Chapter 9
Greener Roads Ahead Driven by Smart Manufacturing Incentives in the Auto Parts Industry

Harmanpreet Singh
https://orcid.org/0009-0004-0378-4434
Lovely Professional University, India

Pawan Kumar
https://orcid.org/0000-0001-7501-3066
Lovely Professional University, India

Muhammad Umar Usman
Department of Business Administration and Management, Jigawa State Polytechnic, Nigeria

ABSTRACT

This study examines the integration of smart manufacturing and green entrepreneurship in Punjab's auto parts industry, addressing environmental challenges and operational efficiency. Using Interpretative Phenomenological Analysis (IPA), it explores motivations driving entrepreneurs toward sustainable practices and the benefits realized. Semi-structured interviews reveal three themes: smart green manufacturing integration, benefits of green entrepreneurship, and adoption challenges. Sub-themes include technology strategies, environmental and economic gains, and barriers like financial constraints and knowledge gaps. Verbatim accounts provide insights into motivations and decisions. The study extends green entrepreneurship discourse through smart manufacturing and offers practical implications for pol-

DOI: 10.4018/979-8-3693-9306-2.ch009

icymakers and industry leaders, emphasizing incentives, policies, and training to overcome barriers. While regionally focused and qualitative, it advances sustainable practices and lays the groundwork for future mixed-method research.

1. INTRODUCTION

As an outcome of the increasingly globalized economy, it is becoming apparent that entrepreneurs now appreciate the need to integrate sustainable practices within their business models. Sustainability, in itself, is no more an ethical issue. Reasonable regulations, market forces, and the overarching need to counter climate change have made sustainability a strategic business focus. All industries are under stress to become greener, and the auto parts industry, traditionally viewed as a carbon-intensive resource gobbler, is no exception (Al Zaabi et al., 2013). Given its position and significance in global supply chains, this industry has an equally important environmental contribution that needs to be addressed. Moreover, the adoption of smart manufacturing technologies such as the Internet of Things (IoT), automation, artificial intelligence (AI), robotics, and predictive analytics is transforming manufacturing processes. These smart technologies empower manufacturers to optimize resource allocation, conserve materials, minimize waste, and enhance operational efficiency (S. S. Kamble et al., 2020). Green entrepreneurship, when combined with smart manufacturing, can empower auto parts businesses to achieve profitability while reducing their ecological footprint. But even with the clear possibilities these technologies bring forth, their use is still lagging behind for some reason, particularly in developing economies that face obstacles like a lack of skilled personnel, insufficient supportive policies, and high initial capital requirements (Bag et al., 2020). A great deal of literature has studied green entrepreneurship in its broad form (Hockerts & Wüstenhagen, 2010; Schaltegger & Wagner, 2011), but it appears that the intersection of green entrepreneurship with smart manufacturing in the auto parts industry has not been studied in depth. This is an important gap because the auto parts industry must go through a transformation toward sustainability, which is not merely about employing eco-friendly business strategies but entails the use of sophisticated technologies to reach these objectives. Players in this domain encounter distinctive difficulties, including value for money while being ecologically sustainable and incorporating new technologies into existing production systems (Ghadge et al., 2012; Rajput & Singh, 2019).

Furthermore, the adoption of green practices is increasingly impacted by regulations. Governments across the globe are now implementing policies with a focus on sustainability, including environmental protection laws and other related policies. For example, the automotive industry is being particularly targeted in the European