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Chapter 7: Environmental sustainability initiatives within the global automotive sector

7.1. Introduction

Climate change, resource depletion and energy crisis, pollution and waste, losing biodiversity are growing environmental concerns globally. Concerned about the environment, businesses are creating a sustainable economy and enhancing social well-being. Not only is sustainability becoming a competitive advantage in businesses, it is also evolving as a management strategy.

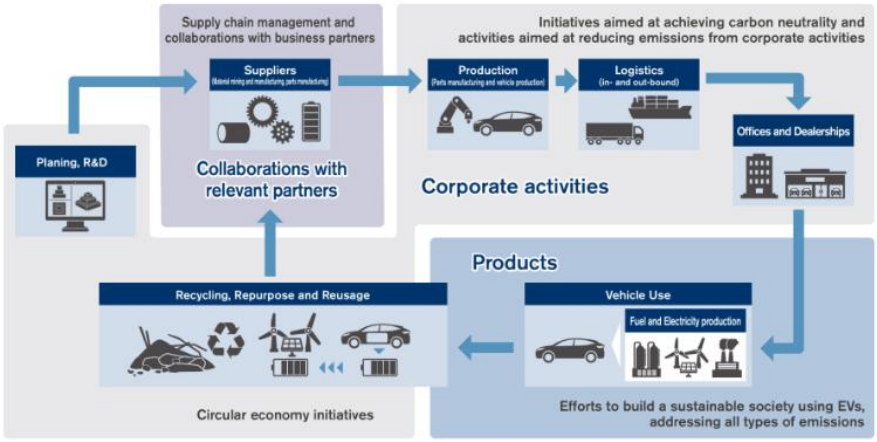

Fig 7.1: Sustainability in automotive industry

Many changes need to be made in all aspects of a business for the industry to become more sustainable. Sustainable development is a multi-faceted issue that attracts considerable interest not just from the automotive sector but also the entire business world that it operates in. The world has endless fleets of vehicles of different types. With

globalisation, automotive firms are becoming truly international. Automakers are among the largest companies and groups in the world, and the automobile manufacturing and supply industry is the central industry and backbone of the world economy. Therefore, the automotive industry needs to take systematically into account how sustainable development can affect each business strategy.

7.1.1. Background and Significance

The automotive industry accounts for 3.5 million jobs in the United States alone, serving as a powerful economic engine. More than 80% of the value added in GM manufacturing comes from OEM suppliers in the industry supply chain. The automotive industry is on the cusp of disruption due to the evolution of electric vehicles and their associated ecosystems, which is beginning to force incumbents into new partnerships and alliances. Value chains need to be overhauled, and offerings need to be redesigned. Innovators are breaking down boundaries between vehicles and customer devices, while automotive ecosystems are forming with competing hardware and operating systems. Habits to embrace automation in vehicle driving are taking root. Uncertain regulatory environments for new mobility services, including ridesharing and autonomous vehicles, abound. Yet the reinventing of the automobile is only the first phase of transformational change.

New forms for the automobile are coming to dominate, and they will carry substantial implications for the conduct of business. Car ownership in the traditional sense will fade and commoditized transportation as a service will arise. Data will become critical in the design, production, and marketing processes through increasingly collaborative development partnerships. Regulation will be reshaped, creating opportunities for traditional players and risks for less adaptive competitors. Reconfiguration of the automotive industry and its policies and regulations will ultimately affect every other sector of the economy.

The automotive industry is undergoing radical disruption as the world's most valuable automotive company is now a Silicon Valley start-up, the traditional boundaries of vehicles are being breached by new entrants, and an alliance has been formed between a major incumbent OEM and a technology company—a move unimaginable only a few years ago. Major search engines and social media platforms are now in the automotive industry, and at the same time, traditional fiefdoms from semiconductors to telecommunications are shaken. Each month brings news of new alliances, counter-alliances, bold pronouncements, and academic conferences on the transformation of mobility.

7.2. Overview of the Automotive Sector

The automotive industry is an essential and lucrative sector, making it one of the cornerstones of the world economy (Investopedia, 2015; Business Insider, 2025; Microsoft Industry Blogs, 2025a). It is also one of the most risky and volatile sectors. Any event that impacts the automotive industry could have a rippling effect. In 2008 and 2009, the global economy crashed, and the herbal elements started in crack form, when the Subprime mortgage collapsed, leading to a sudden slowdown of the US economy. This would be a milestone event for the automotive industry, mainly centred in Detroit, Michigan. As the market around the world is affected, the major markets of the automotive industry such as US, Japan, and Europe have to undergo immense hardship in anticipation of the worst sector recession ever. The industry witnessed colossal losses, decline in sales, massive layoffs, plant closures, rapid descent of reputed companies into the book of history and much more futility. Lastly, this was managed through consolidation, collaboration, adoption of new technologies and strategy reorientation. The future picture on the automotive industry is however optimistic. Internationally, the automotive industry is at its peak. Major OEMs and suppliers are adopting a growth strategy. The automotive industries in various countries are gaining momentum. As a result, severe competition is coming up in the automotive sector, which is fuelling innovation, quality, increased value chain and lucrative opportunities. In recent years, Global automotive companies are aggressively focusing at the developing countries to capture the untapped and crazy market; Countries like China and India has already been a real threat. Japan, South Korea and German automotive industries are also following the suite. By sensing the new growth phenomenon, Singapore, Thailand, Malaysia, Indonesia along with many other developing countries have experienced exponential growth worldwide. It is believed that the future automotive industry is in Asia and is going to be dominated by Asian players.

7.2.1. Research design

The current study is conducted to determine and evaluate the environmental sustainability initiatives undertaken by the luxury, mid, and low-end automotive manufacturers in the developing and developed nations. Past research focused on sustainability initiatives primarily from developed economies, as developing automotive industries are not only growing at a rapid speed but are also taking initiatives in environmental sustainability. This research would help to bridge the literature gap by shedding light on the initiatives undertaken by such manufacturers in a developing economy and the market leaders in sustainability in the automotive industrial sector. Hence, a qualitative research approach is used to collect primary data from industry experts through interviews. The collected data is analyzed using thematic data analysis

methodology. Research is conducted using the thematic analysis approach that applies data collection from the focus group and interviews. The data is categorized statistically and presented under themes to help develop a model on the sustainable basis of manufacturing. Qualitative comparative analysis helps indicate the characteristics of a phenomenon. In this regard, the NVivo software program is used for data analysis purposes.

The main theme of the current research is environmental sustainability initiatives undertaken in the automotive manufacturing industry (Microsoft Industry Blogs, 2025b; Microsoft Industry Blogs, 2025c). The theme is categorized into four sub-themes, i.e., supply chain sustainability, manufacturing sustainability, product sustainability, and organizational sustainability. The sub-themes are supported by the interview transcripts which point to the adoption of environmental sustainability initiatives in the automotive manufacturing sector. In addition, direct quotations from interviewees indicate and support the adoption of environmental sustainability initiatives in the manufacturing sector. The sub-themes are also supported by references from previous literature that helps lend credibility to the results obtained in the current research study.

7.3. The Need for Environmental Sustainability

The need for sustainability emerged, accompanied by a growing field of research, from the recognition that projecting current extravagant and unbalanced development patterns into the future is biophysically impossible. Environmental sustainability is the ability to meet the resource and service needs of present and future generations without compromising the health of ecosystems. Environmental sustainability is the upkeep of natural resources. There is a need to limit the current rate of depletion of resources and to maintain renewable resources to current levels of regeneration. Environmental sustainability is important because the global ecosystem is large, but limited. In order to ensure that resources are maintained, sustainability is required. The Land, air and water resources of the Earth are its life-support systems, and there is an urgent need to ensure that they are sustainably maintained. The life support systems that the Earth supports are large, but finite, and as such must be maintained in a sustainable condition. Environmental sustainability is, therefore, an urgent need. Global life support systems are under a time limit. If present trends are extrapolated into the future, these systems will degrade and collapse within the lifetime of a person alive today in ecologically fragile regions such as Africa as early as the next decade. The changes that have been experienced in our climate are undeniable. There have been changes in temperature, sea level, precipitation, and many variable weather patterns. There have been efforts to reduce greenhouse gas emissions, but this has not reduced the threats posed by climate change.

Environmental performance is an important driver for a company to measure in order to increase competitive advantage. A company's environmental performance can result in substantial benefits within the company and in the company's market, thereby helping to increase the company's competitive advantage. Benefits can be in the form of saving costs, conserving energy, enhancing brand equity, improving customer satisfaction, and gaining customer loyalty. Implementing environmental sustainability initiatives may raise concerns that costs would increase. The cost increases could arise from the need for upfront stakeholder engagement and environmental assessments, implementation of the initiative, and improvements in employee wages and expenditures. It is considered the relative level of competitive advantage compared to other companies in the automotive sector that these costs would impede the firm's competitive advantage.

Fig 7.2: Sustainable Environmental Technologies

7.3.1. Impact of Automotive Emissions

Vehicles have benefitted from rapid advancement in technology, engineering excellence, and diverse design choices. However, automobiles have resulted in societal issues as diverse as the complexities of technology. Growing concerns about various emissions from the use of internal combustion engines in automobiles compelled automobile manufacturers to start improving fuel efficiency with lower CO2 emissions, particulate matters, hydrocarbons, and nitrogen oxides (NOx) levels. Passive measures like better combustion chamber design and conventional catalytic converter systems may meet emission standards set by governmental bodies and have been the automotive industry trend through the late 1980s to early 1990s. However, automotive engineers insisted that more active methods, like more complex electronic control including map-based fuel leakage, be employed. Such measures posed safety concerns as they led vehicles to be more sensitive to input from drivers. It was needed for better real-time exhaust feedback systems to enable fast recovery of engine controlling units within permissible limits. Such necessity often leads to enhanced cost, size, and power requirements of onboard hardware as well as ambiguity in hardware compatibility with various automotive platforms. Thus, the development of a more feasible, greater scope estimation for engine control parameters using a hybrid Arbor equilibrium weight synthesis technique-based neural Pseudo-Fuzzy method was proposed. Testing results found that the proposed method could achieve a very good error margin in the full range even with faults present using a minimum 2x14 knapsack-based engine decision parameters. The South African automotive industry consists mainly of foreign multinational automakers. The supply chain of the South African automotive industry contributed extensively to national environmental concerns. Over-abstraction from surface and ground water resources, salinization of surface water due to the discharge of saline effluent, destruction of riparian and in-stream habitat, discharge of toxic substances, health and environmental impacts on groundwater resources, production of solid waste, emissions of greenhouse gases and other air pollutants, and localized pollution through spillages and accidental leakages can cause health problems and damage to ecosystems. The Motor Industry Development Program (MIDP) reintroduced the South African automotive industry to the global automotive value chain in 1995. It saw the departure of Nissan South Africa and accounted for over 80 % of the domestic market between the late 1980s and early 1990s. The MIDP translated into improved country-wide competitiveness. The MIDP included an import-export complementary scheme with overall equipment manufacturers earning duty rebates. On the 2nd of June 2009, GM declared that it was bankrupt and filed for Chapter 11 protection. It was one of the few corporate giants which became a victim of soaring fuel prices.

7.3.2. Global Climate Change Challenges

Global climate change poses the greatest single threat to the earth's environment and human beings today. Regardless of efforts to reduce greenhouse gas (GHG) emissions levels, the existing stocks of atmospheric GHG continue to cause climate changes. Attempts to tackle climate change emissions have also been shown to be too little too late to avert dangerous climate change. In 2009, the annual increase to atmospheric CO2 was about 2.9 ppm and growth of CO2 from energy and industry was about a new record high of 29.8 Gt CO2. It is estimated that atmospheric CO2 was at 378.7±2.0 ppm in December 2009, and growth of CO2 is expected to keep climbing even higher. The estimated land use changes in emissions of CO2 of 2.8 Gt CO2 are responsible for slightly less than 10% of the overall human effect on the carbon cycle, and since 1750, this is estimated to have resulted in a net increase of 84 ppm in the atmospheric CO2 concentration. At present, the ambition of B2 scenarios is insufficiently stringent to hold present temperature levels. What is more alarming is that the climate sensitivity probably lies within the range of 2.0 to 5.6 °C but is more likely 2.4 to 4.0 °C. A sensitivity in excess of 4.0 °C poses a commensurate risk of high-impact climate thresholds, yet the current emissions trajectory makes it likely that the world will pass this threshold early in the next century.

Recognition of the cause of today's climate change is leading to growing awareness of a responsibility for action. Nations are now seeking to create sustained climate frameworks for action in a similar way that was done in the 1990s on stratospheric ozone depletion. Immediately uncertain is the rate of emissions increase. It was estimated to be in the range of at least 0.6 ±0.2 GtC/year in the mid to late 1990s. Growth rates of perhaps double this amount have been reported since, with especially strong growth in CO2 from energy and industry. The growth of emissions of other radiatively active gases is also strong and growing. While more limited observations have been made, the warming response of the earth's climate system is also becoming evident. Precise temperature rise and associated effects are all non-linear, with huge uncertainties in both timing and character of climate change impacts.

7.4. Regulatory Frameworks and Policies

As established enterprises navigate the challenge of sustainably integrating into the economy, governments, particularly in emerging economies, face the arduous task of "building" their own automobile industries. Countries as large as China and India view the automobile industry not just as a sector, but as a large country developmental platform. The transition is complicated by the proliferation of not only diverse, but sustainable, growth paths, as discussed in the previous chapter. Nevertheless, in acknowledgment of emerging debates in the Sustainable Automotive Development

(SAD) literature, some general stylized facts of Smart Auto-Mobility (SAM) for emerging economies were developed.

The dynamic interactions between the global and domestic levels of production and regulation raised socio-political challenges for emerging country governments. The emergence of a new world car threatens local firms' capabilities, and consumer behaviors may shift from walking to cars. The South-South technological transfer and joint-responsibility cooperation within the BRICs raise governance problems at both the national and intra-organizational levels. Simultaneously, citizens are more demanding than ever. Climate change concerns trend towards increased industry-wide compulsory regulations, the enforcement and compliance of which is in doubt in most developing countries.

There exists a wide regulatory gap within emerging economies. Firms use a variety of technical, regulatory, and lobbying defenses to defend their market positions against new entrants. Innovative Public-Private Development Partnerships (PPDPs), research alliances, and joint ventures within equal partnerships emerged in the pre-trial period of policy enforcement. The brand new Technical Support Regulation Authority (TSRA) for the regulation of electric vehicles (EVs) and smart infrastructures may address the transition to Smart Auto-Mobility (SAM), given its arrangement of executive independence, stakeholder representation, parallel task settings, and information exchange mechanisms.

7.4.1. International Agreements

Governments, as well as non-governmental organizations and industry groups, have responded on a global basis to the challenge of climate change, underlining the importance of long-term carbon emission reduction targets at the levels of 28 nations and the EU. These targets guide national invitation plans in decarbonization and have profound implications for business activities in various sectors under the jurisdiction of national governments.

Within this context, the automotive sector is already undergoing a technological transformation from internal combustible engine vehicles to battery electric vehicles and has seen the most profound impacts caused by long-term carbon emission reduction targets. On the one hand, there are mandatory policies promoting the deployment of battery electric vehicles throughout nations, states, and cities resulting in a very large number of new entrants with very low or even zero feasibility that could enter the market, and severe governance and managerial challenges. On the other hand, car manufacturers are challenged to balance any unanticipated risks and urgent economic profits of indirect

suppliers under the pressure of stringent mandatory policies to deploy battery electric vehicles.

Yet, there is limited academic research on the impacts of the new external environmental factors on influential car manufacturers and, particularly, the responding measures taken by manufacturing organizations. Under this circumstance, it is important to study how the reform of the external environment affects the proactive strategies of incumbent firms. This can be accomplished through an empirical study on high impact cases suggested by category theory. In this regard, it is essential to analyze manufacturers' environmental initiatives for mitigating the external shocks, which are critical for both industries and existing firms. This is particularly true for the global automotive sector, where the responses taken by firms are more challenging and uncertain.

7.4.2. National Regulations

Increasingly stringent environmental regulations in developing and developed nations affect vehicle manufacturers and their supplier contractors. Companies must conform to product safety and intellectual property laws. Product liability legislation and the adoption of such laws by nations is an effort to protect consumers from defective or dangerous products. Environmental regulations influence all aspects of product design, testing, and manufacturing. These regulations directly affect vehicle design because the regulations require compliance with specific standards. The design of test hardware and the procedures used by quality personnel is also influenced by regulations. A clause in environmental law permits courts to impose stiff penalties on manufacturers or employees of manufacturers that do not divulge violations of environmental law. Nations may impose stiff taxes on emissions, hazardous material disposal, or other environmentally harmful acts. Nations may attempt to prohibit the importation of hazardous products, including those regulated by voluntary standards, as unable to enforce laws, rules and standards that other nations used to protect their environments. The manufacturer's compliance with acceptable international or national standards can be determined through pre-market evaluation. Acceptance testing assures that the product complies with safety and performance standards. Independent testing involves large commitment costs or concerns that preclude relying heavily on independent testing. A policy of not relying solely on independent testing for compliance controls is an effective alternative.

The practice of voluntary standards bodies is the development of international standards. Standards must be unambiguous enough to achieve interoperability and consensus. Nations through which or from which materials or products move may adopt such standards into law or codify them. Noncompliance with such standards may render the product unsafe or unfit for use in that nation. These standards may require product

redesign and retesting as well as modification of design and manufacturing procedures and the omission of hardware. The complexity and legal liability of actual or potential noncompliance with national laws or intentions that a nation may perceive against its national interests require careful product design and corporate planning to minimize exposure.

7.5. Sustainable Manufacturing Practices

With stricter and more comprehensive regulations designed to offset or mitigate negative environmental impacts on a global scale, the automotive industry has been moving toward EOL parts management options that are more environmentally sustainable. Improving environmental sustainability throughout the entire automotive manufacturing process and the efforts geared toward this goal utilizing sustainable automotive materials in the global automotive sector is the most likely initial step that would successfully take root. Transitioning to and innovating with sustainable and environmentally friendly materials will present fewer implementation issues than other initiatives. Bans against petrol engines and the target of producing 1.4 million carbon-neutral vehicles by 2030 with 100% sustainable automotive materials reduced vehicle lifetime carbon footprints will prompt innovative shifts.

The global automotive industry supply chain is one of the largest and most intricate supply chain systems in the world, which includes large tier 1 corporations needing an extensive network of tier 2, tier 3 and tier n suppliers, and it also needs a large number of machinery and equipment manufacturers, car parts and component manufacturers, holding yards and metro operators. Diverse worldwide independents, ASMEs, subsidiaries and privatized companies do participate in the supply chain ranging from car part component makers to vehicle recyclers. Both the vehicle recycling and mechanic's businesses are small to medium-sized natural monopolies that tend toward interim ownership, particularly where developing nations are concerned. Different and stringent requirements for complete vehicle/parts recycling exist. Hence, with minimum collection costs, recyclers send vehicle carcasses or other EOL parts and components to other countries for processing. The global automotive and EV manufacturers are working on and implementing parts and components design innovations to minimize the use of unsustainable materials and substitute EOL parts with sustainable and remanufactured ones to press for the circular economy process.

New advanced engineering for the manufacturing, distributing, and end-use stages combined with technological jumps in AI and big data collection, processing and intelligent use will also hasten the switch to a more circular EOL parts system. There is no panacea for reinvention, and a properly designed mix of regulatory and economic instruments will be part of the answer.

The burdens of vehicle materials include energy input during raw material extraction, energy use during processing to automotive components, materials transport, end-of-life burden of landfilling, incineration, and recycling, and solid waste, liquid waste, and air contaminants from production processes. Worldwide, steel produced and used in automobiles accounts for about 8 percent of total anthropogenic carbon dioxide emissions annually. Global automotive manufacturers have put a lot of effort into reducing vehicle materials burden to improve the environmental sustainability of their automobile products. Dual-composite and green-composite materials enable the design of more sustainable and environmentally friendly automotive structures. Environmental sustainability and material selection models of dual-composite and green-composite materials are developed to consider weight, fuel consumption, biodegradability, life cycle energy input, and life-cycle CO2 emission costs.

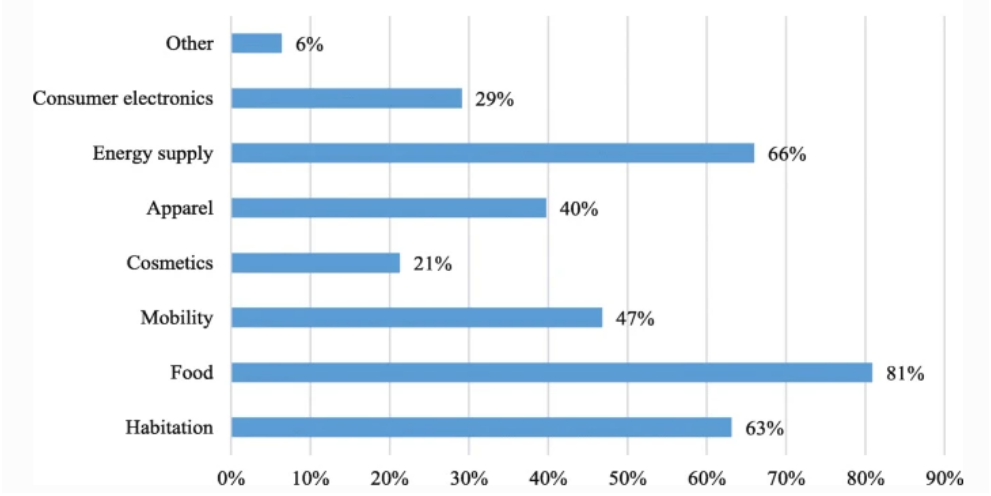

Fig : Sustainability in the automotive industry

7.5.1. Material Selection

The automobile industry consumes enormous amounts of materials, energy, and water, generates large amounts of waste, and emits greenhouse gas emissions. The automotive industry has become involved in "green" initiatives to enhance the environmental sustainability of their automobile, manufacturing process, and supply chain. The burdens of vehicle materials consist of energy input during raw material extraction, energy use during processing to automotive components, materials transport, and the end-of-life burden of landfilling, incineration, and recycling. Global automotive manufacturers have put a lot of effort into reducing the burden of vehicle materials to improve the environmental sustainability of their automobile products.

Automobile weight reduction is one of the most effective approaches to achieving further reductions in energy and CO2 emission. The weight reduction of automotive structures results in fuel consumption benefits, manufacturing cost increase, and crash performance reduction. Computer-aided structural optimization techniques can be utilized to obtain weight-efficient structures. It is possible to achieve a good balance between fuel consumption and crash performance enhancements, with the former increasing with reductions in the biodegradability cost. To consider environmental sustainability, vehicles need to be designed in an environmentally sustainable manner from the initial development stage. Common fuel-efficient designs of vehicles without consideration of environmental sustainability would become environmentally unsustainable. The environmental sustainability index of traditional designs could be improved by about 27 percent without cost increase.

The automotive industry has become involved in "green" initiatives to enhance environmental sustainability. Automobiles comprise huge amounts of materials at the frontiers of material consumption: 31 million vehicles made per year; 23.2 million tons of iron and steel; 1.9 million tons of nonferrous metals; and 123 thousand tons of polymers. Major vehicles of large production numbers include passenger cars and pickup trucks. Intensive life-cycle assessments of vehicle materials have been conducted globally to identify major burdens and point out improvement opportunities. In the manufacturing process of automobiles, huge amounts of materials are consumed, energy is consumed, wastes are generated, and pollutants are emitted into air, water, and soil.

7.5.2. Waste Reduction Techniques

As environmental issues are more widely debated, the automotive industry is following closely behind other industries to establish sustainable practices. Reducing waste produced by the manufacturing process by increasing efficiency and design change, recycling hazardous materials, and discovering ways to reduce input material leads to best practices related to waste minimization. Improving efficiency maximizes the utility and life of parts, chemicals, equipment, or other consumables to slow the rate of consumption. This can be done through simple design changes, better equipment maintenance, cleaning methods, storage practices, or buying a higher quality product. Simple and cheaper techniques can produce large benefits and often pay for themselves within a month to a year. Some additional waste reduction techniques are providing careful storage for parts so they don't become damaged too soon; allowing parts to be recovered from cars before they go to shredders; and developing a more effective method for recycling tires to produce rubber powder which can then be used for road surfacing or in insulation, matting, or in injection molded products. Some chemicals used in producing vehicles are classified as hazardous materials due to their toxicity,

corrosiveness, mobility, persistence, or potential for bioaccumulation. Safe use of these chemicals requires proper storage, on-site handling, monitoring, periodic health assessments, and employee training. Using inline analyzers to monitor levels of these chemicals can reduce their consumption. Most of these chemicals, when released into the environment, are very difficult to recover and pose great risks to water, air, and food resources. Proper design can eliminate or minimize their release at the source, which is much better than end of pipe treatments. Environmental audits can also help management to learn the extent of their problem and organizations can help them devise plans and seek funds to fix it.

7.6. Conclusion

Effective environmental sustainability initiatives of global automotive companies include target setting, engagement with stakeholders, investment in sustainable product development, supply chain consideration, and internal specific actions. Sustainability targets and current initiatives were examined in this section, which shows an overview of strong progress towards meeting targets. The manufacturing initiatives of the companies were compared to identify best practices. Within the product area, companies had targets regarding the fleet emission development aim, which goes considerably further than the current product focus on local emissions. Companies developing other fuels and full electric vehicles already considerably outperform others in a large share of sustainable fleet development. Many manufacturers engaged in renewable energy acquisition or production, while local supply chain initiatives were less frequently reported. Such programs on the whole help to drive sustainability progress. Therefore, as a future agenda, sustainability targets and current sustainability initiatives should be communicated more transparently and comprehensively to all stakeholders. Engaging with stakeholders and presenting themselves as a cooperative partner is key in this respect. Working with their supply chain might become increasingly important in the future.

Thus far, the automotive sector has made significant strides since the introduction of the mitigation area. The number of transparency companies and the scope of targets are notable progress indicators. Strongest coverage of initiatives can be seen in the areas of management, climate strategy, and accounting. Targets are particularly ambitious in the carbon footprint and revenue share with strong performance. However, public policy and external considerations should be considerably elaborated, indicating potential for improvement. Groundwork for compatible targets has been laid, with the public discussion on target pathways. However, a relatively high share of performance credibly indicated with mentioned believable assumptions in these performances might yet impede the credibility of these targets. This study recommends that methodological

approaches on compatible targets might be grasped more widely, while global automotive players with a significant weight should lead coalitions or initiatives in this regard.

7.6.1. Emerging Trends

Automotive sector in Malaysia and ASEAN countries have to adopt green, meeting external requirements and market pressure. Industry 4.0 enabling technologies can be integrated with Green Technology (GT) to enhance sustainability. The concept of sustainable development (SD) is derived from the assertion arguing that human economic issues must sustainability in conjunction with human ecological issues. The growing realization of the increasing ecological deterioration primarily attributable to the unceasing consumption of natural resources and the subsequent pollution generation has triggered the concerted global efforts for environmental protection and conservation. This consequently ushered in a holistic paradigm shift from the traditional focus on economic development to a new way of thinking of achieving economic growth with sustainable development. In the global efforts to promote SD in varied social implications, environmental consideration is more stressed in industries as the chief environmental polluter. Sustainability is now viewed as the ideology of the forthcoming industry to which wholesomeness, limitlessness, recyclability, reusability and renewability are the core values.

Business model (BM) is the logical construct to describe how the firm systematically creates, delivers and captures values. As a rational design, BM accounts for a new way of producing, supplying and selling in firms, markets and industries. Sustainable business model (SBM) has also emerged as a new competitive BM with the consideration of the social and ecological bottom lines. In today's multinational world, the automotive industry is viewed as an automobile, transportation and service industry providing mobility and productivity to their societies. An automotive industry ecosystem consists of automotive original equipment manufacturers, parts suppliers, customers, after sales service network and supportive scientific & technological agents. The automotive sector refers to the social enterprise and economic activities that company supplies automotive products and services for profit. The automotive sector anyway is a responsible sector to comply with the national development plan and the regional integration. It has meaningful contributions to economic development, employment generation, workforce development and environmental preservation at country and regional level. As a knowledge-based, capital-intensive and competitive manufacturing sector, the automotive sector also has to comply with the emergence of new trends, rapid industrial restructuring and varies market needs.

References

Mobility Agent partners. (2025). Microsoft Industry Blogs. Retrieved from https://www.microsoft.com/en-us/industry/blog/manufacturing-and-mobility/mobility/2025/01/08/revolutionizing-mobility-solutions-for-an-ai-powered-future/

Connected Mobility reference architecture. (2025). Microsoft Industry Blogs. Retrieved from https://www.microsoft.com/en-us/industry/blog/manufacturing-and-mobility/mobility/2025/01/08/revolutionizing-mobility-solutions-for-an-ai-powered-future/

Connected Mobility partners. (2025). Microsoft Industry Blogs. Retrieved from https://www.microsoft.com/en-us/industry/blog/manufacturing-and-mobility/mobility/2025/01/08/revolutionizing-mobility-solutions-for-an-ai-powered-future/

How Self-Driving Cars Could Change the Auto Industry. (2015). Investopedia. Retrieved from https://www.investopedia.com/articles/personal-finance/031315/selfdriving-cars-could-change-auto-industry.asp

Uber Freight is leveraging AI to make truck routes more efficient. (2025). Business Insider. Retrieved from https://www.businessinsider.com/ai-trucking-logistics-uber-freight-tech-optimize-routes-2025-4