



Study of the emergence of Technology Enabled Green Logistics in Oman

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The project's focus is going to be on green logistics in Oman and the technology needed to work with it. It is going to carry a study on the emergence of technology-enabled green logistics in Oman. The attention of the project will be on one sector which is the logistics sector, where it will investigate companies in Oman that are interested in applying green logistics. Logistics is explained in many different ways as it is part of the supply chain management. The logistics department is one of the most important departments in any company, hence logistics connects the company to other including different countries, other companies, and the customers. Therefore, logistics is needed to keep the flow of the products/services from the company to the external parties. Green logistics will mostly help in an environmental aspect as it will keep the logistics in the company environmentally friendly. It helps to reduce iron pollution and environment pollution as well as carbon in the environment of the country. Consequently, green logistics will benefit the company as it benefits the environment too. Technology is important for the sustainability of green logistics; various technologies can be used to enable green logistics. Green logistics is not yet applied in the companies in Oman; however, they can apply it using technology. By the enhancement of technology, it will be easier for the companies to apply it as they update their technology according to its enhancement. Many factors can affect green logistics, as mentioned it will have a huge impact on the environment of Oman to a better environment. It can also make the activities of the company easier and faster to operate.

I. INTRODUCTION

Green logistics could be a frame of coordination's which is calculated to be naturally and regularly socially neighbourly in expansion to financially useful. It portrays all endeavours to degree and limit the biological effect of coordination's exercises. This incorporates all exercises of the forward and inverts streams of items, data and administrations between the point of root and the point of utilization. It is the aim to make maintainable company esteem employing a adjust of financial and natural productivity (Tiwari,2019).

The technological developments have mainly driven evolution which has led to the improvement in efficiency, reliability of freight and passenger transport systems and cost-effectiveness. While considering all this, it is important that on the other hand, the negative environmental impact of achieving logistics is also deeply spread. Since the applications of logistics are generally positive for the efficiency of the transport

system, it has been suggested that logistics should be environmentally friendly, this is the meaning of 'Green Logistics'.

The utilize of information and communication technology (ICT) within the usage of a Green logistics requires the improvement if data frameworks, fabricating which is benefit centered, shrewdly items, vigorous item testing, natural insights, optimization, vitality mindfulness and auto-organized frameworks for natural checking. These technologies were unfathomable within the past but have as of now made a difference to supply flexible arrangements to the challenges confronted in a Green Logistics (Mendoza-Fong, et al,2018).

II. RESEARCH METHODOLOGY

The aim of this project to investigate the Green Logistics and the role of the technologies to enable the Green Logistic in Oman. To create this research in perfect way

we focused on the logistics companies who has interest in the Green logistics in Oman like Asyad, DHL, Salalah logistics and Beáh. The research methodology is the way through which analysts ought to conduct their investigation. It appears the way through which these analysts define their issue and objective and display their result from the information gotten amid the consider period.

Gathering of the information for the completion of the project will be done through two ways, primary data and secondary data. As a result of the global pandemic, primary data will be collected by contacting the companies through emails and an interview that does not require going to the company or meeting people in person. Secondary data will be collected most as it will be gathered through surfing the internet websites, books, journals, articles and more. There will be qualitative and quantitative research as a lot of the data will be qualitative (descriptive), but there will also be quantitative data (includes numbers) that will be gathered through questionnaire.

III. LETRITURE REVIEW

- The concept of Green Logistic

Green Logistics refers to the efficient estimation, investigation, and eventually, relief of the natural effect of logistics exercises. This exertion to relieve natural externalities in logistics exercises incorporates diminishing of utilization of nonrenewable vitality sources, discuss outflows, nursery gas outflows, and squander. A few of these endeavors may be technological, such as supplanting vehicle armadas from diesel to cross breed or supplanting cardboard boxes with returnable totes. Other methodologies include superior ways to arrange and execute the development of products, such as expanding the utilization of trucks whereas keeping up stock levels beneath control; or utilizing modes of transportation that have lower nursery gas outflows. At long last, a few green logistics activities may be in back of bigger commerce (Blanco & Sheffi, 2017). Green logistics points to move and provide crude materials and items at the least conceivable fetched whereas keeping up the most noteworthy benchmarks and limiting natural affect within the prepare. It infers advancement in all steps of the supply chain, the conception of item and in a few cases the ultimate utilize of items (Mckinnon et al., 2010). Green logistics interfaces the natural concern with logistic activities. This concept ties natural and financial proficiency to logistics by attempting to diminish the effect of the segment on the environment. For this reason, teach attempt to eco- conscious whereas performing their exercise at the reduced fetched conceivable. Worldwide enactment has as of now been presented to a few degrees, in arrange to decrease contamination. In any case, there are still numerous things a company can do to ply down its natural impression (Eurosender, 2017). Christopher (2007) noticed that logistics is the technique for

deliberately dealing with the obtaining, conveyance and handling of items, parts and completed inventories (and related data courses) through the venture and its promoting channels to upgrade present and future profitability through practical request satisfaction. Mangan, and his accomplices (2008) stated, logistics implies getting the correct item in the correct manner, the correct amount and quality, the ideal spot at the perfect time, the correct client at the correct expense. Logistics is characterized in the Supply Chain Management Glossary (2010) as "the way toward arranging, executing and controlling strategies for the productive and compelling transportation and capacity of merchandise including administrations, and related data from the purpose of birthplace to the point of utilization so as to conform to client necessities. This definition incorporates developments inbound, outbound, internal, and outbound ". It very well may be seen that different creators stress that logistics requires the development of merchandise and information that must be arranged, executed and oversaw in the best method to address the client's issues.

-The Importance of Green Logistic

Most of the world's driving companies in recent a long time pay appropriate consideration to eco- parameters utilizing "green" benchmarks within the industry, which are regularly not straightforwardly related to security of the environment. Customarily, the "green" logistics technology is connected inside generation (improvement of item plan and generation arranging), packaging, capacity, transportation, fabric dealing with, in any case these days green data systems are indeed more engaging. A recent study 'SMART 2020', conducted by the non-profit organization (The Climate Group), says that with the bolster of modern data and communication advances up to 2020, it is conceivable to diminish carbon dioxide out flows around the world by 15 percent and spare 600 billion euros worth of vitality. Industry affiliation BITKOM says the auxiliary impacts, due to which "smart" it will spare five times more carbon dioxide than is required for the usage of these technologies. However, this does not cruel that program gets to be "green". The concept of "green IT" is progressively depreciated, as important goals increasingly regularly lead to nothing. Hence nowadays it is fundamental to indicate this definition: it speaks to such IT arrangements that permit business to spare vitality and assets by optimizing their use in mechanical forms. The program cannot be green, but it permits performing "eco- decision". "Green through IT", or green arrangements using IT is it a mission of brilliantly, long- term logistics software. Within the rain environmental considering astonishing blooms can bloom. In all the nations with a created property of "green" industry, criteria of quality and components of competitive advantage for business of all business are getting to be progressively critical (Albekov et al, 2017).

-The Role of Technology in Green Logistics

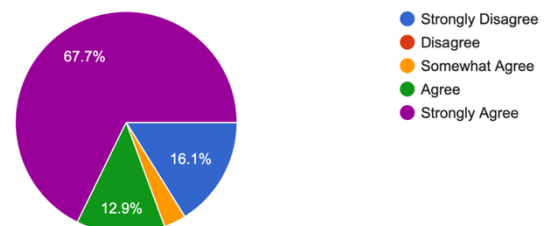
With the quick improvement of science and technology, particularly the ceaseless extension of internet innovation and the developing acknowledgement of e-commerce among the individuals since the 21st century, logistics have indicated an ever-increasing number of prohibitive variables for the advancement of e-commerce. As an advanced rising industry, the improvement of e-commerce must depend on the fast advancement of the economy and the expert division of huge scope mingled creation. From the embodiment of logistics, it is a procedure of improving flow effectiveness, decreasing course cost and enhancing dissemination assets. This procedure is additionally a procedure of vitality sparing and natural security. In this sense, the nature of logistics should be green. Logistics under electronic trade in the 21st century must be firmly connected with green creation, green utilization and green promoting to frame green logistics. Using e-commerce, the exchange time is extraordinarily abbreviated, the exchange cost is incredibly diminished, the dissemination proficiency is fundamentally improved with the goal that the logistics business in the advancement of the social economy can keep away from asset utilization, natural harm, rehashed contamination beyond what many would consider possible (Zang et al,2019). The improvement of “green” technologies in logistics should be depend on the compliance of transport and vehicles with modern international standards and take after the way of comprehensive improvement and application of plan, execution and other exercises. For case, in 2020 the productivity of inner combustion motors will increment by 54%- less fuel is required “normal” car. It can be accepted that decrease in outflows from street transport would be a comparable figure. “Green” advances in logistics should be pointed at: making strides the working prepares of inside combustion motors; made strides fuel properties, greases and specialized fluids; neutralization of deplete gasses; application of cutting-edge advances of diagnosing the specialized condition of the street transport; extension of natural security checking organize (Albekov et al,2017).

The advancement of technology rapidly driven to a lopsidedness within the biological region, and thus a need for mindfulness of the concept of the social environment. In any case, the later a long time have seen expanded significance of the social environment, which has gotten to be a key component in green logistics, and the appearance and advancement of the financial and money related segments, which have taken on an imperative, vital role in a country’s financial arrangement. This is often since they are the components of the output of administrative decisions, and they too impact the social behavior toward economics decisions (Monnet, 2008).

-Green Logistics in Oman

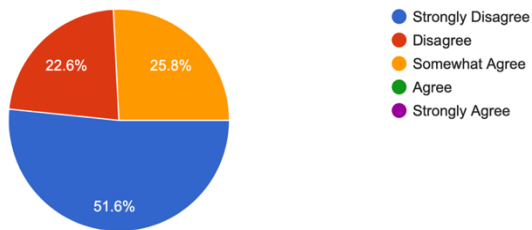
The logistics sector plays an imperative part in Oman’s present-day and driven economy and is the key to expanding internal speculation, non-oil out and the nation’s competitiveness. Logistics isn’t only a critical segment in its own right but too a basic business of all sizes working over the Sultanate- from the gypsum quarry in Thamrait, hypermarkets in Seeb, battery producer on Rusayl Mechanical Domain, the pelletizing plant in Sohar to the plastics exporter on Salalah Free Zone. A well-oiled logistics segment gives Omani businesses and producers with ways to extend proficiency, go greener and drive profits. Oman’s logistics industry is expected to develop at a CAGR of 7% between 2015 and 2020. The key drivers for financial development are the infrastructure ventures in ports, free zones, mechanical bequests, airports and rail networks, economics expansion endeavors and exchange with GCC states, Asia and Sub-Saharan Africa (Ithraa,2016). The Sultanate is one of the nations that are connected within green logistics in future. The independent factors of green logistics incorporate the three components of monetary economy, society and the environment, and the application of these components is a basic flag in deciding the economy of the nation, and how they influence the expansionary financial arrangement markers. Within the sitting of the business as detailed by the World Bank, Oman’s ranking is moving forward to position itself as an investment- friendly area. Improved standings and appraisals of differing factors draw more outside businesses into the nation, and if the trend holds, logistics segment advancement maybe higher than anticipated. Notwithstanding above Oman also points at “an environment with feasible components, a secure and well- preserved environment with effective and adjusted ecosystems and renewable resources” as per Oman Vision 2040 (Al Balushi et al, 2019).

IV. DATA ANALYSE -Qualitative Data



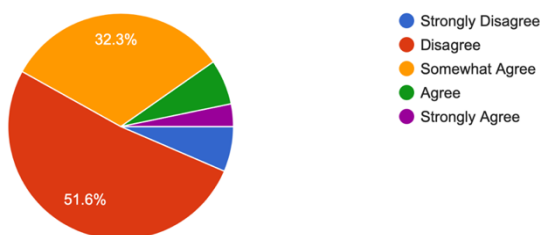
The importance of the Green Logistics in Oman

The graphs show the positive results of the importance of the green logistics in Oman. As we can see 67.7% are strongly agree of the importance of the green logistics and 12.9% are agree. In the other hand there is 16.1% says strongly disagree, those who have less knowledge about the Green logistics.



Green Logistics in Oman

The graph shows that Oman is still not ready for green logistics. As we can see 51.6% says strongly disagree and 22.6% says Disagree. In other hand 25.8% answers between agree and disagree.



The implementation of the Green Logistics in Oman

51.6% of the participants says Oman doesn't have the technologies to implement the Green Logistics and 32.3% participants says somewhat agree. That's mean Oman still in the first step of the Green logistics.

-Quantitative Data

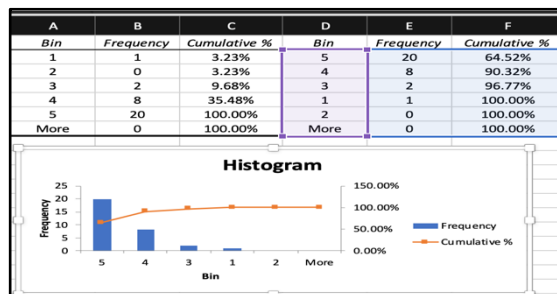
- Descriptive statistics (It is important to have Green Logistics in Oman)**

Q1	
Mean	4.161290323
Standard Error	0.26678804
Median	5
Mode	5
Standard Deviation	1.485412944
Sample Variance	2.206451613
Kurtosis	0.954113623
Skewness	-1.599883188
Range	4
Minimum	1
Maximum	5
Sum	129
Count	31

From the table we observe that Mean response of Question is 4.16. that means most of the respondent are responded with Agree and more. From the Mode information, respond 5 is repeated maximum

number of times. That means a greater number of respond with 'Strongly Agree'. Count column showcase that total number of respondents are 31. That means 31 people responded the Questionnaire.

- Histogram (will Green Logistics reduce environmental issues in Oman?)**



From the table and graph, we observe that Response 5 'Strongly Agree' and 4 'Agree' are selected by a greater number of participants. Whereas no one responded Disagree and 1 responded strongly disagree. That's mean the participants are agreeing that the Green Logistics will reduce the environments issues.

- T-test (Are you familiar with Green Logistics?)**

A	B	C
t-Test: Two-Sample Assuming Unequal Variances		
	Yes	No
Mean	1	1.647058824
Variance	0	0.617647059
Observations	17	17
Hypothesized Mean Difference	0	
df	16	
t Stat	-3.394673699	
P(T<=t) one-tail	0.001850767	
t Critical one-tail	1.745883676	
P(T<=t) two-tail	0.003701534	
t Critical two-tail	2.119905299	

Logistics?)

From the table, we observe that P(T<=t) two-tail 0.003, which is <0.05. Hence, we conclude that there is a significant difference between the response of the participants. However, t Stat = -3.39467, which is negative states that the participants are familiar with Green Logistics, but they need more knowledge to apply the Green Logistics in Oman.

-Results Analyses

Quantitative and Qualitative sections show that we achieve the research objectives. The T-test analysis achieves the research objective, that is Oman needs to understand more about the Green logistics and to be ready needs to improve the technologies and the

information systems of the organizations. In addition, the results show that the organizations need to be more aware about Green Logistics and train their employees how to go Green. In other hand to the research participants mention that the governments in Oman needs to change some rules and regulations to go green. The histogram analysis prove that the Green logistics will reduce the Air pollution, and the environmental issues. In same time will help to achieve the businesses sustainability. The participants are agreeing that Oman needs to have Green logistics to increase the economies and to be one of the development countries.

V. FINDINGS

First of all, senior management will recognize that the incorporation of ecological problems into corporate approaches depends on multiple factors that may alter for some time. In line with the positive relationship between green practices and economic development, Oman's Government is focusing on environmental programs that are efficient, sustainable and scalable to conserve the environment and preserve its natural capital in support of the national economy (Oman Vision 2040). It aimed at maintaining a balance between conservation policies and assessments of monetary and social change while promoting the use of natural assets to demonstrate their resilience and support the economy. The Government uses sufficient technological resources and specialized techniques to implement policies that adopt a green economy strategy. Conservation of natural resources while at the same time giving importance to social welfare such as food and water security, education and health and steady economic growth during the advancement process, and the use of current methods in the water and horticulture segments to achieve water and nutrition security and transform them into elective sources of vitality to enhance the sustainability of natural resources. In the perspective of waste management and environmental conservation, Be 'ah puts resources into driving change in industries. They accept that they build a strong establishment for both financial and natural sustainability for the country in the long term by boosting the viable use of assets and limiting the damaging ecological impacts. Be 'ah focuses on turning the waste to electricity rather than the water plant. The waste to energy to water project expected to process about 2,200 tons per day of MSW from the catchment area of Muscat and South Al Batinah, which would usually go to landfills and drain the space. The plant gets the waste generating steam thermally which transforms a steam turbine into electricity. The electricity generated is used to build a desalination facility theoretically. This will create an annual consumable waste of about 75 million cubic meters. The ordinary fuel which used to operate desalination plants in Oman is gas and water production from warm debris treatment would help lessen Oman 's dependence on gas for water generation. The saved petrol will be shipped out, and the Sultanate

would collect additional revenue. Oman has committed to the Paris Arrangement to reduce the nation's traditionally speaking carbon outflow by 2030. The loss of vitality to water plant will fundamentally contribute to the dedication of Oman and is the first idea of its kind, and the plant will expand the green list of the nation. Their Mechanical Biological Treatment (MBT) Project is a waste disposal solution that involves both mechanical and natural disposal to reduce the ecological impact of the residual landfill. It settles and isolates squander that is not suitable for reuse, eliminates recyclable material and creates a Refuse Driven Fuel that used for mechanical purposes. Biogas Technology is one of their programs, as well. The goal of the Biogas Project is to produce biogas, a renewable source of energy produced from raw materials such as agricultural waste, urban waste, plant material, sewage, green waste or nutritional waste. It used as a fuel for heating. This can also be found in a gas engine to shift strength and temperature around the energy of the gas (Be' ah, 2017-2019). Be' ah also educates and supports students in the area of green practices at the school and college. According to the interviews with Asyad Company staff, it was clear that companies were involved in the protection of the environment and were adamant about their contribution to the cause. We were conscious of the country's political course for the next two decades. They will of going green along with joining the hands of Government in creating innovative technologies in the field of logistics. They decided that this is indeed a relatively new area of logistics that needs to discuss and improved further. But with policy emphasis on both infrastructure and the protection of the environment, organizations must work together to come up with solutions.

VI. CONCLUSION

This research is on implementing sustainability standards in Oman for logistics organizations. The strategic vision 2040 focuses on a "green and circular economy which is sensitive to national needs and in line with the global course of climate change adaptation." Project findings point to emphasis for institutions such as regulatory authorities, logistics associations, vendors and even staff to encourage green practice in the logistics field. Firstly, the government aims at policies that can tie together public and private sector organizations to manage the effort to create a circular and productive economy harmoniously.

This will require a balanced and sustainable relationship with interconnected positions among government, private sector, civil society and individual stakeholders to ensure successful institutional efficiency (Vision 2040). Rewards and other sources of motivation may play a crucial role at people level. Pressure by the passage of laws would not be the primary method of fostering a firm's normal behavior. Instead, different solutions such as increasing ecological focus as part of corporate social and environmental responsibility, working

collaboratively, and legislation that would deliver successfully, accountable execution could help accomplish the long-range aim of corporate-level green logistics.

VII. FUTURE RESEARCH

This paper has been completed successfully with the objectives of the research being met completely alongside a comprehensive investigation of the comes about that is determined from the investigate. In any case, this investigation has been as it were an introductory step for the execution of the green practices in Oman. This research courage us to think of the master's degree research that will be about the technical solutions to go green in Oman and the World to achieve business goals and the social goals. Future studies are required in order to confirm the kinds of conclusions that this research can draw. I hope the situations in the future will be easier to implement the green logistics in Oman. Further attempts could be proving quite useful to the research in the future which offers a great outset spot for more inquiry and debate.

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