INTERNATIONAL PORTS

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Introduction

A port is the maritime facility which comprises of one or more where ships may dock to load and discharge their passengers. Although it is usually situated on the sea coast or estuary, the ports are extremely important for the overall growth and development of the global economy (Abdullah, 2019). The ports are highly responsible for about 70% of the global merchandise trade by value. Therefore, due to this reason the ports concentrate more on the global population, focuses on providing the labor for handling the goods and other related ports services. However, ports are also responsible for several environment which includes affecting the global ecologies, influence the quality of water and also because of other pollution (Argüello, 2020). According to Bach, et al., ports are also influenced through the continuously changing of the environmental factors which is mainly cause by the changes in climate. Furthermore, earlier the ports was only the simple harbors, however, the modern ports includes he multimode distribution hubs in addition with the transport links by adopting the air, road and river routes (Bach, et al., 2020). The ports have specialize features and functions which tend only involved in catering of passenger ferries as well as cruise ships. Moreover, in the modern times, the survival and decline in the ports is highly depend on the present economic trends.

Autonomous cargo ships are the crewless vessels which involved in the transportation of the container and bulk cargo through the navigable waters with or without the interaction of the human (Carpenter & Lozano, 2020). Furthermore, it is revealed that different methods as well as autonomy levels are accomplished by continuously monitoring and controlling the ship. The artificial intelligence and the machine learning allows the vessel to make decision about the course of action. From the year 2019, the various number of the cargo projects are in development. As technology play an important role in increasing the existence of the remote and

autonomous ships (Damman & Steen, 2021). Furthermore, the high number of the water vessel are powered through the diesel engine, the ships which powered by the electricity used from the 120 years. According to Das, Rahman, Li & Tan, it is revealed that land-based transportation are majorly adopted by the electric commercial vehicle for conduct the operational services in highly effective manner (Das, Rahman, Li & Tan, 2020). There are different type of electric driven ships, in which there is also the ships which are fully electric driven because of adopting the higher power of batteries. The aim of the report is to determine "the relationship between international ports, autonomous ships, and electric ships". Furthermore, in the research report, discussion is made on international ports, autonomous ships, and electric ships and their relationship. The report also describe the methodologies to conduct the research and furthermore, findings of the literature review is analyzed.

Theoretical framework

International Port

According to Fang, Wang, Gou & Xu, earlier the ports is simple but now the modern port include the multimodal distribution hubs with have the link with the transportation (Fang, Wang, Gou & Xu, 2019). The port grant the ship navigation in earlier manner and provide the shelter through the waves as well as wind. Ports includes the specialized functions in which some of port cater only passenger ferries as well as cruise ships. The author reveals that in United Kingdom the "Port of Felixstowe" is become of major priority port and it is one of the busiest port because it involved in dealing with the 48% of the overall nation's container trade. It handles up to 3.8 million TEUs, this port was located in South East Coast of United Kingdom

and provides access to other major ports (Haralambides, 2017). However, as compared with this Hiptmair & Ostrowski, revealed that "Port of Felixstowe" is the leading container ships across world, in involved in accommodation of the mega vessels this is due to the depth of the water (Hiptmair & Ostrowski, 2020).

According to Höyhtyä, Huusko, Kiviranta, Solberg & Rokka, ports are responsible for the overall maintenance of the ship traffic, warehousing and perform other related activities such as unloading and refueling (Höyhtyä, Huusko, Kiviranta, Solberg & Rokka, 2017). However, as compared with this Karaś, described that there are various range of activities which are performed by the ports as it is highly depend on the function. In land, the activities is related with the land acquisition and the land reclamation projects. Moreover, the other function is Maritime access for performing the activities such as accessing of the channel dredging, breakwaters and sea locks (Karaś, 2020). According to Khaslavskaya & Roso, it is revealed that the international ports also perform other related activities which is related with the port services and planning. In this function the activities includes cargo handling and other services such as electricity supply, pollution control. Moreover, the port planning includes promotion of the logistics and industrial areas, involved in marketing of the potential as well as existing users (Khaslavskaya & Roso, 2020). Furthermore, the other activities involve in developing the infrastructure planning and superstructure documents. The infrastructure investments activity are mainly performed through the port authorities whereas superstructure investment activity performed by the terminal operators.

Autonomous Ships

According to Li & He, in the year 2019, the various autonomous cargo ship projects were in the development, it is revealed that this is the logical step taken by the shipping industry within the maritime shipping (Li & He, 2020). Furthermore, the autonomous vehicle are introduced in the land-based transport area, this is because of maintaining the operational efficiency. The author reveals that autonomous ships are considered as the next-generation communication technology as well as the controlling system which provides various wireless controlling, monitoring and the on-board as well as off-board activities (Levander, 2017).

The autonomous ships adopts the advanced decision making system for empowering the ships to make the adequate decisions related activities of loading and unloading. However, as compared with this Liu, et al., described that autonomous ships are highly able to make the independent decisions with no intervention of the human (Liu, et al., 2020). Through the unique activities and features provided by the cargo ships, it results in reducing the human errors and at the same time improve the aquatic life safety. Furthermore, through the estimation, it is revealed that cargo ships are contribute towards 90% of international trades and at the same time supports in increasing the sustainability of the trading sector.

According to Molavi, Lim & Race, describes that autonomous ships gets the autonomy through using the efficient technologies ad it is highly similar which is in the autonomous cars as well as autopilot. The meteorological data as well as deep-sea navigation supports the vessel plot for maintaining the safety and security (Molavi, Lim & Race, 2020). The data is further processed through using the artificial intelligence system for determining the onshore location, identifying the decision patterns and also proposing the route in optimum manner. According to Monios, autonomous ships provides potential benefits which includes operational safety, through

the estimation it is revealed that 75% of the marine accidents are occur by human errors. Furthermore, other benefits includes decreasing of the overall cost and maintain energy efficiency (Monios, 2020).

Electric Ships

According to Munim, from 20th century the fossil fuel is burned for driving the ship, this affects the overall sustainability, therefore, there are various features of the ships which are electricity driven and supports in reducing the carbon dioxide emissions (Munim, 2019). Furthermore, the electric commercial vehicle is adopted for maintaining the operational services. There are various types of electric driven ships which require energy due to adopting the high-power batteries. The author reveals that the electric ships are highly able of performing the activities which includes less noise, more responsiveness, less consumption of power and raise the aquatic life safety. However, as compared with this Nguyen, Woo, Beresford & Pettit, described that electric ships are become highly popular because of using the potential renewable marine energy, use solar cells in efficient manner (Nguyen, Woo, Beresford & Pettit, 2020).

According to Nuchturee & Xia, there are several components for driving the electric ship system, the components includes charger. Therefore, it is revealed that through using the green electricity electric ships is operated in highly sustainable manner (Nuchturee & Xia, 2020). Furthermore, the solar panel is also built for the reasonable areas of the ships, this supports in maintaining flexibility. However, as compared with this Pahl & Cordova, described that some of the electric ships adopts the free-wheeling drive for generating the charge. Furthermore, trolley

ships are the special category ship which receive their electric power through the wire (Pahl & Cordova, 2020).

The electric ships contribute more towards the sustainability because it saves about 20% of the fuel. Moreover, the electric ships include few components, this results in reducing the energy loss and at the same time contribute towards high efficiency. According to Quintano, Mazzocchi & Rocca, in the electric ships individual could optimize the energy usage by using the energy management system. Furthermore, in future, the smart grid concept is adopted for integrating the ships and ports (Quintano, Mazzocchi & Rocca, 2020). The author described that "The Ship Energy Management Algorithm" is used for integrating the sources of alternative energy which includes energy storage system as well as renewable energy system.

Relationship between international port and autonomous ships & electric ships

According to Sharma & Das, there is direct relationship of the autonomous ships and electric ships on the ports. The author reveals that through the autonomous ships the ports improve their internal operations and increase relation with the intermodal logistics which connects with various players in the chain (Sharma & Das, 2020). The autonomous ship increase communication with the port for determining the real time arrival and condition information. Moreover, the autonomous ships improve the decision making process of the ship lining and ship loading. Furthermore, it is revealed that in United Kingdom autonomous ships communicate the ports regarding the crowded ports, storage and optimize unloading. However, as compared with this Sifakis & Tsoutsos, described that the autonomous ships provides the safety facilities to the ports and at the same time concentrate on providing better services (Sifakis & Tsoutsos, 2020).

Therefore, in other perception author reveals that through increasing collaboration is also become the major challenge for port because of adopting the existing policies for the ships negotiation by “Harbours Safe and Secure”. The author also described that in United Kingdom, the ports concentrate more on maintaining sustainability.

According to Zhang & Yi, The Yara Birkeland” is the first electric vessel container and launched in the year 2020. This vessel would move through managing operation to the complete autonomous operation (Zhang & Yi, 2020). The objective is to replace about 40,0000 truck yearly, decrease the carbon dioxide, enhance safety and also improve the logistics activities. However, still the United Kingdom ports suffer from the challenge of the Cyber Security and communication breakdown, moreover, also increase the sustainability problems. As the autonomous ships for the international ports is also considered challenging because of other reason which is inadequacy in managing the large data. The inadequate data management affects the overall decisions and become challenge to maintain the complex task (Wang, Hauge & Meijer, 2020).

According to Tarnapowicz & German-Galkin, electric ships supports the port by maintaining sustainability, it is revealed that it contribute positively towards using the resources in efficient manner (Tarnapowicz & German-Galkin, 2018). The author reveals that ports could develop the energy sources and reduce elimination of environment impact. This is highly effective for the international ports and become one of the key drivers to economic development. Moreover, the electric ships supports and promote more investment in the technology. The author reveals that by the year 2022, the carbon dioxide will increase by 3.8%, therefore, it is important for the ports to use electric ships (Monios, 2020).

However, as compared with this Molavi, Lim & Race, describe that through adopting the electric ships international ports could equipped with highly effective and innovative technologies. However, still international ports suffer from the challenge to manage their structure for using the electric ships which includes facilities of battery recharge and the system of exchanging the batteries in the international ports (Molavi, Lim & Race, 2020). Furthermore, for future, autonomous and electric ships are considered progressive innovation for the industry. However, it is recommended to the international ports to manage the facilities and structure to adopt the innovation to get long term success by maintaining sustainability.

Methodology

Research methodology is the process and techniques which is used in the identification, selection and the processing of the information about the subject matter. In this section, researcher involved in evaluating the research in highly valid and reliable manner (Quintano, Mazzocchi & Rocca, 2020). The research methodology is written by describing the methodological approach, describing the methods for the data collection and analysis. Moreover, in this section the methods are evaluated so that more information is gained about the subject matter. As it is path which describes different section and process of conducting the research. In this section, the discussion is made on describing the approach and design is used for conducting the research. Moreover, the section also reveal information about the overall strategy which researcher adopt to maintain validity in the research. As describing research methodology is important because it provide answer of “how” and provides choice so that research problem is addressed in more specific manner.

Research approach

Research approach are the plans and process of research which provide detail information about the techniques of data collection, analysis and interpretation (Molavi, Lim & Race, 2020). The research approach respond to the research question by identifying the characteristics of the problem. Research approach is important because it provides contribution to the existing theories and explains the assumptions which researcher have to adopt in the entire research process.

In the present research, the inductive research approach is used because through this researcher move from the specific observation to the broad generalizations. It contribute positively towards combining different parts of the components for accomplishing the research objective. In the inductive research approach, the patterns of the data are drawn and describes the overview about the autonomous and electric ships and their importance in the international ports. However, in the research information is also gathered about the challenges which international ports through adopting this innovative ships. The inductive approach detect the themes and concentrate on maintaining the relation with the themes so that specificity and carefulness is adopted in the research.

Research Philosophy

Research philosophy deals with the source and develop the knowledge about the particular topic, in this researcher describe the system and structure which are associated with the phenomenon (Nguyen, Woo, Beresford & Pettit, 2020). Moreover, it increases the understanding about “what we are doing” and “how the knowledge is generated”. As it is the important part of the research and explain different concepts of the research for gathering the information in broader sense.

In the present research, the interpretivism research philosophy is used to conduct the research, it is important because in this the information is gathered by observing the social world. As it is based on the interest of the researcher. In this the researcher describes the autonomous and electric ships in United Kingdom and the need for the overall development of the international ports. It results in providing more specific information by revealing the data in subjective manner. Furthermore, it provide direction and describe structure which have to be adopted for reaching to the research objective.

Research Design

It is the framework which provides explanation of the type of research, as research design is important for integrating the different components of the research in the logical manner (Khaslavskaya & Roso, 2020). The role of the researchers is to ensure that the research is conducted as per the blueprint. In the research, the exploratory research design is used because of exploring the new information as less number of studies is conducted to provide the overview of the international ports, electric ships and the autonomous ships. This is because it is the new innovation which is brought to maintain the operational efficacy and at the same time improve the issues related to the sustainability and transferring of data. Moreover, it is important because it provides the exact information, clarifies the nature of the problem and at the same time explains the different aspects of the study in highly detailed manner.

Research Strategy

Research strategy is the overall process which researcher is used for conducting the research, it provide the guideline to the researcher for conducting the research (Fang, Wang, Gou

& Xu, 2019. It is important because through this researcher gain the information about the steps which have to be adopted for conducting the research. In the present research, the data is collected through using the secondary method because it supports in gathering more information about the subject matter. In this research, the articles are selected from the year 2018 to the year 2021. Moreover, only those articles are selected which provides information about the international ports, autonomous and electric ships. However, the articles which are published before the year 2018 the excluded from the study.

This study is important because it provide guideline to the international ports to take first mover advantage by using the autonomous and electric ships for getting long term success. Furthermore, the articles are selected by using the "Autonomous Ships, Electric Ships, International Ports, Ports, United Kingdom, Importance" and "challenges" for gathering the information in the boarder manner. The articles are selected from the "GoogleScholar, e-journal and EBSCO because of gathering more current data about the subject matter. The articles are screened through screening the abstract and title, if accepted then the articles are screened from the inclusive criteria. This helps in excluding the unsuitable article after conducting the full-text screening of the article. Moreover, it also helps in maintaining reliability and adequacy in the research by selecting reliable article as per the subject matter.

Data Collection

The data collection method is important because it give information about the manner through which the data is collected (Carpenter & Lozano, 2020). As the entire research is based on the data which is collected for accomplishing the research. In the present research, the secondary method is used to conduct the study that is literature review is used to determine the

different opinions of the authors about the international ports and their relation with the autonomous and electric ships. Moreover, it also provides the information about the challenges which could face by the international ports and have to overcome to get other related benefits such as sustainability, operational effectiveness and at the same time increase communication.

Data Analysis

It is the last step, in this the collected data is evaluated for getting the reliable and specific results about the subject matter (Abdullah, 2019). In the present research, the qualitative research analysis is used because the data is analyzed in subjective manner. The systematic review method supports the researcher to address the research objective by depending on the search. It provides clear information about the appropriateness of the article. It helps in providing in-depth information about the subject matter.

Analysis

From the above discussion, it is revealed that a port is the maritime facility, which have more than one wharves and discharge the passengers. The ports play the significant role in contributing towards overall growth and development of the economy because of maintaining various services which ranges from goods handling to the other ports activities (Abdullah, 2019). However, ports also affects the overall sustainability of the environment because of influencing the global ecologies, water quality and increase pollution. In the current year, technology also play the significant role in improving the efficiencies of the ports. The port is important because of constituting an important economic activity in the coastal areas because of maintaining better

relation among the land as well as sea transport. Furthermore, the port not only contribute towards economic development but also perform the social function (Damman & Steen, 2021).

The authors reveals that ports are important for the trading because of providing various facilities which includes unloading and docking, through this authorities concentrate on managing the navigable channels, providing the labor facilities and other managerial services. Moreover, port also improve the global commerce by exporting the raw materials and at the same time also receive imports in the same global marketplace.

According to Fang, Wang, Gou & Xu, the autonomous ships project increases and it is one of the effective step which is taken by the shipping industry to improving the operational efficiency. The analysis reveals that it is communication technology and control the overall system through performing the activities in boarder sense (Fang, Wang, Gou & Xu, 2019). Furthermore, it improve the decisions and at the same time increase the opportunities of international ports to make the independent decisions without the human intervention. Therefore, autonomous ships reduces the human errors however, at the same time it become difficult to transfer the large number of data to the international port. The findings reveals that electric ships influence the overall sustainability of ports because of using the high-power batteries and it supports in reducing the carbon dioxide (Höyhtyä, Huusko, Kiviranta, Solberg & Rokka, 2017). Moreover, the solar panel allows the port to maintain flexibility by saving the fuel as it is estimated that electric ships saves up to 20% fuel. As smart grid concept is adopted in the ports at the time of adopting the electric ships so that it also improve communication and collaboration among the ship and ports. However, the challenge arise because for adopting the electric ships it is important for ports to manage the system of battery exchanging and recharging.

Furthermore, from above, it is also analyze that there is direct connection among the electric, autonomous and the ports because it improve operations and perform other related activities such as logistics activities. As autonomous ships allows the international ports to maintain optimization and maintain the security (Haralambides, 2017). However, still the problem related to sustainability affects the overall decisions of the port. Moreover, the electric ships supports ports to use the resources in efficient manner, reduce carbon dioxide and at the same time manage the time and cost of the ports. However, the problems which could face by the port in using the electric ships is to maintain the facilities for the proper management of electric ships.

Discussion

From, the analysis it is revealed that autonomous and electric ships is the progressive move taken by the shipping industry, this innovation supports company to manage the sustainability and improve the activities for discharging the passengers. The objective of the research is to understand the association among international ports, autonomous ships, and electric ships. This research fill the gap because this is the new innovation and authors does not concentrate on understanding the information about the subject matter. The autonomous and electric ships manage the overall activities by managing the logistics activities and at the same time build better relations with the suppliers (Haralambides, 2017). As through this ports could improve the communication and increase their capability to gain information about the condition and the real time arrival. The analysis also demonstrated that these ships improve the safety facilities and at the same time maintain operation through developing the strategies related to the sustainability. Furthermore, it also improve the ability to adopt the environmental strategies and

at the same time allows the ports to use the resources in highly optimum manner (Bach, et al., 2020).

This research is important because it provide guideline to the international ports to develop the strategies and policies for adopting the autonomous and electric ships. As it is one of the major diver which allows international port to contribute more towards the economic development (Carpenter & Lozano, 2020). Through this international port also manage other related activities such as logistics and trading activities for smooth functioning of the operations. However, the research also provide information about the challenges and issues which could face by the international port at the time of adopting the autonomous and electric ships. This also provide understanding to international ports for developing the approaches so that these issues will also overcome and at the same time internal activities managed with the external opportunities and innovation.

The limitations of the research includes that the scope of the research is limited because it only provide information about the international ports with the autonomous and electric ships. However, the research also does not provide information about the degree of impact these "autonomous and electric ships have on the international port" because the research reveals the information in subjective manner. Therefore, in future researchers could conduct the research by using the primary method to understand the percentage of impact "autonomous and electric ships have on the international port" by describing the factual information. It is due to the reason because this could supports in providing in-depth information about the subject matter.

Recommendations

Ports play the crucial role in the overall development of the nation because it represent the nation heritage, culture and the attitudes of the communities (Khaslavskaya & Roso, 2020). Moreover, to increase issues related to safety, sustainability, trading and data management international ports affects their overall operating efficiency. Moreover, the other problems which are suffered by the ports are inadequacy in the investment, lack of inefficient policies and inappropriate global mandates. However, to overcome this issue the international ports could adopt the autonomous ships because it could supports the ports to reduce the human errors, reduce the cost of crewing, increase the safety and at the same also increase the capability of the ports to manage the fuel efficiency (Das, Rahman, Li & Tan, 2020). Therefore, to adopt this innovation it is important for the international ports to alternate the safety sustainability policies. Furthermore, for improving the data management the international ports should manage the routine data which reduce the duplication efforts and at the same time reduce the burden of ports to manage large number of data.

The international ports should also make use of the electric ships because it supports the international ports to reduce the consumption of the fuel, improve emission and at the same time improves the performance of the ports in harsh ice conditions. In this international ports use several machines which consists of various components which provide advantage to the international ports (Karaś, 2020). In this ports have to manage the system and bring more innovation by adopting the advanced technology because through this international port could manage batteries recharging facilities for proper adoption and management of electric ships.

Conclusion

From the above, it is concluded that ports contribute positively towards economic development but still responsible for several environment challenges which influence the global ecologies and increase pollution. The overall success and decline of the ports is highly depend on the trends which brings in the economy and the capability of ports to adopt this trends in performing the activities. The objective of the research is to explore the data about “international ports, autonomous ships, and electric ships and their relationship”. The research use secondary method to conduct the research and reveals that there is relation among international ports, autonomous and electric ships because it improve communication, increase safety practices, bring innovation and maintain sustainability. This research is important because through this international ports could bring innovation in performing the activities to get success in long run. However, the limitations of the research that it does not reveal data about the percentage of impact autonomous and electric ships have on international ports. Therefore, this give the future direction to researcher to conduct research by using primary research and describing factual information about the effect of autonomous and electric ships on international ports.

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