

# **CHAPTER**

# **4**

## **IMPACT OF INDUSTRY 4.0 ON SUPPLY CHAINS AND SUSTAINABILITY**

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### **4.1 INTRODUCTION**

The study intends to develop and empirically test a model explaining Industry 4.0. application capabilities, affect and influence the relationship between green supply chain management (GSCM) practises and sustainable performance through the moderating role of Industry 4.0 application. This section will briefly introduce green practises and their impact on firm performance.

The emergence of Industry 4.0 has become one of the leading topics in the 21st century and provides new models of the business environment in all aspects of life (Ghosh, 2019; Yoon et al., 2018). This issue has engaged academics and practitioners globally (Drath & Horch, 2014; Hermann et al., 2016). Since the German Federal Government declared Industry 4.0 one of its main high-tech initiatives in 2011, many new research journals, conferences, reports, and businesses have shifted their focus to remain relevant (Yoon et al., 2018). Furthermore, innovations in business technology have inevitably brought about a fast

change in the globe; in terms of growth and diffusion, innovation velocity seems to have increased more than ever (Drath & Horch, 2014). As a consequence, the collaborative implementation of sustainable supply chain management (SCM), green supply chain (GSC) practises, total quality management (TQM), and just-in-time (JIT) are all linked to a company's operational performance (Ehie & Muogboh, 2016; Fang & Zhang, 2018; Norhayati et al., 2015).

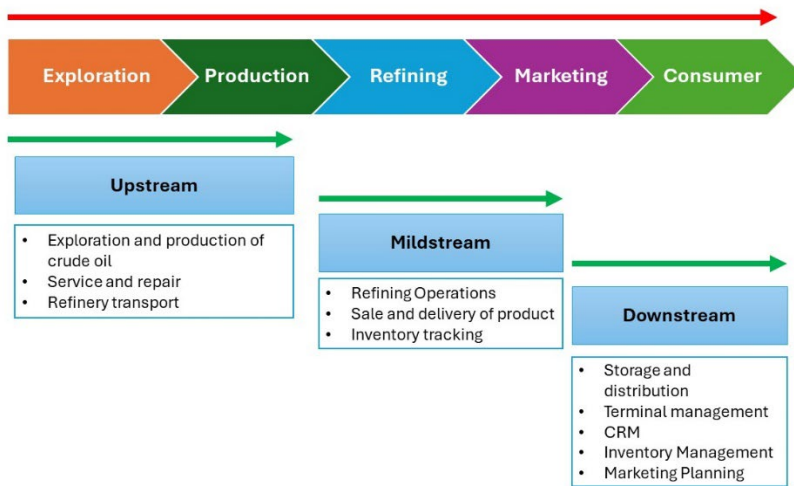
## **4.2 OVERVIEW OF GREEN SUPPLY CHAIN MANAGEMENT PRACTISES AND SUSTAINABLE PERFORMANCE**

This overview examines the correlation between GSCM practises and sustainable performance, with a focus on the moderating influence of Industry 4.0 applications. The text explores the impact of GSCM practises on environmental sustainability and operational efficiency across different industries. An analysis is conducted to explore the potential of integrating Industry 4.0, which encompasses cyber physical systems (CPS) and the internet of things (IoT), in order to bring about a revolutionary transformation in supply chain management. This study emphasises the positive interaction between cutting-edge technology and environmentally friendly practises, demonstrating how Industry 4.0 can enhance the advantages of GSCM practises, resulting in improved sustainable performance in various industries.

### **4.2.1 Supply Chain in Nigeria's Downstream Oil and Gas Field**

This study aims to take hold of this research to moderate the Industry 4.0 applications through the GSCM practises in the Nigerian context, particularly in the area of oil and gas, to enhance sustainable performance (SP) (Fang & Zhang, 2018). The oil and gas supply chain (SC) and the Industry 4.0 framework will be connected to provide a comprehensive analysis of relevant literature and a broad connection between the oil industry and the research field. The oil and gas industries

are one of the most diverse industries with complicated operating systems (Abubakar, 2014). Furthermore, it includes crude oil drilling from extraction points, discovery, pipeline service, and commodity refineries to maximise various product types (Khan et al., 2016). The oil and gas industry's operating structure has three classifications. According to Abubakar (2014), the petroleum industry consists of three sources: The upstream and downstream, while at the centre is midstream (Figure 4.1)



**Figure 4.1** Oil and gas green supply chain (Source: Abubakar, 2014)

Nigeria's membership in OPEC in 1971 was contingent on the Nigerian National Petroleum Company (NNPC). Following Declaration 18 of 1971, Nigeria established the Nigerian National Oil Company (NNOC) (Ayoade et al., 2009; Gboyega et al., 2011). Likewise, the NNOC was commanded in tandem with a new four-year Nigerian Economic Development Plan (NEDP), as given orders to all aspects of the supply chain oil and gas industry, including upstream, midstream, and downstream to implement the green environment plans (Gboyega et al., 2011).