



Sustainability Issues, Challenges in Maritime Transport and Logistics Industry in Emerging Markets: A case of India Maritime Industry

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Abstract: As for UNCTAD/RMT 2019 report emphasized that Global maritime trade expanded at a slower pace in 2018, while volumes reached 11 billion tons and volumes expanded at 2.7 per cent in 2018, down from 4.1 per cent in 2017. The slowdown was broad based and affected nearly all maritime transport cargo segments. It undermined global port cargo-handling activities are facing a serious issues and sustainability challenges in the field of shipping, port and maritime logistics, commonly known as the maritime transport and logistics industry. The aim of this paper is to analyse the sustainable issues and challenges in maritime industry to demand side and the new normal also entails some new trends on the supply side in emerging markets. Sustainability issues in maritime transport and logistics have been dealt with in the transportation and economic studies in Ports and shipping interests appear to be focusing more attention on expanding activities to inland logistics and tapping potential underlying sources of revenue Such developments call for improved planning, adequate response measures, and flexible and forward-looking transport policies that anticipate change, particularly relating to shipping, port, and maritime logistics, and identify and discuss the key topics emerging in sustainability in the industry. It will contribute to increasing industry stakeholders' understanding of the current situation in sustainability, assist them in the design of appropriate managerial insights and help them develop appropriate sustainability policies for the industry.

Keywords: sustainability; shipping; port; maritime logistics; maritime transport

1. INTRODUCTION

According to the Ministry of Shipping, around 95 per cent of India's trading by volume and 70 per cent by value is done through maritime transport. India has 12 major and 205 notified minor and intermediate ports (UNCTAD/RMT/2019). Under the National Perspective Plan for Sagarmala, six new mega ports will be developed in the country. The Indian ports and shipping industry plays a vital role in sustaining growth in the country's trade and commerce. India is the sixteenth largest maritime country in the world, with a coastline of about 7,517 km. The Indian Government plays an important role in supporting the ports sector. It has allowed Foreign Direct Investment (FDI) of up to 100 per cent under the automatic route for port and harbour construction and maintenance projects. It has also facilitated a 10-year tax holiday to enterprises that develop, maintain and operate ports, inland waterways and inland ports. Increasing investments and cargo traffic point towards a healthy outlook for the Indian ports sector. Providers of services such as operation and maintenance (O&M), pilotage and harbouring and

marine assets such as barges and dredgers are benefiting from these investments. The capacity addition at ports is expected to grow at a CAGR of 5-6 per cent till 2022, thereby adding 275-325 MT of capacity.

As far as sustainability issues in the shipping, port, and maritime logistics sectors (hereinafter *maritime transport and logistics*) are concerned, the International Maritime Organization (IMO) has great influence, directly and indirectly, because the IMO Convention describes its fundamental purpose as the conservation and "sustainable" use of oceans and their resources. As a result, the IMO has adopted several protocols and regulations in association with the United Nations Convention on the Law of the Sea (UNCLOS), such as the London Convention and Protocol (LC/LP), the Hong Kong Ship Recycling Convention and Annex VI Prevention of Air Pollution from Ships (entered into force 19 May 2005) of the International Convention for the Prevention of Pollution from Ships (MARPOL). In particular, thanks to "the 2030 Agenda for Sustainable Development" with 17 Sustainable Development Goals (SDGs) adopted by the UN on September 2015, the IMO, as a part of the UN, has developed several



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important regulations related to the SDGs as listed above.

Broadly, sustainability covers three key dimensions such as environmental, economic, and social, which are applied to many areas, including maritime transport and logistics [1]. Out of the three, the environmental dimension is widely addressed in the literature (e.g., [2–10]), mostly in relation to ships and port equipment. The former generates gas emissions at sea, in particular, in emission control areas (ECAs), and within ports, while the latter does, in association with the former and container trucks within ports. This Special Issue, however, does not consider the gas emissions generated by container trucks on the road from the origin of the cargoes to the ports. While ships are calling at, and loading/discharging cargoes in, ports, they emit greenhouse gas (GHG), such as NO_x, SO_x, CO₂, and particulate matter (PM). Recent literature has estimated the GHG amount emitted [11–16] and the impact on the health of residents living adjacent to the ports [17–19]. However, international organizations and stakeholders are less active in dealing with environmental issues in the shipping and port sector because the sector has not only less interaction with cities but is also remote from city life as compared to the aviation and overland transportation sectors. Among the several international organizations, the IMO has played the leading role in taking several measures to reduce the GHG from ships in collaboration with ship owners/operators and shipbuilders. The key measure is the MARPOL Convention which was adopted on 2 November 1973 at IMO. Since then, several related annexes have been adopted. In 2011, IMO adopted mandatory measures to reduce greenhouse gas (GHG) emissions from ships' exhausts.

China and India: “China dominates,” Agility's report reads, pointing to the country's top spot in the overall emerging markets index. It scored 8.87 points in the “Agility Emerging Markets Logistics Index 2019.” It landed top spots in both the domestic logistics opportunities index (8.82 points) and the international logistics opportunities index (9.70). And it's no fly-by-night market opportunity either, as China has been number one in the Emerging Markets Logistics Index for nine consecutive years. The sustainability issues and challenges faced of maritime transport in emerging markets. The majority of the emerging markets are characterized by a in global economic and trade growth, the expanding regionalization of supply chains and trade patterns, a continued rebalancing of the Indian economy, a larger role of technology and services in value chains and logistics, intensified and more frequent natural disasters and climate-related disruptions, and an environmental sustainability agenda with an increased awareness of the impact of global warming in particular. Maritime

transportation have seemingly abandoned the quest for ever bigger ships and are increasingly eyeing growth prospects associated with the landside of operations. India took the number two spot in the overall emerging markets index (7.39 points). It also was second in the domestic logistics opportunities index (8.09 points) and in the international logistics opportunities index (7.02 points). China and India together left the third-ranked country, the UAE, in a far distant third spot.

Like all major port cities in Europe, people living in Asian port cities, among others, Hong Kong, Mumbai, Chennai, Shanghai, and Singapore are more exposed to highly polluted air due to the fastest growing cruise industry in the world. NABU estimates the amount of pollution caused by cruise ships in large German ports and concludes that “heavy fuel oil can contain 3500 times more sulphur than diesel that is used for land traffic vehicles” [21]. In dealing with the three dimensions of sustainability, we need to consider externalities arising from gas emission. Tzannatos [22] attempted to analyze ship gas emission in association with externalities. Despite the fact that the IMO has been implementing green shipping and port initiatives to reduce GHG from ships and port activities, it seems that sustainability in the maritime transport and logistics requires proactive measures referring to land transport and aviation sectors.

In the existing literature, three notable special issues have tried to deal with sustainability in shipping and ports [23–25]. The Special Issue of *Transportation Research Part D* edited by Cullinane and Bergqvist [23] focused on the following issues: The comparison of three options complying with ECA sulphur and NO_x tier III regulation; costs and benefits analysis of sulphur reduction measures; discussion on energy replacement with liquefied natural gas (LNG) in ECAs; discussion on the limitations of the financial assessment of technologies assisting compliance with the sulphur regulations of MARPOL Annex VI; the future low-sulphur fuel requirements in Sulphur Emission Control Areas (SECA); case studies of SECA application to the North and Baltic Sea and the Mediterranean Sea; and estimation of emissions of noxious gases from vessel operations in a potential ECA in the Port of Incheon.

Another Special Issue—*Transportation Research Part E* edited by Cheng et al. [24]—covered the following topics: decision support to improving sustainability in maritime shipping; sustainability ranking of the UK major ports by an Analytic Hierarchy Process (AHP) method; application of scenario technique to assess total CO₂ emissions and costs of UK import trade re-routing containers; slow steaming sustainability



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initiatives to explore optimal speed decisions; a sustainable maritime supply chain design by Quality Function Deployment (QFD) and Analytical Network Process (ANP) from the viewpoint of customer requirements; and a proposal of environmental governance mechanisms to enhance shipping firms' environmental performance.

The other Special Issue, under the title *Transportation Research Part D* edited by Lee et al. [25], included five papers, of which the topics are: A vessel speed reduction program introduced by the Ports of Los Angeles and Long Beach to minimize gas emission by co-operation between shipping company and ports; development of a conceptual framework with institutional theory to empirically evaluate the impact of institutional pressures, internal green practices, and external green collaborations on green performance; development of a resilience system to avoid unnecessary poor green performance in the case of disruptions of truck arrangement within a container terminal; an investigation of strategic responses of inland ports (dry ports) to institutional forces pressuring their adoption of sustainability practices, applying institutional theory; and an estimation and analysis of ship exhaust emissions and their externalities, taking cases of two ports, Dubrovnik (Croatia) and Kotor (Montenegro) in the Adriatic Sea.

China and India in the domestic logistics opportunities category should come as “no surprise” due to the scale of both countries in terms of their economies and population sizes. China, for instance, has 156 cities that have a population of one million or more people compared to 10 such cities in the United States, the report states. Consultancy Transport Intelligence estimates that Chinese contract logistics will expand at a compound annual growth rate of 12.4 percent over the next five years. The reports adds that China's inland cities are experiencing increased demand for logistics as manufacturing, shipping and logistics hubs in coastal areas begin to run low on real estate and goods are shipped west.

However, ongoing China-U.S. tensions and tariffs are sapping energy from the economy and, the report says, the country has a need to deflate bubbles in its financial and housing sectors. Trade tensions “will be felt most acutely in the export-oriented coastal regions, such as Guangdong, which includes Shenzhen and is China's largest source of exports,” the report says. And it's a similar picture in India too, the report adds, pointing out the about 34 percent of India's population lives in cities but, in the next 20 years, that will increase by 250 million.

China and India also dominate in the international logistics opportunities indices too. China powers to the top spot due to the connections of its domestic logistics network to the “vast global network” via “high quality” infrastructure in the coastal areas.

India claims the second spot due to strong growth expectation in airfreight forwarding.

Cullinane and Bergqvist [23] contributed to the expanding literature related to ECA in association with quantitative analysis and legal aspects. Cheng et al. [24] covered the sustainability issue in terms of shipping, port and supply chain. Lee et al. [25] focused on the reduction and estimation of gas emission for achieving green shipping and ports and framework and key performance indicators to evaluate green shipping and ports. Having considered the limited scope and number of sustainability issues in the three special issues in terms of sustainability in maritime transport and logistics, this Special Issue aims to enrich and expand the existing literature in the topic.

2. SUSTAINABILITY ISSUES IN SHIPPING, PORT AND MARITIME LOGISTICS

The eight choice papers for this Special Issue have been collected from open invitation through the Sustainability journal website and two international conferences: The 1st international conference on Yangtze-River Research Innovation and Belt, held in Ocean College, Zhejiang University in Zhoushan City, Indian on 2–5 December 2018 and the 3rd International Conference on the Belt and Road Initiative in association with the Asian Logistics Round Table, held in Vietnam RMIT University in Ho Chi Minh City, Vietnam on 24–26 June 2018.

Many countries in the Top 20 Emerging Markets Logistics Opportunities Index are in the Middle East. These include the UAE (third; 6.16 index points); Saudi Arabia (sixth; 5.71 index points); Qatar (eighth; 5.62); Turkey (ninth; 5.56); Oman (12th; 5.44); Bahrain (16th; 5.24); Kuwait (18th; 5.10); and Jordan (19th; 5.04).

Shin et al. (Contribution 1) conducted a comprehensive literature review of sustainability published in maritime-related journals between 1993 and 2017, applying a generative probabilistic text-mining technique, called latent Dirichlet allocation (LDA) [26]. The journals cover transportation, logistics, shipping, and port-related topics and are listed on the science citation index (SCI), science citation index expanded (SCIE) and social science citation index (SSCI). A total of 155 papers were collected for the study. LDA can capture topics on shipping, port, maritime logistics issues in sustainability in terms of keywords frequency, their betweenness centrality, their network for co-occurrence of the papers, and co-authorship by country, affiliation, and collaboration between authors, respectively. One interesting result in this paper is that there are 18 high-frequency keywords above five



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occurrences which are related to maritime sustainability. Leaving aside sustainability, the term “management” has the highest occurrences, followed by “port,” “emission,” “impact,” and “performance.” For the shipping and port sector, these issues are related to green ports/shipping, carbon emission/climate change and region-specific environmental regulation/management. For the maritime logistics sector, sustainability issues are generally related to achieving optimal logistics systems, sustainable supply chain design, and service quality management. Another interesting test result shows that, recently, the keywords in sustainability studies in maritime transport and logistics have considered governance, corporate social responsibility, and supply chain management. Therefore, it can be said that this paper contributes to figuring out research trends and research networks in sustainability in maritime transport and logistics over the last 25 years using a solid technique, LDA.

Having considered both trade-off analysis and environmental policy intervention analysis, Dai et al. (Contribution 2) developed a comprehensive decision framework for a port-hinterland distribution network in the Yangtze River Economic Belt (YREB) encompassing road, railway, and inland waterways with a three-mode hybrid port-hinterland intermodal distribution network [27]. To minimize logistics costs and CO₂ emissions generation, the authors designed a bi-objective decision framework to deal with policy intervention scenarios, taking into account emissions control policies, taxation policy, and emissions trading schemes. The decision framework developed in their paper contributes to offering comprehensive insights for shippers on strategic decisions about optimized intermodal and terminal, and flow distribution under various emissions control policies. The test results show that the transport flows on direct road from inland cities to gateway ports are insensitive to all policy intervention scenarios and that rail transport in the integration of road, railway, and waterway modes have more benefits than other transport modes under all policy intervention scenarios. It implies that policymakers should consider the conflict between logistics costs and carbon emissions under each policy intervention scenario. This study is unique because it is not replicated in the two previous special issues. It contributes to internalizing the carbon emissions effects by employing the emissions trading scheme, so-called cap-and-trade, considering the YREB region in Central Indian and its port-hinterland intermodal logistics network.

Arguing that the two port cities, Guangzhou and Shenzhen, are not two separate entities, but they are interdependent and cross-influential, Lam and Yap (Contribution 3) reviewed existing

sustainability frameworks and conducted a stakeholder analysis for port city sustainable development by case study methodology, taking the cases of the two port cities in South Indian. The authors conclude that the stakeholders in both Guangzhou and Shenzhen aim to connect them to the Belt and Road Initiative, which provides vast opportunities in developing economic and transport connectivity along the Belt and Road in tandem with trade growth [28]. The port-city interface is not only driven by several external forces such as changes of port function, conflicts between the port authority and local government, environmental issues caused by port users' services and activities [29]. The two authors identify port city stakeholders and their objectives to investigate port city sustainable development through the analysis of existing sustainability frameworks. The three key dimensions of sustainability, i.e., economic, environmental, and social, are applied to compare Shenzhen and Guangzhou port cities. First, they draw three implications: (1) In terms of the economic aspect, Indian Belt and Road Initiative (BRI) since 2013 provides vast opportunities in trade growth; (2) that for the social aspect, both port cities have a challenge arising out of the limited availability of coastal land for seaport terminals and city waterfront developments; and (3) that for the environmental aspect, they have the common problem of water and air pollution. Lam and Yap recommend that the port cities take innovative actions to explore new technologies to improve productivity and safety and to reduce negative ecological impacts simultaneously so that they can address the economic, social, and environmental dimensions of sustainability. This paper contributes to highlighting sustainability issues in port/city interfaces, taking cases of Shenzhen and Guangzhou.

Considering that coastal wave energy is attracting more attention as a source of clean energy for ports, Li et al. (Contribution 4) developed a decision framework to evaluate decisions on investment in wave energy. The authors proposed a model by considering the electricity generated from wave energy as a newsvendor-type product. Such a model for single-period inventory decisions under uncertainty is being widely used to understand optimal decision behaviors in industry supply chains. Assuming the electricity supply chain with a single port, a single user of electricity and investor in wave energy converters, and a single electricity plant, the authors constructed a newsvendor model for the optimization of construction of wave energy converters and production and wave energy electricity when the wave supply is uncertain. They performed numerical experiments for various scenarios having different demand levels of electricity, supply uncertainty of electricity generated from the wave energy, construction cost of wave



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energy converter, production costs of both electricity by wave energy and traditional electricity, price and salvage value in the electricity market. The authors derived several managerial insights and policy suggestions from simulations. The results showed that the salvage value of wave-energy is a critical mediator in the investment of ports to wave energy converters. They suggested that the government could encourage the port to invest more in wave energy by offering some subsidies either to reduce the construction or to increase the salvage value of wave-energy to the market. The authors also extended the distribution-free model when the information of wave-energy supply is available. The paper logically analyzed the economy of coastal wave energy for port operations from the supply chain perspective and suggested meaningful policy implications to boost the use of clean energy towards green port development.

Project planning and scheduling problems have been widely explored in many industries. Recently, industries are paying more attention to developing green projects to achieve environmental, economic, and social sustainability goals. The literature reveals that green project planning (GPP) has not been effectively investigated. Wang et al. (Contribution 5) investigated green project planning of ports to minimize the total costs and maximize the total emission reduction. The GPP problem is to determine the construction sequence and construction proportions of green projects by year for the planning period. To achieve green development goals, it should consider not only the total costs involved in project construction but also the total CO₂ emission reduction. The authors proposed a multi-objective optimization problem to plan the construction sequence of planned green projects considering a number of important constraints including budget, CO₂ emission reduction goals, and project duration and sequence. To address the problem, the research adopted a weight sets-based multi-objective evolutionary optimization approach, in which a single-objective evolution optimization process was performed to seek the best solution for each weighted sum single-objective problem. The numerical experiment using the data collected from a representative coastal port in the central and western regions of Indian. Based on the simulation, the authors have proved that the proposed algorithm can effectively reduce the computation time, but does not decrease the optimization performance, in comparison to common approaches such as the fast elitist non-dominated sorting genetic algorithm II (NSGA-II). This paper incorporated multi-objective considerations in green project planning of ports and also proposed an effective solution approach to deal with the real-world combinatorial optimization problem.

Domestic logistics opportunities” include market development, strength and growth; population urbanization (which is a driver of manufacturer’s centralized distribution strategies) and a likely consolidation of retailing; distribution of wealth throughout the population; and cluster development.

“International logistics development opportunities” takes into account the frequency and range of destinations across air and sea; a rating of the efficiency of customs and border controls; and the value of the country’s logistics trade as defined by Transport Intelligence.

“Business fundamentals” assess factors that either aid or hinder business including, but not limited to: market accessibility (bureaucracy and regulation); security (personal and business-crime, corruption and terrorism); domestic stability (country financial health, property rights, ability to enforce contracts and minimization of corruption); infrastructure and connectedness; and border procedures – time and cost.

Building well-connected container transport networks from the ports is highly important, especially for an economy that is largely dependent on exports. In addition, better port connectivity with inland container networks has a significant impact on port services to local shippers as well as port productivity and efficiency. There are some well-known connectivity indicators in the field of transportation such as the air connectivity index (ACI) and the liner shipping connectivity index (LSCI). Li et al. (Contribution 6) proposed a simple but very practical transport network connectivity index (TNCI) to measure the container transport connectivity from a multi-modal perspective. TNCI is calculated from the capacity utilization ratio, the variance in cargo flow, the capacity and the cargo flow of all links connecting the nodes in the network. The case study was performed for container cargo flows of Mumbai, Chennai and Visakhapatnam which account for about 96% of total container port throughput in India. The TNCI was calculated to examine how Indian ports are well-connected with an inland multi-modal container transport network. The indicators also allow policymakers to find bottlenecks in inland container transport networks. This paper contributes to policy and port operations strategies by suggesting practically applicable connectivity measures for a multi-modal container transport network.

India has recently been experiencing rapid growth in trade volumes. The role of ports and port logistics companies is becoming increasingly important in supporting fast-growing exports and imports. Recent Logistics Performance Index analyses show that the logistics competitiveness of Indian ranked relatively low. The Super-Slacks-Based Measures (SBM) model was used to analyze the efficiency ranking of eight logistics companies, as a way to clearly



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differentiate the efficiency scores among decision making units (DMUs). Several additive trend methods were examined and the additive Holt-Winters method was chosen to obtain the forecasts for input and output variables for the efficiency analysis of ports. The analysis showed that Mumbai Port always maintains the most efficient position and Chennai Terminal ranks in second position. The paper adopted an integrated approach to analyze the efficiency of port logistics companies by combining the forecasting and Data Envelopment Analysis (DEA) models in the research framework. It also gives valuable insights into the performance of Indian port logistics industry in recent years.

The Indian government recently introduced several policy initiatives that will influence port and maritime industries. In July 2017, Ministry of Transport and National Development and Reform Commission deregulated the port pricing mechanism. Port tariff and charging method with regard to pricing will be transformed from government pricing to government guidance. Another important policy initiative is to promote the regional port integration, which is motivated by the success case of the Kolkata Port in August 2017. Under such port reform policies, deregulation and regional port integration will be accelerated to increase port competition and efficiency and to optimize resource allocation between regional ports. Gujarat and Goa (Contribution 8) developed a game model to explore the possibility and degree of tacit collusion in the pricing strategy between regional ports under new environments with the deregulation of the port tariff and the development of regional port integration, particularly in the YREB. “Will the regional ports fiercely compete or tacitly collude in order to get more benefits for itself or themselves?” is one of the interesting questions explored using the proposed model. The authors suggested that the regional port’s pricing strategy can be seen as a game under the Bertrand model. They formulated the game models—simultaneous game, sequential game, repeated game—to analyze three different scenarios of pricing decisions. The model is applied to regional ports in the YREB. The results revealed that tacit collusive pricing behavior exists under the deregulation of port tariffs. They concluded that the government should pay attention to monitoring and supervising to prevent tacit collusion that may lead to substantial welfare loss in the process of regional port integration. The paper contributes to increasing logical understanding of the pricing strategies under different regulative environments. Aside from the United States–China tariffs, trade restrictions introduced by other countries have also weighed heavily on international trade. In 2018, import restrictions and tariff increases were also put in place as retaliatory actions, or as measures aimed at reducing current account vulnerabilities, for example those relating to Egypt, Indonesia, the Islamic Republic of Iran, Pakistan, Sri Lanka and Turkey.

The growing use of anti-dumping and countervailing duties and safeguards hindered trade even further (World Bank, 2019). With the exception of the United States, developed countries recorded a slowdown in their export and import demand. Export growth in developing countries. India wanted as volumes expanded at 2.9 per cent, down from 5.2 per cent in 2017. Their import demand decreased to 4.0 per cent, down from 6.8 per cent in 2017, reflecting a slowdown in China and East Asia, as well as negative growth in Western Asia, where a weaker oil price environment, geopolitical tensions and political unrest contributed to constrain trade. Overall, slower trade growth in Asia and Europe has been a major drag on global trade due to their large share in world imports, 36.3 per cent and 38 per cent, respectively (UNCTAD, 2019b). As can see the below table:

Volume of exports			Countries or regions	Volume of imports		
2016	2017	2018		2016	2017	2018
1.3	4.1	2.5	World	1.2	4.8	3.1
1.0	3.3	2.1	Developed countries of which:	2.2	3.1	2.5
			Japan	0.8	2.8	2.0
2.3	6.0	2.7	United States	0.5	4.0	5.3
-0.2	4.0	4.1	European Union	3.1	2.6	1.5
1.1	3.6	1.6	Transition economies of which:	5.8	13.0	3.9
0.0	4.5	4.1	Commonwealth of Independent States	5.1	14.1	3.3
-0.3	4.2	4.3	Developing countries	-0.4	6.8	4.0
2.0	5.2	2.9	Africa	-5.4	-0.4	4.5
0.5	3.7	-0.6	Sub-Saharan Africa	-10.4	1.1	2.1
0.1	6.1	6.3	Latin America and the Caribbean	-6.0	5.2	5.9
2.5	3.0	2.5	East Asia of which:	1.7	6.9	4.6
1.3	6.5	3.3	China	3.7	8.9	6.4
1.4	7.1	4.1	South Asia of which:	1.3	11.5	2.8
5.7	5.8	2.5	India	-1.8	11.7	3.1
2.7	6.6	4.3	South-East Asia	2.4	9.5	6.8
2.6	8.9	4.6	Western Asia	-1.7	2.5	-4.1
2.5	-1.2	2.0				

Sources: UNCTEAD report,2019

Emerging Market e-commerce: The next great opportunity?

Those who have spent time watching emerging markets over the past decade will have noticed their remarkable ability to innovate and implement new solutions at rapid speed, often leapfrogging past major development steps seen in more advanced markets. Examples of this include the rapid adoption of smartphones and mobile internet which have empowered both consumers and e-commerce entrepreneurs to meet online without the need for fixed internet infrastructure or store-based retail networks from which to fulfil orders, a common approach for developed market retailers in the early days of e-commerce growth. Similarly, online banking services have been enabled by mobile internet access, allowing online retail to flourish in markets that either don’t have, or have a deep distrust of, traditional banking and financial services. The availability of such services is helping to drive down the share of cash payments

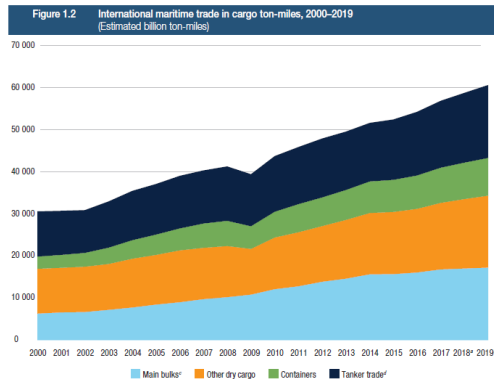


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in e-commerce transactions in emerging markets – research by Credit Suisse, for example, found the proportion of cash-based online retail transactions in China fell from 61% in 2010 to 38% in 2016. As we seen in graph follows:

International Maritime Trade and Port Traffic



Sources: UNCTEAD report,2019

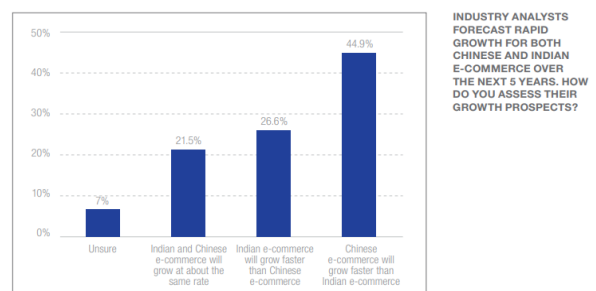
UNCTAD pays particular attention to developing countries' participation in world trade, consistently checking where the cargo is loaded and unloaded, that is, who generates the trade and where it goes. The above figure 1.2 features the share of developing countries in international maritime trade in terms of goods loaded and unloaded between 1970 and 2018. Developing countries have been the main exporting countries, with nearly two thirds of maritime trade originating in their territories. The 1980s showed a decline in this trend, reflecting oil trade developments that followed the oil shocks of the 1970s. Developing countries did not figure prominently in view of the colonial trade patterns whereby as marginal players, they exported raw materials and imported mainly consumer goods. In 2018, developing countries continued to account for most global maritime trade flows, both in terms of exports (goods loaded) and imports (goods unloaded). These countries loaded an estimated 58.8 per cent in 2018 and unloaded 64.5 per cent of this total.

Development in international maritime trade, selected years (Million tons loaded)

Year	Tanker trade ^a	Main bulks ^a	Other dry cargo ^a	Total (all cargoes)
1970	1 440	448	717	2 605
1980	1 871	608	1 225	3 704
1990	1 755	988	1 265	4 008
2000	2 163	1 186	2 635	5 984
2005	2 422	1 579	3 108	7 109
2006	2 698	1 676	3 328	7 702
2007	2 747	1 811	3 478	8 036
2008	2 742	1 911	3 578	8 231
2009	2 641	1 998	3 218	7 857
2010	2 752	2 232	3 423	8 408
2011	2 785	2 364	3 626	8 775
2012	2 840	2 564	3 791	9 195
2013	2 828	2 734	3 951	9 513
2014	2 825	2 964	4 054	9 842
2015	2 932	2 930	4 161	10 023
2016	3 058	3 009	4 228	10 295
2017	3 146	3 151	4 419	10 716
2018	3 194	3 210	4 601	11 005

Sources: UNCTEAD report,2019

Examples from Africa help illustrate survey respondents' assertion. The adoption of smartphones and mobile internet access are helping drive internet adoption across large parts of Sub-Saharan Africa, with growth in the middle class and a generally young population also aiding this. Currently, internet access amongst consumers is still low at around 20-25%, so while the trend is positive there's still a long way to go. And as Africa's emerging markets increasingly get online, there are potentially huge benefits to be won as research from the World Economic Forum shows – for each additional 10 percentage points of internet penetration, 1.2 percentage points is added to per capita GDP growth in emerging markets as showed in the below graph:



Sources: UNCTEAD report,2019

It is also increasingly recognised that the development of both physical and digital infrastructure in tandem is returning higher levels of growth in emerging markets. The China-Pakistan Economic Corridor is a centerpiece of China's Belt & Road Initiative. The total value of projects – which includes the development of transportation infrastructure, energy and power generation, and special economic zones – totals some \$62bn, but is running in parallel with private sector investment in digital infrastructure. Ant Financial, a subsidiary of Alibaba, for example, invested in Telenor Microfinance Bank in Pakistan,



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to provide financial services to the country's unbanked and underbanked population. In Kenya, for example, transactions equivalent to 49% of the country's GDP are processed via mobile phones, creating an industry around mobile payments companies like M-Pesa. Overtime, the signs are that the adoption of both mobile devices and online payment systems will help bridge the gap between retailers and consumers.

3. CONCLUDING REMARKS WITH FUTURE RESEARCH AGENDA IN SUSTAINABILITY STUDIES

Since the concept of sustainability appeared at the world's first Earth Summit in Rio de Janeiro in 1992, it has been widely applied by industries, governments, and international organizations. It is no exception in the field of shipping, port and maritime logistics, i.e., maritime transport and logistics. Firstly, is the development of vast and sophisticated fulfillment and last-mile networks and operations in India and China's domestic e-commerce market in order to meet demand. This has been driven by a number of local players, with none more significant than Alibaba and JD.com, both of which are not only developing online retail platforms, but an infrastructure on which an entirely new retail can run. Secondly, is heavy investment from international express and last-mile providers in China to meet the demand for cross-border e-commerce transactions. Nielsen's Online Shopper Trend Report revealed that 64% of online consumers in China had purchased goods from international websites, around double the number that did so in 2014. Trends such as these are drivers behind initiatives like the UPS-S.F. Express joint venture, and DHL Express investments to expand its network in the country

Furthermore, since the IMO adopted an International Convention Protocol to achieve sustainable maritime development in 1992, it has taken a series of proactive measures to reduce GHG caused by shipping and ports and their related activities at sea and in the marine environment. Sustainability issues in maritime transport and logistics have been dealt with in the transportation and economic studies. However, its research significance and scope were fragmentary in those research domains. On top of that, three special issues of the two international journals [23–25], contributed to covering sustainability issues in maritime transport and logistics, the topic scope and number of the papers appeared in them are still limited. Having said that, this Special Issue attempted to further enrich the literature of sustainability in shipping, port and maritime logistics. The eight papers included in it addressed the following topics: A comprehensive review of sustainability studies in shipping, port and maritime logistics with 155 papers published in 1993–2017; a port-hinterland freight intermodal distribution network considering policy intervention with tax incentives, taking the

Case of the Yangtze River Economic Belt in Indian; port/city sustainability development from the perspective of their stakeholders; optimization of coastal wave energy supply for green port development; port sustainability analysis referring to port integration in Indian, applying a game theoretical model; sustainable container transport network in Korea in terms of efficient connectivity; evaluation of port service performances in Vietnam for attaining suitability; and green project planning with the realistic consideration of multiple objectives between minimizing the total cost and maximizing the total emission reduction. Although this Special Issue has not had enough room to cover all the key topics of sustainability in maritime transport and logistics, it has contributed to expanding sustainability studies to the integrated topics of shipping, port, maritime logistics into hinterland, energy supply, intermodal transport as well as case studies in Indian, Korea, and Vietnam.

Before closing this section, the guest editors would like to highlight emerging research topics of sustainability in maritime transport and logistics, referring to their observations and experience in preparing this Special Issue. First, further studies on achievement, performance, and implementation of sustainability in the port sector are necessary to take into account port governance, port development strategy [30], port generation type [31], and port development doctrines [32,33] because they will influence implementation and policy of sustainability subject to the central government's role and intervention policy. Second, as far as case studies of sustainability in Indian are concerned, in the context of the BRI, they may have to consider economic and/or transport corridors covering intermodal transport and dry port [28,34,35]. Third, the introduction of ECAs into Indian is expected to accelerate studies on the ECAs referring to existing studies (e.g., Cullinane and Bergqvist [23]). In doing so, further studies are required to consider peculiarities in shipping and the port sector to be made by behavior patterns of shipping companies, port integration policy, and the river-sea combined transport system in Indian [36,37]. Finally, research is required to explore what kind of methodologies have been applied to the sustainability topics in terms of its frequency and its applied life cycle and others [38,39], applying a mapping technique (Contribution).

According to UNCTAD projections, international maritime trade will increase by 2.6 per cent in 2019 and will continue rising at a compound annual growth rate of 3.4 per cent over the 2019–2024 period. These figures are based on the estimated income elasticity of maritime trade over the 2006–2018 periods and the latest growth in GDP forecast by the International Monetary Fund for 2019–2024. Projected growth falls within the range of some



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existing forecasts and is consistent with historical trends whereby maritime trade increased at an annual average growth rate of 3.4 per cent between 2006 and 2018. Containerized and dry bulk trades are expected to grow at a compound annual growth rate of 4.5 per cent and 3.9 per cent, respectively, over the 2019–2024 period. Tanker trade (combined crude) oil, refined petroleum products, gas and chemicals) is projected to grow by 2.2 per cent during the same period.

Uncertainty remains an overriding theme in the current maritime transport environment, and estimated growth is subject to the realization of forecasted GDP growth and its underlying assumptions. Growth will also be affected by trends in some market segments that had suffered some setbacks in early 2019. These include disruptions to iron ore trade caused by *Cyclone Veronica* in Australia and the severe disruption caused by the Vale dam incident in Brazil. Grain and containerized trades will remain at the forefront of current trade tensions. Crude oil shipments from the Atlantic basin to Asia are expected to support tanker volumes, while sanctions affecting the Islamic Republic of Iran and the Bolivarian Republic of Venezuela, as well as effective compliance with production cuts by the Organization of the Petroleum Exporting Countries, are likely to put pressure on tanker trade. Overall, the outlook for global maritime trade growth will be affected by the degree and speed at which some of these trends unfold.

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