



The Impact of Sustainability on Logistics Excellence

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ARTICLE INFO

Article History:

Received: September 01, 2022

Revised: December 23, 2022

Accepted: December 24, 2022

Available Online: December 31, 2022

Keywords:

Sustainability

Logistics

Carbon Footprint

Asset Utilization

Funding:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

ABSTRACT

At present environment, industry and sustainability both are considered a well-complimented combination in almost all the areas. The reason is that sustainability itself is an inclusive term, hence, beneficial for every aspect of business operations. Thereby, it becomes now essential to inculcate sustainability in order to ensure operational excellence. As logistic area is being affected due to technological advancement, thereby, it becomes a persistent need of organizations to ensure sustainability by enhancing reliability as well as efficiency at the same time in order to safeguard the environment. By considering the importance of sustainability in logistic area, the study attempts to explore the effectiveness of sustainability on logistic excellence. The study chose FMCG industry of emerging markets as a sampled data and used regression method to test the hypothesis. Findings of the study revealed that carbon footprint reduction, solar energy and asset utilization are the significant contributor to connected sustainability with logistic excellence. It implies that a controlling idea only is not sufficient and brands must appear their impact across the board particularly on surroundings where they operates.

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1. Introduction

Environmental sustainability has been gaining a lot of recognition lately due to environmental concerns and major industrial development, which have been causing pollution at greater level. Not only the pollution is the problem due to such exercises but it is also diminishing raw material resources and becoming a reason of overflowing waste sites. These environmental concerns are not only raised by scholars and practitioners but also questioned by government regulations, consumers and international environmental standards. This is the reason, organizations are progressively prioritizing sustainable initiatives in order to join the league of safe climate (Seroka-Stolka, 2014). There is no denying fact that heavy contributions have been made by scholars under the label of green supply chain management. However, still there is so much to learn about environmental issues in logistics area. Moreover, it is interesting to observe that literature on this topic has been expanded in a progressive manner, thereby, there is a need to shift attention towards environmental sustainability within organizations that either execute logistics or outsource from third parties (Nilsson, 2019).

As discussed, the ecological effect of logistics gained recognition due to its broader application. Organizations are working on operations having a less harmful impact on the environment. Some researchers have also worked on defining future logistics and sustainable practices from a broader perspective. Logistics consists of warehouses and transportation as products move from the point of initiation towards the final part of sale. It also includes procurement, sourcing, manufacturing, reverse logistics, and distribution, etc. Sustainability means those activities, which do not have a harmful effect on future generations: "A sustainability plan meets the needs of the present without harming the needs of upcoming

generations to come." Corporate sustainability is in high demand due to the growing need for sustainability in our society, in public and private organizations, and on the planet. Investors and stakeholders with an interest in sustainability must have a clear and comprehensive view of a company's ability to create sustainable revenue. Up till now, all research has mainly focused on logistics systems and the productivity of industry. In the last 15 years, there has been a remarkable improvement in the concept of sustainability (reduction of harmful environmental effects). Now, industries are assessing many things for planning environmentally friendly logistics systems. In this document, carbon footprint reduction, day light utilization, and asset utilization as a part of sustainable practices are discussed for the planning of a better logistics system with a focus on sustainable practices. Logistics excellence includes the efficiency of transport, containers, and warehousing within environmentally friendly activities. For logistics excellence, companies should have to work on economic, environmental, and social objectives (Akkad & Bányai, 2021; Marchet, Melacini, & Perotti, 2014).

Globally, sustainability is the focal point for companies, which are operating in the environment. Organizations are focusing on the elimination of those sources, which are polluting the environment, creating danger for life on earth and contaminating the environment with carbon traces and energy utilization. Due to industrial growth, there is an immense pressure on the usage of energy, carbon emissions in transportation etc. Because of overall modernization, industrialization is encouraged, and, as a result, logistics and supply chain are expanding. Transportation is one of the prime objects that we need to move things from raw materials to the point of utilization, but with the enormous pressure on logistics and the usage of energy, carbon trace penetration into the environment is increasing. In this document, it is discussed how organizations can reduce their carbon footprint in the environment, but in developing and emerging markets, it is still an untapped area (Martins, Anholon, Quelhas, & Leal Filho, 2019). Therefore, it is imperative to establish a relationship on how we can create environmental sustainability to determine the logistics excellence with special consideration to the FMCG sector of developing and emerging markets.

A sustainable living plan is very important for the profit and growth of an organization. Sustainability includes overall supply chain process of a firm, demanding responsibility from the primary level, through suppliers, to retailers. If making something in a sustainable way gives multinational corporations a competitive edge, this could change many industries. Thus, the study attempts to fulfill following objectives are to determine how carbon footprint reduction creates logistics excellence in the FMCG sector of developing and emerging and market, to determine how daylight utilization contributes to logistics excellence in the FMCG sector of developing and emerging and market and to determine the impact of asset utilization on logistics excellence in the FMCG sector developing and emerging and market. All over the world, modernization and industrialization are improving, which ultimately changes the modes of transportation and warehouses. Very little research in the past has addressed the impact of sustainability on logistics excellence, but this research is mainly from developed markets. In addition, with a fast expansion goal by the FMCG division in the rising market of Pakistan, there is a need to establish a relationship between sustainable practices and logistics. This study will explore how sustainability affects logistics excellence and how it lessens the harm to environment. As discussed, the study main objective is to look into the reverse logistic operations as well as sustainability concept, particularly in FMCG sector. Moreover, the study also intends to assess the trip bottom effect of sustainability in the area of reverse logistics performance indicators.

2. Literature Review

The involvement of sustainability in logistics management has become a great interest of researchers. Scholars argued that measuring sustainability in logistics processes could make fruitful contribution to attain UN SD goals (Bandeira, D'Agosto, Ribeiro, Bandeira, & Goes, 2018; Stindt, 2017). This indeed serves a great purpose when there is a talk about objective no 12 which is made to make sure the responsible production as well as consumption standards. The reason is that slightest change in production and distribution patterns could lead to indispensable exercises, which would help to raise environmental quality. According to Leal Filho et al. (2019), the vision related to sustainable development goals is very much clear, however, still there is a need of further exploration in order to give the clear picture that how these objectives could be helpful to meet not only present challenges but also future

challenges related to sustainability. Similarly, Hong, Alzaman, Diabat, and Bulgak (2019) stated that due to scarcity of literature, there is a need to assess the effectiveness of sustainability in logistic operations. Scholars also emphasized that it is better to explore environmental and social both aspect in said area. Similarly, D. B. Kim, Shin, Shao, and Brodsky (2015) also profound that due to lacking of robust methods there is a need to evaluate the social and environmental effect of logistic activities in transportation systems.

Besides academia, organizations and governments are also taking keen interest in sustainable logistics. Sustainable logistics includes various activities such as "sustainable procurement, sustainable transportation, sustainable packaging, sustainable distribution, reverse logistics and design and control of sustainable supply chain processes." Similarly, study of Reefke and Lo (2011) showcased that overviewing the sustainable logistic area can be of great contribution to extant literature. Thereby, it is quite imperative to look in to the current literature in order to support the proposed framework.

2.1 Logistic Systems

The term logistics explains "the managerial aspects pertaining to the acquisition, maintenance and transportation of materials, people and facilities." Moreover, it also regulates the planning, implementation and controlling part in order to optimize the commodities and information flow from source to destination, thus, fulfilling customer demand (Smykay, Bowersox, & Mossman, 1961). Ballou, Lagerholm, Ernst, Bruchez, and Waggoner (2004) argued that logistic process is comprised of various components that further break down in to key activities. These activities are linked to transportation, inventory flow, information management and other support activities such as "storage, materials handling, purchasing management, packaging design and maintenance of information".

Logistics activities are strategic in nature and are considered as a critical part of business operations. This indicates that logistic planning is essential for businesses to stay competitive as it helps in improving business performance and integrate sectors by providing quality services (Ballou et al., 2004). Moreover, it is suggested that organizations must evaluate the logistic excellence in the presence of sustainable policies (Chen & Bidanda, 2019; Eroglu, Kurt, & Elwakil, 2016). Similarly, another important aspect of logistics is the routing of vehicles, which demands the assessment of cargo capacity and routes frequency. However, its planning might create additional issues and increases cost (Baykasoğlu, Subulan, Taşan, & Dudaklı, 2019). It is argued that freight pricing is important in logistic systems and for that various factors must be considered including sustainability (Gavriilidis, Kambouroudis, Tsakou, & Tsouknidis, 2018; Sánchez-Díaz, 2017). According to Boyacı, Zografos, and Geroliminis (2017), it is quite necessary to evaluate the services, which are offered to logistics clients. Scholars argue that optimized resources and its usage must meet the satisfaction level of customers, which can only be fulfilled when it is reflected on offered services. Similarly, Melović, Mitrović, Djokaj, and Vatin (2015) argued that meeting consumer's demands has received much attention in companies' logistic area, especially in recent decade.

Further to discussion, efficient warehouse management also has the potential to improvise logistics. Thereby, it is the fundamental duty of firm to achieve its strategic operational goals through operational configuration (Makaci, Reaidy, Evrard-Samuel, Botta-Genoulaz, & Monteiro, 2017). Moreover, relationship with suppliers along with purchase period and quantity must also be defined in logistics system. Rao and Rao (2018), also argued that selection of suppliers enhances the competitiveness of businesses. In recent years, organization are focusing on packaging projects and they believe that the accurate structure of packaging not only revolutionizes commodity handling but also reduces the chances of loss by providing greater security. This implicates that efficient packaging not only limits the logistic budget but also increases productivity within limited cost without compromising on business performance.

2.2 Logistics and Sustainability

Eroglu et al. (2016) explored the significance of sustainability in firm logistics system. For that, the authors assessed the stock market reaction towards sustainability awards. According to findings, stock markets give positive reaction towards these types of awards. It was also revealed in the study the said reaction tends to show more significance in contrast

with other reactions, given in similar scenarios. This shows that shareholders also understand the significance of sustainability for survival of organizations. According to McKinnon, Browne, Whiteing, and Piecyk (2015), in recent times, the combined effect of financial, political and societal practices have remarkably suppressed the percentage of carbon emissions. Firms, thereby, are looking further to explore the ways through which they can get rid of those exercises that are hurtful for environment. For that, mindful administration in the realm of coordinated operations appears to be a critical component of said goal. Kahn and Kobayashi (2007) provided the evidences, which show that 8% of global energy is linked to carbon emissions, which are derived from freight transport. In 1998 Rogers and Tibben-lemcke defines the term Greenness Logistics as "the attempt to measure and minimise the ecological impact of logistics activities."(Rogers & Tibben-Lembke, 2001).

As discussed previously, several energy efficient opportunities are present in logistics and transportation network. Besides, technical benefits and control mechanism opportunities are present which ensures that either the conveyor transporting good are in running condition or not (Meneghetti & Monti, 2013). Similarly, a range of green benefits of smart production has been detected previously. The core focus is on usage of less ordinary resources (materials, energy) is fundamentally fruitful for everyone. They also focus to minimize the wastages of production of product for the particular factory (Florida, 1996).

Lu, Shang, and Lin (2016) also evaluated the concept of sustainability in logistics operation of firms. According to authors, external practices and internal practices both are important for firms' sustainable performance, hence, must be collaborated with each other. Another study assessed the relationship in the context of port. According to the findings, external practices are internal management are positively associated to each other and together they influence sustainable performance. Similarly, Buldeo Rai, Van Lier, Meers, and Macharis (2018), introduced indicators list that is associated with cargo transportation as an operational goal. The idea was to evaluate that how these indicators could be of any help to improve sustainability service. Within similar context, Andersson and Forslund (2018) also introduced a set of indicators; however, it was more focused towards the measurement of sustainable logistic innovation in retail operations.

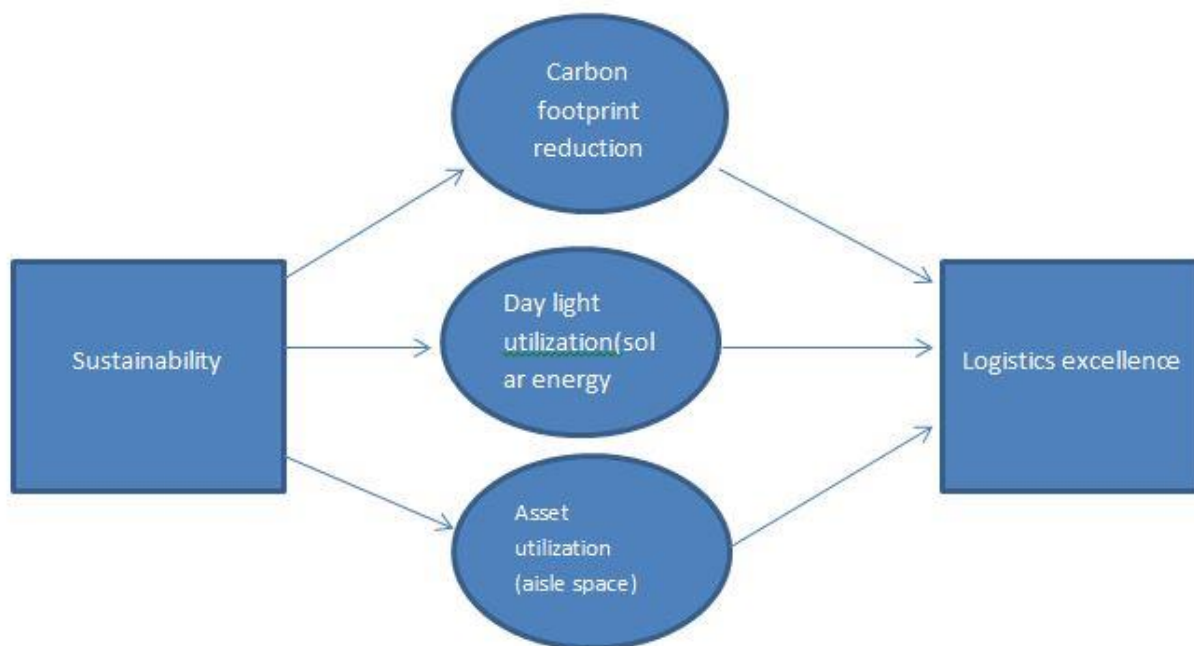
According to Cherrafi et al. (2018) eco-designing, green manufacturing, reverse logistic and waste management are one of those practices that heavily affect logistic chain excellence. Similarly, Morgan, Tokman, Richey, and Defee (2018) evaluated that which factors have the potential to ensure the implementation of sustainable practices in logistics operations successfully. From study, it was revealed that resource commitment is one of the fundamental practices that helps in obtaining better outcomes. Bask et al. (2018) also investigated the linkage of environmental sustainability and transport operations in those firms, which offer logistic services. Results exposed that international carrier companies are more focused towards environmental issues. The reason is due to external pressure. However, these companies also see transport sustainability as a opportunity through which they earn competitive edge. Unfortunately, the lacking of methods to assess environmental influence of transport, it is not easy for firms to share cost and benefits with supply chain members. Moreover, they are also not permitted to consider such initiatives as a marketing activity in order to differentiate their offerings. Similarly, Watanabe et al. (2018) also argued that in order to raise the performance of logistics operations, it is mandatory to increase the usage of technological resources in transport operations. However, sadly, no standard criteria have been proposed until yet to scrutinize these initiatives in terms of sustainability due to which it becomes difficult for organizations to comprehend the situation.

By looking into literature, number of practices related to green supply chain have been explored from different perspectives. Studies such as (Beamon, 1999; Murphy & Poist, 2003) unveiled this fact that very few of the organizations made emphasis on environmental aspect, hence neglected the reduction of their carbon footmark in the supply chain process. Similarly, there are studies, which focus on individual store networking components, warehousing etc. By focusing on these areas, these studies claimed to mitigate the effect of carbon emissions (Beamon, 1999; Marchant & Baker, 2010; McKinnon et al., 2015; Murphy & Poist, 2003; Sarkis, 2003). From these reviews, (McKinnon, 2007) defined system seems to be more fitted as it has the tendency to reduce carbon activities associated with street cargo transport operations. Thus, we can say that the framework introduced by McKinnon (2007) is more

appropriate as it makes categories in carbon reduction activities that are being utilized in road freight transport operations.

Lastly, it is worthy to discuss studies that have prioritized sustainable logistics practices from different contexts. Such as the study of Kang (2020) incorporated the idea of social responsibility in logistics operations. Similarly, González-Benito and González-Benito (2006), determined the factors that makes the logistics management more adoptable. For that, two variables were identified in the study that heavily affect environmental performance which are stakeholders' environmental pressure and manager's beliefs. Similarly, (S. T. Kim & Lee, 2012) assessed environmental inspired culture of company. After looking into synthesized literature regarding sustainable logistics, it is easier to draw the variety of objectives and verify them in FMCG context. The aim is to contribute efforts to extend the prior debates on this specific topic. Moreover, it is also interesting to highlight the themes of logistics excellence in the presence of sustainability. In addition, the assessment of particular environmental practices in logistic area of FMCG also adds significant contribution to sustainable logistic literature.

Figure 1: Conceptual Framework



Based on above researches and studies, following hypothesis are made for checking the impact of sustainable practices on FMCG sector of developing and emerging market.

- H₁: Environmentally sustainable practices lead to carbon footprint reduction and ultimately to logistics excellence in supply chain.
- H₂: Environmentally sustainable guidelines implement daylight utilization for leading towards logistics excellence.
- H₃: Environmentally sustainable practices contribute to asset utilization and ultimately to logistics excellence.

3. Research Methodology

The study used quantitative approach to test the proposed hypothesis. In order to achieve the study's objective, the study used first hand data and adopted instrument from prior studies to measure the constructs. The sample chosen for the study were FMCG companies and probability-sampling approach was used and stratified disproportionate sampling collected data. The respondents of the study were FMCG directors and managers. As discussed, three hypotheses are made on carbon foot print reduction, day light utilization and asset utilization which are also described in framework and total 100 questionnaires have been distributed among the employees Of FMCG companies. Moreover, the study used Cronbach alpha test to assess the reliability of model and used regression and ANOVA method to the association between variables. SPSS software was used in the study. It can be seen in Table 1, that the

value of Cronbach is greater than 0.803, hence, ensures the model reliability and proves internal consistency.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
.803	12

4. Results

As discussed, SPSS 17 was used for data analysis. In order to assess the relationship between outlined constructs, regression model has been used. The expression developed for the proposed model is stated below:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon \quad (1)$$

Y = "Regression containing all Intercepts"

β_1 = Degree of Dependency

X_1 = Study predictors

ϵ = regression error

Table 2 Model Summary

Model	R	R.Sq	Adj R Sq	Std. Error of
1	.637	.406	.387	.40804

Note: Predictors: Asset Utilization, Daylight utilization, Carbon footprint reduction, Dependent Variable: Logistic excellence

Table 2 present model summary, where It can be that adjusted R square is 38.75, hence, shows that impact of study predictors on dependent variable is 38.7%,

Table 3: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	10.927	3	3.642	21.876	.000 ^a
Residual	15.983	96	.166		
Total	26.910	99			

Note: Predictors: (Constant), Asset Utilization, Daylight utilization, Carbon_foot_print_reduction, Dependent Variable: Logistic excellence

Table 3 ANOVA shows a significant relationship among variables and as evident from results that p value is less than the significance value. ANOVA results is exhibiting this overall model as significant (the p-value of F-Test is less than .05). Model also exhibit that an acceptable value of 38.7% of adjusted R-square.

Table 4: Hypothesis Testing

Model	B	Std. Error	t	Sig.
(Constant)	1.125	.351	3.202	.002
Carbon footprint reduction	.266	.087	3.072	.003
Solar energy	.212	.086	2.477	.015
Asset Utilization	.204	.068	2.985	.004

Sr. No.	Hypotheses	Testing Specification	T-Value	Empirical Conclusion
Hypothesis 1				
1	H1: Environmentally sustainable practices lead to carbon footprint reduction and ultimately to logistics excellence in supply chain.	.003	3.072	Accepted
Hypothesis 2				
2	H2: Environmentally sustainable guidelines implement daylight utilization for leading towards logistics excellence.	.015	2.477	Accepted
Hypothesis 3				
3		.004	2.985	Accepted

H3: Environmentally sustainable practices contribute to asset utilization and ultimately to logistics excellence.

Table 5 Hypotheses Assessment Summary

Table 4 presents the relationship of variables which happened to be assessed through regression method. It can be seen that the beta value of carbon foot reduction is 0.266 and p-value is less than 5%. Hence, it reveals a positive and significant relationship with logistics excellence. Similarly, in the case of solar energy, the relation is also positive and significant as the beta value is positive and p-value is less than 5%. Finally, asset utilization also impacts logistics excellence in positive manner as the values meet the standard criteria. Hence, we can say that the results of the study support the proposed hypothesis. As discussed, Table 5 summarizes the results that there is positive impact of sustainability on logistics excellence and there is a positive relationship between carbon foot print reduction, daylight utilization and asset utilization on creating logistics excellence. The results show that the claim of the study is accepted.

5. Discussion

The research results show the importance of sustainable plan in companies' vision, mission and operations for increased business performance. Remarkable facts are also on hand now for in view of sustainability as a core area for firm's performance improvement in terms of logistics. Furthermore, hypothesis built during this research clearly shows the significance of sustainable practices on logistics excellence. With growing concern on environment, it is a mandate for today and tomorrow from economic and social perspective. If any organization utilize all the assets properly with reduction in carbon foot prints besides efficient utilization on of day light in warehouse it will ultimately create logistics excellence.

To sum up, one can position that in the past, preparation and study linked to logistics excellence has mainly alert towards the purpose of intensifying the competence of business activities with admiration to sustainable practices. However, within the last 15 years increasing apprehension over environmental impacts has created the perception of Logistics excellence as a motivation for rising methods, which can diminish the environmental impact of shipment transport. As an outcome, researcher and industries have initiated the options for planning logistics systems with concern for environmental effects. For the purposes of this document and to provide a general definition, sustainability can be thought of as an advance for preparation of logistics systems

Today many organizations are not just working on implementation of environmentally friendly activities and getting excellence on all the operations including logistics. In this manner, to build their image organizations are making plans for sustainable practices from not only business but environmental perspective too. Today as we are having a compound and unified world, a controlling idea only is not sufficient and brands must appear their impact across the board particularly on surroundings where they operate. Brands cannot do public good while harming the earth. Following aspects needs to be explored in detail for acquiring a thorough snapshot pertaining to this domain.

- Sustainability impact on logistics excellence to be explored in other sectors too apart from fast moving consumer goods sector.
- Day light utilization impact on logistics mainly warehousing to be explored separately as this is a broad domain with so many untapped areas yet.
- Carbon foot print reduction quantification with respect to logistics mileage reduction and route optimization needs to be explored.
- Assets with proper valuation and utilization percentage in logistics domain could be explored as separate research.

6. Conclusion

Despite the limitations, this study on sustainable practices in logistics provides important evidences in contribution to environmentally friendly activities. Literature review visibly identify the relationship between carbon foot print reduction, day light utilization and asset utilization on logistics excellence. The study's restrictions include only FMCG industries. Study on reverse logistics in other industries would be areas that are more interesting for

researchers. As the current study focused only three indicators of sustainable practices in logistic area, thereby, it is suggested to test more indicators to generalize the study findings.

Since surveys have a limited amount of time, it's best to get more responses and use qualitative methods like interviewing experts to get a deeper understanding of the research question and analyze results by looking at both qualitative (interview) and quantitative (survey) data. Finally, this research solely examined the sustainability of reverse logistics due to its limitations. However, since forward logistics and reverse logistics are actually closely related to each other, more studies regarding the forward logistics indicators that affect sustainability would be valuable in this area.

The research results show the importance of sustainable plan in companies' vision, mission and operations for increased business performance. Remarkable facts are also on hand now for in view of sustainability as a core area for firm's performance improvement in terms of logistics. Furthermore, hypothesis built during this research clearly shows the significance of sustainable practices on logistics excellence. With growing concern on environment, it is a mandate for today and tomorrow from economic and social perspective.

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Appendix

No	Please Select Your Desired Response: For example: If your response is 4 (Agree) than it will be like this √	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
	Sustainability					
1	Sustainability in logistics encompasses end to end operations in logistics					
2	Shippers can contribute to sustainable environment by packaging rationalization.					
3	The transportation industry is a major contributor to environmental impact with multiple modes.					
	Carbon foot print reduction					
4	LCL services are suitable for small load but not cost effective as well as non-sustainable.					
5	In FCL there is higher level of security, less damage risk with carbon foot print reduction as well.					
6	Green logistics focuses on increasing the environmental benefit of the logistics activities					
7	Focus on vehicle efficiency contributes to optimize distribution networks, which has brought significant efficient plus sustainable gains.					
	Asset Utilization					
8	The transportation infrastructure of country plays a vital role in movement of goods.					
9	Organizations are devising regulations to make manufacturers responsible for minimizing the waste via recycling the product					
	Logistics excellence					
10	Multinational Companies should have to set targets to reduce the volume of waste generated in their logistics.					
11	Logistics excellence ultimately effected by handling of					

	freights or warehouses.					
12	Green logistics has further increased the need of environmentally friendly RL strategy					
	Daylight utilization					
13	Daylight utilization in warehouse is contributing in sustainable environment creation nowadays.					
14	Multinational organizations are promoting sustainable natural resources usage in different areas of their operations.					