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### The Evolution Green Logistics

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#### Abstract

Environmentalism is a growing human sensitiveness about nature which is under threat of pollution, waste and deprivation. The desire of fast growing and acquiring huge profit have resulted in environmental deterioration. Sustainability development paradigm has been implemented by states to care for current and future generation needs. Among economic sectors, logistics, as a growing one, has also undesirable effects on the environment. Among all, the transportation sector which heavily depends on fossil fuels can be considered one of the main culprits for climate

change and global warming. With the widening green growth discourse, the green logistics concept has also evolved to find a practical solution to emerging needs of the environment and adapt itself to its concerns. Therefore, this paper aims at exploring the evolution of sustainable development and green growth as well as green logistics in many perspectives. In this regard, firstly the conceptual development of sustainable development and green growth and green logistics will be analyzed and then green logistics will be examined from the environmental viewpoint.

**Keywords:** Green Logistics, Environmental Degradation, Sustainable Development, Green Growth

#### 1. Introduction

Environmentalism is a growing human sensitiveness about nature which is under threat of pollution, waste and deprivation. It relates with the pollution of the world occurring owing to meeting the increasing human needs. Environmental problems, especially climate change seemed the most influential one affecting the whole globe (Dunlap and Jorgenson, 2011, 1).<sup>[24]</sup> Given the reasons for the environmental degradation, overpopulation, fast growing and excessive consumption of natural resources have a great impact on the deterioration of nature. The desire of fast growing and acquiring huge profit have resulted in environmental deterioration.

Environmental concerns raised the salient among people and states as degradation has caused death of humans, extinction of species and killing wildlife etc. Among many acceptable alternatives, the term sustainable development was seen as an enigmatic tool in 1992 Rio UN Environment Conference in meeting the current generation's growing needs while also caring for future offspring' needs.

Sustainability development paradigm has been implemented by states to care for current and future generation needs. Although the concept has been in practice since 1992 and countless agreements have been signed relating to environmental protection, the environmental degradation has outpaced the predictions. In order to overcome environmental worsening, green economy and green growth concepts have been publicized. While green growth tries to find a practical solution to environmental problems in neo-classical economic principles, green economy focuses on alternative economic doctrines out of neo-classical discourse.

Among economic sectors, logistics, as a growing one, has also undesirable effects on the environment. Among all, the transportation sector which heavily depends on fossil fuels can be considered as a significant culprit for environmental worsening. Other logistics activities have a partial role in degradation of the environment. Therefore, sustainability has become a very important concept in all business activities. With the widening green growth discourse, the green logistics concept has also evolved to find a practical solution to emerging needs of the environment and adapt itself to its concerns.

Therefore, this paper aims at exploring the evolution of sustainable development and green growth as well as green logistics in many perspectives. In this regard, firstly and the conceptual development of sustainable development and green growth and green logistics will be analyzed and then green logistics will be examined from an environmental viewpoint.

#### 2. Methodology

To conduct this analysis, qualitative methodology has been used via scientific publications such as books journals, reports etc.

### 3. Results and discussion

#### 3.1 The evolution of sustainable development and green growth

Environmental protection has become an urgent issue in our world as the life of all creatures and living species have been under danger because of the worsening of natural resources. In order to assure economic, social and political progress for the different generations, our environment needs to be conserved (Lazar *et al.*, 2021, 13).<sup>[18]</sup> Since 1960 some scholars, researchers and environmentalists have tried to bring this over growing problem to the attention of people and states.

As explained earlier, sustainable development has been conceptualized to tackle growing environmental problems. Climate changes, air and water pollution, global warming, deforestation, and natural disasters have been witnessing day by day. Therefore, sustainable development has received wide-reaching attention in previous decades. Sustainable development has been seen as an instrument not only to tackle environmental challenges but also for the prosperity and wellbeing of humanity for current and future generations (Lazar *et al.*, 2021, 13).<sup>[18]</sup> Like other fields, business and logistics stakeholders have attached a great importance to the notion of sustainability as it is likely to adversely affect the long-term sustainability of the planet. (Curioso, 2018)<sup>[4]</sup>

During the 1960s and 1970s, the concept of sustainable development marked a significant step towards responding to environmental degradation (Klarin 2018, 70)<sup>[16]</sup>. Sustainable development offered a response to emerging ecological problems through conserving and caring for environmental resources (Mensah 2019, 2; Oliveira 2012).<sup>[20, 5]</sup>

The most frequently cited definition of sustainable development is that in the *Brundtland Report* (WCED 1987)<sup>[37]</sup>, that is, 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' This requires the inclusion of three key dimensions of economic growth, social inclusion, and environmental protection (Klarin 2018, 84; Mensah 2019, 9)<sup>[16, 20]</sup> Sustainable development was revised at the UN Conference on Sustainable Development in New York in 2015. The meeting proposed 17 Millennium Development Goals to be achieved by 2030 in its "Resolution for Transforming Our World: the 2030 Agenda for Sustainable Development" (UN, 2015c; UNDP, 2015; Klarin 2018, 86; Mensah 2019, 10-11).<sup>[34, 29, 16, 20]</sup> Those goals are clearly determined to achieve social, economic and environmental perspectives of sustainable development.

On the other hand, the concept of Green Growth was utilized to respond to the increasing resource scarcity and raising prices. It definitely seeks solutions to the environmental degradation and the need of economic growth within the neoclassical economics (OECD, 2011, 3).<sup>[22]</sup> Its main goal is to find the best solution for achieving growth and maintaining nature.

The 2008 global financial crisis put a priority on growth and state involvement in the economy while de-emphasizing neo-liberal economic policies. Therefore, the UN offered the institutional framework for sustainable development and the green economy for Rio+20 and beyond (Oliveira 2012, 12)<sup>[5]</sup>. The green economy has been conceptualized to tackle environmental problems with a deeper approach.

The green economy is a wider concept and its aim is to

meaningfully decrease the environmental damage while improving social welfare and equity (UNEP, 2015a, b; Klarin 2018, 85; Allen *et al.*, 2018; Mensah 2019, 7).<sup>[31, 32, 16, 20]</sup> UNEP defines green economy as enhanced human welfare and social equity, meaningfully abated environmental dangers and ecological shortages. (UNEP 2011; Johnson 2012, 33).<sup>[30, 12]</sup>

While mainstream economics focuses on production, distribution, and consumption, green economics considers ecological and planetary issues in making economic decisions, and works to prevent foreseeable adverse effects on people and nature (Cato 2009, 12).<sup>[3]</sup> It also addresses the reasons of inequity and poverty as well as prioritizes participation, freedom, and democracy centered on social and environmental justice (Kennet and Heinemann 2006, 70; Cato 2009, 5).<sup>[13, 3]</sup> Thus, green economics has a wider scope that sustainable development and green growth. It also aims to achieve better growth through green policies rather than neoliberal economic policies while supporting social and human interests (Cato 2009, 3)<sup>[3]</sup>.

To meet these challenges, a new approach, green growth, was developed to conserve the environment while achieving economic growth. The Organization of Economic Cooperation and Development (OECD) (2011)<sup>[22]</sup> defined it as promoting growth and development as well as guaranteeing the availability of natural resource to support to the globe.

Green growth does not replace sustainable development, but it makes available a useful and flexible discourse for attaining tangible progress (Valavanidis, 2019, 20).<sup>[36]</sup> Whereas green growth was rarely discussed before 2008, the economic crisis demanded a new strategy and discourse to manage economic development and environmental preservation.

Regarding the differences between sustainable development and green growth, both aim to provide a positive discourse. Unlike sustainable development, green growth mostly prioritizes growth while asserting that preserving the environment can actually lead to better growth (Jacobs 2013, 6).<sup>[11]</sup> Consequently, sustainable development prioritizes environmental conservation to offset the damage of limitless growth whereas green growth assumes that sustainable growth is achievable through rational use of natural resources that balances growth and environmental protection. This both prevents environmental degradation and enables better economic growth.

#### 3.2 The evolution and implementation of green logistics

Environmental preservation has become an urgent issue because of the growth of pollution in the world. It has also turned into an alarming issue for business and commercial activities as customers have started to request more ecological goods and services which comply with the policies of environmental protection. (Gotschol *et al.*, 2014; Min and Kim, 2012<sup>[21]</sup> cited in Evangelista *et al.*, 2017, 353-362).<sup>[8, 7]</sup> So, customers' growing sensitivity has forced entrepreneurs to consider green discourse in logistics activities.

Logistics concept refers to the effective plan, conduct and control of movement from the point of origin to consumption point in order to meet customer needs (Grant, 2012).<sup>[10]</sup> Logistics activities are critical for business success (Martins *et al.*, 2019, 3).<sup>[19]</sup> Logistics has been a vital process for various firms, in coordinating the transport

of goods from the production market to the consumer market (Remondino and Alessandro Zanin, 2022, 3).<sup>[23]</sup>

Given this definition, logistics covers forward and reverse movement of goods, services and information. The key issue here is the movement. Because, from environmental preservation, transportation seems the first service that has causality relation with the environment. Like forward movement, reverse movement also encompasses polluting implication on the environment. It takes place in the opposite direction. Reverse logistics also includes processing returned merchandise due to damage, seasonal inventory, restock, salvage, recalls and excess inventory. (Grant *et al.*, 2017, 24)<sup>[9]</sup>

Green logistics has been an attractive topic for scholars, researchers and business groups in recent decades. The term of green logistics has evolved with the sustainable development concept and green growth. It clearly focuses on how logistics activities must care about environmental concerns while running its business. It thoroughly deals with all processes and phases of logistics activities. This means that sustainable concept/green logistics can be applied in procurement, transportation, warehousing, packaging, distribution, retail and reverse logistics. It also covers the logistics supply chain. So, the management of logistics business and supply chain are very important in planning and conducting the sustainable development and green policy in those operations.

Given the phases of the logistics management, each one has different relations with the environment. Each phase has a negative impact on the environment. Among them, transportation which heavily depends on fossil fuels has the most disruptive impact on the environment. The vehicles used for transportation of goods for logistics operation are considered main culprits. They pollute air, water and cause deforestation and to death of living species. Fossil fuels are the main culprit of global warming and climate changes through greenhouse effects. Logistics activities heavily produce CO<sub>2</sub> emissions, waste, land consumption, and create other negative externalities as well, such as accidents and traffic congestion (Remondino and Zanin, 2022, 3)<sup>[23]</sup> and noises in road and residential areas.

Environmental concerns have been an alarming issue in commercial and business activities. As for the logistics sector, besides fossil fuels problems, hazardous materials must be carefully handled in transportation, production, storage and the disposal sense. These issues complicate the job of logistics and SCM, increasing costs and limiting options (Grant *et al.*, 2017, 10).<sup>[9]</sup>

In this perspective, the implementation of renewable energy and green practices in the logistics system can decrease the use of fossil fuels and reduce their negative impact. These are practical and appropriate answers to control air pollution, climate change and global warming (Aldakhil *et al.*, 2018, 861-886; Khan and Dong, 2017, 26692-26705; Khan, 2019, 1-23).<sup>[1, 14, 15]</sup> Every phase of the logistics system must consider sustainability concepts for environmental protection.

For the sake of clarification, the green logistics concept relates to preventing the hazardous impact of logistics on environmental impacts as well as dealing with the environmental impact on logistics business (Martins *et al.*, 2019, 2).<sup>[19]</sup> So, it can be summarized that the concept of green logistics aimed at alleviating detrimental effects of logistics on social and environmental sustainability without

compromising profitability and efficiency of logistics operations (Khan, 2019, 1-23).<sup>[15]</sup> So, the green logistics concept does not overlook profitability and efficiency of logistics for the sake of ensuring sustainability. It needs to ensure the profitability and efficiency of logistics as well as conservation of environment at the same time. All in all, the green logistics concept ensures that all logistics as well as supply chain systems follow environmentally friendly policies, minimize waste emission, and concentrate on decreasing carbon emissions (Grant *et al.*, 2017, 284).<sup>[9]</sup> The acceptance of green policies in logistics highlights the waste decrease for improved environmental protection (Tomsana, *et al.*, 2020).<sup>[28]</sup> All these policies render additional cost for all stakeholders in logistics and SCM systems.

While the sustainability concept is widely implemented in transport, it can create many advantages for various stakeholders. For instance, it increases and facilitates the mobility of people and goods; it can decrease poverty by generating and enabling access to jobs. it can facilitate access to vital services, such as health, education, and finance (UN, 2021, 2).<sup>[35]</sup> All in all, an environmentally friendly transport sector can achieve an efficient and profitable process for service providers as well as other external beneficiaries for different stakeholders.

In order to adopt the green logistics concept new measures, policies, technologies, new understanding need to be applied in logistics and SCM. In this perspective, logistics enterprises should apply those new techniques/processes in transportation, vehicles and infrastructure networks, green buildings, sourcing, product and packaging design (Grant *et al.*, 2017, 29-30).<sup>[9]</sup> Because transportation seems the most unfriendly sector in terms of CO<sub>2</sub> emission for global warming. The design of transportation modes or the widening of vehicles with electricity are some environmental friendly solutions. The logistics firms or enterprises should progress new approaches in recycling and waste management that alleviate environmental problems. (Grant *et al.*, 2017, 29-30).<sup>[9]</sup> Besides, cleaner modes of transportation, sustainable production, logistics, and supply need to be advanced to tackle the hardship of growing population and inadequate natural resources (Lazar *et al.*, 2021,3).<sup>[18]</sup>

Logistics sustainability can be explained in three aspects. From an economic development perspective, it means expansion and growth in logistics in terms of profit, increase of employees, investment and contribution to the global economy. It also means congestion, inefficiency and resource waste. From an environmental conservation viewpoint, it means logistics activities should be carried to consider environmental impact, and logistics service providers should take care of ecological result of its activities. These include pollutant emissions, the use of non-renewable fossil-fuel, land and aggregates, waste products and the loss of wildlife habitats. From a social development standpoint, the logistics sector should consider the effects of logistics activities on human society. It includes the implication of pollution, traffic accidents, noise etc. on humans (Tambovcevs and Tambovceva, 2012; UK Round Table on SD, 1996 cited in Browne and Allen, 2011, 1-19).<sup>[27, 2]</sup>

The aim of logistics is to minimize costs and maximize profits (Kuma, 2015, 8).<sup>[17]</sup> in order to have optimal functioning logistics. On the other hand, in order to possess the optimal sustainable development, it requires efficiently

handling the costs, and decreasing waste and environmental pollution (Tambovcevs and Tambovceva, 2012) <sup>[27]</sup> in order to have optimal functioning logistics. Green logistics contains ecological constraints in conducting the forward and reverse flows of products and information between the point of origin and the point of consumption to meet customer demand (Kuma, 2015, 8). <sup>[17]</sup> Sustainable development sees green logistics as 'producing and distributing goods in a sustainable way, taking account of environmental and social factors' (Sibihi & Eglese, 2007 <sup>[26]</sup> cited in Kuma, 2015, 8). <sup>[17]</sup> In this context, green logistics is seen as all struggles to attain a sustainable balance among environmental, economic and social purposes (Kuma, 2015, 8). <sup>[17]</sup>

As green logistics fits with ecological requirements, it also causes additional cost, incurs extra time or causes slow the speed of logistics activities, brings extra burden for warehousing, causes administrative burdens. This was conceptualized by Rodrigue *et al.*, (2001) <sup>[25]</sup> as the "paradoxes of green logistics". For environmental protection logistics service providers must bear additional cost and to implement green policy in all business activities. As the sensitivity arises among people, society and scholars this causes the change of the customers' preferences at markets. Companies need to apply green policies in phases of the logistics system.

#### 4. Conclusion

Sustainability development paradigm has been implemented by states to care for the current and future generation needs through achieving growth and environmental protection. Although the concept has been in practice since 1992 and countless agreements have been signed relating to environmental protection, the environmental degradation has outpaced the predictions. The world has witnessed the critical role of sustainable development in business and commercial activities. Logistics, as part of business issues, aims at minimizing costs and maximizing profits (Kuma, 2015, 8) <sup>[17]</sup> for optimal function. In order to adapt itself to the environmental protection policies, the sector has also adopted sustainable development policy.

Green logistics is a concept to implement sustainable development in all phases of logistics and supply chain processes. Therefore, green logistics directly deals with consider the ecological constraints in conducting logistics activities without making any discrimination between the forward and reverse logistics (Kuma, 2015, 8). <sup>[17]</sup> In this perspective, green logistics takes into consideration all sustainable development aspects, which are economic, environmental and social factors, in producing, storage, packaging, freight and distributing goods (Sibihi & Eglese, 2007 <sup>[26]</sup> cited in Kuma, 2015, 8). <sup>[17]</sup>

In order to adopt the green logistics concept new measures, policies, technologies, new understanding need to be applied in logistics and supply chain management. On the other hand, green logistics ought to attain a sustainable balance among environmental, economic and social aspects. (Kuma, 2015, 8). <sup>[17]</sup> In this perspective, logistics enterprises should apply new techniques/processes/technologies to all phases and processes of logistics and supply chain management, notably in transportation and vehicles (Grant, *et al.*, 2017, 29-30). <sup>[9]</sup> Because transportation seems the most unfriendly sector in terms of CO<sub>2</sub> emission for global warming.

Although green logistics has some disadvantages in terms of rendering additional cost, increasing the time for acquisition, production, freight, packaging, storage and distribution, causing a lower speed of activities, it definitely suits customer needs as environmental sensitivity has become an urgent issue for all humanity. At the end, the logistics sector like other business fields will gain in attaching importance to green policies.

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