

Chapter 13

The Role of Technology in Enabling Sustainable Road Freight Transport Operation: Challenges and Opportunities

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EXECUTIVE SUMMARY

The aim of this case study is to summarize the most recent contributions by reviewing recent papers conducted on the adoption of innovative practices in the freight transport sector in addition to how their implementation in this sector will contribute to enhancing the road freight transport sector by concluding an overview of the obstacles and challenges standing against their incorporation in developing countries such as those in the Middle East. The role of the freight transport sector is increasing dramatically in most countries because most cargo is transported from point of origin to point of destination via roads.

INTRODUCTION

The aim of this case study is to summarise the most recent contributions by reviewing recent academic papers debating the adoption of innovative practices in the freight transport sector, in addition to how their implementation in this sector will contribute in enhancing the road freight transport sector by concluding an overview of the obstacles and challenges standing against their incorporation in developing countries, such as the Middle East. The role of the freight transport sector is increasing dramatically in

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most countries as there is more and more demand for door-to-door delivery, and more goods are transported from point of origin to point of destination via roads (Sorrell et al., 2018). On the other hand, there is a negative impact generated due to these activities that have a direct effect on the environment and put social pressures, such as traffic jams, gas emissions and an increase in traffic accidents.

Winebrake et al. (2015) and Sorrell et al. (2018) state that road freight transport activities account for more than one third of different countries' economies. However, it is responsible for more than 60% of their gas emissions and environmental problems. The dependency on inland transport for moving freight is mainly on roads, and it is higher than the dependency on transporting passengers. Even though, the movement of excessive numbers of empty running trucks leads to the generation of cost. Furthermore, substituting road transport with any other inland mode for moving cargoes is limited because it provides door-to-door services with reasonable prices and large quantities. Still, most countries need to maintain and further develop their road infrastructures and transportation networks. Moreover, there is a rapid increase in the development of technological applications and innovative solutions for this sector. It is also recognised that road freight transport companies are still further adopting them effectively as they require a large investment and well-maintained infrastructures and highways (Liang et al., 2016; Naletina et al., 2019). Accordingly, governments and policymakers are expected to cooperate with the private sector in order to invest more in incorporating technological applications and innovative solutions to enhance and improve the performance of this sector to reduce its negative impacts towards sustainability.

Therefore, it has been suggested that the adoption of technology and innovative solutions would assist in reducing these negative impacts because their application has shown positive signs in this sector. Still, their applicability has been limited due to several factors: high investments, high drivers' turnover and inefficient infrastructures' maintenance in some countries (Kluschke et al., 2019; Naletina et al., 2019) as well as required knowledge to use this technology. Li et al. (2015), Abate et al. (2018), and Noguerol et al. (2018) recommend that some of the innovative solutions should assist in mitigating the environmental and social issues. For example, 75% of the gas emissions are caused by road freight transport; hence, it is considered that by substituting fuel with another environmentally-friendly one, like biofuel or electricity, its negative effect will be reduced. Moreover, the use of information and communication technologies (ICT) is another solution that could reduce these negative impacts. Route optimization and eco-driving systems are other operational solutions that could have a significant effect to reduce the negative impact on the environment.

Naletina et al. (2019), Sullivan et al. (2018), and Tejada et al. (2017) suggest that substituting petroleum oil with the use of natural gas or electric vehicles would encourage lessening the percentages of gas emissions and noise pollution, produced as a result of the truck engines moving by diesel. Another point of view is that adopting innovative practices assists in increasing reliability and security levels, which leads to rebounding effects on the road freight transport sector. The adoption of ICT on a wider range, such as electronic devices, tracing systems and telecommunication processes, should positively impact the performance of road freight transport companies (Muerza et al., 2017).

However, the implementation of innovative solutions and technology applications is still limited in the road freight transport sector, especially in developing countries, as road infrastructures still need higher maintenance and development to be able to adopt new technologies (Nazir et al., 2016; Tobgue et al., 2018). There are also external risks, such as the acts of terrorism in some regions, that require higher investments and enforcement of legislation and policies, which some countries still lack (Ranieri et al., 2018; Carlan et al., 2019).

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