually. To control the COVID-19 spread, the RPA created and strictly adhere to the preventative strategy. The RPA also released 10 circulars of which eight focused on safety measures with the remaining two on operational elements to ensure the fulfilment of both health and economic responsibilities. According to the operational circular, the RPA could assist port customers by altering the operating hours to reduce waiting times. Additionally, the RPA created an application form to receive consent from the PDRM and the resident office in expediting the good delivery schedule.

Since March 2020, the RPA has been developing internal SOPs based on the guidelines provided by the state to satisfy the minimal requirements of the state apart from the internal requirements. Entrance inspections on each floor of the building, including the work area, and temperature assessment devices were also implemented by the RPA. Concurrently, the RPA maintained a steady supply of sanitisers in the port under the initiatives of continuing operations throughout the pandemic and serving as a positive model for other ports. Multiple studies were performed to promote behavioural changes in conjunction with the adoption of enhanced risk management decision-making approaches, especially to prevent the pandemic spread and prepare for tackling the infection issue [33]. The RPA demonstrated the ability by executing its obligations to respond rapidly to any emerging situation by designing personal SOPs since the beginning of March 2020. Moreover, the RPA sought assistance from the Fire and Rescue Department of Malaysia (BOMBA) to develop an applicable sanitisation programme and three sanitisation units.

Fortunately, the COVID-19 outbreak affected the RPA financial situation positively as observed by the 5.3 per cent increase in the cargo volume in terms of tonnage for the year 2020. Generally, the 2020 profit was elevated by RM 1.46 million, a sky-rocketing 200% increment after the tax deduction. The senior management also informed that the largest fixed cost was their manpower expenses and the 'Bantuan Khas' programme which was introduced to temporarily relieve the

employees from financial burdens. Nevertheless, the revenue obtained was a significant financial contribution to the RPA, thus allowing additional measures and initiatives, such as designing a brand new form and guidelines for the shipping processes and procedures with the SOP adherence to be implemented. The RPA also emphasised employee welfare by providing personal protective equipment, such as masks, gloves, and hand sanitisers, and introducing the COVID-19 prevention measures, including thermal imaging systems and visualisation of social distancing guidelines, as part of the expanded budget and the execution of the Integrated Port Management System. In terms of manpower allocation, employees' working days and times were rescheduled by implementing the rotation method.

5.0 Conclusions and Recommendations

Summarily, the current study enlightened the COVID-19 situation and its impacts on the three Sarawak ports. After perusing the individual situation on the RPA, the impacts were revealed to be mostly positive due to the financial status being improvised accordingly from the rapid response to the sudden pandemic occurrence. KPA was also impacted on the relevant operational processes as these processes were improvised and computerised to improve port productivity. Whereas for the MPA, the study discovered that the relevant stakeholders suffered several losses when the cargo volume was significantly reduced as a result of the pandemic outbreak. As such, this study contributed multiple insights into the real problems encountered by the ports during the COVID-19 emergence. The findings also recommended the solutions or preventive measures to mitigate the risk pertinently and ensure the negative repercussions on the economic activities were minimised if another pandemic were to exist in the future, as the existing ports serve as a vital link between sea and land transportation [34].

Concurrently, the analysis revealed that numerous ports were affected in terms of scheduling and resources. Policymakers in all affected countries had discussed the trade-off between future transmission of disease and socioeconomic implications that required essential data and knowledge available to determine and implement appropriate action plans [35]. Providing pertinent data of the pandemic impacts on different ports could assist policymakers to draft new policies in supporting the society, especially the port management, when another pandemic emerges [36]. Accordingly, immediate engagement with policymakers could be an effective way to generate a significant difference when policies, strategies, courses of action, and a collection of laws are supported by the stakeholders, as per the recommendation [37].

In times of crisis, the government could assist various port managements by offering incentives or by re-examining the fund allocation method with

strict adherence to special disaster or pandemic management guidelines [38]. Furthermore, strengthening the entire defence system would be essential for the government in providing massive support to the affected individuals. For example, former Prime Minister Tan Sri Muhyiddin Yasin announced RM 20 billion in an economic stimulus package to combat the COVID-19 spread [30]. The government is playing a leading role in defending against the COVID-19 pandemic which continues impacting all walks of life, including stakeholders at different ports [39].

Ports could currently indulge in investments generated for the accelerated digitalisation process and enhanced connectivity with various port users, such as a berth optimisation engine – the ‘CargoMove’ Vehicle Booking System (CM VBS), to upgrade existing terminal operating systems. Simultaneously, blockchain technology could also facilitate the shipping processes by increasing the efficiency level from the application of distributed ledger technology that is closely associated with the internet of things and big data in enhancing data transparency and demand management that is capable of managing and tracking innumerable records of million containers globally [40]. Consequently, the application advances the automatic generation of maritime smart contracts after implementing automated actions and countermeasures and obsoleting the traditional approaches of manual interventions and operations. This study elucidated the substantial impacts of the COVID-19 pandemic on the operational scheduling and resource allocation at Sarawak ports, with specific emphasis on financial resources, manpower, equipment, and spare parts. By delineating the repercussions of the pandemic on port operations and supply chains, this research enhances the existing corpus of knowledge. The insights garnered from this investigation can serve as valuable benchmarks and guide the development of future port management systems.

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