

# Chapter 17

## Intermodalism: Integrating Transportation Modes for Enhanced Efficiency

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### **ABSTRACT**

*Intermodalism is the coordinated application of different modes of transport that has changed global logistics by optimising efficiency, cost-effectiveness, and reducing environmental impact. This approach offers the advantages of each mode, such as rail, road, sea, and air, to enhance the transportation of commodities and passengers from origin to destination. Intermodalism, in its evolution, has been one of the most significant factors influencing global logistics, driving modern transportation systems that contribute to international trade and building connectivity across regions. Intermodalism is thus becoming more crucial for improving supply chain management and service delivery with the growth in demand for rapid and reliable freight movement solutions. Intermodal transportation allows companies to be more adaptable, react to market changes, and resist disruption. However, compatibility with infrastructure, regulatory hurdles, and coordination complexity hinder the harnessing of the benefits of intermodalism.*

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# 1. INTRODUCTION

Intermodalism is the synchronised use of more than one mode of transport, including rail, road, sea, and air, to transfer goods or passengers from their point of origin to their destination. This collaborative practice exploits the characteristics of each mode to provide maximum efficiency, minimum relevant costs, and limited environmental damage (Gronalt et al., 2019; Reis et al., 2019). Intermodalism has played a crucial role in contemporary logistics and transportation evolution, enabling global trade and facilitating connectivity. With the global need for speedy and reliable shipping solutions, intermodalism is becoming increasingly recognised as an integral tool for businesses wanting to align their supply chains (Crainic & Kim, 2007). The adoption of multimodal transport enables firms to increase flexibility and responsiveness to changes in the market and, hence, a robust supply chain. Being agile and flexible enables the fulfilment of customer expectations along with adapting to better ways of managing disruptions, thus keeping organisations competitive within an ever-changing environment (Tuzkaya, 2009). In addition, real-time tracking and data analytics are value-added activities that increase the operational efficiency of intermodal transport, which companies can use to optimise routes and reduce costs (Harris et al., 2015). However, this increases collaboration opportunities among all stakeholders across the logistics ecosystem, with a more unified supply chain embraced through better innovations (Odimarha et al., 2024). The incorporation of real-time tracking and data analytics reduces friction in operations and encourages transparency among parties to enable better-informed decision-making using up-to-date information (Adeusi et al., 2024). Consequently, firms may act rapidly to adapt to market changes, allowing them to admit more agility and resilience against challenges (Nautwima & Asa, 2022; Moşteanu, 2024). This high flexibility becomes important in an environment in which consumer expectations shift rapidly, forcing companies to adjust and improve strategies to be effective (Asa et al., 2024; Obrenovic et al., 2024).

## 2. THEORETICAL BACKGROUND

### 2.1. Defining Intermodalism

Intermodalism synchronises two or more transport modes together to ensure the greatest efficiency in transportation while minimising operational costs and negative environmental impact), such as rail roads intermodally, road-sea intermodal transshipment, air-rail high-speed train motion, and airport bus transit connection (Gronalt et al. 2019). Modal integration is a coordinated strategy that aims to provide continuity

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