DRIVING BACKWARDS

WHAT IS WRONG WITH PAKISTAN'S AUTOMOBILE INDUSTRY?

PIDE
Pakistan Institute of Development Economics

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The contributors to this volume are:

Usman Qadir, Senior Research Economist, PIDE

Mohammad Shaaf Najib, Research Fellow, PIDE

Saddam Hussein, Assistant Chief (Policy), PIDE

Mohammad Armughan, Research Associate, PIDE

Abid Rehman, Research Fellow, PIDE

Anjeela Khurram, Lecturer, PIDE

Saba Anwar, Senior Research Economist, PIDE

This volume has been edited and compiled by:

Usman Qadir, Senior Research Economist, PIDE

Mohammad Shaaf Najib, Research Fellow, PIDE

Nadeem Ul Haque, Vice Chancellor, PIDE

Research Support:

Zaheen Zada Research Assistant, PIDE

Composed & Designed by **Mohsin Ali,** Graphic Designer at the
Pakistan Institute of Development Economics, (PIDE). Islamabad

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Preface

"Driving Backwards: What is Wrong with Pakistan's Automobile Industry" is the result of a collaborative effort led by Usman Qadir, Shaaf Najib, and myself, aimed at unraveling the complexities and inefficiencies that have long plagued Pakistan's automobile sector. The importance of the global automobile industry is undeniable, with its valuation projected to reach USD 4.36 trillion in 2024. This sector is not only essential for daily mobility but also underpins numerous ancillary industries such as steel, glass, engineering, rubber, and paint. Despite these vast potentials, Pakistan's automobile industry has struggled to tap into these opportunities, remaining trapped in a cycle of low production, outdated technology, and widespread consumer dissatisfaction.

For the past 70 years, Pakistan's automobile policy has been misguided, providing excessive protection to the industry without fostering the development of exports. This protectionist approach has stunted growth and innovation, leading to an industry that is insulated from global competition and out of touch with international standards. Moreover, the policy dialogue in Pakistan is dominated by outdated concepts such as "localization," "indigenization," and "import substitution." These terms have long been rendered obsolete by decades of research on global value chains, economic growth, and the experiences of other countries. Yet, they persist in Pakistan, often to the point of absurdity.

The policy-making process itself is another area of concern. Policies are formulated in the interests of a select few, with little to no local research or public debate. Such policies are often crafted behind closed doors, without any meaningful discussion with society at large. This lack of transparency and inclusivity has contributed to the perpetuation of ineffective and outdated strategies.

One glaring example of misguided policy is the longstanding ban on new car imports. For decades, there has been no local car import business, and instead, Pakistan has relied on convoluted schemes like the "baggage scheme" and inconsistent secondhand car import policies. At various times, these policies have allowed the import of three-year-old cars, five-year-old cars, and now, no secondhand cars at all can be imported. These erratic policies have only served to stifle competition and limit consumer choice.

Manufacturers in Pakistan often contend that they need decades to build a position where they can export. However, this argument does not hold up under scrutiny, as many countries that started after Pakistan are now successfully exporting vehicles, often using the same manufacturers as those in Pakistan. Additionally, manufacturers frequently threaten that any disruption to their operations would destabilize the Pakistani labor market. In reality, these manufacturers employ only a small number of workers, and their departure would not significantly disturb the market. The broader car value chain, which employs a far greater number of people, has the potential to thrive if the industry were opened up to competition and innovation.

To address these issues, the Pakistan Institute of Development Economics (PIDE) recommends a radical shift in policy. Specifically, PIDE proposes that the profits of automobile manufacturers be taxed at a rate of 60%. However, to incentivize exports, manufacturers should be offered a rebate of 2% for every 1% of their sales that they export. In this way, any manufacturer that exports 30% of its production could effectively become tax-free. This policy aims to push manufacturers towards greater integration into global markets, enhancing competitiveness and reducing reliance on the domestic market alone.

This book is the culmination of three years of intensive research, stakeholder consultations, and conferences organized by PIDE. It is meticulously structured to provide a thorough analysis of the persistent challenges faced by the sector and to propose potential pathways for revitalizing this critical industry. The book is divided into seven chapters, each penned by experts in the field, offering a diverse range of perspectives and in-depth analyses.

The initial chapters (two to five) delve into the fundamental issues that have stunted the growth of Pakistan's automobile industry. These discussions cover the detrimental impacts of an overemphasis on localization, the ongoing challenges faced by consumers, the black market premium phenomenon known as "On Money," and a critical review of past government policies. The subsequent chapters (six to eight) turn towards the future of mobility, exploring the potential and challenges associated with Electric Vehicles (EVs) in Pakistan. These chapters address environmental implications, the current state of the EV transition, and a comparative analysis of the costs and benefits of EVs versus Internal Combustion Engine Vehicles.

Our objective with this book is to illuminate the deep-seated issues within Pakistan's automobile industry and to stimulate discussions on actionable strategies for reform. The insights provided by the various contributors underscore the urgent need for a paradigm shift in policy and industry practices, aligning them with global advancements and consumer expectations.

As editors, Usman Qadir, Shaaf Najib, and I are deeply grateful to the contributing authors for their invaluable input and to PIDE for its unwavering support of this research endeavor. We hope that this book will serve as a catalyst for meaningful change, guiding policymakers, industry stakeholders, and academics towards a more competitive, efficient, and consumer-friendly automobile industry in Pakistan.

Nadeem ul Haque
Vice Chancellor, PIDE

CHAPTER 01

Setting the Stage: Auto(Im)mobile Industry

Mohammad Shaaf Najib

The automobile industry is a major manufacturing industry globally, valued at USD 4.36 trillion in 2024 (Fintech Futures, 2024), with revenue of USD 2.52 trillion (Carlier, 2024) and employing over 8 million individuals directly in manufacturing process. It is so not solely due to the impact advancements in automobiles have made on daily mobility, but majorly also due to the industry's linkages with other manufacturing industries. An efficient automobile industry helps many other industries flourish too, including steel, glass, engineering, rubber and paint to name a few. The industry helps boost trade activities as well due to its extensive forward and backward linkages. Pakistan's automobile industry though has seemingly failed to kick-in those benefits and continues to struggle.

Much like the economy, Pakistan's automobile industry has also faced a series of ups and downs over the decades. Low production levels, handful companies, outdated technology, poor built quality, black market premiums are just a few of the ever constant characteristics of Pakistan's automobile industry. Localization obsessed policies have restricted the growth of automobile industry in Pakistan, disconnecting it from the outer world. At a time when the world has moved towards becoming part of global value chains and specialization in different stages of production, Pakistan continues to disintegrate itself from the world. Consequently, the country's automobile industry seems to lose out on the capital and technological input from major global players.

The automobile industry in the country was facilitated in operating as an oligopoly for decades. High level of protection from external competition, including limiting the import of used vehicles in the country and not creating an enabling environment to support the setup of any new firms led to the evolution of the 'Big Three' in the automobile sector. The automobile sector giants developed great rent-seeking capacity and were able to drive policies to keep competition out. Following the introduction of the Automotive Development Policy 2016-21 (Ministry of Industries Production and Special Initiatives, 2016), many new firms have entered the automobile industry of the country. Despite increase in number of firms, total production levels in the industry have failed to increase significantly. Consumers continue to face the same issues as before (on money, delayed deliveries, low quality, ever rising prices), while automobile ownership has remained static as well.

Technologically speaking, Pakistan's automobile industry lags years or even decades behind the global automobile industry. The vehicle variants introduced in the Pakistan market are often a generation or two older than those being sold globally, while many features are omitted for the Pakistan market that were provided elsewhere in the same variant. The technology used in engines for example, is not in line with global trends – hybrid vehicles and EVs have only recently penetrated the domestic market. Thus Pakistani consumers are forced to use vehicles that are not just outdated globally, but also toned down in terms of features.

The extent of this can be understood from the fact that the world started moving away from carburetor engines in the 1990s, while Pakistan did not mandate use of fuel injectors in engines a decade into the 21st century. Not only this, but hybrid vehicles which have been available globally since late 1990s were introduced for the first time in Pakistan's market in 2023-2024, over two and a half decades after they were available globally. Resistance towards technological adoption, especially for fuel efficient vehicles is surprising in a country which is dependent entirely on imported fuel for vehicles and faced with a severe foreign currency crisis every two to three years.

The world now is moving towards electrification of vehicles. Electric Vehicles (EVs) are replacing the Internal Combustion Engine (ICE) Vehicles rapidly. Pakistan, however, remains behind the world in this aspect as well. EV adoption remains rather stagnant, with primarily most EVs of the luxury segment being used in the country. However, Pakistan has the window of opportunity to not fall behind the world this time if necessary measures are undertaken timely.

Considering the issues highlighted above, this book is a compilation of the research work done over the last three years by the Pakistan Institute of Development Economics (PIDE) on Pakistan's automobile industry. It consists of a total of nine chapters, including the introduction. Chapter two to five focus on the underlying issues of the automobile industry and the way forward for the industry as a whole, while chapters six, seven and eight are focused on the future of mobility i.e. EVs and their future in Pakistan.

Chapter two details the localization obsession of Pakistan automobile industry and its impact on the industry development in the country. Chapter three analyses how over the past decades while some changes have been brought in the automobile industry from policy perspective as well as by the industry itself, however the problems faced by the consumers as well as the major characteristics of the industry have not evolved towards the good. Chapter four focuses on the phenomenon unique to the Pakistan automobile industry i.e. the black market premium termed as the On Money. The chapter details the extent of On Money payments, how and why they exist and how the production limitation and dealership models facilitate the black market premium. The fifth chapter analyses the last three policies introduced by the government for the automobile sector in 2007, 2016 and 2021 respectively.

Chapter six gives an introduction to the world of Electric Vehicles, its expected impact on the environment and the increase in electronic waste disposal due to rise in use of electric vehicles. Chapter seven analyses Pakistan's current state of EV transition, associated incentives and what must be done in the future to facilitate the transition towards EVs. Chapter eight focuses on the need for EVs at a macro level as well as the

constraints from the consumer side while comparing the costs of EV usage and ICEV usage to the consumers on a daily usage basis as well as the lifetime costs of these vehicles.

The ninth chapter of the book sums up of the entire work presented in this volume and shares the key takeaways coming out of this research effort by the PIDE team for the automobile industry.

CHAPTER 02

Sputtering Towards Self-Sufficiency

Rethinking the Allure of Endless Localization / Indigenization

Usman Qadir

2.1. Introduction

If one picks up a newspaper these days, it is highly likely one will come across a column on either the domestic automobile industry or the global one, and the tone and focus of the columns is what is particularly interesting. The global industry is exhibiting signs of vibrancy, transformation and even growth in areas. The discussion regarding the domestic automobile industry revolves around the level of localization (indigenization), ever rising pricing, eroding consumer welfare stemming from the on-money culture, poor quality and limited choices available coupled with the rising prices. There is finger pointing galore among the stakeholders. Domestic industry blames rising prices on the unfavorable exchange rate and high cost of infrastructure provision, and issues with localizing components. Do we really need to keep thinking of localization and indigenization as the Holy Grail of industrial activity any longer, or can we finally move beyond it?

This chapter sheds light on the obsession of policymakers and even industrialists with pursuing outdated and unnecessary localization and indigenization efforts in the domestic automotive industry. Our research has pointed out that despite over 60 years of operation, and doggedly pursuing the mantra of localization, the industry has not benefited, and our consumers are worse off than before. Sections 2.2 to 2.4 present the key aspects of localization; what it is, and what are the costs and benefits associated with it. Evolution of the global automotive industry and the trends, including localization, emerging in the industry are highlighted in Section 2.5. The debate on whether localization is the way forward for Pakistan is given in Section 2.6, while final thoughts on Pakistan's localization obsession are presented in Section 2.7.

2.2. What is Localization of Production and Indigenization All About?

Localization of production and indigenization of production are both strategies aimed at adapting industrial processes to better suit local conditions, but they differ in their scope and objectives. Localization of production involves tailoring manufacturing processes, products, and services to meet the specific demands of a local market. This adaptation often includes adjusting product features, packaging, marketing strategies, and even manufacturing techniques to align with local preferences and cultural norms. The primary goal is to enhance market penetration and competitiveness by catering more effectively to local consumer needs and preferences.

Localization of production, also known as production localization or reshoring, is a strategic business practice that involves bringing the manufacturing and production processes of goods closer to the markets where they will be sold or consumed. This stands in contrast to the more common approach of offshoring, which involves outsourcing production to countries with lower labor and production costs.

Indigenization of production refers to the process of developing local capacity and capability in manufacturing through the establishment of indigenous industries. This involves creating or expanding domestic industries to produce goods that were previously imported, thereby reducing dependency on foreign products. The main objective is to foster economic independence, enhance national security, and promote sustainable industrial development within a country.

To put it simply, for an economy with a nascent industrial base, indigenization of production makes sense in the context of developing domestic technological capabilities where none existed before. At the time of Independence, Pakistan had been born from the agricultural hinterlands of British colonial India, so a strategy of indigenization was the need of the day to develop manufacturing capabilities and a strong industrial base.

Pakistan pursued localization of tractors, and that effort bore fruit, with the country now having a well-established tractor manufacturing industry. However, similar efforts in the passenger vehicle industry has not yielded the intended impact. Preliminary assessment of the localization of mobile phone manufacturing under the Mobile Phone Policy has also not proved advantageous to Pakistan.

2.3. The Benefits of Localization/Indigenization

Localization of production, if properly carried out, yields several benefits ranging from lowered costs to efficiency and welfare gains, hence the allure of following this approach to industrial development.

Increased Sales and Revenue: Tailoring products to local preferences can boost sales by following several key strategies (DePalma & O'Mara, 2020; Guillén, 2024). First, product adaptation involves modifying products to meet local preferences, tastes, and cultural expectations. Second, marketing and messaging are tailored to resonate with the target audience in terms of language, imagery, and cultural relevance. Third, optimizing distribution channels and logistics ensures efficient delivery of localized products to the market. Finally, enhancing customer engagement is achieved through personalized customer service and support in local languages.

Nike's localization strategy in China involved tailoring product offerings to match local preferences and cultural norms. By focusing on designs and marketing campaigns that resonate with Chinese consumers, Nike significantly increased its market share and revenue in the region. Toyota's approach to localization in Europe included adapting its vehicle models to meet European environmental standards and consumer preferences. This strategy not only boosted sales but also improved brand perception and market acceptance (Hemingway, 2022).

Reduced Transportation Cost and Times: One of the primary advantages of localization is the significant reduction in transportation costs. Reduced transportation costs benefit localization and indigenization of production through several channels. Lower transportation costs reduce the overall cost of production, making localized and indigenized products more competitive in the market. This allows local industries to offer products at lower prices or with higher profit margins, facilitating their growth and sustainability. Additionally, lower transportation costs enhance the efficiency of supply chains by reducing the time and expense involved in moving raw materials and finished goods. This leads to more reliable and faster delivery schedules, which is crucial for just-in-time manufacturing and inventory management. Furthermore, with reduced transportation costs, local producers can expand their market reach both within the country and to nearby regions. This expansion can lead to increased sales volumes and economies of scale, further reducing production costs. Finally, lower transportation costs make a region more attractive for investment, both from local entrepreneurs and foreign investors. This can lead to the establishment of new manufacturing facilities and the creation of jobs, fostering economic development.

India's focus on improving road infrastructure and reducing logistics costs bolstered its automobile industry. Companies like Maruti Suzuki have localized production to cater to the domestic market more effectively, reducing dependency on imported parts and enhancing the indigenization of their supply chains. By investing in transportation infrastructure, Brazil reduced the cost of exporting agricultural products. This has enabled local agro-industrial companies to compete globally and has attracted foreign investment into the sector. Improved logistics have also supported the growth of localized processing industries, adding value to raw agricultural products before export (Atal, Yogesh, 1981).

Faster Response to Market Demand: Localization and indigenization of production enable a faster response to market demand by integrating production processes closer to the end consumers and adapting to local market conditions. By localizing production, companies can significantly reduce lead times associated with shipping and logistics, allowing for quicker adjustments to changes in market demand. This proximity facilitates better understanding of local preferences and faster implementation of feedback into product development.

Multinational corporations (MNCs) operating in China have reaped benefits from localizing their supply chains, allowing them to swiftly cater to the dynamic demands of the Chinese market (Dong, 2011). Similarly, the automotive industry in Poland has demonstrated the advantages of embedded production systems where localized supply networks enable rapid adaptation to market needs, enhancing competitiveness and customer satisfaction. This approach not only improves operational efficiency but also fosters stronger relationships with local suppliers and customers, contributing to sustained economic growth (Domanski & Gwosdz, 2009).

Improved Quality Control: Maintaining production facilities closer to home enhances the ability to oversee and control quality. Companies can implement rigorous quality assurance processes, reduce defects, and ensure that products meet or exceed local standards and regulation. Localization and indigenization of production significantly enhance quality control by embedding production processes within local contexts, allowing for closer monitoring and immediate resolution of issues. This proximity enables manufacturers to implement stringent quality standards and quickly adapt to any deviations.

Research on quality control in manufacturing highlighted how localizing production processes allowed for more effective quality checks and better alignment with local regulatory standards (Sayzwani et al., 2015). Additionally, localized production facilitates the use of local materials and components, which can be more easily assessed and controlled for quality, as seen in various industries implementing Six Sigma techniques to enhance process quality management. This approach not only improves product quality but also fosters a culture of continuous improvement and quality assurance within the local workforce.

Customization and Adaptation: Localization enables companies to tailor their products to suit local tastes, preferences, and cultural nuances. This customization can lead to higher customer satisfaction and stronger brand loyalty within different markets.

Localization and indigenization of production facilitate customization and adaptation by aligning products and services with local cultural, linguistic, and market needs. This process allows businesses to tailor their offerings to specific consumer preferences, enhancing relevance and acceptance. For instance, localization involves adapting marketing materials to fit the cultural context of different regions, which can significantly impact consumer engagement and sales (International Trade Council, 2023). Additionally, the use of local materials and community-specific information in educational curricula enhances the relevance and effectiveness of learning content.

A notable example is the customization of industrial production through Omni-channel strategies, which enable manufacturers to meet diverse customer requirements by integrating multiple production and distribution channels (Guryanova et al., 2020). This approach has been effectively employed in various industries, such as automotive manufacturing in Poland, where localized supply networks have improved production efficiency and responsiveness to market changes.

Supply Chain Resilience: Relying solely on distant suppliers can make businesses vulnerable to disruptions caused by geopolitical events, natural disasters, or global crises. Localizing production diversifies the supply chain and reduces the risk of major disruptions.

Localization and indigenization of production enhance supply chain resilience by reducing dependency on global supply chains, improving flexibility, and fostering quicker response times to disruptions. Localization involves sourcing materials and components from nearby suppliers, which minimizes the risk of international logistical challenges, such as those seen during the COVID-19 pandemic (International Institute for Management Development, 2022). Indigenization ensures that production processes align with local capabilities and resources, which enhances adaptability and responsiveness to local market demands and supply chain disruptions (Nweze, 2024).

An example of localization enhancing supply chain resilience is seen in the manufacturing sector in India. By increasing the use of local suppliers for pharmaceuticals, India managed to maintain steady production and supply during global crises, securing both domestic and international demand (Li et al., 2021). Additionally, Japanese automotive companies have localized their supply chains to ensure continuity and mitigate risks associated with global semiconductor shortages.

Another case is that of the U.S. and its shift towards indigenizing critical technologies to safeguard against global disruptions, enhancing their supply chain's resilience and ensuring continuous production of essential goods (Alkhatib & Momani, 2023).

Availability of Affordable Cars: Localizing production in the automobile industry leads to more efficient manufacturing processes, resulting in increased production at lower costs. This efficiency allows for the creation of cheaper vehicles, making them more accessible to consumers. As a consequence, there is a higher availability of affordable cars tailored for urban mobility needs. With cheaper vehicles in the market, more people can afford to purchase cars, thereby enhancing urban mobility by provid-

ing individuals with convenient and flexible transportation options. This shift towards localized production not only benefits consumers by offering cost-effective solutions but also contributes to the overall improvement of urban transportation infrastructure and accessibility.

Localization and indigenization of production enhance urban mobility by aligning transportation systems with local needs and resources, fostering efficient and sustainable movement within urban areas. Localization ensures that transportation infrastructure and services are tailored to the specific requirements of the local population, reducing reliance on imported technologies and practices that may not be optimal for local conditions. Indigenization integrates local knowledge and practices into urban planning, leading to more effective and culturally appropriate mobility solutions.

An example of localization improving urban mobility is seen in the development of bicycle-sharing systems in China. These systems, designed with local input and using local resources, have significantly enhanced urban mobility by providing an affordable, efficient, and sustainable transportation option tailored to the needs of Chinese cities (Yang et al., 2017). Another case is the indigenization of urban transport in Curitiba, Brazil, where the Bus Rapid Transit (BRT) system was developed using local knowledge and expertise, making it a globally recognized model for efficient urban mobility (Rodrigue, 2017).

The question that needs to be asked is where does the domestic automobile industry in Pakistan stand with regard to reaping the benefits of localization and indigenization of production. Automobiles in Pakistan are notorious for having to be booked, delivery times are measured in months, not hours or days, vehicles are highly priced and of low quality, and till recently, consumers had only limited choices at their disposal. Domestic firms operate at their installed capacity level or below it so sales and revenues of the firms are not increasing or benefiting from the localization and indigenization effort. Automobile prices in Pakistan exhibit an upward trend, so if transportation costs for inputs are being reduced due to localization and indigenization, this reduction is not being passed on to the consumer.

2.4. Costs and Challenges of Localization/ Indigenization

If localization is not properly implemented, it can also turn into a noose around the neck of the domestic industry and economy when the initiative spirals out of control. The downside ranges from increased costs to high levels of initial investment.

Higher Labor Costs: One of the significant costs associated with the localization and indigenization of production is higher labor costs. This phenomenon is observed as localized production often requires the hiring and training of a local workforce, which can be more expensive compared to sourcing labor from regions with lower wage rates. Additionally, the development of specialized skills locally can lead to increased labor costs.

For instance, a study on the costs of increased localization in a multiple-product food supply chain in the United States found that while localization reduces assembly costs, it increases processing and distribution costs, including labor costs, especially in regions with smaller and less specialized workforce (Nicholson et al., 2011). Similarly, in Poland, the globalization and internationalization of production created opportunities for entrepreneurs to establish global value chains. However, localizing these chains led to higher labor costs as firms had to comply with local labor standards and wages, which are typically higher than those in less developed regions (Kapela, 2019). Another example can be seen in China's economic boom where higher wage costs fueled by domestic growth and income increases, compelled many Chinese firms to move their operations overseas to manage labor costs more effectively (Chen et al., 2016).

Initial Investment: Establishing or relocating production facilities requires significant initial investments in infrastructure, equipment, and workforce training. These costs can be substantial and may take time to recoup. One of the significant costs associated with localization and indigenization of production is the initial investment required.

For instance, the automotive industry requires substantial initial investment due to the high fixed costs and the need for specialized technology and infrastructure. Hyunjeong Kim (2010) highlights that manufacturing automobiles is capital-intensive, necessitating large initial investments to establish production capabilities and meet local content requirements. In Pakistan, the automotive industry is purportedly focusing on increasing localization, with plans of companies such as Indus Motors Corporation (IMC) to achieve up to 60% localization in production of hybrid SUVs. However, this shift requires significant financial outlays for upgrading facilities, sourcing local components, and ensuring quality standards. Moreover, a 10-year framework for increasing indigenization in Pakistan's manufacturing sector by PBC (Pakistan Business Council, 2018) outlines the need for phased investments to gradually build local capacities. This phased approach spreads out the costs over time but still necessitates substantial upfront capital.

Limited Specialization: Limited specialization poses a significant challenge in localization and indigenization of production because local industries often lack the specific skills and expertise required for efficient and high-quality production. This can lead to inefficiencies, lower productivity, and higher costs.

For instance, the indigenization policies in Saudi Arabia, known as Saudization, aim to replace expatriate workers with local employees. However, this transition has faced challenges due to a mismatch in skill levels and specialization. Local workers often lack the specialized training and experience needed, which impacts the overall efficiency and performance of industries implementing these policies (Alanezi et al., 2020).

Moreover, product localization strategies face challenges due to limited specialization in local markets. For example, adapting products to meet local preferences and regulatory requirements can be difficult when local expertise and knowledge are lacking, leading to increased costs and longer time-frames for product localization.

These examples highlight how limited specialization can hinder the successful localization and indigenization of production, necessitating investments in education, training, and skill development to overcome these barriers.

Regulatory Challenges: Rent-seeking and inefficiencies arising from regulatory complexities and exemptions present significant challenges to the localization and indigenization of production. Rent-seeking occurs when entities seek to increase their share of existing wealth without contributing to productivity, often through lobbying for favorable regulations or exceptions.

Regulatory complexities can create an environment conducive to rent-seeking. For example, in many African countries, the prevalence of high-level rent-seeking is linked to the weakness of public institutions and regulatory frameworks. This environment enables entities to exploit regulatory loopholes or secure exemptions that undermine economic efficiency and fair competition (Coolidge & Rose-Ackerman, 1997). Such inefficiencies are evident in the case of the Nigerian oil sector, where regulatory complexities and exemptions have led to significant rent-seeking behaviors. Companies often secure favorable terms through political connections, which distorts the market and discourages genuine investment and competition, ultimately hampering the localization of production processes (Congleton et al., 2008). Not to mention the peculiar nature of the regulatory framework in Pakistan that sees exemptions and special use application of preferential duties that benefit select stakeholders. These SROs instill a rent seeking behavior in economic agents and discourage competition and innovation in the industry.

These examples illustrate how rent-seeking and regulatory complexities create barriers to the successful localization and indigenization of production by fostering inefficiencies and reducing the incentives for productive investment and innovation.

Economies of Scale: Producing on a larger scale might be easier in some offshore locations where there are well-established manufacturing clusters and economies of scale. Localized production with fragmented markets serving a smaller, local customer base, and small production runs naturally lead to reduced economies of scale, impacting cost efficiency.

China's "Made in China 2025" initiative aims to indigenize high-tech manufacturing. However, despite significant government support, the initiative struggles with achieving economies of scale in certain sectors due to fragmented production capabilities and the need for large-scale investments to compete with established global players (Malkin, 2018).

In a state with weak governance capabilities and a risk-averse private sector, several issues arise with the approaches highlighted for encouraging indigenization and localization of production. Weak governance often results in inconsistent and poorly implemented policies, reducing their effectiveness, and corruption and bureaucratic inefficiencies further undermine policy initiatives. Limited state capacity to fund and manage R&D initiatives can hinder technological advancement, and a risk-averse private sector may be reluctant to invest in innovative but uncertain projects. Weak governance can also lead to underfunded and poorly managed educational systems, which fail to produce a skilled workforce, thereby stymieing efforts to localize production. Successful public-private partnerships (PPPs) require trust and effective coordination between the public and private sectors, but weak institutions and governance issues can hinder collaboration and lead to inefficiencies. Poor governance capabilities often result in inadequate infrastructure development due to misallocation of resources, corruption, and lack of long-term planning, impeding local production efforts. Without strong governance, financial assistance programs and market access initiatives for SMEs may be ineffective or mismanaged, and a risk-averse private sector may be hesitant to engage with such programs. Inefficient and corrupt procurement processes can prevent local firms from competing fairly for government contracts, undermining the goal of encouraging local production. Addressing these issues requires comprehensive governance reforms to enhance policy implementation, reduce corruption, and build trust between the public and private sectors.

In conclusion, localization of production is a strategic decision that involves balancing the benefits of reduced transportation costs, quicker market responsiveness, improved quality control, customization, and supply chain resilience against the challenges of potentially higher labor costs, initial investments, and regulatory complexities. The choice between localization and offshoring should depend on factors such as the nature of the products, market dynamics, cost considerations, and a company's long-term strategic goals.

2.5. Global Trends in Automobile Production

Modern automobile manufacture or assembly is not localized, but globalized, with focus on global value chains and global production networks more recently. The experiences of new entrants such as Tesla and BYD have shown that the key to success in the industry is the ability to produce quality parts at competitive prices, final product at competitive prices. There is a notable shift toward electrification and sustainable practices, with major automakers heavily investing in electric and hybrid vehicles to address changing consumer preferences and environmental concerns. Autonomous driving technology remains a key focus, ranging from advanced driver-assistance systems to the development of fully autonomous vehicles.

Connectivity and Internet of Things (IoT) integration are enhancing the driving experience, with cars becoming more connected and equipped with advanced infotainment systems. However, the industry has faced challenges, particularly in global supply chains, with issues like semiconductor shortages impacting production levels for many manufacturers.

Consumer preferences are evolving, with increased demand for sustainable, tech-savvy, and urban-friendly mobility solutions. Shared mobility services and changes in car ownership patterns are also influencing the market. Regulatory changes, including stringent emission standards, are driving innovations in vehicle design and production.

The digitalization of sales and services is transforming the automotive retail landscape, with online sales platforms, virtual showrooms, and digital customer service options becoming more prevalent. Auto-makers are forming strategic partnerships and collaborations, not only within the automotive industry but also with technology companies, to accelerate innovation.

2.5.1. Evolution of the Global Automobile Industry

The invention of the steam engine in the First Industrial Revolution led to the birth of the steam powered automobile in the eighteenth century. The subsequent introduction of the automobile powered by a gas fueled internal combustion engine was achieved fairly rapidly in the early nineteenth century. The first gasoline powered automobile followed at the end of the nineteenth century, proof of the dynamic and constantly evolving nature of a nascent industry and potential for future growth. Innovations and developments maintained a brisk pace in the industry and in sectors related to the automobile as well. While the core mechanical technology at the heart of the automobile was primarily invented by the 1930s, countless refinements and innovations continued to be made in the design and manufacture of automobiles in the decades to come.

The automobile industry today is one of the largest manufacturing activities in the world and is credited with providing employment for one in eleven individualwhees. If the industry were a country, it would be the sixth largest economy in the world (OICA, 2022). Not to mention the fact that on the supply side the automobile has advanced our knowledge of the most efficient methods of manufacturing complex pieces of technology. More specifically, three major transformations occurred in the history of the automobile industry that have shaped our understanding and impacted on manufacturing techniques in industries throughout the economy. On the demand side, automobiles are the second largest household expenditure item in developed countries.

It must be acknowledged that the automobile industry has undergone significant technological advancements at the global level. From the three-wheeler, two-seater first ever gas-powered vehicle in 1885, to the recent competition of electric powered vehicles, and to the new race for self-driving vehicles, automobile industry has been ground zero for some great innovations. But while the rest of the world moves towards hi-tech cars, turbo-charged engines, plug-in electric vehicles and self-driving AI, Pakistan's automobile industry keeps looking to the government for subsidies and other protectionist policies to support its 50-year infancy.

(Qadir, 2024) and Najib in Chapter 3. of this volume have highlighted the stagnation and lack of competition and vibrancy in Pakistan's automobile industry. This section spells out the key transformations that have taken place in the global automobile industry over time as evidence of the role the industry can play in driving development and growth of the economy. This will also shed light on key deviations in Pakistan's automobile industry from the global norm. Enabling transformation and growth in the domestic industry along the lines of the global automobile industry's evolution is the key to resolving persistent inefficiencies ("on money" culture – discussed in detail in Chapter 4) and bottlenecks (constrained supply) in the domestic industry. This is also part of PIDE's holistic plan to

2.5.2. Key Transformations in the Automobile Industry

2.5.2.1. Ford's Moving Assembly Line

The manufacture of "horseless carriages", as automobiles were called in the late 1890s, was a craft initially, carried out in metal and machine shops by craftsmen. Automobiles at the time were considered to be novelty items on account of their relative scarcity and unique construction of each unit. This construction was at the hands of craftsmen who had a very firm grasp of the intricacies involved in building their automobiles and familiarity with the working of each part. Naturally this was a very labor and time intensive production process that was inefficient and had drastically limited options for expansion of output.

By the time the Ford Motor Company began successfully manufacturing automobiles in bulk in a factory in the early 20th century, the production process no longer required expert craftsmen to assemble each unit by hand and automobiles were much more commonplace and in higher demand. A push-and-move system was utilized where laborers would bring the parts required to the factory floor from the stock room. This method was less time consuming than simple craft production but was labor intensive, relatively inefficient, and subject to several shortcomings. The bare frame of each automobile was hauled up on two wooden blocks and bands of workers moved from workstation to workstation completing their tasks. Over 100 part-fetchers would hand deliver parts and components to each chassis assembly workstation: essentially bringing the stockroom to each and every chassis assembly point. This was still a labor and time intensive process, and due to the use of labor for moving parts, unreliable.

In an effort to streamline the production process and boost productivity and output levels, Charles Sorensen, the production chief of Ford Motor Company experimented with various ideas. After much trial and error and learning by doing, Sorensen pioneered the moving assembly line featuring practical implementation of Adam Smith's idea of increasing productivity through specialization. The idea of an assembly line sped up the process by removing the role of fetchers and hence a major source of friction in the assembly process. The assembly process was divided into simple sequential action which would be performed by a single assembler at each stage.

Instead of bringing the man to the work, the work would be brought to the man. This process of experimentation and learning by doing led to the adoption of the ideal specification for operating the assembly line. These developments were initially met by skepticism by company management, but their eventual implementation allowed Ford Motor Company to meet surging demand for their Model T automobile. The developments at the Ford Motor Company were also the successful outcome of learning-by-doing and resulted in spill over to the rest of the industry and the economy eventually when manufacturers adopted the moving assembly line and best-use practices to boost productivity levels.

On the heels of this development, General Motors adopted a different approach to Ford's single model not by producing cheaper cars but quality automobiles in greater variety to appeal to a wider demographic. Better quality in this case was determined by General Motor engineers to be improved performance and economy. The focus was not on innovating, but on offering better looking cars with more variety in the market. General Motors was able to pursue a strategy of following the leader to avoid the expense and unpredictability of innovation while capitalizing on aesthetic innovation which was cheaper and more predictable. General Motors rise to the top is an early example of how late comer firms can

thrive in the market.

The moving assembly line was the first of three major transformations in the automobile industry that had a profound impact not just on the nature of competition within the industry but in the manufacturing sector at large (Jones & Womack, 1985). Mass production and the moving assembly line allowed the United States to dominate the global automobile market through enormous growth in productivity coupled with simplified assembly and low prices.

2.5.2.2. The European Desire for Competition

The second transformation in the automobile industry was European in origin, further advancing the use of technology in manufacturing. This shift was driven by the desire to compete with, and eventually surpass, the then world leaders in mass production of automobiles. After the adoption of mass production, the top three US automobile manufacturers were able to dominate the market and did not fear competition from any other manufacturers, either domestic or foreign. Unable to compete with the US in terms of volume, the European manufacturers turned to the manufacture of small and unpretentious automobiles. These vehicles stood in stark contrast to the gaudy, gargantuan sedans produced by the US Big Three (Ford, General Motors, Chrysler) as a way of challenging the status quo.

The European approach focused on innovation and efficiency, often incorporating advanced technologies and engineering techniques to produce higher quality vehicles. This allowed them to carve out a niche market, appealing to consumers who valued practicality and fuel efficiency over size and power. This transformation also led to a more competitive global automotive industry, as European manufacturers expanded their influence and market share through strategic partnerships and innovation.

2.5.2.3. Japanese Quest for Efficiency

The third transformation had its roots in the skyrocketing oil prices in the first half of the 1970s and again at the tail end of the decade negatively impacted demand for the fuel inefficient automobiles manufactured by the Big Three in the US in favor of smaller, more efficient automobiles from Europe and Japan. Automobile manufacturers from Japan studied US production methods; in particular, those of Ford, as well as Statistical Quality Control practices after World War II to help rebuild their economy. Faced with a number of constraints, Japanese manufacturers had a strong imperative to develop a more efficient manufacturing technique. (Cheng & Podolsky, 1996) pointed out that such a system would build on the society's strengths of a strong work ethic revolving around work and not leisure, desire for seeking continuous improvement, a life commitment to work, group conscious rather than individualism and striving to achieve a common goal.

With each transformation, the production process underwent changes and refinements that permeated not only the automobile industry but the manufacturing sector as a whole. Firms attempted to adopt the manufacturing processes that each transformation brought about and reap the benefits of the changes; though not always successfully. Compared with craft production, mass production offered a number of benefits.

Japanese manufacturers, led by Toyota, recognized the inherent contradictions and shortcomings in the simple mass production system, while also acknowledging the central role played by workers and inventory. The deficiencies identified by Toyota covered the key benefits of the system, indicating that mismanagement would lead to more issues than it solved, such as delivery delays, poor quality, high costs.

The Just-In-Time system designed by Ohno was based on the pull system used in US supermarkets to keep shelves stocked. Items that were pulled from the shelves to fill shopping carts created empty spaces on the shelf, which was used as a signal by the stocker to restock the item on the shelf. If quantities fell below a certain threshold, it was a signal to the store manager to order more units of the product(s) from their suppliers. Excess inventories were avoided, and waste was minimized. This feature also appealed to the precise and efficient nature of the Japanese who were able to devise a pull system at each step of the assembly process; materials would be pulled through the factory by the usage of parts in the final assembly, and excessive inventories would be minimized.

On the labor side, because of the simplification and standardization of tasks and parts the demand for expert craftsmen declined, while there was a surge in demand for semi-skilled workers who could perform simple and repetitive tasks. Developing technological capabilities and innovating was taken out of the hands of factory workers and relegated to qualified engineers who were removed from the production process itself. While it is true that given the limited development of human capital in developing countries and stunted technological development that mass production would easier to implement than Just-In-Time, there is a limit to the productivity increase that can be achieved, while the technique would also place considerable pressure on the labor market (in the form of worker discontent) and create further disharmony in an already fragile system, as happened in the case of the US.

The mass production system of the US and developments subsequently were driven by the notion that labor was "the problem" to achieving higher productivity and therefore higher profits. (Graves, 1993) suggested that the production philosophy that evolved was designed to eliminate this "problem" throughout the system. In doing so, the mass production system created a dehumanizing effect on workers which would be unworkable in developing countries and such a view would be inconsistent with the goals of developing countries, where labor employment is a

In contrast, Taichii Ohno and Shigeo Shingo at Toyota were of the view that workers could also contribute more to the production process than simply assembling the components, as believed by Ford. The strong Japanese work ethic encourages highly motivated workers to constantly improve tasks and processes. Quality circle implementation provides managers with feedback from the factory workers and could be used to streamline production processes at the shop floor level by helping solve work-related problems and thus improve productivity levels. Thus, the Japanese model gives importance to labor by seeing them as "the solution" to problems and thus prioritize social context more. Care must be taken to ensure the political and economic environment of the host country is conducive to a lean production system setup. Given these facts, one can conclude that countries where Japanese automobile manufacturers have established Joint Ventures or production facilities are conducive to lean production setups.

Ohno also made effective use of the Japanese focus on groups, teams and collective goals by creating manufacturing cells on the work floor, rather than an assembly line. Compared to the Ford assembly line, the manufacturing or work cells are significantly different in their organization and offer a number of benefits/advantages.

Japanese manufacturers also acknowledged the benefit of having low priced product variety (not restricted to the aesthetic variety of General Motors) to satisfy customer demands following the example set by European manufacturers and as a consequence designed production systems to accommodate smaller lot production of different models. Japanese manufacturers were able to effectively combine the best features of mass production and quality product variety within the existing domestic cultural framework. Japanese automobile manufacturers were able to upset the world order and surpass Europe and even the US as global leaders in the 1980s.

2.5.2.4. The Rise and Diffusion of Microelectronics

According to (Jones & Womack, 1985), the fourth major transformation in the automobile industry came with the diffusion of microelectronics in the industry. This particular transformation is noteworthy for the fact that in contrast to the first three transformations, there was a change brought about not just in the production methods used, but also in the design and manufacture of tooling equipment and more importantly, in the design of automobiles themselves. The nature of these changes is such that developing countries can also benefit immensely from the transformation.

In the wake of mass production techniques spreading across the globe and the move towards dedicated lines of machines with high volume output of a standardized product, this meant that there was limited flexi

bility in the production process for switching to a new model or new engine design. However, now owing to widespread use of microelectronics, production lines began to switch over to computer-control and robot assembly, meaning plants were able to accommodate model and design changes with more flexibility than before.

Automation has also resulted in more rapid die changes for stamping allowing production runs to be much shorter than previously possible. Since automated machining and welding machines can be easily reprogrammed to accommodate new models, automobile production is becoming more flexible, and thus able to accommodate changes and advances in technology more readily. Production line robots can be replaced as and when needed, which is more cost effective than having to scrap and rebuild the entire production line. This flexible and modular approach to production means subsequent modules can be incorporated into the production line relatively easily. Theoretically speaking, it should be easier for firms to move up the value chain once they have incorporated this new flexible lean production process.

Production line automation and Just-In-Time manufacturing have reduced economies of scale for firms in the industry. No longer do firms have to produce a minimum of 2 million units of output, meaning the fortunes of smaller sized producers (even those from developing countries) are more promising. Japanese firms have shown the ability to compete in the market with models that have an average age of 2 years (as opposed to the 4 years for US and European firms), and production runs (per model) of 500,000 vehicles (as opposed to the 2 million for US and European firms). Being able to have smaller production runs lowers the cost of market entry for the firm, which naturally opens the doors for firms from developing countries to enter the global market and compete with incumbent firms such as GM, Ford and Volkswagen that have an established presence and brand in the market. Tesla challenged the status quo with the release of its models, and now BYD is giving Tesla a run for its money by engaging in a price war and massive production runs.

The next transformation happening in the industry as it matures is the resurgence of green technologies, and in particular hybrid and electrical propulsion systems for all manner of automobiles. There has also been a trend in recent years of the acquisition of several niche-market developed country automobile manufacturers by developing country firms.

2.5.3. Current Features and Trends

The automotive sector stands out for its highly concentrated corporate landscape, where a few major firms wield significant influence over smaller ones. Eleven leading companies from Japan, Germany, and the USA dominate global production, thanks to mergers, acquisitions, and alliances in the 1990s. Despite not being as extreme as some sectors, like com-

mercial aircraft, this concentration hampers the establishment of industry-wide standards.

Another key aspect is the proximity of final vehicle assembly and parts production to end markets due to political sensitivities, market saturation, and automakers' preference to manufacture locally. Despite global integration since the mid-1980s, the industry retains strong regional integration, unlike apparel and electronics.

Distinctive to the automotive industry is the limited interchangeability of parts, which ties suppliers to lead firms and limits economies of scale and scope. Suppliers often serve as the sole source for specific parts, necessitating close collaboration and concentrating design work near lead firm headquarters.

Global integration in design has increased, with firms leveraging design efforts across multiple markets. Suppliers now play a significant role in design, establishing their own design centers near major customers for collaboration. This results in nested value chains within the global organizational structures of major firms.

2.5.3.1. Regionally Integrating Production

The prevailing direction in production leans towards regional integration, notably since the mid-1980s. Automakers and major parts suppliers are deeply entrenched in various regional production networks spanning North and South America, Europe, Southern Africa, and Asia. Regionally manufactured parts primarily supply final assembly plants catering to local markets. Factors driving regional production's significance vary from political and strategic considerations to cultural, technical, and economic factors. The automotive industry's high visibility and cost, especially regarding passenger vehicles, can incite political opposition if imported vehicles dominate sales or threaten local producers. This influence stems from powerful local lead firms, industry associations, substantial employment, and high unionization rates.

Despite the absence of import tariffs or local content regulations, manufacturers opt to limit exports and establish local production sites to avert political repercussions. These dynamics explain why automakers from Japan, Germany, and South Korea haven't concentrated production in Mexico and Canada despite cost advantages and preferential access to the US market via NAFTA. Additionally, technical and economic rationales exist for locating production near final markets, driven by factors like transportation costs, lean production techniques, and product variety demands since the 1980s. While the automotive industry historically favored building vehicles and heavy subsystems close to end markets, globalization has complicated this picture with emerging markets and increased global integration.

2.5.3.2. A Global Supplier Base

Globalization has led to the emergence of two supplier categories within the automotive sector: global and local. Historically, major firms either exported components to overseas assembly plants or relied on local suppliers at each manufacturing site. However, a new type of supplier, the global supplier, has arisen, marking a shift in the industry paradigm (Alfasi & Fenster, 2009). This development has broadened the clientele for many large automotive suppliers. Presently, top-tier suppliers cater to leading firms in the US, Europe, and Japan, necessitating adjustments to accommodate varying approaches to vehicle development and supplier relationships (Aláez-Aller & Carlos Longás-García, 2010).

The globalization of lead firms has consequently extended to suppliers, with contractual demands often including provisions for local production. However, full-scale manufacturing at every site is unnecessary. Suppliers with a global footprint can centralize the production of specific components in select locations, delivering them to nearby assembly plants as required for module and subsystem integration into the final assembly line (Lokpriya Gaikwad & Vivek Sunnapwar, 2019).

2.5.3.3. Linking with the Global Value Chains

The automotive industry faces challenges due to the lack of standardized parts, necessitating different specifications for each vehicle model. Lead firms aim to reduce design efforts by utilizing shared vehicle platforms across their brands, albeit with limitations. Most visible and performance-affecting parts remain model-specific to avoid homogenization (Sturgeon et al., 2008).

The complexity of vehicle parts structures value chain linkages, which can be jointly developed or provided with detailed instructions. Market linkages allow supplier switching, while relational and captive linkages offer stability but hinder switching. Outsourcing in the 1990s intensified tensions between lead firms and suppliers, especially regarding aggressive procurement practices (Sturgeon et al., 2009).

Japanese lead firms adopt a paternalistic approach, fostering long-term relationships with suppliers through equity ties and in-house design. Supplier switching for short-term gains is rare, promoting trust-based relationships (Aláez-Aller & Carlos Longás-García, 2010).

2.6. Is Our Obsession with Indigenization and Localization Past its Expiration Date?

The Short Answer: YES, we have been obsessed with the mantra of localization and indigenization for too long.

The Long Answer: The need for indigenization and localization has diminished because technological capabilities have been developed and are now present in the economy. The gains from self-sufficiency are being more than offset by the losses incurred from not integrating with global value chains (GVCs) and production networks, from both the consumers' and producers' perspectives. For example, participation in GVCs has been linked to productivity gains at both the firm and industry levels, as seen in multiple case studies such as South Korea's rapid industrialization and technological advancement through GVC integration.

The focus must shift to competitiveness, efficiency, and productivity. By integrating into GVCs, countries and firms can benefit from efficiency gains, access to advanced technologies, and improved managerial practices. For instance, Estonia's participation in GVCs has led to significant productivity improvements and economic growth. Similarly, firms in the electronics industry from developing countries have experienced substantial productivity gains by specializing in specific tasks and leveraging advanced technologies and knowledge from more developed partners.

What is needed now is for these capabilities to be diffused and enhanced, and for our firms to become competitive and productive. Instead of focusing on self-sufficiency, promoting integration into GVCs and emphasizing competitiveness and efficiency can yield significant economic benefits. Vietnam's integration into global textile and garment value chains, for example, has led to increased productivity and higher export earnings.

Firms wishing to localize should be free to do so at their pace and timing. They should not need special support from the state in the form of SROs and policy interventions. Given the severe shortage of financial resources, it is crucial to avoid extensive subsidies and instead create a supportive environment for firms to thrive. Policies that promote GVC participation can significantly raise aggregate productivity and potential growth, as evidenced by various country experiences.

2.7. The Bottom Line

Question to be asked is why are our OEMs and policy makers content with low volume production, high prices, low quality, limited choices and obsessing over localization and sales levels?

Bottom Line: Our dubious flirtation with localization has meant that we have ended up not focusing on volumes, efficiency and competitiveness, the hallmarks of vibrant economies. Instead, we are on the path to endless subsidization and consumer welfare loss with niche production, low volumes and little focus on quality. Is it due to a myopic vision of our stakeholders, or does it serve short term interests better?

The automobile industry of today is the largest manufacturing activity in the world, with backward and forward linkages with virtually all sectors of the economy. The industry is credited with providing employment for one in eleven individuals in the typical economy. On the supply side the automobile has advanced our knowledge of the most efficient methods of manufacturing complex pieces of technology. More specifically, three major transformations occurred in the history of the automobile industry that have shaped our understanding and impacted on manufacturing techniques in industries throughout the economy. On the demand side, automobiles are the second largest household expenditure item in developed countries.

The major transformations discussed here were all borne of the need and desire to improve upon the existing systems. In each case, first movers developed their niche in the market and reaped the greatest benefit from the transformation they led. The industry benefited over time when the changes were implemented in second, third movers and other firms. Given the nature of the industry and its deep linkages with the other sectors of the economy, the benefit of these transformations was naturally felt there as well.

In the case of Pakistan, all indications are that the industry is not operating at desirable output levels, nor do they appear to be driven by competitiveness or output expansion considerations. Rather, through its policies, the state is creating a walled environment rather than a level playing field and protecting the domestic industry from foreign competition, when it should in fact be encouraging a competitive environment.

We have previously discussed the stagnation and lack of competition and vibrancy in Pakistan's automobile industry which are hindering growth of the industry. This knowledge brief has discussed the key role the industry can play in driving development and growth of the domestic economy, drawing on the experience of the global automobile industry with key transformations that it has undergone over the years. Unfortunately, similar developments have not taken place in Pakistan, and growth of the

industry here remains stunted. Enabling transformation and growth in the domestic industry along the lines of the global automobile industry's evolution is therefore required. This is the key to resolving persistent inefficiencies (on money culture) and bottlenecks (constrained supply) in the domestic industry, as part of PIDE's holistic plan to tackle consumer welfare losses in the automobile market.

2.8. Key Takeaways

- The emphasis on localization and indigenization in Pakistan's automobile industry is outdated. The focus should shift towards integrating into Global Value Chains (GVCs) to enhance productivity, efficiency, and competitiveness, as seen in examples from South Korea, Estonia, and Vietnam.

- The economic drawbacks of over-reliance on localization are low production volumes, high prices, poor quality, and limited consumer choices. This has led to inefficiencies and consumer welfare losses in Pakistan's automobile industry.

- There are significant transformations in the global automobile industry, like Ford's assembly line and the Japanese quest for efficiency, which have driven the industry's global success. These lessons are crucial for Pakistan to learn from.

- Pakistan's protectionist policies have created a non-competitive environment. It suggests that the industry should be exposed to competition to drive growth and improve standards.

- Pakistan's automobile industry needs transformative changes to align with global practices, which will resolve persistent inefficiencies and bottlenecks in the domestic market.

CHAPTER 03

Everything Seems to Have Changed, But Nothing Has Changed

Mohammad Shaaf Najib

3.1. Evolution of the Automobile Industry in Pakistan

Owning a four-wheel vehicle was still a luxury in Pakistan not too long ago. In fact, up until the start of the 21s century; vehicle ownership was limited to only a small number of households while it was not even a distant dream for majority of the rural households. The turn of the century brought a major change in Pakistan's economic outlook. The country focused on consumption led economic growth which was fueled significantly by imported consumption goods. From food items to high-tech electronics, all kinds of goods started being imported to support the consumption spree. Furthermore, the government introduced multiple financial instruments and measures to facilitate the jump in consumption. Credit cards and bank financing for various activities were also introduced in the economy in the same period.

The auto industry of Pakistan too benefited from pro-spending economic vision of the time. In 2004, the government through commercial banks introduced auto financing schemes. The idea behind auto financing schemes was to provide financing on relaxed terms to make purchasing of cars financially feasible for those who could not buy vehicles otherwise. The next few years saw a surge in vehicle ownership, as a large number of people benefited from the auto financing scheme.

Pakistan's economy though has seen many booms and busts. With high degree of macroeconomic imbalances, the economy has been vulnerable to external shocks as well. This has impacted the performance of the auto industry of the country in a similar manner as well. While the country saw increased economic activity, primarily through exaggerated demand in the economy during the first decade of the century; as a result of poor macroeconomic fundamentals and the global financial crisis the situation started reversing. The country adopted strict demand management policies as risk of default peaked. The auto sector mirrored a similar kind of turn as well, as car financing became difficult as interest rates were increased (Nisar, 2017).

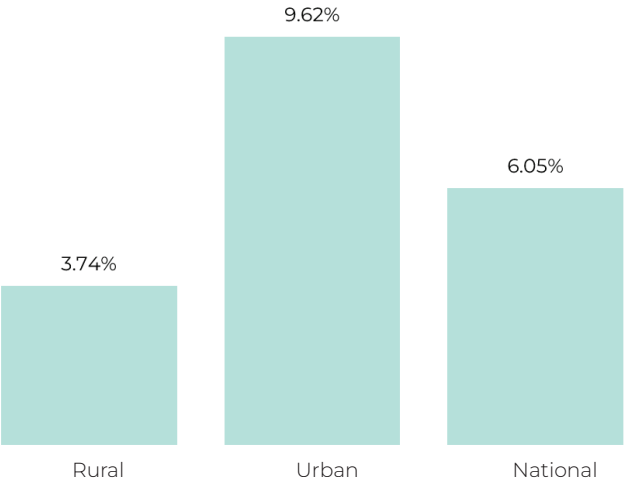
The country's economic conditions have always, and particularly in the last couple of decades, faced significant twists and turns. Period of high growth followed by an increased default risk leading to the IMF emergency ward has been the continuous trend. Even right now, the country is in dire straits. Productivity and exports are on a downfall, imports despite increasing demand have been curbed to forcefully limit capital outflow as we try to negotiate the next tranche of IMF loan. The auto industry's trajectory has not been much different either. From easing up financing terms to encourage more sales, to increasing interest rates and banning imports of vehicles to curb demand and prevent capital outflow for CKD kits and CBU vehicles both. Currently too, the auto industry is in shambles. Due to the prevalent economic conditions, the demand for vehicles is

much lower while due to restrictive government measures, the banks are unable to provide the LC for importing CKD kits thus preventing auto companies in the country to supply adequate number of vehicles either.

3.2. Cars in Pakistan: Too Many or Too Few?

While vehicle ownership has increased over the past few decades, it still remains significantly low in the country. More often than not a myth is sold in Pakistan regarding vehicle ownership and how the rush on roads is an evidence of increase in number of cars in Pakistan. On the contrary, the facts tell an exact opposite story. According to the PSLM Survey of 2019-20, 94 percent of households even currently are reported to not own even a single car in Pakistan (Pakistan Bureau of Statistics, 2021). Even in urban areas, the car ownership is just below 10 percent of the total households, while not even four percent in rural households (Figure 3.1). Based on this, we can conclude that out of over 32 million households in Pakistan, only under 2 million households own at least 1 car. Out of these, over 1.1 million households belong to the urban region while only 772k households in the rural areas reportedly own a car.[1] With low sales domestically and no exports, one has to think if the auto industry has any economic benefits to the country or is yet another lost cause in Pakistan's manufacturing sector?

Figure 3.1: Household Car Ownership - Pakistan



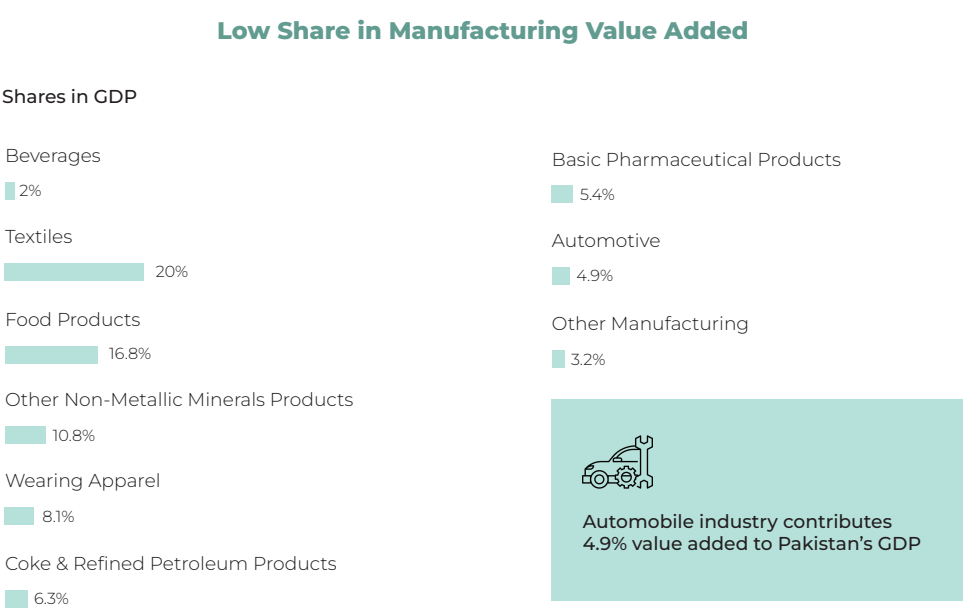
Source: Author's calculation using PSLM 2019-2020

The automotive industry in Pakistan started with the assembly of Bedford trucks in Karachi by National Motors Limited in 1953. The company later diversified its assembly portfolio by branching out into assembly of cars. The industry has been nurtured by the state as an infant industry, remaining extremely protected till the early 1990s. In subsequent years that was a shift towards major deregulation and Japanese manufacturers entered the market and set up assembly operations. This resulted in some measure of competition amongst manufactures including Suzuki, Toyota, Honda, and Mazda. Unfortunately, the structure of the industry has not witnessed much transformation in subsequent years and has remained by and large static till the mid-2010s.

The automobile industry of Pakistan does not have a major share in total value added (4.86) in the manufacturing sector (Figure 3.2); that distinction belongs to the categories of 'textiles and wearing apparel' and 'food, beverages and tobacco'. Both of these sectors are heavily dependent on the agricultural sector for raw materials and accounted for over 50 percent of valued added in manufacturing (in 2009-10). They accounted for 48.92 percent in 2015-16, which suggests Pakistan has had limited success in transforming its manufacturing base.

Despite the low share in manufacturing value added, the automotive sector still manages to make an important contribution to the domestic economy in terms of employment, revenue and foreign exchange generation, not to mention human resource development (as shown in Table 3.1). The annual turnover for the industry has been in excess of PKR 30 billion.

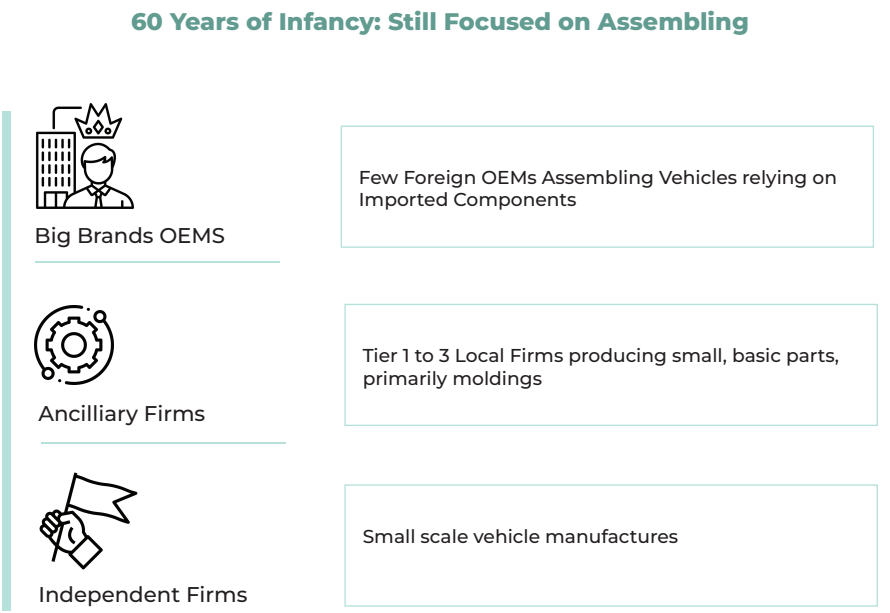
Figure 3.2: Manufacturing Value Addition



The automobile industry in Pakistan today consists primarily of several units producing original components for assembly (under license) under the deletion program and other units producing reconditioned and original components for local use.

There are 2,200 vendors in the country with a total investment of over USD 1.09 billion; that are engaged in the manufacturing of original components for the assembly operation under the deletion program[2] as well as producing reconditioned and original components for sale in the local market. The parts being manufactured for local supply include pistons, engine valves, gaskets, camshafts, shock-absorbers, struts, steering mechanism, cylinder head, wheel hubs, brake drums, wheels, bumpers, instruments and instrument panels, gears of all types, radiators, cylinder liners, blinkers, lights, doors and door locks as well as auto air conditioners.

Figure 3.3: Structure of the Automobile Industry in Pakistan



1. Authorcalculation, based on Population Census (2017).
2. Which was phased out by July 2006 under the WTO regime and replaced by the Tariff Based System (TBS)

Table 3.1: Key Statistics of the Automotive Industry of Pakistan

Key Statistic	Value
Economic Multiplier	1.3
Annual Turnover	PKR 30 Billion
Investment	USD 1.09 Billion
Contribution to GDP	2.8 % (USD 3.6 Billion)
Contribution to Revenue	USD 0.82 billion (indirect taxes)
Direct Employment	215,000
Job Multiplier	1.8
Vendor Base	2,200 units
Organized and Tier One	450
Tier Two	425
Unorganized and after-market suppliers	1325

Source: Author's estimates and industry reports based on data provided by PAMA, PAAPAM, EDB

In terms of the global automobile industry tiered supply chain, Pakistan entered the market at the Tier 3, and the ancillary industry has been able to make limited progress up the value chain, with a number of units reaching a Tier 1 status. In fact, the automotive industry of the country can be classified as full-line production of the major automotive vehicles (including buses, tractors, trucks, 3-wheeler rickshaws and motorcycles). The industry has not managed to significantly increase the purchase and use of domestically manufactured components and is regarded as labor intensive assembly shops rather than modern production lines. Local component manufacturers by and large have not yet managed to reach international levels of operation, though a small number do manage to export.

The majority of these manufacturers have the capability to supply only one component, and not an assembly of components as Tier I manufacturers do in other countries. Traditionally the Tier I function is undertaken by component manufacturers that have achieved sufficient technological capabilities to provide complex assemblies and collection of components pre-assembled to Original Equipment Manufacturers (OEMs). This is currently being managed by the OEMs themselves in Pakistan. Moreover, component manufacturers can be classified as OEM suppliers/vendors or aftermarket parts suppliers.

3.3. Emergence of the Pakistan's Big Three

We have often heard the term Big Four used for the top four accounting firms globally as measured by revenue. Similarly, in Pakistan the term Big Three has been associated with the three automobile companies that are considered to have held the market hostage for a significantly long period. Many other companies tried to operate in Pakistan, especially

during the first decade of the 2000s, but remained unsuccessful and were forced to exit the market. The three companies, Toyota, Honda and Suzuki, otherwise referred to as the Big Three have though continued operations despite the regular ups and downs of the economy.

3.3.1. Indus Motor Company

Indus Motor Company (IMC) was incorporated in 1989 as a joint venture between companies belonging to the House of Habib of Pakistan, Toyota Motor Corporation and Toyota Tsusho Corporation. As per this JV, IMC is the local manufacturer and assembler of the Toyota vehicles in Pakistan. These now include their flagship passenger vehicles Corolla and Yaris, the Pick Up Truck Hi-lux as well as the SUV Fortuner. Toyota has recently also entered the Compact SUV market by introducing Corolla Cross Hybrid and Non-Hybrid variants.

3.3.2. Honda Atlas Cars Pakistan Limited

A joint venture between the Honda Motor Company Limited Japan and the Atlas Group of Companies, Pakistan led to the established for Honda Atlas Cars Pakistan Limited which started its operations in April 1993 while the assembly line rolled off the first Honda Vehicle in Pakistan on May 26, 1994. With 58 dealerships offering from one to three major services to customers across the country, Honda for many years specialized in assembling and manufacturing only sedan vehicles in Pakistan. Recently, it has also added to its fleet a subcompact crossover SUV and a SUV each. Consumers now have five Honda vehicles to pick from in the local market namely Civic, City, Accord, BR-V, HR-V and CR-V.

3.3.3. Pak Suzuki Motor Company Limited

As a result of a joint venture between the Government of Pakistan and Suzuki Motor Japan, Pak Suzuki Motors was incorporated in the year 1983 as a subsidiary of Suzuki Motor Japan thus becoming the official assembler and distributor of Suzuki manufactured vehicles in Pakistan. Over the decades, Suzuki has offered a wide range of vehicles in the Pakistan automobile sector and thus remains as the largest car assembler in the country. Suzuki has assembled hatchbacks, sedans and MPVs for the Pakistan local market and over the years kept changing the four-wheel vehicles on offer for its consumers. It has recently discontinued the production of its all-time famous Mehran hatchback. Suzuki remained the only manufacturer in the hatchback category, and even today in a more competitive market remains the major producer and market shareholder of hatchback category vehicles. It has thus been able to maintain a large market share among the entry level vehicles and successfully kept other automobile manufacturers away from this segment, further strengthening its monopoly.

As mentioned earlier, the economy of Pakistan has seen numerous booms and bust cycles in rather smaller periods. The same has impacted the country's industrial performance, including the automobile sector. Furthermore, arbitrary policy changes and inconsistencies have made doing business in the automobile sector even more difficult. Despite these difficulties from the policy side, it is a positive fact that these three companies have sustained in Pakistan. In the same period, few other companies also entered the Pakistani market through Joint Ventures or other partnerships. These included Hyundai, Kia, Daewoo, Nissan and Chevrolet. These companies were unable to gain any significant market share and after doing business for a few years decided to exit the market. Pakistan by 2010 was back again to just three companies available to choose from for the consumers.

While the persistence of Big three in times of economic turmoil is praise-worthy, blame for lack of options for consumers regarding cars for a very long times goes to these companies as well. Firstly, the big three have over the years directly or indirectly influenced automobile sector policy in Pakistan. The only thing consistent in varying policy initiatives has been high protectionism and a fantasy of localising entire production line for vehicles. Protection from external competition has kept the industry from developing any competitive edge, while the consumers mostly limited to only a handful of options to pick from. Secondly, the big three companies never diversified in the types of vehicles they were offering. While Honda and Toyota focused on competing in the sedan section, Suzuki held the monopoly for hatchbacks. Even Suzuki, one of the big three companies was unable to break through the sedan market despite introducing multiple sedan vehicles time to time. Toyota was again the only company primarily offering locally assembled or CBU imported SUVs and pickup trucks.

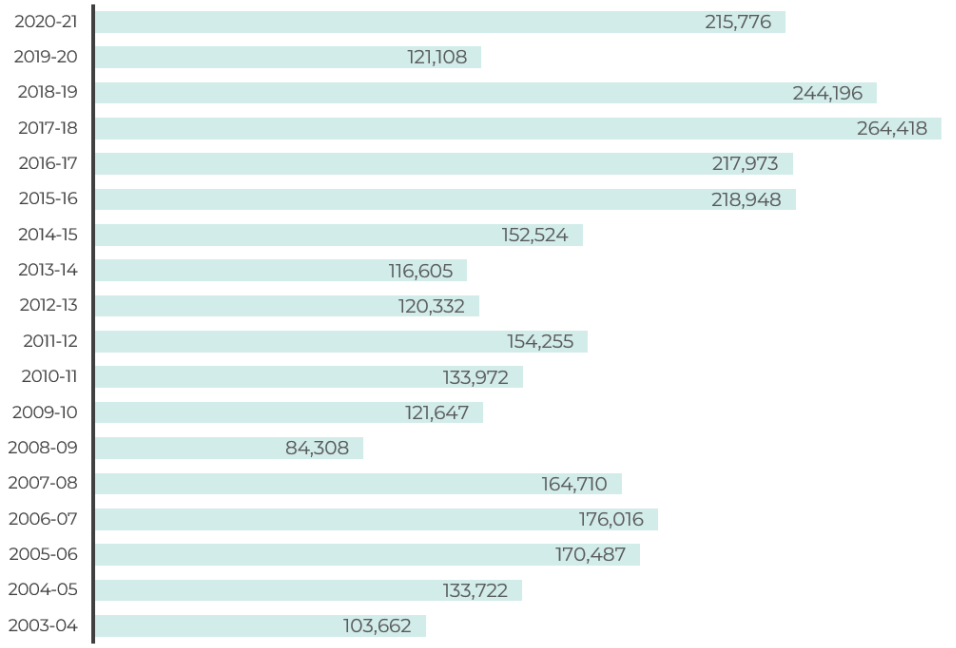
3.4. Key Characteristics of the Pakistan's Automotive Market

There are several key characteristics of the Pakistan automotive market that sets the country apart from other developing countries and that should be borne in mind while assessing the policy outcomes.

3.4.1. Low Levels of Vehicle Production

As mentioned earlier, only six percent households in Pakistan have reported to own a car. We consider this as a significantly low ownership ratio of cars in Pakistan, and the production numbers over the last two decades mirror the same view. While the production numbers have steadily increased over the years, no significant enhancement is visible despite numerous policy initiatives and interventions during the same period.

Figure 3.4: Pakistan Automobile Industry Vehicle Production



Source: PAMA

The Auto Industry Development Programme Policy Report 2007-2012 (Ministry of Industries Production and Special Initiatives, 2008) targeted increasing production of vehicles in Pakistan to 500,000 by 2011, while the Automotive Development Policy 2016-2021 (Ministry of Industries Production and Special Initiatives, 2016) set out a goal of taking production of cars in Pakistan to 350,000 by 2021. Not only did both the policies failed to achieve their set out targets, the targets have been revised downwards for a decade later. This represents the clear disconnect between the policy and ground realities of the automobile industry of Pakistan, as well as points out to weakness and shortcomings of the policy which is unable to encourage production to increase significantly. Further, the policy goals seem to be designed to appease the galleries with sweeping statements and lack any actual homework prior to setting out the policy goals.

The Auto Industry Development and Export Policy 2021-2026 (Ministry of Industries Production and Special Initiatives, 2021) now intends to increase the installed capacity for production of 4-wheel vehicles in Pakistan to 600,000 by 2026. While the installed capacity in the country has increased from 275,000 ((Ministry of Industries Production and Special Initiatives, 2008) in mid 2000s to 418,500 (Ministry of Industries Production and Special Initiatives, 2021) in 2021, it is important to note that the vehicle production numbers have remained much less than the capacity most of the years. Pakistan had started producing over 200,000 cars in a

single year even before the AIDP 2016-21 was presented and approved, and hence the AIDP 2016-21 seems to have made no impact in increasing vehicle production in the country despite granting greenfield and brown-field status to many manufacturers. Resultantly, now over 10 automobile companies are producing almost similar number of vehicles as just the Big Three were doing prior to the AIDP 2016-2021. If anything, the market share of an individual company has reduced while the size of the pie remains same, thus pushing them further away from any chance of achieving the economies of scale that could help in reducing the price of vehicles if mass production is achieved in the country.

Basing off the above explained information, we can conclude that a few things about Pakistan's auto industry. Firstly, the demand for cars under status quo i.e. vehicle prices, economic situation in times of no shocks, inflation etc. the demand for new vehicles lies somewhere between 200,000 and 300,000 annually. Secondly, all production currently it being done only for the local market and neither any export is taking place nor are there any plans or efforts from the industry to target any export markets. This situation hence brings forth the following questions:

> **i. What is the rationale behind targeting further increase in production capacity without increasing production or increasing demand through improving consumer purchasing power?**
>
> **ii. Can production be increased and sustained at higher levels unless manufacturers target export markets as well?**

3.4.2. No Export Vision

Pakistan's vehicle ownership and production both remain at significantly low levels, particularly due to limited annual demand for new vehicles. This further deteriorates the viability of automobile manufacturing in Pakistan. With market shares per company depleting due to the new entrants as supply and demand of vehicles has failed to significantly increased, the fear regarding another wave of exits of firms from the auto sector remain high. The industry is heavily dependent on the import of Completely Knocked Down (CKD) kits and hence not just production but prices are also vulnerable to any external sector shocks or macroeconomic imbalances in the country.

A major reason for low demand of vehicles are the prices of vehicles, which are unaffordable for a large proportion of the population and with worsening exchange rate continue to rise steeply. With the companies targeting only the local consumer and having no export ambition, even the former BIG THREE of the country's auto sector have failed to achieve economies of scale. Consequently, the low production volume has not allowed them to reduce their per unit costs and hence the price of

vehicles which would have made cars more affordable for the general public and increase demand locally as well.

3.4.3. The Obsession with Localization

LOCALIZATION: If Pakistan's continued vision for the automobile sector has to be described by a single word, it will be localization. This vision is reflected clearly in the multiple policy documents issued and approved by the government as well as many other arbitrary policy interventions through SROs, mini budgets and otherwise.

High protection to local firms through increasing import tariffs and other non-tariff measures including absolute bans and other restrictive measures have constantly been utilized in a bid to drive away foreign competition in the automobile industry in attempts to push for increased localization of the automobile industry.

The government of Pakistan introduced the Localization Policy in 1987 for various industries including the car manufacturing industry and continued for the next decade and a half. It was also commonly referred to as the deletion program due to its aim to eliminate import of manufacturing contents and instead building local capacity to manufacture the same for domestic industries. The deletion program resulted in establishment and to some extent flourishing of the vendor industry for car manufacturing. The vendors though remained focused on producing parts that required only basic production technologies and looked to cater for just the local demand. Consequently, no technology transfers or upgradation of the vendor industry and its workers was achieved as part of the deletion program under the 1987 localization policy.

The phasing out of deletion program was not an effort to correct the course of auto sector policies. Instead, the deletion program was replaced by a Tariff Based System (TBS) in an attempt to comply with the World Trade Organisation's Trade Related Investment Measures (TRIMs) which Pakistan was a signatory of. As per the TBS, automobile assemblers were permitted import to Completely Knocked Down (CKD) kits to assembly the vehicle at their assembling facilities in Pakistan. The components that under the deletion program were considered to have been localized were placed under a higher custom duty while those not indigenized by June 2004 were permitted to be imported at a relatively lower tariff rate. The TBS has been in place ever since with a bi-annual review to update the list of localized components. TBS continues to provide high protection to the local vendor industry regardless of its capacity to fulfill the demand of local auto sector in terms of quantity and whether the parts produced domestically meet the standards of global competitors or not. TBS, just like the deletion program has failed to enhance the productivity of local vendors or encourage the upgradation of technology to manufacture high value parts in the country.

Now, the AIDEP 2021-2026 looks to continue with the tariff structure and protection provided for decades. The localization policy is still well and truly alive, earlier through the deletion program, TBS and now the same is being presented in the AIDEP under a new packing. Continuing the TBS tariff regime is the only concrete and certain policy measure regarding the auto parts industry mentioned in the AIDEP while other interventions have been left to consideration in view of fiscal developments in the country.

3.4.4. Regulatory Interventions Creating Bottlenecks

As mentioned above, government's vision with regards to the automobile sector has for decades focused on localizing production. Yet, after over three decades since the introduction of the first localization policy for automobiles, Pakistan's car manufacturing remains highly import dependent. The issue is not just the failure of localization promotion repeatedly, but the lack of realization that the regulatory interventions by the government are in fact counter-productive as they prevent competition and discourage any innovation in the car industry and to the parts manufacturers as well.

The tariff structure for the import of CKD kits is managed through the following three SROs:

1. **SRO.655(I)/2006:** this SRO permits the vendors and parts manufacturers for import of parts and other vehicle manufacturing inputs not listed in the SRO.694(I)/2006 under a concessionary tariff regime

2. **SRO. 656(I)/2006:** this authorizes the vehicle assembles/OEMs to import CKD kits at concessionary duty

3. **SRO.693(I)/2006:** this SRO contains the list of auto parts that are believed to have been localized and hence any import of these parts will result in payment of additional duty.

The policy implemented through these SROs has driven away the competition from local parts industry. With a major price difference due to tariff differential, the OEMs are forced to procure the party locally or being forced to increase price of the vehicle due to increased cost of production. In a country where the vehicle ownership is as low as six percent households and the supply for new vehicles has not yet surpassed the 250,000 mark, increasing the price is not always a feasible option for the assemblers.
Knowing this, there is no incentive for the local part manufacturers to improve their product quality or increase production efficiency. Instead, they continue to perform in the same manner over years. This tariff regime has also discouraged any innovation among the parts industry as

the car companies by regulatory intervention are forced to procure the available components regardless of quality and price. Consequently, the major contribution of the above mentioned three SROs is discouraging innovation and investment in the local parts industry, eliminating any incentive for increasing productive efficiency and also prevented the car companies from increasing the production levels close to the full capacity of their plants and assembly lines.

Pakistan's local parts industry has failed to kick-off or be effectively localized as envisioned by the decision makers of the country, but has been successfully been disintegrated from the global value chain completely.

3.4.5. Production in Isolation: Disintegration from Global Value Chain

With a continuous increase in globalization over the past few decades, and hence the increase of trade among countries; the manufacturing industry has significantly evolved. While comparative advantage is still held important in making manufacturing decisions, making the final product is no more the goal. Instead, the world has moved towards the idea of a global value chain. The automobile industry is not different either. While some countries such as Japan have achieved great deal of automobile manufacturing advancements and are able to produce majority of parts as well as carry out vehicle assembly by themselves, many countries still focus on manufacturing selective parts and components.

As a result, the target market for parts manufacturers are not just their local automobile producers and assemblers, but manufacturing units from a single country market their products to automobile companies across regions. This has helped develop a global value chain for the automobile industry allowing for high-tech vehicles being made available at least possible costs as parts manufacturers specialize and expand production to achieve economies of scale.

While the world has moved on from the Internal Combustion Engine vehicles to Electric Vehicles, the production process continues to follow the GVC model.

Pakistan, on the other hand has missed the opportunity to become part of the automobile GVC. Instead, the policy focus for the past nearly 40 years now remains on absolute localization which has failed to provide any tangible benefits to the industry and most importantly, to the consumers.

Despite decades of fantasizing domestication of automobile production, Pakistan remains high on automobile imports. The chunk of it belongs to import of Completely Knocked Down (CKD) kits, imported directly by the

automobile companies in Pakistan for vehicle assembling. On the other hand, the exports of auto parts remain negligible. On one hand we have not specialized in producing any auto parts or components that can be exported to other countries, and have also failed to develop capacity to even assemble parts to form vehicle kits. Instead, our imports rely not on just auto parts but build up CKD kits which only need to be screwed together to assemble the vehicle.

Localization focus has isolated Pakistan's automobile industry which now lags decades behind the world, while also failed to develop any local capacity to contribute effectively to the production process.

3.5. Parts Industry: Challenges and Limitations

The intention behind decades of localization has been to develop the local parts industry capacity to not only produce all the necessary parts for a vehicle but also fulfill the local demand for automobile OEMs and replacement market both. The parts industry consists of two types of firms. The first termed as vendors who are responsible for supplying parts to only the OEMs whereas the rest are referred to as the auto parts manufacturers who supply their products to the replacement market as well as to the OEMs. Approximately 2,200 auto parts manufacturers and vendors operate in Pakistan producing and supplying automotive parts for automobiles, 2/3 wheelers, tractors, busses and trucks (Pasha & Ismail, 2012).

Majority of the parts manufactured belong to tractors and motorbikes where the OEMs have achieved near 100 percent localization, while localization in busses and trucks remains low. On the other hand, there are claims for some degree of localization in the automobile industry as whole, however, the story cannot be left as is.

It is essential to realize that the automobile parts industry in Pakistan consists mainly of small firms with minimal production levels. Further, despite decades of localization efforts Pakistan's automobile parts industry has failed to penetrate into high-tech parts manufacturing. Instead, most of the firms specialize in use of technology related to moldings, casting, forging, casting among others.

Majority of these firms have rather low capital investment, and do not operate on large scale either. The auto parts industry is also disconnected from the outer world in two ways. Firstly, there is no foreign investment or partnership of foreign firms with Pakistan's auto parts manufacturers. As a result, there is no technology and skill transfer or capital investment from foreign firms. This has restricted the growth of auto parts manufacturers in the country who are to date stuck in producing no to low tech parts, while the high value modern technology based parts are imported along with many other CKD kits for automobile assembling and manufacturing.

Secondly, with high protectionism provided to the automobile industry as explained in the section 'Regulatory Intervention' above, the government has eliminated any sort of foreign competition in the parts industry as well. Any part that local firms continue to produce, if imported will be taxed heavily. This creating an unfair advantage to the local firms who are now guaranteed a market with no competition, thus taking away their incentive to increase efficiency and productivity.

The high degree of protectionism provided to the automobile sector is also anti-innovation and anti-modernization. The auto parts manufacturers products are based on the designs and specifications as provided by the OEM. However, any change in specifications and designs will require additional investment by the parts manufacturers for installing new dyes as per the needs of the new specifications provided by the OEM. Being small firms with low capital input, the auto manufacturers do not have the financial capacity and will to invest more capital frequently to adapt to the changing designs. This leaves the OEMs with two options: either to not change the vehicle design and parts configuration, or to modernize but import the required parts at higher taxes thus increasing the price of vehicle to the consumer. Whichever way the OEM decides to step; it is a loss-loss scenario for the end consumer which will either continue to be provided an outdated vehicular design or a much higher priced vehicle primarily due to the taxes. This has been witnessed in the Pakistan automobile industry over the last couple of decades where there have been vehicles for which there has been no meaningful change. Suzuki Mehran followed the exact same design for over two decades up until the closure of its production, while Honda did not introduce its 6th generation of B category sedan Honda City for at least 7 years after it had been introduced elsewhere. The 5th generation Honda City continued to be produced and sold in Pakistan for 13 years from 2009 to mid-2021.

Similarly, Toyota and Honda never stepped into the hatchback market where the most localization is assumed to have been achieved, while even the new entrants have preferred to avoid this segment. Instead, the new entrants focused on and succeeded in penetrating the compact SUV market which had no offerings for the consumers before thus not even a single part fell under the localized components thus avoiding the regulatory barriers altogether. On the other hand, the new introduced variants of hatchbacks are priced significantly higher as they require the supposedly localized parts but as per the new specifications which the local firms do not have the capacity to produce or the financial capacity to invest in new dyes. As a result, the OEMs are forced to import those parts which higher duties the burden of which is then transferred onto the consumers by increasing prices. Furthermore, the OEMs on few occasions have also bailed out their vendors by providing loans or investing in their business to keep the vendors from exiting the industry. In case where the vendor shuts down the business, the OEM would be forced for importing that

part which will be constituted as localized and hence charged a higher duty as per the SROs.

In order to uplift the local parts industry, which is essential for uplifting the entire automobile sector, the government must end the policy of disjoining the parts industry from external world. Instead, the parts industry must be encouraged and pushed for increased interaction with global firms through joint partnership for capital investment and technological and skill transfer as well as competitors by providing foreign firms an equal opportunity in Pakistan's automobile sector. While some firms may end up shutting down as a result of failing to compete, this will prove to be beneficial for the auto parts industry and hence the automobile industry in Pakistan. Partnering and also competing with foreign firms will allow local firms to not only enhance their production and technical capacity, but also open up avenues for them in other countries and regions, thus becoming a part of the global value chain.

3.6. Not All is Doom and Gloom in Pakistan's Automobile Industry

Pakistan's automobile industry has been prone to severe issues that have significantly reduced the consumer welfare and the responsibility lies upon the shoulders of all stakeholders. The industry is not just years but decades behind the world in many aspects, including quality, production levels and vehicle features. While this paints a fairly dismal picture of the automobile industry, which is not far from reality, not everything has been in absolute shambles either. Instead, in recent past the industry has undergone some necessary progress.

Following the grant of brownfield and greenfield status to multiple companies under the Automotive Development Policy (2016-21), many new companies entered the Pakistan automobile market. While the total production of these new entrants remains low, it has successfully challenged the hold of the infamous Big Three on the automobile market as now over ten more companies have entered the market.

Previously, the choice for the consumers was limited not just in terms of companies but also in terms of vehicles. As mentioned earlier, out of the three companies, only two companies competed in the Sedan category while the third company i.e. Suzuki had the monopoly in hatchback category. Even Suzuki despite introducing four different types of sedans in over two decades was unable to penetrate into the sedan market. Further, Toyota remained the only company offering SUV and Pickup truck vehicles in the Pakistan market.

Now, after the entry of more companies, the big three hold on the market has been shattered in terms of companies as well as the types of vehicles available. New companies have introduced vehicles in all categories,

giving consumers a wide range of vehicles to choose from while also providing competition to the Big Three. The compact SUV category was entirely unavailable in Pakistan, and has been successfully penetrated by all the new entrants. Consequently, each company has now a wider range of vehicles to offer to consumers. Fostering competition in the industry has increased the consumer welfare, as companies now seem to be competing on prices as well as vehicle characteristics. While the production capacity in the country has significantly increased, the production levels remain low which has limited the benefit that could have been extended to the consumers. Booking system, delayed deliveries and On Money still exist and acts as a barrier towards extending the complete benefit of expansion of automobile industry in Pakistan.

Pakistan in April 2020 has become a signatory of the WP-29[3] of the UN 1958 Agreement. Under this agreement, Pakistan has opted to ensure the implementation of 17 out of 160 safety and environment regulations. This comprises regulations regarding brakes, steering, tires, lighting, safety belts, seats, airbags, collision, safety glazing, mirrors and cameras, anti-theft devices etc. for cars as well as heavy commercial vehicles. These regulations have been presented for over 60 years and implemented in various countries since then. Pakistan's automobile industry has adopted only 17 of these regulations as mentioned above, that too six decades later. However, despite the delay it remains a step in the right direction towards ensuring better consumer safety and improved vehicle quality in Pakistan.

Besides, the automobile industry is now also tapping into technological change. The advent of the fiscal year 2024 saw for the first time Hybrid Electric Vehicles (HEVs) being introduced in Pakistan. Hyundai became the first one to offer a HEV in Pakistan as it introduced Santa Fe in the local market in October 2023. This was followed by Sazgar (local partner of Chinese company Great Wall Motor) and Toyota launching their HEVs in Pakistan few months later as well. Here again, Pakistan seems to be lagging decades behind the world but it is a welcome change in the automobile industry of Pakistan. Moreover, in attempts to stay parallel with the global changes in the automobile industry, automobile companies in Pakistan are now also shifting focus towards fully electric vehicles.

Earlier, consumers in Pakistan had only the option of importing Electric Vehicles from abroad or purchasing through local dealerships of foreign luxury brands such as Audi and BMW. However, noticing the change in preferences of a certain consumer segment as well as the shift of focus of the government towards EVs, the automobile companies in Pakistan have begun tapping into this market as well. Few companies already have introduced their EVs for the Pakistan market, while more are expected to do so in the coming future. The benefits extended to encourage the use of EVs including reduced import taxes and duties as well as registration costs is taken as a positive signal by the automobile companies for intro-

ducing EVs in Pakistan. The penetration of EVs in the country, particularly to the extent as desired in the National Electric Vehicle Policy (2019), seems like a far-fetched dream in the status quo. The chapter of Electric Vehicles later in this book analyses the potential, benefits and challenges for transition to EVs in Pakistan.

What we can conclude from the above analysis is that if the government allows competition to foster in the automobile market instead of trying to protect a handful of firms and obsessing over absolute localization of the automobile industry, the industry can flourish in a way to provide quality vehicles with global equivalent features at a reasonable price to enhance consumer welfare and increase vehicle ownership in Pakistan. In addition, facilitating imports and lowering custom duties and taxes to an adequate level will also act as a booster for the automobile industry in Pakistan.

3.7. The Diagnosis

Pakistan's automobile industry has been present for numerous decades, yet the automobile ownership in country remains significantly low. The companies have failed to provide consumers affordable, good quality vehicles equal to the global standards. The local automotive industry has failed at growing into a high-tech competitive industry that could not only supply parts to the automobile companies in the country but also become part of global value chain by targeting export markets.

The role of government in protecting this industry from competition which has instead created hurdles in its growth is cannot be ignored either. The obsession with localization has completely failed yet there seems to be no review of policies at the government level or any intention to move away from it. This has resulted in the country's automobile industry to be lagging decades behind the rest of the world.

While there have been some positive advancements in the industry in recent few years, they are not enough to bring it up to the level of global industry or to significantly increase consumer welfare. Drastic and brave steps must be taken to Revitalize Pakistan's automobile industry, as have been suggested in this research. Currently, it seems that despite all the changes we may see on the face of automobile industry in Pakistan, not much has evolved as the same issues persist as they did decades ago when the industry was initially set up.

3.8. Key Takeaways

- Structural issues still persist in the automobile industry.
- Despite continued efforts of localization, the policy has failed.
- Local auto parts manufacturers produce only basic, low-tech products.
- Automobile assemblers depended on import of CKD/SKD kits for value added components and vehicle assembly.
- Policy formulation appears to be divorced from reality.
- Automobile industry and auto parts manufacturers both disintegrated from global value chain. They target only the local market and have failed to increase production to meet even local demand, let alone expand into foreign markets.
- In recent years, some positive changes can be seen. Number of assemblers has increased from 3 to over 10, hybrid vehicles are being introduced while companies also seem to be benefitting from favorable tax regime to introduce EVs in the country.
- Production and availability of vehicles still remains limited. Long delivery times, price fluctuations, arbitrary tax changes and On Money continue to haunt consumers.
- CBU import restrictions have unnecessarily protected companies from foreign competition and reduced consumers' options.

3. WP-29: working party 29 is a UN forum that works towards harmonization of vehicle regulations globally under the ambit of United Nations Economic Commission for Europe (UNECE).

CHAPTER 04

Imports, Dealerships and the Unending Menace of On Money

Usman Qadir & Mohammad Shaaf Najib

4.1. Introduction

The constant gap in demand and supply of vehicles in Pakistan gave birth to a phenomenon unique even today to the Pakistani automobile market known as the 'On-Money' for brand new vehicles. For immediate possession of an automobile that has been purchased, the buyer must pay a premium charge: On-Money. The question is, what is this On-Money, and why must one pay this to possess something one has already paid for?

In early 2000s, when car sales in Pakistan rose sharply, aided also by the introduction of car financing services by the banks, the demand and supply gap widened. The number of buyers increased rapidly, while vehicle production capacities did not significantly increase to match this rise in demand. This resulted in an increased waiting period for the delivery after booking of the vehicle. An opportunity was thus created for exploitation and profiteering by those in the middle of the supply chain i.e., the 3S dealerships.

At the time of vehicle shortages and production delays, the car dealers started charging On-Money for quick delivery of brand-new vehicles. on money is a premium charged over and above the quoted price of a vehicle for a quick delivery. For instance, the company ABC sets the market price of its vehicle X at PKR 2 million inclusive of all taxes, but the tentative date of delivery is 6 months from date of booking. The buyer is forced to pay a huge amount of money and wait for a long period of time. This allowed the car dealers to come up with the process of on money, where they offer the buyers a way out at the time of booking. As a result, the buyer is given the option to pay an 'm' amount of money, over and above the price quoted by the company, and get the car in under a week, even on the same day in some cases. The buyer, by paying this on money, is then relieved of the waiting time for vehicle delivery and obtains ownership of the car immediately.

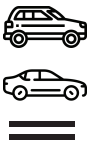
The question that arises is, when the company is taking a much longer period to produce and deliver vehicles, how can the dealers offer express delivery? Does that mean the companies are directly involved in in encouraging the culture of On Money on sale of vehicles or indirectly seeking the benefits of this culture? This chapter sheds light on the current structure of the industry and highlights the slim margins between production and sales in virtually all sub-sectors of the industry. The on mechanism is discussed, followed by the implications for consumers and the dealership model that fosters this unsavory practice.

A possible way forward, based on a new import framework for vehicles is proposed to reign in the nuisance of on money.

4.2. Fostering the On Culture

The automobile industry of Pakistan was set up with the assistance of foreign firms by forming Joint Venture agreements to facilitate the transfer of technology and know-how for manufacturing automotive vehicles of all types. Income levels in the country have influenced growth of the sectors of the industry; the motorcycle and small automobiles have become the workhorses of the low and lower-middle income groups of the economy, while high powered luxury sedans are the preferred choice for the higher income bracket in the economy. In the motorcycle industry, the established Original Equipment Manufacturer (OEMs) are facing stiff competition from the new incumbents from China, but recent trends indicate they are managing to hold their own, no doubt capitalizing on brand name, quality and after sale service while the Chinese brands are focusing on undercutting the price (Qadir, 2016).

Figure 4.1: Pakistan Annual Vehicle Production (2016-17 to 2020-21)



	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
	9,228	20,849	13,574	7,318	19,290
	186,936	217,774	209,255	94,325	151,794
	196,164	238,623	222,829	101,643	171,084

Production data for PAMA members, Taken from PAMA website

The domestic automobile industry in Pakistan is comprised of several OEM firms that are manufacturing a variety of products in the industry, ranging from two and three wheelers to passenger cars, commercial vehicles and even buses, trucks, and tractors. The distribution of these manufacturers is skewed in favor of two and three wheelers (motorcycles and auto rickshaws) and there is a high degree of concentration in the remaining segments of the industry.

Table 4.1: Original Equipment Manufacturers (OEMs) Registered with PAMA

Category	PAMA Registered OEMs
Passenger Cars	5
Trucks	3
Buses	3
Jeeps	4
Pick-ups	5
Farm Tractors	3
Two and Three Wheelers	10

Source: PAMA Website

The on money culture is not hidden from anyone, and while the regulators (i.e., Auto Industry Development Committee on the supply side, and Competition Commission of Pakistan on the demand or market side) and companies might not be actively involved in this, but they have not taken any steps to curb the practice. Instead, their in-action has ended up aiding the own culture in Pakistan.

When a company opens bookings for a new vehicle, the 3S dealers themselves book several vehicles. Not only does this create artificial demand at the time of booking, but it also creates hypes about the vehicle in the market. As a result, more people are pushed to book their vehicle as soon as possible due to rising bookings. This creates a fear among potential buyers that waiting a while before booking could result in a much longer waiting period thus better to book immediately. This overbooking causes severe issues for the companies as well who are then unable to meet the demand, leaving the field open for 3S dealers to exploit buyers. As a result, when the vehicles booked by the 3S dealers themselves are delivered to them, they start offering the car to buyers with an immediate delivery under the condition they pay some premium over and above the actual price of the car. This premium, as mentioned above is known as the on money.[4]

While regulators and companies are rightly criticized for harboring the on money culture in Pakistan auto industry, and the 3S dealers held the most responsible for being at helm of the affairs in this, a lot of responsibility lies upon the buyers as well who are willing to pay the premium amount thus giving the dealers the message that not only are people willing to pay extra for an immediate delivery but there is a high demand regardless of the on money involved. In economic theory, this can be described as the "Time Cost of Money."

4. This discussion is based on information collected from interviews with various stakeholders in the industry, including those from several dealerships

The on money culture has become so common and successful in Pakistan's automobile market now, that only the 3S dealerships are not profiteering from this mechanism. Instead, many private dealers have developed their entire business model on the Own-Money concept. These private dealers now do not deal in secondhand cars, but instead deal in brand new cars only (a snapshot of on money, final price of the vehicle and supply side trends is given in Table 4.2 to highlight these distortions). They book new cars from multiple companies and then sell them to consumers who are willing to pay extra for buying the car immediately instead of waiting for months. The edge that these dealers have over 3S dealerships is that 3S dealers can deal in only one company's vehicles whereas the private dealers have no such restriction.

As On-money at any given time is impacted by the market forces of demand and supply, there is a fluctuation in the own-money demanded on every car. So, if the demand and supply gap for a certain vehicle is lower, with a minimal waiting period, then the on money demanded will either be quite low or none. On the other hand, as the demand supply gap widens and the waiting period increases, the own-money rate also increases. Consequently, the private dealers due to diversification can cater to such risks, whereas for the 3S dealers the risk levels are higher as they might not be able to earn the profits as they planned by twisting the consumer's hands if the automobile company is adequately managing its supply.

A look at on money, prices and automobile production and sales data reveals key insights into the working of the automobile market. For one, the ratio of on money to final price of the automobile does not vary according to price, but the perceived popularity in the market. Companies like Kia, Hyundai and MG are offering premium vehicles aimed at the upper segment of the market so the on money being charged is higher. Similarly, Toyota Yaris is an entry level Sedan, so it commands lower on money as compared to the company's Corolla variants. The Altis and Grande models are highly popular due to their brand recognition and relatively more rugged build.

Table 4.2: Vehicle Price, Production and Sales - July 2021

(PKR)

Manufacturer	Vehicle Model	Own-Money over Price	Price			Ratio: on money to Final Price (%)	Automobile (Nos.)		
			Ex-Factory	Ex-Dealership	Final*		Production	Sales	Gap (Production - Sales)
MG	ZS	165,000	4,099,000	4,149,000	4,239,768	3.89			
	HS	465,000	5,749,000	5,799,000	5,922,768	7.85			
Hyundai	Tucson	863,000	4,979,000	5,098,500	5,211,845	16.56	3,821	3,748	73
Kia	Sportage	396,000	5,270,000	5,370,000	5,488,775	7.21			
Toyota	Yaris	70,000	2,669,000	2,753,000	2,815,848	2.49	29,127	28,295	832
	Corolla Altis	370,000	3,249,000	3,333,000	3,412,035	10.84	18,552	18,355	197
	Corolla Grande	400,000	3,869,000	3,978,000	4,069,435	9.83			
Changan	Alsvin	250,000	2,519,000	2,569,000	2,628,168	9.51			
Honda	Civic	300,000	3,864,000	3,952,500	4,043,425	7.42	25,081	25,276	-195
Suzuki	Alto VXL	110,000	1,521,000	1,528,500	1,564,710	7.03	35,994	37,720	-1,726
	WagonR VXL	100,000	1,610,000	1,625,000	1,662,100	6.02	12,280	12,659	-379
	Cultus VXL	120,000	1,830,000	1,845,000	1,884,300	6.37	18,714	17,510	1,204

Note: Final price includes: Federal Capital Charges (Token Tax, Income Tax, Registration Fee, Professional Tax, Number Plate Charges) + Ex-Dealership Price

Source: PAMA Website, Interviews with various dealerships, Pak Wheels (2021).

4.2.1. Government Policies Boosting On Money

As established above, the primary reason for On Money premium is the significant gap between the demand and supply of vehicles in the country as well as the time delay in between the demand for vehicle and supply of the vehicle. On Money in the country seems to have reduced significantly in periods when import regulations for vehicles have been eased up. Reason being, the gap between supply and demand though not entirely but still considerably is filled by import of vehicles.

Consequently, whenever the government has increased curbs on automobile imports as a result of its sheer economic Misgovernance, it has ended up facilitating in increasing the dead weight lost in the automobile industry and hence enabling further increase in the automobile black market premium known as the On Money. Mohammad Shaaf Najib (2022) analyzing the import ban imposed by the Pakistan government on over 800 items in May 2022 concluded that the import ban imposed not achieve its objectives of reducing the current account deficit, instead it will contribute to further increasing the black market of all banned goods in the country.

A market survey conducted by the PIDE team at the time of imposition of the aforementioned import ban found that On Money which less than a year prior to the ban as shown in Table 4.2 averaged around seven

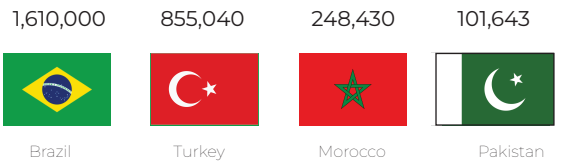
percent, immediately increased by five percentage points to on average 12 percent on the vehicles. Research and market survey combined are evidence enough to argue that bans and restrictions particularly in the name of protecting the current account deficit are in actuality counter-productive. These bans bring no economic benefit to the external sector of the economy but manage to create an alternate black market through smuggling of banned products while increase the cost and particularly premiums of products within the country by limiting supply and competition.

If Pakistan aims to protect its automobile industry while increasing competitiveness but also shielding its external account, instead of imposing blanket bans or restricting imports through other non-tariff measures, the country needs to develop an effective and efficient import framework. Section 4.6 below details PIDE proposed Import Framework for the automobile sector.

4.2.2. Policy Measures to Tackle On Money

Given that the production of automobiles in Pakistan is being done on-demand, rather than mass manufacturing, just in time or even lean production, the justification for charging own money does not make sense. The question is, what can the government do about this nuisance from a policy point of view – both in the short term and in the long run.

Figure 4.2: Passenger Vehicle Production - 2020



Source: Brazil and Turkey: Statista.com. Morocco: CEIC Data. Pakistan: PAMA

The answer to this question lies in short term measure(s) that the government can adopt, and the transformation in manufacturing that must be encouraged in the long term. As the source of the problem is on the supply side, in the short term the government must impose a ban on automobile bookings. Given the untapped demand in the domestic market, manufacturers must start manufacturing at capacity and supplying their vehicles in the market for sale as soon as they are manufactured. Customers will then purchase their desired vehicle directly from the showroom after negotiating the price rather than booking them in advance.

There is no reason why a model like that in other countries cannot be adopted here, with a minimum price for each model of vehicle is notified below which a dealer will not sell a vehicle. Dealers should be free to

charge premiums for their services, but consumers are free to shop around and choose the premium they are willing to pay. Setting a price cap or ceiling in the market translates to intervening in the market, and our experience has shown time and again that will not work and only creates further distortions.

Table 4.3: Existing vs Proposed Frameworks

Existing Framework	Proposed Framework
Consumer gives down-payment for booking of vehicle	**OEM manufactures vehicles according to productive capacity and delivered to dealer for sale.**
Consumer is provided with two options:	— OEM specifies a minimum price to be charged for the vehicle, and dealer is free to charge a premium for additional services.
— Option 1: To pay a large sum of money to book their vehicle and wait months for vehicle delivery.	— The premium varies by dealer and is not fixed as vehicles are readily available at multiple dealerships.
— Option 2: pay a premium, own money, and get the vehicle immediately.	— The invoice must document the dealership premium in addition to the minimum sale price specified by OEM.
Following Option 1, company orders the parts and assembles the vehicle on demand.	**Customer inquiries with multiple dealers to purchase a vehicle.** **Customer negotiates the best possible deal for themselves.**
Delivery date is tentative and changes subject to availability of parts.	**Customer acquires vehicle and invoice documenting full price paid for vehicle.**
Total cost at time of booking is tentative and can change by the time the vehicle is delivered.	
Customer has no definitive information regarding actual delivery date and final price of vehicle. Customer is liable for paying the final price of the vehicle at the time of delivery, whenever that may be.	
Following Option 2: Dealer pre-books vehicles and offers to customer an already delivered vehicle.	
— Dealer offers immediate transfer of ownership of vehicle against the "own" premium.	
— Customer is compelled to choose option of paying "own" premium.	

Regarding the long-term measures, the snapshot of productive capacity in the country, and comparative perspective has highlighted that there is scope for expansion of production capacity in the economy. That is why the recent focus on attracting new entrants into the market is a promising start. Now the government must leverage any concessions or benefits the new entrants and incumbents receive to push for an expansion of production capacity in the coming years. To lower costs it would be in the interest of manufacturers to source parts locally, for which the automotive parts industry needs to develop in terms of their manufacturing processes and quality control. This has been accomplished successfully in the past, in tractors and motorcycles segment of the market. However, this

4.2.3. The Long and Short of On Money

Pakistan has a unique automotive industry, with variety at the higher end of the spectrum in terms of different models being offered, and many variants being offered by a dominant player at the lower end of the spectrum. The culture of charging own money has been credited to production shortfalls that result in demand exceeding supply. On the flip side, consumes are willing to pay whatever premium being charged to take ownership of a product they have paid for in advance. In the US, dealers charge premiums for their services, but consumers are free to shop around and choose the premium they are willing to pay. The manufacturer identifies a minimum price to the dealers there, below which they cannot sell. The premium above that is negotiable between the dealer and consumer so allowing them to reach a mutually beneficial price and not letting one twist the arm of the other party.

Moreover, given the fact that production of automobiles in Pakistan is being done on-demand, rather than mass manufacturing, just in time or even lean production, the justification for charging own money simply does not make sense. This feature of the Pakistan automotive industry bears further analysis, but the current culture of own money in the industry is a result of actions of all stakeholders involved. The regulators must fulfill their duty to protect the rights of consumers by crippling the unregulated power at hands of auto manufacturers. Instead, regulations must focus on creating a market structure facilitating all market players and not tilting to one side only.

4.3. How the Dealerships Work?

It is imperative to understand the working of the automobile dealerships in Pakistan to recognize their impact on the entire supply chain of automobiles in Pakistan as well as the effect on consumer welfare, primarily in the form of "on money". Automobile dealerships in Pakistan can be classified into two categories:

A. Company Dealerships
B. Private Dealerships

Looking at both these types of dealerships individually we get a grasp of their working and business models, and hence the impact of these on the overall automobile sector in Pakistan.

4.3.1. Company Dealerships

Automobile Manufacturer/Assembler outsources its sales and after sales operations through franchise model, establishing a vast dealership network throughout the country. These franchise dealerships are further divided in three categories based on the services they offer

i. 1S: 1S Dealers exist only in the after sales operation and offer only 1 service i.e. sale of spare parts. 1S dealers are provided by these parts the official vendors of the automobile manufacturer/assembler, therefore, the spare parts available at 1S dealerships are the company approved and recommended parts for vehicles. A consumer will only be able to purchase spare parts from the 1S dealerships and will have to look elsewhere for any repair work and servicing needed.

ii. 2S: 2S dealers also provide only after sales services, but instead of just 1, offer 2 services. The 2S dealerships are authorized to sell spare parts just as 1S dealers do and in addition to that offer vehicle servicing to the consumers as well. This means that 2S dealerships have in-house workshop facilities with staff trained under the company guidance itself. Unlike 1S dealerships, consumers can through 2S dealerships get repair work and services done in addition to purchasing spare parts.

iii. 3S: 3S dealers form the major share of company dealerships in Pakistan. These provide sale and after sales services both to consumers. In addition to the servicing and spare parts, the 3S dealerships are authorized for sale of new vehicles on behalf of the company. For the sale of new vehicles, the consumers through 3S dealerships book their vehicle order after which a tentative delivery time and price is shared with the consumer. However, the delivery of vehicle is highly vulnerable to further delays while the price of vehicle is decided not at the time of booking but at the time of delivery hence increasing risk of ex-factory price increase at time of delivery. The arbitrary changes in taxes contributing to increased price at time of delivery is another risk that the consumer bears fundamentally due to the booking system. The booking system for purchase of new vehicles is explained in Section 4.5.

This booking system becomes the basis of On Money exploitation in three different manners. Firstly, with limited vehicle productions in the country it becomes easy for only a handful of the people to choke up the supply chain through placing early orders including those on partial payments and earn On Money. These people book multiple vehicles over a short period of time, especially after launch of new model or generation of a vehicle. They are able to secure the early deliveries of vehicles while other genuine consumers are forced to face long delivery times. In such situations and the uncertainties attached with price and delivery time of vehicles, the consumers are forced to look towards vehicle available by paying On Money. This method is adopted by individuals as well as private dealership owners who use online classifieds, their private dealerships and other similar forums for sale of vehicles and earning On money.

Secondly, there are instances where the 3S dealerships are involved in the exploitation of consumers in collaboration with individuals or private dealership owners through On Money. In this case, the 3S dealership staff is themselves found involved in offering consumers a vehicle parked at their dealership owned by someone else for sale at a price higher than the current invoice. The difference between sale price and invoice price is not documented and paid in cash unlike the invoice price which is to be paid through a bank draft. In this scenario, the 3S dealerships also have a share in the profiteering through exploitation of the consumers.

Lastly, companies allow 3S dealers to book new vehicles against the initial dealership security money they have deposited. While the intention behind this could be to allow 3S dealerships to build inventory of available cars for sales immediately, but this has been used for exploiting consumers instead. The dealerships again, in such a scenario, push consumers towards purchasing the available vehicle at a higher cost than the invoice price by paying the difference in cash. In this instance, all the black market premium is pocketed by the dealership by itself. The 3S dealership business owner does not need to take any financial risk in this scenario as the security deposit for the franchise is used as a booking deposit and refilled when the vehicle is sold to end consumer and payment is made by the consumer. Hence, the dealers without taking any risk are not only making it difficult for the consumers to purchase a new vehicle but also earning a black market premium for it.

4.3.2. Private Dealerships

Private Dealerships are primarily individual run businesses that deal in sale and purchase of used vehicles in the country. These are regulated by the Real Estate Agents and Motor Vehicle Dealers (Regulation of Business) Ordinance. While there are no regulatory limitations for the private dealerships to deal in sale and purchase of new vehicles, but as automobile manufacturers/assemblers operate their dealerships through a franchise model, the private dealerships are not permitted to directly order a vehicle through the company. All new purchases must be routed through a company franchise dealership, thus traditionally restricting private dealerships to dealing in sale and purchase of used vehicles.

In recent years, however, there have been new vehicles seen parked at private dealerships for sale to consumers. No change has been brought in the modus operandi of automobile companies for sale of their new vehicles, so how come such a large number of new vehicles are available at private dealerships? Over time, these private dealerships have developed their business model around earning On Money. These dealerships place order through 3S dealerships for new vehicles and upon delivery of vehicles take them over to their private dealerships. Knowing the persistent delays in car availability to consumers through 3S dealerships and the associated risks attached with these, the private dealerships provide

consumers an alternate way of bypassing this system. Consequently, these private dealers then sell vehicles to consumers at a higher price earning On Money black market premium. Numerous private dealerships across major cities especially have in recent years stopped dealing in used vehicles altogether and offer consumers only new vehicles at higher prices.

The profiteering through On Money has become such a viable business model and widely practiced, that there are single buyers with even 100 vehicles bought every year for the sole purpose of selling ahead by earning On Money. The automobile companies do not act against such buyers as in their view the company is not in any right to prevent any individual's right to purchase a vehicle from the company, whatever the buyer's intention be. This information, however, is not hidden from the relevant government authorities. The automobile sector is one of the most documented sectors in the economy, and the automobile companies submit details of any vehicles booked and sold to the relevant authorities fortnightly. If the government was any serious in dealing with the issue of On Money, it has enough data available to point out exactly the people involved in profiteering from On Money by exploiting end consumer. Instead, the government chose to put the burden on the consumer that is already facing hardships in purchasing a car.

The government in February 2021 imposed a withholding tax on sale of any vehicle within 90 days of delivery as a measure of curbing On Money practice. Instead, this measure increased the On Money as the withholding tax amount was also included in the premium being collected by profiteers from the consumer. No other measure has been taken by the government to benefit the consumer in this regard.

Not only the government, but the companies also share a major blame for this. The booking system coupling with non-fixed price of vehicle at the time of booking is at helm of this which allows the companies to not build any significant parts inventory while also not risk production of vehicles before any orders. As a result, the companies only manufacture vehicles that it has a booking for, and hence having no risk involved in case of low sales due to not building any inventory or increasing its production. Consequently, this adds onto the supply demand gap in the automobile market, allowing the entire market to be held captive by a handful and exploiting the consumers. Lastly, the 3S dealers that either by themselves or in collusion with other players exploit the actual consumer also share a major share of blame for the emergence of the nuisance called as the On Money in Pakistan automobile industry.

Some might try to sell On Money as a pure case of supply and demand gap issue, and give an example of recent few sales of vehicles at under invoice cost, calling it off (discount pricing) due to a drop in demand of new vehicles considering the latest economic conditions. However, it is

important to realize that given the low production levels of Pakistan, the supply demand gap primarily stems from the supply side and not the demand side and hence must be tackled from the supply side. The reality regarding the 'Off' sales, or discount pricing, in past year or so is explained in the later in the section titled 'Discount Pricing: What's the Reality?'

Further, the lack of completion from foreign companies allows the companies to maintain their low levels of productions which prevent achieving any sorts of economies of scales and keep companies from having to explore export markets. As a result, consumers in Pakistan get high priced vehicle with delays and price inconsistencies mostly a generation behind the equivalent vehicle available elsewhere and with much knocked down features. The government instead of promoting the competition has through its regulatory interventions limited the import of vehicles into Pakistan. New vehicles if imported are taxed unimaginably high to force their costs to rise significantly beyond the locally assembled vehicles, while used vehicles are not permitted to be imported at all. Used vehicles can be brought into Pakistan only through the gift scheme, which too has now been made much difficult in order to prevent the entry of these vehicles into Pakistan. There is a dire need for Pakistan to develop an import framework for automobiles in the country to not only increase the availability of vehicles in Pakistan, but to also provide an adequate competition to the local players. PIDE's proposed import framework is outlined in Section 4.6.

4.4. Discount Pricing; What's The Reality?

Pakistan's economy has taken a turn for the worse in the last couple of years. This has affected people from all walks of life as well as all sectors of economy. The automobile industry is no different as the sales of vehicles have drastically dropped. The industry was already struggling in the post pandemic era due to the global economic impacts of the pandemic, and while the global economy began some recovery to normalcy, Pakistan's economy decided to embark on a journey of its own. While the automobile industry is full of issues of its own, the current downturn in the industry is not entirely its own fault. The country's economy in current times could be termed to be in a state of stagflation, i.e. stagnant growth with high inflation. Consequently, the economic activity, particularly in the formal sectors has been severely hurt.

In such times, few vehicles are available at dealerships for immediately delivery at price below the invoice price. This brings forth the question that how come vehicles are available for immediate delivery when vehicles are produced only after a prior booking has been made, and that too at the price below the quoted invoice price? This would imply that during times when the economic activity is on a downward trend, the companies produced vehicles without any booking and were willing to sell them at a discounted price or possibly even at a loss, both conditions highly

uncharacteristic of the automobile industry of Pakistan. So how were the vehicles really available at a lower cost?

In reality, these vehicles were produced after booking as always. However, these were not booked by the end consumer and instead by those intending to earn On Money on the further sale of these vehicles. Due to increasing uncertainty and downfall in the economic activity in the country, the rupee faced sudden depreciation against the US dollar which in turn was translated in rising prices of vehicles as well. These vehicles that were booked and delivered at an earlier price were due to falling economic activity and falling vehicle sales parked at dealerships awaiting further sale to earn On money. A rise in prices due to worsening of exchange rate provided such people a golden opportunity to try and sell off these vehicles and earn On Money while showcasing a discounted price to the public.

For instance, if the Car A was delivered at price PKR 5 million by the company and the buyer X was holding out to sell it further earning On money but due to the falling sales was unable to sell off the vehicle. In the same time, as the production costs increased while the exchange rate worsened as well, the company increased the price of new bookings of Car A to PKR 5.5 million. Consequently, the buyer X decided to offer the vehicle bought by him earlier at a price of PKR 5.3 million, depicting a discount of PKR 0.2 million. However, in fact the vehicle was produced and delivered at an earlier time at a price of PKR 5 million and in this sale the person X was still profiteering by PKR 0.3 million just due to the persistent delays in automobile production and deliveries. The end consumer buying the vehicle for use and not profiteering is given a false sense of PKR 0.2 million savings when in fact he is being forced to pay PKR 0.3 million more for a vehicle that should have been available, in a functioning automobile market, to him at the price of PKR 5 million.

4.5. Booking System: How and Why?

All automobile companies in Pakistan for the purpose of selling their new vehicles through their 3S dealerships follow a vehicle booking system. Under this booking system, when a customer visits the 3S dealership to buy a new vehicle, it is not available for immediate purchase. Instead, the customer must place an order, commonly referred to as book a vehicle, for the manufacturing/assembling of the vehicle. At the time of booking, mostly a partial payment for the vehicle is made against which the 3S dealership on behalf of the company shares a tentative delivery time and tentative price of the vehicle (other than government taxes). The company of course is not responsible for any changes in the price due to changes in government taxes, which given the track record, are subject to frequent revisions even during a running fiscal year.

The price and delivery times are tentative due to uncertainty regarding the vehicle assembling time period while the price of the vehicle is taken at the time of delivery and not at the time of booking. The uncertainty in delivery times and final price stems primarily from the same place. The companies do not build up any large inventories of parts and CKD/SKD kits[5] and import periodically based on bookings. As majority of the imported parts are imported with a "n-3, or n-6"[6] time period, companies take bookings to preempt their demand and manufacture/assemble as many vehicles as bookings. This is also why most of the tentative delivery dates given to customers are between 03 to 06 months, though in some cases could be even more as well.

As a result, the consumer's money paid as partial payment for booking of vehicle is parked with the company which uses it to finance its operations as well as through banks earns interest over it. On the other hand, the customer is forced into long periods of uncertainty and waiting for their vehicle as the opportunity cost of the money they have paid to the company increasing each passing day.

As the company does not have any significant inventory of parts without bookings, the cost of importing parts is also subject to change due to any production cost or price changes by the parts manufacturers abroad, changes in exchange rate and/or any increase in taxes on imports of CKD/SKD kits and other parts. This all cost is then passed onto the awaiting customer.

In case of taking the full payment of vehicle, the companies have only recently been bound to deliver the vehicle to the customer in no more than 03 months. Upon failure to do so, the companies are liable to pay customers KIBOR + 3%[7] per day interest on the money they have taken from the customers. This way the government through regulation has allowed the companies to hold customers' money for at least three months and encouraged them to continue with the booking system that is the breeding ground of many ills of the customer experience with the automobile industry, including the emergence of On Money as explained in the earlier sections. Since this is applicable only to cases where a full payment has been made, there are no repercussions for the automobile companies if they take only partial payment and fail to delivery vehicles even for an indefinite period of times. There have been cases in recent past where delivery times for some vehicles have been as high as 10 to 11 months, while some companies failed to deliver vehicles to customers even up to 18 months and beyond.

Globally, the entire mechanism is completely different. Automobile manufacturers build up their parts inventory and manufacture vehicles to deliver to various dealerships who are then responsible for sale of vehicles. A customer can walk in to any of the dealerships, inquire about vehicles and buy the one of their preference on the spot and drive away with it.

Additionally, dealerships abroad also offer consumers a test drive of the vehicle they intend to buy, an idea still alien to Pakistan's automobile industry.

Further, while company dealerships do exist in other countries as well, most of the business is performed through private dealerships who are permitted to perform sales of new vehicles after procuring them from countries. These private dealerships procure new vehicles from multiple companies, purchase old vehicles from local customers as well as have used imported vehicles for sale available as well. This helps the companies broaden their reach to more people while also allowing the dealership business owners to build up their stock as per the demand of the market instead of being bound by selling one company vehicles only. Consequently, it allows for a greater competition in the market place as well increase the reach of automobile companies and customers to each other. Moreover, in any case where the vehicle is not available for sale and customers must place booking for future manufactured units, the amount taken at the time of booking is minimal and the price to be charged at time of delivery is fixed at the time of booking. This way, the welfare of consumers is protected if the manufacturing is facing delays due to any reason, especially as was the case in post COVID-19 years due to supply side bottlenecks.

The booking system allows for the companies to exploit customers and minimize their risks while putting all liabilities on the customer. Regulatory frameworks that facilitate and encourage booking system in the automobile industry are regressive and prevent the growth of automobile industry in Pakistan. Until unless the booking system is not let go, the consumer welfare cannot be ensured while the industry will also not have incentive to grow and improve. For this purpose, the following few steps must be taken immediately:

1. The Booking System must immediately end. Automobile Companies must manufacture vehicles without bookings and make available at dealerships for sale to customers on the spot.

2. Private dealerships must also be permitted to procure new vehicles from automobile companies to sell to customers. This will not only break the monopoly of company dealerships in sale of new vehicles, but also allow companies to reach more areas and customers without necessarily having to establish 3S dealerships for sale of vehicles.

3. Dealerships are already offering vehicle registration services to customers, but is not mandatory as of yet. Instead, no car must be allowed to leave the dealership unless it has been registered with the excise and taxation department.

4. In case where a booking is necessary, only minimal amount (not more than 02% of vehicle price) must be charged for booking. The price quoted at time of booking must be the price charged to customer at time of delivery (excluding government taxes).

5. Companies to indicate a minimum sale price of vehicle, allowing dealerships to charge a minimal premium over the price of vehicle, negotiable with customer. The premium, if charged, must be mentioned as it is on the invoice. This will help bolster competition among dealerships to attract customers by offering competitive prices and any other offers and services.

6. The government must consider penalizing those found involved in the exercise of buying vehicles to sell for earning On Money. Any black market premium to exploit consumers must not be tolerated or permitted.

4.6. Developing an Automobile Import Framework

The Current Account Deficit (CAD) has always been a thorn in the neck for Pakistan's economy. It has led the country to 23 IMF programs, all with a similar stabilization program and austerity measures (PIDE, 2022). Increasing tariffs and other trade restrictions has always been the go-to policy for Pakistan as part of its various stabilization attempts over the years. Ban and limiting imports considered to be non-essential or luxury is always thought of as a beneficial policy.

The government of Pakistan has remained highly inconsistent in its policies towards import of new and used vehicles into the country. In fact, every time Pakistan faces yet another crisis primarily stemming from economic Misgovernance, curbs on automobile sector imports are one of the most immediate steps of the government. This has led to a highly anti-import tax regime coupled with other restrictive measures to limit the import of vehicles to the country including imposition of a complete ban on import of Completely Built Units (CBUs) of Automobiles along with other over 800 products terming them as non-essential and luxury commodities. PIDE research at the time concluded that the ban will not prove its effectiveness, as these over 800 products contribute to less than even 5% of the country's total commodity imports (Najib, 2022). Not only this, but the CBU imports that were also banned as part of this order form less than 1% of the total commodity imports. In the fiscal year preceding the import ban (FY21), consumers in Pakistan paid a total of just over PKR 33 Billion for the imports of CBU automobiles, thus being equal to the average amount paid by automobile consumers as ON Premium for locally assembled automobiles (Qadir & Najib, 2021).

Furthermore, Mohammad Shaaf Najib (2022) noted that while the import ban will prove ineffective in achieving its set out objectives but also will have adverse impacts on the local markets of these products by increasing the opportunity to exploit customers and encourage rent-seeking behavior. Market Research by (Qadir & Najib, 2021) showed that on average 7 to 8 percent of the total cost of vehicle is charged as On Premium rate. Following the imposition of the import ban for CBUs initially, and then the increase in tariff duties along with other Non-tariff barriers for the import of CBU and Completely Knocked Down (CKD) vehicles, the automobile market conditions further distorted. As shared in section 4.2.1, the reduced supply of the vehicles in the automobile market altogether and delayed delivery of locally assembled vehicles has giving rise to the On Premium being charged up to 12 to 15 percent of the total cost of vehicles in the months after the imposition of import ban and other restrictions on imports of CBU and CKD units. This totals to a 5 to 8 percentage points increase in the On Premium on vehicle by just one single arbitrary ban on import of vehicles.

Keeping this in consideration, it is important that an effective and efficient Automobile Import Framework is developed to ensure a smooth supply of vehicles in the country, a healthy competition for the local assemblers, comparable choices for the consumers yet not providing any further dent on already bleak Current Account situation.

4.6.1. Existing Import Regulations

The existing regulations for the import of vehicles in Pakistan are divided into two categories – for the import of new vehicles and for import of used vehicles (Federal Board of Revenue, 2020).

Import of New Vehicles is freely allowed subject to the payment of liable taxes and duties as defined in the Import Policy Order and Custom Laws. On the other hand, the import of used or second hand vehicles is allowed if the cars are no more than three years old, and other vehicle types not more than five years old.

The import of used or second hand vehicles though is not a simple import transaction as in the case of new vehicles. Instead, used or second hand vehicles can be imported into Pakistan only under the following three schemes and conditions, after paying the liable taxes and duties:

i. Personal Baggage
ii. Gift Scheme
iii. Transfer of Residence

The conditions for the import of used vehicles are against the principles of import and sales transactions. Under this rule, no sales transaction is happening as the car can be either brought into the country by the individual personally coming to Pakistan while owning the vehicle already, or gifting an already owned vehicle abroad to a family member in Pakistan. Consequently, no sale transaction takes place and only a change of geographical location of the vehicle occurs. This means, as per the law, there is no actual import of used or second hand vehicles happening in Pakistan, and thus, having no genuine economic activity associated with import and sale of used vehicles in Pakistan.

Any sale of used imported vehicles being undertaken in Pakistan is in reality a direct result of gaming the rules. Due to the government's set out procedures, those willing to import vehicles, use the details of other individuals to fulfill the documentary requirements – usually of the labor living abroad working blue collar jobs. The unchecked exploitation of the loopholes is a testament to the shortcomings of the current import laws as well as put a large question mark on the performance of authorities and agencies responsible for monitoring the implementation of these import laws. This is not the first time or the only sector where this has happened. When the government allowed bringing one phone per person without paying tax while traveling to Pakistan subject to registering the details of said mobile phone against passport numbers of people arriving into the country, similar gaming of the system was visible. The data of those who did not register any mobile against their passport number was used to facilitate illegally those who brought more than a single mobile phone. The government as a result decided to take away the one tax free phone policy and made payment of taxation necessary for all mobile phones being brought into the country. Subsequently, the general public was forced to pay the cost of incompetence of policymakers and corrupt practices of policy implementing agencies, as has been the case in the automobile industry.

Summing, the import regulations are anti-economic activity, do not allow sale transactions and continue to be gamed while the government and state authorities turn a blind eye to it. In fact, the current import rules must not be considered to be allowing imports of vehicles, instead the current import rules for automobiles restrict and ban import of vehicles while also contributing to keep a competitive automobile market from developing in Pakistan.

4.6.2. SRO Based Inconsistent Tax Regime

The Statutory Regulatory Orders, commonly referred to as SROs are a common feature of Pakistan's policy-making. The government, as and when it wishes, through a SRO issues new policy directives for immediate implementation. SROs have always resulted in distortions in the economic activity, and added to uncertainty through sudden policy changes.

The SRO culture also undermines the importance of parliament as the budget approved by it can be altered at any time without any necessary consultation or homework done on the impact of the policy. The continuous use of SROs is in no doubt against the democratic norms.

SROs have been quite commonly issued for policy changes related to the automobile sector, particularly for changes in taxes and duties on the sale-purchase and import of vehicles. In recent times, (SRO-966(I)2022, 2022) issued on 30-06-2022 and (SRO-1571(I)/2022, 2022) issued on 22-08-2022 have been used to bring about immediate changes in the tax and duty structure for the import of vehicles. A two-time policy change in under two months (53 days in between the two SROs) represents an absolute lack of seriousness on the policymakers and decision takers part, while also adds to the future uncertainty regarding the policies and tax structure, thus, pushing people away from taking part in the automobile related transactions. Simply put, the SROs are a deliberate attempt to limit and restrict economic activity in the automobile sector.

In a span of just three months during the year 2022, the government introduced three different policies regarding the import of vehicles. From imposing the ban in May, issuing new tax rates in June and equalizing all tax rates at 100% in august, the government's actions have nothing but a distortionary impact on the market and economy. The SRO 1571(I)/2022 increased the tax rates by a minimum of 10% and a maximum of 85%, thus, creating a near ban situation as this makes the import an unfeasible option. Such distortion proves counterproductive for development of the markets and increases the public and business distrust on the government policies. Summing, the government actions regarding the import of vehicles into the country do not have any economic or otherwise grounding but represents a clear lack of vision and consistency regarding policies and decision making. There is a need to let go off the SRO culture for overnight policy changes. Instead, a long term and consistent policy must be adopted based on an effective and efficient mechanism. Henceforth, PIDE presents the following Import Framework for the import of CBU vehicles into the country.

5. CKD: Completely Knocked Down kits. SKD: Semi-Knocked Down kits. These both are various parts/components of vehicles imported in their final form ready for assembling on the assembly line. No further manufacturing is required for these CKD/SKD kits.

6. N-3 means the imported parts will arrive 3 months after the order is placed while n-6 means the parts will arrive 6 months after the order is placed.

7. KIBOR: Karachi Interbank Offered Rate. KIBOR + 3% means that companies will be paying to customers an interest rate that is 3% higher than the current KIBOR.

4.6.3. Proposed Import Framework

1. Import of CBU vehicles must be allowed into the country under a well-defined criterion. Tax or other import restrictions based barriers for import of CBU vehicles must be eliminated, though a vehicular feature based limitation might be considered (see point 11)

2. Private Motor Vehicle Dealers only must be allowed to import CBU vehicles for purpose of sale in the country.

3. Private Dealers wishing to be involved in the business of sale and purchase of imported vehicles must register with Excise as motor vehicle dealers. The Registration will also act as a license for import. No additional license or permission for import shall be required for import of vehicles. Private dealers not having registered their business with excise will not be able to import and sale (including locally bought earlier imported) vehicles.

4. Private Dealers shall not be allowed to sell locally assembled new unregistered vehicles unless they are procured directly from the automobile company for sale to customers (as explained in section 'Booking System: How and Why?')

    a. Any unregistered locally assembled vehicle not having excise issued number plate will not be allowed to be sold through private dealers.

5. Registration of imported vehicle with excise after sale through private dealership must be performed before the buyer can home-take the vehicle.

6. Lower import and custom duties on imported vehicles to an adequate level. SROs and supplementary finance bills/mid-term budgets must be avoided for any change in import/custom duties on CBU vehicles. Any changes in tax rate must be done through the parliament and only under the annual finance bill.

7. Categorize vehicle as per engine capacity. Custom Duty to get higher with engine capacity of import vehicle:

    a. Up to 1000cc
    b. Over 1000cc up to 1500cc
    c. Over 1500cc up to 2000cc
    d. Over 2000cc up to 2500cc
    e. Over 2500 cc up to 3500 cc
    f. Over 3500 cc

8. Hybrid vehicles should get 50% custom duty concession/should be charged 50% of what equivalent engine capacity non-hybrid vehicles are charged to promote or encourage the use and import of eco-friendly and less fuel consuming vehicles.

9. Turbo-charged vehicles should get 25% custom duty concession/should be charged 25% of what equivalent engine capacity non-hybrid vehicles are charged due to less emissions as compared to non-turbo engines producing equivalent power.

10. Import/Custom Duty on vehicles being imported under transfer/baggage/gift scheme must be charged 10-20% higher tax rate as compared to import per the new framework. This way importing under this scheme will be economically unfeasible thus acts as disincentive to cheat the system.

11. In order to limit the imports through criterion instead of tariffs/bans, vehicles shall be eligible for import only if:

    a. The Car manufactured/sold in country of origin no more than 3 years before the date of auction, and
    b. The vehicle, as per the Japanese Automotive Standards Organizations (JSO) grading falls under the following grades (Younus, 2015):

        i. Grade S
        ii. Grade 6
        iii. Grade 5
        iv. Grade 4.5

4.7. Key Takeaways

- Booking culture must end. Companies must manufacture vehicles without bookings and sale through dealerships only already manufactured vehicles present at the dealership
- A comprehensive import framework is necessary to facilitate import of vehicles to increase competition in the automobile market and give consumers a wider range of vehicles to choose from.
- On money is a black market premium that customers in Pakistan pay to take ownership of a vehicle they have already purchased and paid for.
- The burden of On money on Pakistani consumers amounts to PKR 30 billion a year in undocumented, un-taxed transactions.

CHAPTER 05

The Skewed Policy Environment

Abid Rehman

5.1. Introduction

Pakistan's auto industry has been shaped by the Automobile Industry Development and Export Promotion (AIDEP) initiatives. These policies were crafted with a clear goal in mind: to boost local manufacturing of auto parts and vehicles while expanding exports. Over the years, AIDEP has undergone three significant phases: the initial phase from 2007 to 2012, followed by the Auto Development Policy (ADP) from 2016 to 2021, and the latest iteration spanning from 2021 to 2026.

Figure 5.1: Automobile Sector Policies

In this study, we will dig deep into the targets set by these policies and assess how they have measured up against reality. By comparing expected outcomes with what actually happened, study will also uncover where these policies have succeeded and where they have fallen short. Study will also take a critical look at the strategies employed, particularly focusing on import substitution and export promotion. How effective have these strategies been in driving the growth of the auto industry? Through our analysis, we aim to provide meaningful insights into the impact of AIDEP's policies on Pakistan's auto industry, offering valuable lessons for future policy formulation and industrial development efforts.

5.2. Review of AIDP (2007-12)

In November 2007, the government initiated a comprehensive plan aimed at bolstering the automotive industry, seeking to elevate its significance within the national economy. Their primary objective was ambitious: to double the automotive sector's contribution to the country's Gross Domestic Product (GDP) from 2.8% to a higher figure by the fiscal year 2011-2012.

This strategic vision underscored the government's determination to amplify the role of cars, trucks, and other vehicles in driving the nation's financial prosperity. To realize this goal, the government delineated key focus areas, including incentivizing investment to attract more capital into the automotive industry, modernizing technological infrastructure to enhance vehicle manufacturing processes, fostering export growth to tap into international markets, generating more job opportunities within the

automotive sector, and nurturing the development of critical components essential for vehicle production.

A suite of measures was introduced to support these objectives, encompassing initiatives such as the Technology Acquisition Support Scheme (TASS) to facilitate technology adoption by companies, the Productive Asset Investment Incentive (PAII) aimed at stimulating investments in productivity-enhancing assets, the Auto Industry Investment Policy (AIIP) providing guidelines and incentives for automotive sector investments, Human Resource Development (HRD) initiatives to enhance workforce skills and knowledge, and Auto Cluster Development strategies aimed at fostering collaboration among automotive-related businesses. Despite concerted efforts, the initiative encountered several challenges. The planned tariff rates were not fully implemented during the stipulated period, potentially impacting the industry's competitiveness. Additionally, the global economic recession of 2008 led to a decline in car production due to reduced consumer spending amidst economic uncertainty. Furthermore, funding shortages hampered the implementation of crucial development schemes such as PAII and TASS, highlighting the importance of sufficient financial support for policy efficacy.

5.2.1. Was AIDP (2007-12) A Failure?

The failure of the Automotive Industry Development Program (AIDP) to meet its targets, both fully and partially, underscores significant challenges within the policy framework and execution.

Firstly, the unmet targets, particularly the failure to achieve the goal of 500,000 cars by 2012, reflect systemic issues within the automotive industry. This failure could be attributed to various factors such as inadequate infrastructure, insufficient investment, and perhaps unrealistic timelines set by the policy. Moreover, the inability to localize critical components suggests a broader issue of dependency on imports and a lack of a robust domestic supply chain. This reliance on foreign components not only undermines the industry's competitiveness but also leaves it vulnerable to external factors such as currency fluctuations and trade disruptions.

Furthermore, the partially met targets highlight a mixed bag of successes and shortcomings within the policy implementation. While cluster development initiatives in certain regions showed promise, the lack of comprehensive success indicates the need for more targeted and effective strategies. Similarly, achieving growth targets in the two-wheeler segment is commendable, but it's essential to examine why similar success wasn't replicated across other sectors of the automotive industry. The limited progress of the Auto Industry Skill Development Company (AISDC) also raises questions about the efficacy of human resource development efforts and the alignment of training programs with industry needs.

In discussing the reasons for the policy's failure, it becomes apparent that a combination of factors contributed to its shortcomings. Inconsistency in government support for schemes created uncertainty and inhibited long-term planning for industry players. Additionally, a weak implementation mechanism within the Auto Industry Development Committee (AIDC) suggests a lack of coordination and oversight, leading to inefficiencies and missed opportunities. The stringent new entrant policy further exacerbated challenges by imposing unrealistic production requirements, potentially stifling innovation and competition within the industry.

Overall, the failure of the AIDP to achieve its targets highlights the need for a comprehensive reassessment of policy priorities, implementation strategies, and stakeholder engagement processes. Addressing these underlying issues is crucial for fostering a more conducive environment for sustainable growth and development within the automotive industry.

5.3. Review of ADP (2016-21)

In the ADP (2016-21), the government introduced several incentives aimed at reviving the automotive industry, including rationalizing duties on Completely Built Units (CBU) up to 1800 cc, as well as import duties on non-localized parts and inputs for auto parts. Additionally, there was a shift from a 1% tariff slab to a 0% tariff slab. These measures were designed to encourage local production, reduce dependency on imports, and promote competitiveness within the industry.

The overarching vision behind these incentives was to nurture a modern, competitive, and sustainable automobile and auto-parts sector capable of meeting both national and regional demand. However, despite these efforts and aspirations, the goals set for the industry remained largely unmet.

The primary goal was to significantly increase the industry's contribution to the Gross Domestic Product (GDP) from 2.3% to 3.8%. Similarly, there were aims to boost the industry's contribution to manufacturing from 22% to 30%, as well as to increase direct and indirect employment from 2.4 million to 4 million. Unfortunately, none of these targets were achieved, indicating significant challenges and barriers to the industry's growth and development.

The focus areas of the policy encompassed various aspects crucial for the industry's advancement. These included implementing measures to attract new investments, rationalizing tariffs to make the industry more competitive, establishing infrastructure to uphold quality, safety, and environmental standards, and ensuring consumer welfare.

However, despite the clear vision and focus areas outlined by the policy, the failure to achieve the stated goals suggests underlying issues that

need to be addressed. These may include structural challenges within the industry, bureaucratic hurdles, insufficient investment in infrastructure and technology, as well as broader economic factors impacting the sector's growth trajectory.

Moving forward, it is imperative for policymakers to reassess the strategies and mechanisms in place, identify and address the root causes of the industry's stagnation, and work collaboratively with stakeholders to chart a more sustainable path towards realizing the vision of a vibrant and competitive automotive industry

5.3.1. Was ADP (2016-21) A Failure?

The policy aimed to revitalize the automotive industry saw notable achievements, including an increase in the number of car companies, which disrupted the dominance of the traditional "Big Three" manufacturers. This expansion offered consumers more options in the sedan and compact SUV segments, enriching the market diversity. However, the hatchback segment remained largely monopolized by a single company, limiting competition in that sector. Despite these advancements, the overall production of vehicles did not see a significant uptick. Moreover, persistent issues such as delayed delivery and additional charges continued to plague consumers, indicating areas for improvement. While progress was made, the parts industry still lagged behind global standards, suggesting the need for further development and investment.

On the other hand, the policy also faced significant challenges and reasons for failure. The Auto Industry Development Committee, tasked with overseeing policy execution, proved ineffective, leading to hindrances in implementation. Furthermore, the policy lacked the necessary flexibility to adapt to dynamic market conditions and emerging realities. As a result, it struggled to keep pace with the rapidly evolving automotive landscape. Additionally, many components of the policy were contingent upon the availability of funds, which were often insufficient or entirely lacking, impeding progress and hindering the achievement of desired outcomes. These shortcomings underscored the need for a more robust and adaptable policy framework that could effectively address the industry's challenges and capitalize on opportunities for growth and development.

5.4. Review of AIDEP (2021-26)

Following the shortcomings of the Automotive Industry Development Program (AIDP) from 2007 to 2012, and 2016 t0 2021, Pakistan has embarked on a new initiative, the Automotive Industry Development and Export Promotion (AIDEP) program, spanning the period 2021-2026. This transition reflects a renewed focus on revitalizing the automotive sector

and leveraging its potential as a driver of economic growth and export revenue.

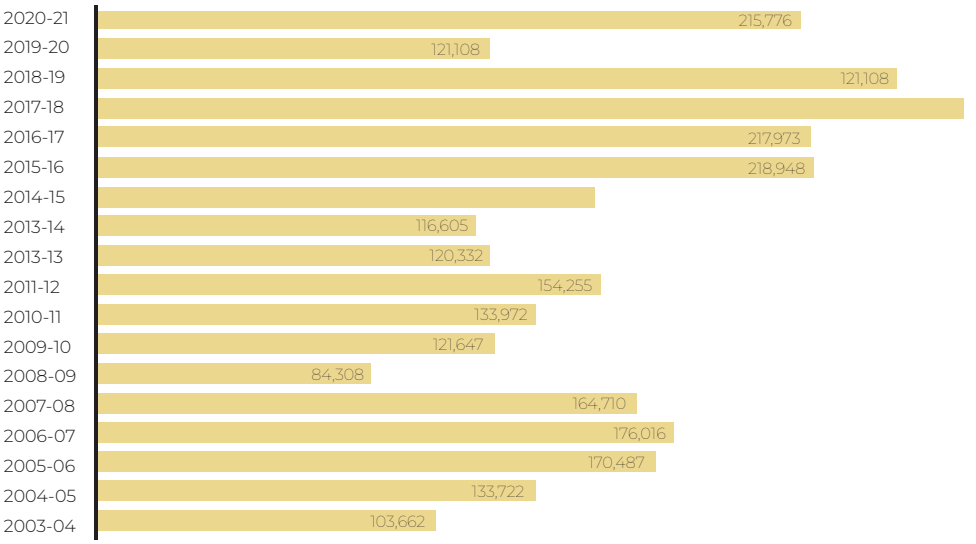
The primary goal of AIDEP is to position Pakistan as a hub for competitive manufacturing of auto parts and vehicles, catering not only to the domestic market but also to global export markets. To achieve this ambitious objective, AIDEP outlines several key targets and strategies. Firstly, the program aims to strengthen competition within the automotive industry. By fostering a more competitive environment, the aim is to spur innovation, efficiency, and product quality among industry players, ultimately benefiting consumers and enhancing the industry's overall competitiveness. Localization and import substitution are also central to AIDEP's strategy. By encouraging local production of auto parts and components, the program seeks to reduce the industry's reliance on imported goods. This not only enhances the resilience of the automotive supply chain but also contributes to the development of a robust domestic manufacturing ecosystem. Furthermore, AIDEP places a strong emphasis on fostering innovation capabilities within the auto engineering sector. By investing in research and development, promoting technology transfer, and supporting innovative practices, the program aims to propel the industry towards greater technological sophistication and competitiveness on the global stage. Lastly, the development of a resilient and efficient supply chain is crucial to the success of AIDEP. Ensuring a steady and reliable flow of materials and components is essential for maintaining production efficiency and meeting market demand. A well-developed supply chain also enhances the industry's ability to adapt to changing market conditions and seize emerging opportunities.

5.5. Evidence on the Failure of Policies

5.5.1. Overall Production

Over the past few years, the production of automobile is very fluctuated and there is no exact growth trajectory which is evident in Figure 5.2 (also shared in Chapter 3). From year 2003 to 2007 there was increased in production of automobiles. However, the period from 2008 to 2016 was random based on Pakistan's energy crisis and exchange rate crisis. Then, there was increased in the production of automobiles till 2019 and that was maximum in history.

Figure 5.2: Annual Vehicle Production - Pakistan



Source: PAMA

5.5.2. Production of Pakistan's Big Three

In the overall production that can be seen, is mainly from three big players that includes Honda, Toyota and Suzuki. The pattern of randomness in also evident in their production as well, evident from Figure 5.3, Figure 5.4 and Figure 5.5. Actually, the AIDEP (2007-2026) gives birth to these big three. Following this study will be analyzing the unit sold, actual capacity of plants in units, and unit produced by the big three by mentioning the three AIDEP polices.

Figure 5.3 shows the Toyota company production is always below the actual capacity of the plant in most of the duration except 2015-19, during early few years the ADP (2016-2021), in which Pakistan has produced maximum number of cars. That was due to favorable conditions to industry and economy overall, which increased the demand for new cars and policy impact seems to be very weak as there is no sustainability in the years 2016 to 2021. Figure 5.4 and Figure 5.5 show similar trends for Suzuki and Honda respectively.

Figure 5.3: Annual Vehicle Production - Toyota

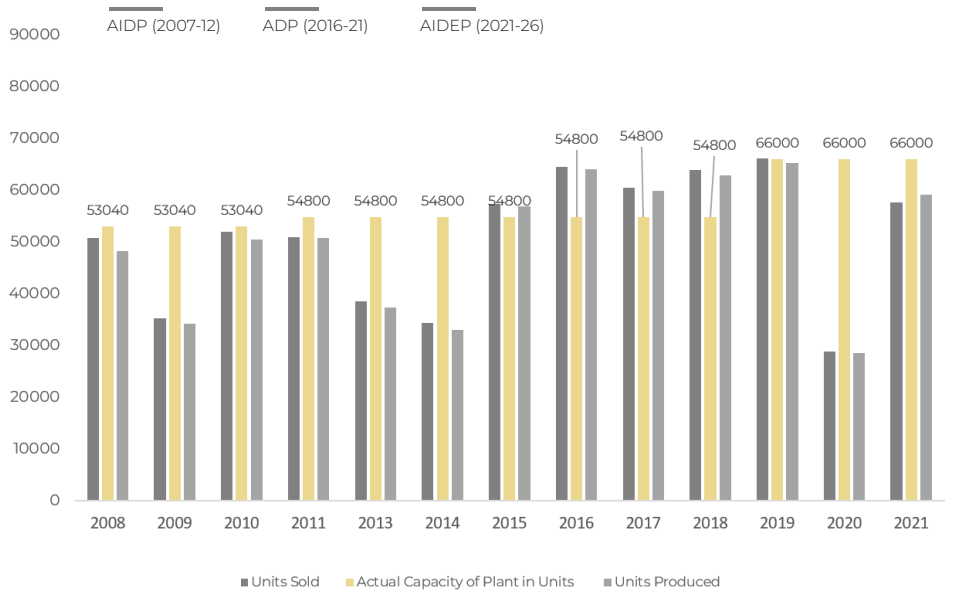


Figure 5.4: Annual Vehicle Production - Suzuki

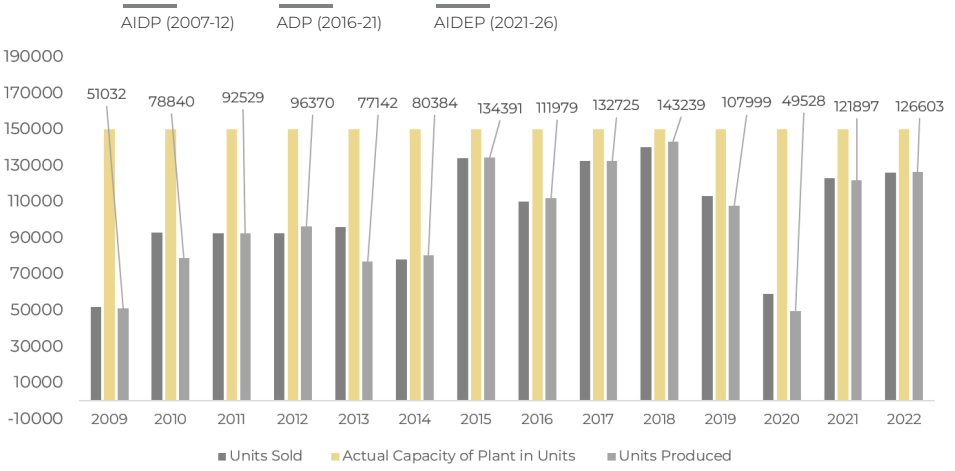
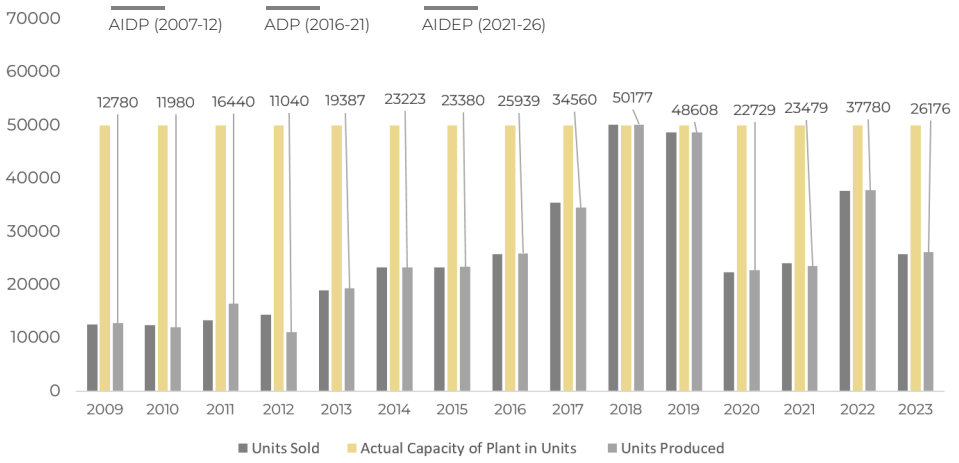


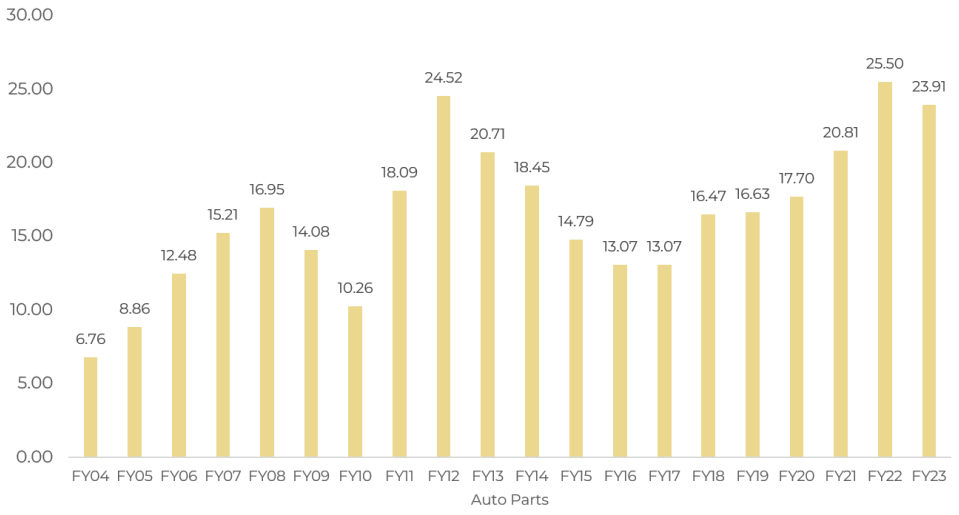
Figure 5.5: Annual Vehicle Production - Honda



5.5.3. Exports (Before and After Policies)

Figure 5.6 shows the Pakistan's exports from the automobile industry has always been very meager. The maximum number for the exports that we got is 25.50 million USD. There have been two spikes shown in the 2012 and in 2022. Overall the numbers of exports from the auto part industry are random and non-systematic shows the evidence that these policies neither have any impact on achieving the export targets mentioned in polices document, nor have any sustainable model for boosting Pakistan's export.

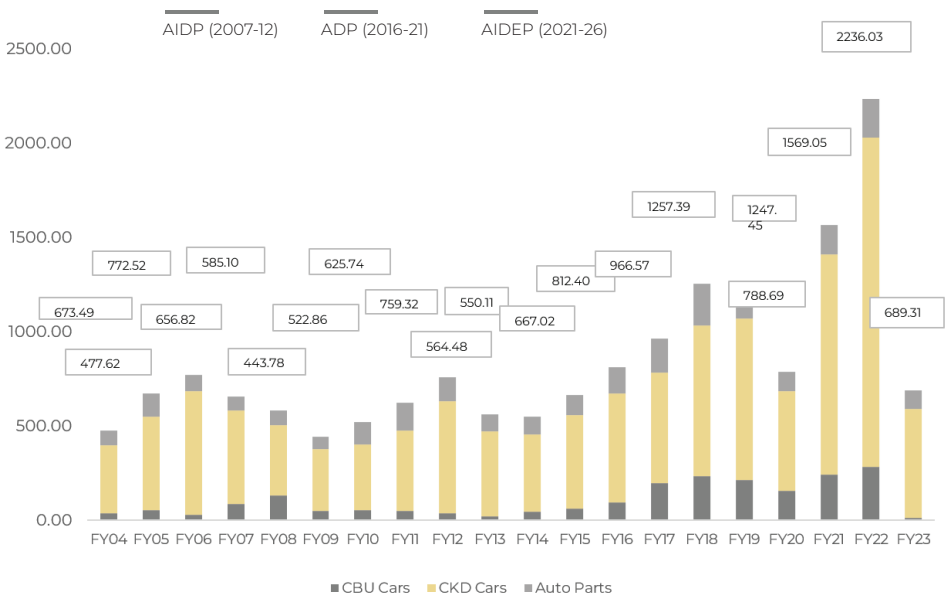
Figure 5.6: Automobile Sector Exports under different Policy Tenues (Million USD)



5.5.4. Imports (Before and After Policies)

As we have seen above in Figure 5.6, Pakistan's automobile industry has not significantly contributed in the exports numbers despite getting support and incentive given in the these three polices. These incentives give the revenue loss and welfare loss to both government and consumers. Despite that, it resulted into policy failure, as this policy neither boosted the export of Pakistan (Figure 5.6) nor reduced the import bill (Figure 5.7). Which concludes that import substitution policy has failed in mobile phone assembling in Pakistan.

Figure 5.7: Automobile Sector Imports under different Policy Tenures (Million USD)



5.6. Comparative Analysis

Comparative analysis of policies used by developing countries to promote growth in the automobile industry are analyzed in this section. The analysis covers Brazil, Malaysia, Thailand, and South Africa, focusing on strategies like import substitution, export promotion, and various sector-specific policies. Table 5.1 summarizes the key points of those policies.

Table 5.1: Automobile Sector Policies across Developing Countries

Country	Policy Approach	Key Strategies	Outcomes
Brazil	Import Substitution & Export Promotion	High import tariffs - FDI incentives - Export subsidies - Local content requirements	Rapid industrial develop-ment - Dominance of foreign firms - Limited local technologi-cal capability
Malaysia	State-driven National Automobile Development	National Auto program - Joint Venture with Mitsubishi (Proton) - Subsidies for local firms	Dominance of national automakers - Limited global competi-tiveness - High project costs
Thailand	MNC-driven Industrial Development	- Liberal trade policies - Thailand Automotive Institute - MNC-led growth strategies	Development of competi-tive auto clusters - Strong MNC presence - Marginalization of local suppliers
South Africa	Protectionism & Lo-cal Content Re-quirements	Prohibitive protection rates - Local content programs - Penalties for non-compliance	Expanded and diversified industry - Inefficient production setup - High consumer prices

The diverse strategies employed by Brazil, Malaysia, Thailand, and South Africa to develop their automobile industries, highlighting the varying degrees of success and challenges each country faced. Brazil adopted a combination of import substitution and export promotion strategies, using high import tariffs, FDI incentives, and local content requirements to protect and stimulate the local industry. While this approach led to rapid industrial development, it resulted in a dominant presence of foreign firms, limiting local technological innovation and reducing potential spillovers. Malaysia's state-driven strategy centered on developing a national automobile industry through initiatives like the National Auto Programme and joint ventures with foreign firms, such as Proton's partnership with Mitsubishi. Although Malaysia achieved significant market dominance for its national automakers, the lack of enforcement of performance criteria and over-reliance on foreign technology hindered its ability to compete globally.

Thailand and South Africa took distinct approaches, reflecting their unique economic contexts and goals. Thailand embraced a liberal, market-oriented strategy, encouraging MNCs to lead the growth of its automobile industry. The establishment of the Thailand Automotive Institute and the focus on export-oriented policies helped create highly competitive automotive clusters. However, this strategy also marginalized local suppliers, relegating them to lower-tier roles while foreign MNCs dominated the market. In contrast, South Africa's approach involved strong protectionist measures and stringent local content requirements, aimed at fostering a self-sufficient domestic industry. While this resulted in a diversified industry, the policies led to inefficiencies, outdated technologies, and high consumer prices due to limited competition and an inward-oriented focus. Overall, the matrix illustrates how the chosen policies shaped the development trajectories of these countries' automo

bile sectors, with varying impacts on local technological capabilities, market competitiveness, and economic integration.

5.7. The Final Assessment

Despite efforts to revitalize the automotive industry in Pakistan, several challenges persist, indicating the need for a comprehensive reassessment of existing policies and strategies. The dominance of three major players in the market, accounting for 90% of production, underscores the limited diversity and competition within the sector. Moreover, the overall production levels have not seen a significant increase, highlighting the apparent lack of policy effectiveness in stimulating industry growth. Localization and import substitution initiatives have not yielded the desired results, as evidenced by the continued increase in import values. Additionally, the policy's impact on the supply chain has been limited, with outreach primarily restricted to Africa, Afghanistan, and the UAE, failing to address broader systemic issues. Despite aspirations for increased exports, the reality falls short, with exports of auto parts declining post-2021. Import substitution policies have failed to achieve their intended goals, further complicating the industry's challenges. Moving forward, it is imperative for policymakers to address these shortcomings, fostering a more competitive, resilient, and sustainable automotive industry that can thrive both domestically and internationally by learning from best practices and policies adopted by Thailand, Malaysia, Brazil and South Africa. This necessitates a holistic approach that addresses structural challenges, enhances policy coherence, and fosters collaboration across stakeholders to unlock the industry's full potential and drive long-term prosperity. The failure of these policies and historical patterns demonstrate that import substitution policies are invariably counterproductive, resulting in higher costs and fewer options for consumers. Additionally, local industries could not be as effective or competitive as those in other countries, which would result in lower-quality goods and a decline in global competitiveness.

In conclusion, there is no impact of import substitution policies on mobile manufacturing in Pakistan, as this policy needs to achieve the core objective of reducing import bills and making the industry export. So, there is a need to link the support in the form of subsidies with research and development and localization targets to make policy more effective rather than blindly giving subsidies.

5.8. Key Takeaways

- AIDEP (2007-12): Targets unmet due to global recession and poor implementation.
- ADP (2016-21): New market entrants, but no significant production increase; issues like delayed deliveries persisted.
- AIDEP (2021-26): Struggles with competition and import reliance; ambitious goals unmet.
- Production has not increased as there is no policy affect due to three big players doing 90% of Production
- Localization – Import Substitution doesn't work as Import value increased despite these three policies
- Policy has not contributed to Supply Chain development and only Limited to Africa, Afghanistan and UAE
- Increase in Exports has not happened as export of auto parts decreased after 2021.
- Pakistan's policies lag behind countries like Brazil, Malaysia, and Thailand, which saw mix of various strategies like import substitution, export promotion, and protectionism, with mixed outcomes in terms of industry growth and technological capabilities.

CHAPTER 06

Future on Wheels: Pakistan's EV Teaser

Anjeela Khurram, Saba Anwar, Mohammad Armughan & Saddam Hussein

6.1. Introduction

Electric vehicles (EVs) represent a transformative shift in the automotive industry, offering a promising solution to mitigate environmental concerns and reduce dependence on fossil fuels. With advancements in technology and growing awareness of climate change, electric vehicles have emerged as a viable alternative to traditional internal combustion engine vehicles. These vehicles utilize electric motors powered by rechargeable batteries, eliminating tailpipe emissions and significantly reducing carbon footprints. As governments around the world implement stricter regulations to combat air pollution and greenhouse gas emissions, the adoption of electric vehicles is gaining momentum, revolutionizing transportation and paving the way towards a sustainable future.

6.2. What is an Electrical Vehicle?

An electric vehicle (EV) is a mode of transportation that uses one or more electric motors for propulsion, powered by energy stored in rechargeable batteries or another energy storage device. These vehicles utilize advanced power electronics and battery management systems to convert stored electrical energy into mechanical energy, enabling movement. EVs are characterized by their electric drivetrain, which includes components such as the motor controller, inverter, and regenerative braking system. They are designed to be charged from an external power source, such as a dedicated EV charging station, and typically feature sophisticated onboard charging and battery management technologies to optimize energy efficiency and performance.

6.3. Types of Electric Vehicles

EVs encompass a diverse array of transportation options that are revolutionizing the way we think about mobility. From compact city cars to heavy-duty trucks, electric vehicles come in various shapes and sizes, catering to a wide range of needs and preferences. Broadly categorized into four categories, each type offers unique benefits and features (Nissan of Rochester, 2022).

6.3.1. Battery Electric Vehicles (BEVs)

BEVs are fully powered by electricity. These are more efficient compared to hybrid and plug-in hybrids. The large battery pack can be charged by plugging into the electricity grid. The power for the electric motor is converted from the DC Battery to AC. As the accelerator is pressed, a signal is sent to the controller. The controller adjusts the speed of the vehicle by changing the frequency of the AC power from the inverter to the motor. The motor then connects and leads to the turning of wheels

through a cog. If the brakes are pressed, or the electric car is decelerating, the motor becomes an alternator and produces power, which is sent back to the battery.

6.3.2. Hybrid Electric Vehicles (HEVs)

HEVs use both the internal combustion (fuel) engine and the battery-powered motor powertrain. The petrol engine is used both to drive and charge when the battery is empty. These vehicles are not as efficient as fully electric or plug-in hybrid vehicles. The fuel tank supplies energy to the engine like a regular car. The batteries run on an electric motor. Both the engine and electric motor can turn the transmission simultaneously.

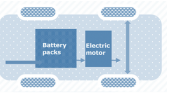
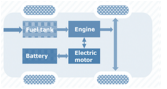
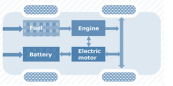
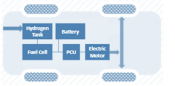
6.3.3. Plug-in Hybrid Electric Vehicle (PHEVs)

PHEVs have both an internal combustion engine and a battery charged externally not by the engine. These are more efficient than HEVs but less efficient than BEVs. PHEVs can run in at least two modes: all-electric mode, in which the motor and battery provide all the car's energy and hybrid mode, in which both electricity and petrol/diesel are employed. PHEVs start-up in all-electric mode and make use of electricity until their battery pack is depleted. Once the battery gets drained, the engine takes over, and the vehicle operates as a conventional, non-plug-in hybrid. PHEVs can be charged by plugging into an outside electric power source, engine, or regenerative braking. When brakes are applied, the electric motor acts as a generator, using the energy to charge the battery. The engine's power is supplemented by the electric motor; as a result, smaller engines can be used, increasing the car's fuel efficiency without compromising performance.

6.3.4. Fuel Cell Electric Vehicle (FCEVs)

In FCEVs, electric energy is produced using 'fuel cell technology' powered by hydrogen to run the vehicle. The chemical energy of the fuel is converted directly into electric energy. The amount of energy stored onboard is determined by the size of the hydrogen fuel tank. The FCEV generates the electricity required to run the vehicle.

Table 6.1: Types of Electric Vehicles and System Architecture

	BEVs	HEVs	PHEVs	FCEVs
System Architecture				
Alternate Name	All-Electric Vehicles (AEV)	Hybrid or Parallel hybrid	Series Hybrids	Zero-Emission Vehicles
Engine or Electric Motor	Electric Motor	Both Engine Electric Motor	Both Engine Electric Motor	Hydrogen Tank
Energy Source	Battery pack	Fuel, Battery	Battery, Fuel or bio-diesel	Fuel cell technology
Main Components	Electric motor, Onboardcharger Inverter, Battery, Power Control Module, Thermal system, Drive train	Engine, Electric motor, Battery pack with controller & inverter, Fuel tank, Control module	Electric motor, Engine, Inverter, Battery, Fuel tank, Control module, Battery Charger (if onboard model)	Electric motor, Fuel-cell stack, Hydrogen storage tank, Battery with converter controller
Examples	MG ZS, Hyundai Kona	Toyota Camry Hybrid, Toyota Yaris, Hyundai Sonata Hybrid	BMW 330e, Chevy Volt, Mercedes S550e, Ford Fusion Energi, Audi A3 E-Tron, xdrive40e, Fiat 500e, Kia Optima, Volvo XC90 T8.	Toyota Mirai, Riversimple Rasa, Hyundai Tucson FCEV, Honda Clarity Fuel Cell, Hyundai Nexo

6.4. Components of EVs

Electric vehicles are equipped with an electric motor and a battery pack. The following are the primary components of electric vehicles (Table 6.2)

Table 6.2: Components of Electric Vehicles

Charge Port to link EVs to a power source to power up the battery pack.
DC-DC Converter to transfer the output power from the battery to the desired level at a steady voltage.
Auxiliary batteries to provide electrical energy to electric car accessories. In the case of the primary battery failure to charge the vehicle.
Traction battery pack to provide electricity to an EV's motors and to store energy in the form of direct current.
Transmission to transfer mechanical power from the electric motor to the wheels through a gearbox. EVs do not require multi-speed gearboxes.
Electric motor to move the wheels.
Thermal system (cooling) to manage the key components of an EV at a constant working temperature.
Power inverter to convert DC power from the batteries to alternating current electricity and to transform the AC generated by regenerative braking into a DC to charge the batteries.
Controller to regulate the operation of an EV

Transitioning to EVs is not just a change of what powers the vehicle. Instead, it comes with a fair share of other advantages as well as a few challenges to. A successful transitioning to owning and using EVs will require a change of habits and behaviors. Table 6.3 mentions some of the major benefits that any owner for an EV may experience while also the challenges that could be faced.

Table 6.3: Advantages and Disadvantages of EVs

Advantages	Disadvantages
Eco-friendly-Minimum/ Zero tail piping	Shorter Range– "Range anxiety"
Renewable energy source	Charging station limitations
Less noise and smoother motion	Recharging Duration
Long Term Monetary Benefits: These vehicles cost less to run over time due to lower (or no) fuel costs	Higher Upfront Cost that may be offset by fuel cost savings over time, a duty and tax exemption, and utility incentives
Less Dependence on Fossil Fuels	Steep Initial Investment for Infrastructure
Regenerative Braking System	Pricey Battery Replacement
Built From Light Materials & Smaller Engines	Skilled Workforce for Maintenance
Automatic Start and Stop	Expensive Battery Disposal & Recycling
	Hydrogen Fuel Cell Issues (Source)
	Accidents from High Voltage in Batteries
	Limited Model Variety and Availability
	Financing and Loan Accessibility
	Supply Chain and Manufacturing Constraints

6.5. Is EV the Ultimate refuge for Pakistan?

Evaluating both EV and ICE vehicles is crucial in the context of Pakistan because the country may face challenges from both types of vehicles. For example, if EVs are promoted without any catch, it will cause electricity shortages. On the other hand, promoting ICE vehicles can lead to serious issues with air quality.

In terms of cost, studies reveal that in the lower bound scenario, traditional vehicles prove to be more cost-efficient. However, as we move to the upper bound, EV emerges as the more economically viable option. The question of the efficiency of EVs remains debatable, as conflicting studies argue that the total costs of EV, when compared to diesel counterparts, are higher, and they may not consistently outperform gasoline cars in terms of overall cost-effectiveness (Funk & Rabl, 1999; Massiani, 2015).

In parallel, the transition from internal combustion engine vehicles to electric vehicles appears to be an appealing and effective strategy to address environmental concerns. However, instead of solving the issue, it may likely expedite the degradation of Pakistan's environment. While the initial perception might suggest that transitioning to EVs is easy and cost-effective, it will simultaneously impose a significant burden on electricity consumption and generation, given that a substantial portion of electricity in Pakistan is generated from fossil fuels, which release a considerable amount of CO2. Additionally, the shift to electric vehicles will contribute to the electronic waste market, further exposing Pakistan's environment to vulnerability. Moreover, the country's infrastructure is not adequately prepared for the adoption of EVs. There are insufficient charging stations, limited repair facilities, and a less favorable resale market, especially for non-luxury EVs. The inadequacy of inter-city charging stations raises concerns about the practicality of EVs for longer journeys, maintaining a continued reliance on internal combustion engine vehicles for such travels.

6.6. Eco-Friendly EVs: Fact or Fiction?

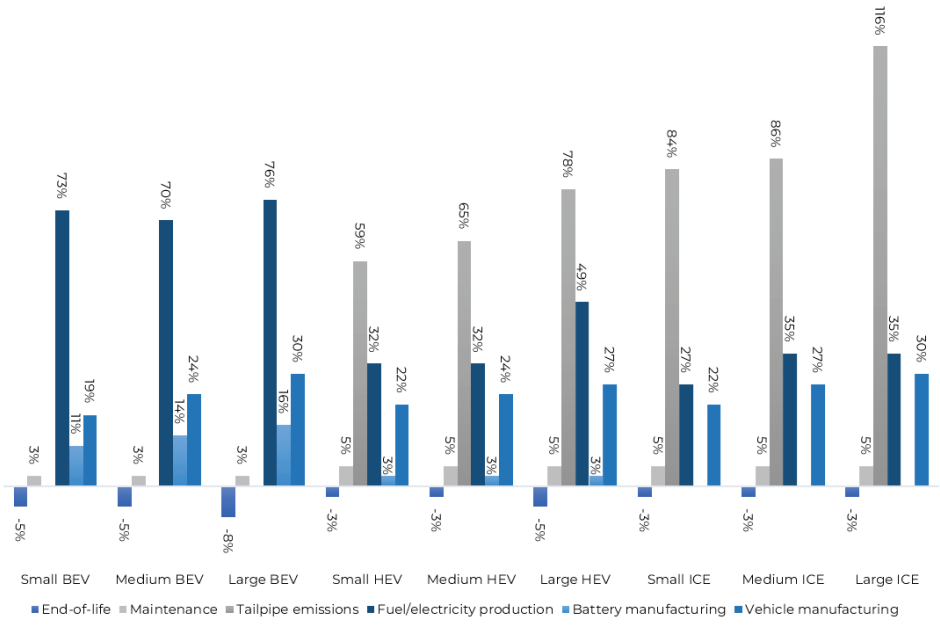
As the world grapples with the urgent need to mitigate climate change and reduce greenhouse gas emissions, the transition to electric vehicles (EVs) seems to emerged as a pivotal solution. While EVs offer promising prospects for decarbonizing transportation and curbing air pollution, their widespread adoption raises critical environmental concerns that necessitate careful consideration. From the extraction of raw materials for

battery production to the management of end-of-life components, the entire lifecycle of EVs presents intricate environmental challenges. Balancing the benefits of electrification with the need to address these concerns is essential for fostering a sustainable and truly eco-friendly transportation paradigm. In this regard, understanding and addressing the environmental implications of transitioning to electric vehicles are paramount for ensuring a cleaner, greener future for generations to come.

6.6.1. The Hidden Carbon Cost

EVs, while, significantly contribute to air pollution during their manufacturing and maintenance phases. A study on the life cycle CO2 emissions from the production of electric and conventional vehicles in China found that the CO2 emissions from vehicle production are about 14.6 tons per electric vehicle, which is 59% higher than the emissions from the production of a conventional vehicle (Qiao et al., 2017). On average, the production of a typical petrol or diesel car releases approximately 5.6 tons of CO2, primarily during the production of the steel body, whereas the manufacturing of an electric car results in around 8.8 tons of CO2, with 43% of these emissions linked to the construction of the battery (Campbell, 2022). Additionally, for long range driving and high-speed emission of carbon from EVs don't reduce; carbon emission reduces only when EVs travel less than 250km with speed of lesser than 80 km/h (Yuan et al., 2015). Moreover, a study showed ICEV emit 100-110 tons of Green House Gases (GHG) in their whole life cycle while EVs emit 77.2 tons of GHG in their life cycle (Karaaslan et al., 2018). Lastly, a report on carbon emissions of small, medium, and large size vehicles of EVs and ICEs mentioned that in the initial phases, EVs emit more carbon, while in later phases, ICEs emit more (Polestar et al., 2023). Therefore, considering overall costs associated with EV and ICEV (Figure 6.1), a comprehensive analysis of EVs and ICEVs costs in the local context of Pakistan is needed.

Figure 6.1: Life Cycle Carbon Emissions of Vehicle Segments



Note: BEVs Battery Electric Vehicle, HEVs Hybrid Electric Vehicle, ICE Internal Combustion Engine

Source: Polestar and Rivian pathway report (2023)

Meanwhile, in the face of critical mineral supply shortages and other challenges, Toyota takes the stance that hybrids, rather than electric vehicles, offer a more pragmatic solution. Their analysis, akin to meticulous number-crunching analysis suggests that the same quantity of critical minerals required to manufacture a single full-electric vehicle could alternatively produce 6 plug-in hybrids or 90 non-plug-in hybrids (Hey, 2023). Toyota argues that this approach not only enables a larger number of individuals to drive lower-emission vehicles but also yields a 37-fold increase in overall carbon reduction over the lifespan of 90 hybrids compared to a single battery electric vehicle. This means that HEV has a carbon reduction impact equal to 41% carbon reduction of an EV. However, also note that carbon footprint at production stage will be much lower, as with mining, extraction and emissions, where you can manufacture one EV, now you will be manufacturing 90 HEVs. Thus, the capture of the HEV is more comprehensive, adaptable and impactful.

6.6.2. The E-Waste Dilemma of EVs

In the year 2022, Pakistan found itself in a concerning position as it was ranked as the third worst country in the world in terms of air quality, as indicated by the Air Quality Index (AQI, 2022). This alarming environmental situation was primarily attributed to the widespread use of Vehicles, which significantly impacted both biotic and abiotic components of Pakistan's ecosystem.

The introduction of electric vehicles in the country was seen as a potential solution to address the air quality issues caused by traditional combustion engine vehicles. However, this shift towards EVs brought its own set of challenges, notably an increased burden on the ecological environment due to the generation of electronic waste (e-waste). According to the Global E-waste Monitor report (Baldé et al., 2024), around 560 kilotons (kt.) of e-waste was generated in Pakistan, and 1129 kt. of new electrical and electronic equipment were introduced into the Pakistani market. The promotion of electric vehicles in Pakistan would entail the production and disposal of more electronic components, contributing further to the mounting e-waste problem.

The connection between using electric cars and the increase in electronic waste highlights how important it is to use good ways to manage waste and eco-friendly practices. This helps lessen the negative effects on the environment as we switch to electric vehicles in the country.

6.7. Can Pakistan's Grid Handle the EV Surge?

The Pakistan's power sector is estimated to be worth around $17.69 billion, constituting approximately 6.5 percent of the country's GDP in fiscal 2015 (Zhang, 2019). Despite its significant economic contribution, Pakistan faces persistent energy crisis, a critical issue that extends beyond challenges related to transmission, distribution, and energy theft. Contributing factors include the burden of circular debt and the overall inefficiency of the power sector.

In spite of these challenges, Pakistan's power producers face performance issues, with more than 56% of electricity being generated through fossil fuels (Statista, 2022). The inefficient state of Pakistan's power sector presents a substantial obstacle in fulfilling the electricity demand re-quired for charging electric vehicles. Even presently, during the summer months, electricity shortages are common. Looking ahead, when more EVs are on the roads, it is expected that the need for electricity will spike. This increase in demand could cause a big shortage of electricity, making the power system even more strained than it already is. The potential shortfall in elec-tricity supply due to the increased demand from EVs creates a vulnerable situation. Governments may exploit this vulnerability as an opportunity to implement higher taxes and tariffs on electric-ity, posing a significant financial burden on the public. This situation could particularly impact lower and middle-income groups, potentially leading to economic hardships.

There is also the worry about Switching to electric vehicles causing an additional significant bur-den on the electricity transmission in the country, much like when public switched from petrol to CNG. Currently, many big cities face a gas shortage for cooking, leading to the use of gas cylinders in homes, restaurants, hotels, and motels. Only limited areas of big

cities have access to gas, while in smaller cities, gas load shedding is at peak in winter and normal in other seasons. In essence, just as the shift from petrol to CNG made the country gas scarce, similarly, the transition to EVs brings forth the worry about electricity supply to charge EVs as and when required.

6.8. Routing Ruckus: Pakistan's EV Supply Chain

Since the market for EVs is nascent in Pakistan, thus to set up indigenous manufacturing facilities and to establish a robust supply chain for EV components would be challenging. The need is to facilitate local manufacturing of battery packs and motors. While duty on import of EV CKD kits has been reduced to as low as 1% for most components increasing production efficiency is essential to help reduce the overall cost of production of EVs in Pakistan (Ministry of Climate Change, 2019). Inefficient production process and supply chain leads towards higher manufacturing costs, rendering the EVs less competitive in Pakistan market. To foster a competitive and sustainable domestic EV manufacturing landscape, the need is set phased targets for localization, revise import duties to encourage local production, and provide incentives for achieving early localization milestones (Arshad, 2023).

In EVs supply chain, one challenge could be higher competition for supply of raw materials since there is a potential global shortage of some minerals by 2030. Another issue is that the production of EV batteries is consolidated in China, Japan and South Korea, making EV supply chain complex, vulnerable, and costly for most automotive companies outside Asia. Thus, EV manufacturers are adopting new strategies like vertical integration, strategic alliances, local supply base, and innovation in battery chemistry.

6.8.1. OEMs' Electrification Plans

In a quest to respond to the tilting market demands towards EVs, the original equipment manufacturers (OEMs) are converting internal combustion engines (ICEs) to electric vehicles (EVs). In the current scenario, smaller OEMs are partnering with bigger ones to maximize innovation opportunities, while midsize OEMs are opting to merge; for example, PSA and FCA, and GM and Honda. Globally, the automotive landscape is evolving rapidly.

OEMs are reviewing their EV transition strategy to ensure potential competitive advantages. The business leaders and supply chain managers are abandoning everything irrelevant and learning best practices from their contemporaries.

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OEMs are reviewing their EV transition strategy to ensure potential competitive advantages. The business leaders and supply chain managers are abandoning everything irrelevant and learning best practices from their contemporaries.

For a smooth sail, OEMs are trying to tackle the challenges related to charging (duration and stations), range and power grid capacity to accommodate all charging needs during peak times. To make EV charging smart and seamless, OEMs are utilizing the vehicle-to-grid (V2G) communication interface in collaboration with charging point operators and mobility operators. For instance, Plug & Charge (PnC) is an EV charging technology for a bidirectional charging with a seamless user identification and payment process. It allows the driver to plug in their car at any charging station without the need to carry membership cards and credit cards. The safe transmission of vehicle and payment data has been ensured using a PKI-based security system made by cutting-edge encryption and authentication technology.

In 2019, Pakistan also stepped towards becoming part of the global efforts for electrification of automobiles. The National Electric Vehicle Policy (NEVP) 2019 has set a milestone towards Pakistan's EVs journey and has now been made part of the Auto Industry Development and Export Plan (AIDEP 2021-26) as well.

6.9. Conclusion

As Pakistan stands at the crossroads of a new automotive era, the electrification of vehicles presents both a beacon of hope and formidable challenges. Embracing EVs could propel the nation towards a greener, more sustainable future, significantly reducing its carbon footprint and dependence on fossil fuels. The environmental benefits are clear: EVs offer a promising solution to the persistent problems of air pollution and greenhouse gas emissions that plague Pakistan's major cities.

However, this transition demands meticulous planning, robust infrastructure, and a comprehensive strategy to address the myriads of challenges, ranging from energy supply constraints to electronic waste management. The current state of Pakistan's power sector, characterized by inefficiencies and dependency on fossil fuels, raises questions about its capacity to support a large-scale shift to electric mobility. Investing in renewable

energy sources and modernizing the grid will be crucial to ensure that the adoption of EVs does not exacerbate existing energy shortages.

Another critical aspect is managing the environmental impact of EVs throughout their lifecycle. The production of EV batteries involves significant carbon emissions and the generation of electronic waste poses a new set of environmental challenges. Establishing efficient recycling processes and promoting the use of sustainable materials in battery production will be essential to mitigate these issues.

As we drive towards this electrified horizon, Pakistan must balance innovation with practicality, ensuring that the journey to a cleaner future is both sustainable and inclusive. The government, private sector, and civil society must work collaboratively to overcome these obstacles and create a conducive environment for EV adoption. Public awareness campaigns can play a vital role in educating citizens about the benefits of EVs and the importance of sustainable practices.

The road ahead is complex, but with strategic foresight and collective effort, Pakistan can steer towards a future where electric vehicles not only represent technological advancement but also a commitment to environmental stewardship and economic resilience. Embracing this change with a comprehensive and inclusive approach is the way to go.

6.10. Key Takeaways

- EVs offer a cleaner, greener future for Pakistan, slashing carbon emissions and reducing fossil fuel dependency.
- EV transition demands meticulous planning, robust infrastructure, and a comprehensive strategy to address the myriads of challenges
- Pakistan's power sector needs a major upgrade to support widespread EV adoption, renewable energy is key.
- Managing the environmental impact of EV batteries, from production to disposal, is essential.
- Public awareness campaigns can drive the shift towards a sustainable, electrified future.
- The road ahead is complex, but with strategic foresight and collective effort, Pakistan can steer towards EV transition.

CHAPTER 07

A Deep Dive into Pakistan's EV Transition

Saddam Hussein, Mohammad Armughan &
Mohammad Shaaf Najib

7.1. Introduction

Pakistan, in its quest for a sustainable automotive future, had introduced its first National Electric Vehicle Policy in 2019 (Ministry of Climate Change, 2019), which proposed aggressive adoption levels, including: 30% of car sales by 2030 and 90% by 2040, 50% of two- and three-wheeler sales by 2030 and 90% by 2040, 50% of bus sales by 2030 and 90% by 2040 and 30% of truck sales by 2030 and 90% by 2040. The same draft policy also proposed: a reduction in the goods and services tax from 17% for conventional vehicles to 1% for EVs, lower electricity tariffs for EVs, an import duty of only 1% for charging equipment, plans for a direct current fast charging network and incentives for manufacturers including lower financing rates from the State Bank of Pakistan. However, there were slight changes later in the incentive structure for EV adoption.

Fast forward to 2021, the Engineering Development Board of Ministry of Industries and Production put forward the Automotive Industry Development and Export Plan 2021-26 (Ministry of Industries Production and Special Initiatives, 2021). This broader initiative aimed to embrace various technologies, including electric, hybrid, and hydrogen fuel cell, while remaining open to emerging innovations. Currently focusing on Electric Vehicles (EVs) and hybrids, AIDEP aimed to incentivize these technologies with an open commitment to consider the same for hydrogen fuel cell vehicles. Acknowledging the early stages of EV technology, the plan addresses the initial high capital costs, anticipating a decline as technology matures. Sectors identified for initial EV adoption include fixed-route public transport and 2-3 wheelers. Others categories were not included for now, due to expected slow adoption due to infrastructure challenges. AIDEP's tailored incentive structure encompasses zero custom duty for charging stations and components, subject to adjustments during localization. Sector-specific incentives are outlined for 2-3 wheelers, motorcycles, cars, buses, and trucks.

Hybrid technology is prevalent in modern vehicles worldwide, including four-wheelers and heavy-duty vehicles, offering reduced fuel consumption compared to conventional fossil fuel vehicles. This technology has received incentives, specifically tariff incentives on hybrid components in the Cars/SUVs/Vans category, but Pakistan's automobile companies have only recently stepped into this category. The policy boasts a framework which will bring required transformation in a planned and phased manner causing minimum disruptions while at the same time having a positive socio-economic impact in terms of industrial growth, employment generation and improved environment for future generations.

7.2. The Inception

Pakistan's pursuit of an EV ecosystem saw its inception in 2019, marked by extensive stakeholder consultations initiated by the Government of Pakistan and delegated to the Engineering Development Board (EDB). The subsequent crafting of proposals and policy formulations unfolded under the lens of the Auto Industry Development Committee (AIDC), a Federal Cabinet-approved entity. The draft policy underwent meticulous scrutiny in AIDC meetings, resulting in initial approval for EVs, specifically targeting 2-3 wheelers and Heavy Commercial Vehicles (HCVs).

In another forward move, the Economic Coordination Committee (ECC) of the Cabinet took charge in March 2020, instituting an Inter-Ministerial Committee initially led by the former Adviser to the Prime Minister on Industries and Production. This committee undertook the critical task of reviewing the policies and incentive packages proposed by the EDB/MoIP and the Ministry of Climate Change (MoCC). Following the subsequent appointment of the Minister for Industries and Production, the ECC revised the committee's composition in May 2020. The revised committee, chaired by the Minister for Industries and Production and featuring the Secretary of the Ministry of Commerce as a member, played a key role in shaping the course of EV incentives.

The proposals for 2-3 wheelers and Heavy Commercial Vehicles (HCVs) received provisional approval from the ECC in its meeting on June 10, 2020 (Engineering Development Board, 2020). Subsequently, the inter-ministerial committee finalized incentives for 4-wheelers, with incentives for hybrid vehicles also reaching a resolution, as officially announced in the Finance Bill of 2021.

It was also determined that the incentives agreed for Electric Vehicles (EVs) would be seamlessly integrated into the overarching Automotive Industry Development and Export Plan (AIDEP). The consolidation aims to provide a comprehensive and unified framework, ensuring a cohesive approach toward the promotion and growth of the EV sector in Pakistan.

7.3. Driving Change: Salient Objectives of the EV Policy

The main objectives of the EV policy is to create a pivot to industrial growth in Pakistan and encourage auto and related industry to adopt alternate manufacturing. The policy also aims to mitigate negative aspects of climate change through reduction in emissions from transport sector through introduction of fuel-efficient green technologies as well as contribute to reduction of current account deficit through reduction in overall share of oil import bill by shifting to fuel efficient technologies. Besides, it would also serve the purpose of employment generation through introduction of new investments.

7.3.1. Incentives at Work

In a move to propel the EV industry forward and create a conducive environment for sustainable transportation, Pakistan has instituted a range of compelling incentives. These initiatives encompass a waiver of custom duty on the import of machinery crucial for EV manufacturing. Furthermore, the government has eliminated sales tax on the import of completely knocked down (CKD) kits, simplifying the assembly process and incentivizing local production. For specific components of EV CKD, such as advanced batteries, battery chargers, controllers, and three connection terminals, a minimal 1% custom duty is levied.

Notably, a concessionary customs duty rate, varying from 1% to 50%, has been implemented on the import of completely built EV units (CBUs), rendering fully assembled electric vehicles more economically attractive. The value-added tax (VAT) exemption on both CBU and CKD imports for select electric vehicle types serves to further enhance their financial viability. Importantly, the government has extended custom duty exemptions on inputs crucial for local EV manufacturing (Federal Board of Revenue, n.d.).

Nevertheless, most of these incentives are focused on supply side or production side of the equation, without taking into consideration the effectiveness of these in translating these incentives into demand side of the equation as well.

The Twelfth Schedule of the Sales Tax Act 1990 (Federal Board of Revenue, 2024) enlists the exemptions to the VAT under Section 3 of the sales tax act or any other notification issued thereafter. The amendment to the twelfth schedule in the Finance Act 2021 inserted new clauses pertaining to concessions for the assembly and import of Electric Vehicles in Pakistan. Passenger EVs with battery up to 50 KwH along with Electric LCVs with battery up to 150kwh were given exemption from the VAT till end of fiscal year 2026. This represented government's intention to incentivize medium income families to switch to EVs.

Tax exemption to small battery sized vehicles is a positive step and must be supported by additional measures for EVs of this category, by minimizing registration fee and token taxes for these vehicles for at least a decade. This will help in reducing the total up front or the on-road cost of smaller sized battery EVs, making them more attainable for the medium income households. Currently, the major proportion of EVs in the country belong to the luxury or high value segment owned by the top income earning households in the country. If the incentive structure is focused towards benefiting the luxury EVs, it will not only prevent any meaningful EV adoption in the country, but benefit the already privileged households at the expense of medium and low-income households of the country.

7.4. Global Perspectives

Governments across the globe are implementing a comprehensive suite of policy incentives to propel the widespread adoption of electric vehicles (EVs) and encourage sustainable mobility. In Europe, Norway stands out as a pioneer with its holistic approach, combining extensive financial incentives with non-monetary perks. The country offers substantial purchase subsidies, exemptions from value-added tax (VAT), reduced tolls, and incentives for EV infrastructure development (European Alternative Fuels Observatory, 2024). Norway's commitment has resulted in EVs constituting a significant portion of the national vehicle fleet.

In North America, the United States provides federal tax credits to EV buyers, varying based on battery capacity. Additionally, several states offer additional incentives, demonstrated by California's rebate programs and access to high-occupancy vehicle (HOV) lanes for EVs (Alternative Fuels Data Center, n.d.). This multi-layered approach aims to make EVs more economically viable and appealing to consumers.

In Asia, China has emerged as a global leader in EV adoption, driven by an intricate web of policies. These include purchase subsidies, exemptions from license plate lotteries and restrictions, and a robust network of charging infrastructure. China's strategic planning and policy coordination have propelled it to the forefront of the EV market.

Countries like the Netherlands in Europe and New Zealand in the Asia-Pacific region focus on promoting EV infrastructure. The Netherlands offers grants and tax benefits to businesses installing charging stations (Halperin, 2023), while New Zealand emphasizes public awareness campaigns to educate consumers about the environmental benefits of EVs.

Furthermore, regulatory measures globally are shaping the automotive landscape. Countries such as the United Kingdom, France, and Germany have set ambitious targets to ban the sale of internal combustion engine vehicles in the coming decades, incentivizing automakers to transition towards electric mobility.

Thus, the global landscape of EV incentives is rich and diverse, with countries employing a multifaceted approach that combines financial incentives, supportive infrastructure development, regulatory frameworks, and public awareness campaigns. This intricate tapestry of policies reflects a concerted international effort to drive sustainable transportation and mitigate the environmental impact of traditional vehicles.

7.5. Feeling the Pulse: Market Dynamics and Cost Factor

In Pakistan, the EV market is experiencing exponential growth, with numerous major firms recognizing its potential and expressing a keen interest in investing in this lucrative business opportunity. Currently, industry giants such as MG Motors, Renault, Hyundai, Toyota, Honda, Nissan, Karakoram Motors, and Haval are strategically positioning themselves to capture a significant share of the 4-wheeler market. Concurrently, companies like Yadea, Jolta, MS Jaguar, Sazgar, Vlektra, and Neon are gearing up to exploit the 3 and 2-wheeler market segments. Figure 7.1 shows the technology big automobile manufacturers currently following internationally, among them few of the companies are coming to Pakistan to penetrate automobile industry.

Figure 7.1: Large Manufacturers Technology Share

	Turbo	GDI/GDPI	Cyclinder Deactivation	CVT	7+ Gears	Non-Hybird StopStart	Hybrid	PHEV EV/FCV
Tesla	0%	0%	0%	0%	0%	0%	0%	100%
Hyundai	25%	72%	0%	23%	64%	37%	9%	4%
Honda	39%	69%	30%	64%	36%	77%	10%	0%
Kia	27%	68%	0%	28%	53%	49%	3%	6%
Subaru	31%	100%	0%	94%	0%	73%	0%	0%
Toyota	6%	78%	0%	38%	42%	25%	22%	2%
Nissan	16%	85%	0%	66%	32%	12%	0%	2%
Mazda	24%	100%	44%	0%	0%	0%	0%	0%
VW	81%	93%	3%	0%	90%	72%	17%	8%
BMW	97%	97%	0%	0%	96%	58%	29%	8%
Mercedes	90%	97%	3%	0%	97%	64%	30%	3%
Ford	78%	88%	21%	4%	91%	60%	6%	4%
GM	49%	94%	49%	11%	72%	76%	0%	2%
Stellantis	13%	8%	27%	1%	96%	47%	17%	5%
All Manufactures	37%	73%	16%	26%	59%	50%	10%	7%

Source: Environmental Protection Agency (2023), Automotive Trends Report 2023

Currently, in Pakistan, minimum price of new electric car is PKR 4.7 million, whereas go as high as around PKR 100 million or even beyond. Moreover, new electric bike price range is PKR 130,000 to 620,000. Including new electric rickshaw increase the range from PKR 720,000 to 925,000. Additionally, minimum price of used electric car is PKR 4 million, go as high as above PKR 50 million. Moreover, used electric bike price range is PKR 95,000 to 620,000. Including new electric rickshaw increase the range from PKR 576,000 to 740,000 (Table 7.1).

Table 7.1: New and Used EV Prices in Pakistan

EV Type	**Small**	**Medium**	**Large**
Electric Car	4.7m to 10m	18m to 30m	33m to 100m
Electric Bike	130k to 220k	260k to 340k	360k to 620k
Electric Rickshaw	...	720k to 925k	...
Used EV Price Ranges			
EV Type	**Small**	**Medium**	**Large**
Electric Car	4m to 10m	17m to 25m	30m to 55m
Electric Bike	95k to 150k	185k to 260k	350k to 485k
Electric Rickshaw	...	576k to 740k	...

m: million, k: thousand
... for rickshaw standard size is considered

On the contrary, the price range of new Internal Combustion Engine (ICE) car in Pakistan is PKR 1.9 million to 157 million. Furthermore, new ICE bike price range is 108k to 547k. Generally, new ICE rickshaw cost in a range of PKR 350k to 500k. Additionally, minimum price of used ICE car is 300k, whereas maximum range is PKR 74 million. Moreover, used ICE bike price range is PKR 30k to 295k. Including used ICE rickshaw increase the range from PKR 80k to 250k (Table 7.2)

Table 7.2: New and Used ICEVs Prices - Pakistan

EV Type	**Small**	**Medium**	**Large**
ICE Car	1.9 to 9.9	13m to 30m	34m to 157m
ICE Bike	108k to 208k	213k to 547k	550k to 1,000k
ICE Rickshaw	...	350k to 500k	...
Used ICE Price Ranges			
EV Type	**Small**	**Medium**	**Large**
ICE Car	0.3m to 4m	4.2m to 9.8m	16.5m to 74.5m
ICE Bike	30k to 82k	112k to 295k	300k to 650k
ICE Rickshaw	...	80k to 250k	...

m: million, k: thousand
... for rickshaw standard size is considered

7.5.1. Infrastructure Snapshot

When making a vehicle purchase decision, the consideration of vehicle infrastructure becomes crucial, whether the vehicle is electric or combustion engine. In the context of Pakistan, acquiring a vehicle may not be an uphill task, but the subsequent maintenance requires considerable effort. This is particularly relevant as the majority of individuals in Pakistan tend to prioritize private vehicle ownership over the use of public transport. Vehicle infrastructure comprises various elements that play a pivotal role in the ownership experience. These include:

Fuel/Charging Stations

Availability of fuel or charging stations is a critical factor to ensure uninterrupted usage of the vehicle. For ICEVs, easy access to petrol or diesel stations is essential, while EV require a network of charging stations.

Repair Workshops

The presence of well-equipped and reliable workshops is important for the maintenance and repair of vehicles. Access to skilled mechanics and quality service centers ensures that any issues with the vehicle can be addressed promptly.

Spare Parts Availability

The availability of spare parts in the market is a key consideration. A robust supply chain for vehicle components ensures that repairs and replacements can be carried out efficiently.

Resale Value

Resale value is an important aspect of the overall cost of ownership. A well-established resale market indicates that the vehicle can retain its value over time, offering a favorable return on investment when the owner decides to sell or upgrade vehicle.

Table 7.3 provides a comparison between EV and ICEV infrastructure. The data highlights significant differences, especially in the major cities Karachi, Lahore, and Islamabad (KLI).

On average, there are only 5 EV charging stations in KLI, while there are a substantial 228 fuel stations in these cities. This contrast raises concerns

for EV owners, indicating a shortage of charging infrastructure. Furthermore, the number of car repair workshops in Pakistan are 109,000 (ILO, 2023), catering to EVs in KLI is significantly lower than those for ICEVs. This presents a challenge for EV owners in case of breakdowns, as the limited availability of repair facilities adds to the dilemma. Additionally, the skill set of mechanics in Pakistan remains a concern. Even if workshops are available, some lack the required expertise, and those with the necessary skills often charge exorbitantly due to their unique abilities, putting an extra financial burden on EV owners. In terms of inter-city travel, the EV infrastructure is lacking, with only two charging stations on the M2 (Lahore to Islamabad) compared to hundreds of fueling stations on motorways and highways. This deficiency in inter-city charging options makes EVs a major concern for long-distance travel. In some instances, individuals opt for ICEVs for long routes due to the limited EV infrastructure.

Spare parts for ICEVs are easily accessible, but for EVs it is a hard nut to crack. If someone is traveling between cities, it could be a big concern because there are few or no workshops on highways and motorways. Additionally, the resale value of EVs, except for luxury cars, is quite low, while ICEVs have a higher resale value, making them more attractive in the market.

Table 7.3: EV and ICEV Infrastructure Overview

City/Infrastructure	**Charging Stations**	**Auto Workshops**	**Spare Parts**	**Resale Value**
Karachi	6	3	2	1
Lahore	5	3	2	1
Islamabad	5	2	2	1
ICEV Infrastructure				
City/Infrastructure	**Fuel Stations**	**Auto Workshops**	**Spare Parts**	**Resale Value**
Karachi	309	15,000	3	3
Lahore	221	10,000	3	3
Islamabad	156	2,000	3	3

spare parts: 3 easily available, 2 somehow available, 3 not available
Resale value: 3 high, 2 medium, 3 low Comparison of automobile companies are out of the scope of this study

7.5.2. Cost of Passenger Vehicles

We now turn our attention to estimating the lifetime cost associated with owning a vehicle whether its Electric or ICE vehicle. Majorly, the costs are divided into two categories, one direct and other indirect. The direct cost includes purchasing cost, maintenance cost, and fuel cost. The indirect cost involves carbons emission cost and time cost which a society and an owner bear after purchasing a vehicle. For a thorough analysis vehicles are segregated into small, medium, and large categories. For ease of analysis all the calculations are based on averages.

7.5.2.1. Lifetime Cost of EVs

Tables 7.4 to Table 7.11 outline a comprehensive analysis of the average lifetime costs of new and used electric vehicles in Pakistan, considering various factors such as charging, purchasing, maintenance, time, and CO2 emissions[8]. The costs are presented for both commercial and household charging rates. EVs are categorized in small, medium and large categories, where smaller vehicles generally have lower total costs and costs per year compared to medium and large ones. Bikes consistently show lower costs than cars, reflecting their affordability. Furthermore, analysis differentiates between new and used EVs, indicating that used vehicles, despite their lower purchasing costs, may still incur substantial overall costs over their estimated lifetimes. Additionally, the distinction between commercial and household charging rates highlights the impact of charging infrastructure and electricity costs on the total cost of ownership for EVs in Pakistan. Overall, the data underscores the importance of considering various cost components and charging scenarios when evaluating the economic viability of electric vehicles in the Pakistani market.

Electric cars in Pakistan, are categorized by small, medium, and large vehicles for both cars and bikes. For small cars with an estimated lifespan of 7 years, the total cost amounts to PKR 9.5 million with an annual cost of PKR 1.3 million. Medium cars, with an estimated lifespan of 8 years, have a total cost of PKR 27 million and an annual cost of PKR 3.3 million. Large cars, spanning 9 years, incur a total cost of PKR 58 million, translating to an annual cost of PKR 6.4 million (Table 7.4).

Table 7.4: Average Lifetime Costs of Passenger EVs – Commercial Rate

('000 PKR)

Cars	Estimated life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 Emissions	Total	Total Per Year
Small	7	920	7,150	97	636	703	9,506	1,358
Medium	8	1,190	24,000	169	800	846	27,005	3,376
Large	9	1,530	54,000	250	1,080	1,050	57,910	6,434

The average lifetime cost analysis of new electric bikes in Pakistan, considering various sizes. Small bikes, with an estimated lifespan of 3 years, exhibit a total cost of PKR 501 thousand, translating to an annual cost of PKR 167 thousand. Medium bikes, spanning lifetime of 4 years, incur a total cost of PKR 895 thousand, resulting in an annual cost of PKR 224

8. Note: For calculations average values are taken
For purchasing cost average prices of each category is taken
For used vehicles, depreciation rates are used
For simplicity values are round off
Authors may be contacted for detailed calculations

thousand. Large bikes, with an average life of 5 years, have a total cost of PKR 1.1 million, equating to an annual cost of PKR 227 thousand.

Table 7.5: Average Lifetime Costs of EV Bikes – Commercial Rate

('000 PKR)

Bike	Estimated life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
Small	3	98	175	9	154	64	501	167
Medium	4	115	300	16	360	104	895	224
Large	5	102	490	25	360	156	1,133	227

Electric cars at household rates in Pakistan costs low as compared to commercial charging rates. Small cars, with an estimated lifespan of 7 years, incur a total cost of PKR 8.8 million, resulting in an annual cost of PKR 1.3 million. Medium cars, lasting 8 years, exhibit a total cost of PKR 26 million, with an annual cost of PKR 3 million. Large cars, extending over 9 years, have a total cost of PKR 57 million, equating to an annual cost of PKR 6.3 million.

Table 7.6: Average Lifetime Costs of Passenger EVs - Household Rate

('000 PKR)

Cars	Estimated life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
Small	7	400	7,150	97	445	703	8,796	1,257
Medium	8	518	24,000	169	560	846	26,093	3,262
Large	9	666	54,000	250	756	1,050	56,722	6,302

The average lifetime cost of new electric bikes at household rates is revealed. Across three categories of bikes—small (3-years life), medium (4-years life), and large (5-year life)—the total costs vary, with the large-sized electric bikes displaying the highest total cost at PKR 956 thousand, followed by the medium and small categories at PKR 758 thousand and PKR 446 thousand, respectively.

Table 7.7: Average Lifetime Cost of EV Bikes - Household Rate

('000 PKR)

Bike	Estimated Life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
Small	3	42	175	9	154	64	446	149
Medium	4	50	300	16	288	104	758	190
Large	5	44	490	25	240	156	956	191

The average lifetime cost of used electric cars at commercial rates highlights substantial cost components and variations across different car sizes. Among small (7-years life), medium (8-years life), and large (9-years life) cars, the large category exhibits the highest total cost at PKR 46.6 million, followed by medium and small categories at PKR 24.5 million and PKR 9.1 million respectively.

Table 7.8: Average Lifetime Cost of Used Passenger EVs - Commercial Rate

('000 PKR)

Cars	Estimated Life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
Small	7	1,149	6,300	156	795	703	9,103	1,300
Medium	8	1,434	21,000	271	964	846	24,515	3,064
Large	9	1,821	42,000	401	1,286	1,050	46,558	5,173

The average lifetime cost of used electric bikes at commercial rates reveals distinctive costs across three categories. The large category stands out with the highest total cost at PKR 1.2 million followed by medium and small categories at PKR 921 thousand and PKR 514 thousand, respectively.

Table 7.9: Average Lifetime Cost of Used EV Bikes - Commercial Rate

('000 PKR)

Bike	Estimated Life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
Small	3	123	123	11	193	64	514	171
Medium	4	138	223	22	434	104	921	230
Large	5	121	418	35	429	156	1,159	232

The average lifetime cost of used electric cars at household rates offers valuable insights into the financial considerations associated with different car sizes. Among small (7-year life), medium (8-year life), and large (9-year life), the large category exhibits the highest total cost at PKR 45 million, followed by medium and small categories at PKR 23 million and PKR 8.2 million respectively. Interestingly, the cost per year is highest for the large category at PKR 5 million, emphasizing the long-term financial implications of larger vehicles.

9. For calculations average values are taken
For purchasing cost average prices of each category is taken
For used vehicles depreciation rates are used
For simplicity values are round off
Authors may be contacted for detailed calculations

Table 7.10: Average Lifetime Cost of Used Passenger EVs- Household Rate

('000 PKR)

Cars	Estimated Life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
	7	500	6,300	156	557	703	8,216	1,174
	8	624	21,000	271	675	846	23,416	2,927
	9	793	42,000	401	900	1,050	45,143	5,016

The average lifetime cost of used electric bikes at household rates also provides valuable insights. The large category exhibits the highest total cost at PKR 947 thousand, followed by medium and small categories at PKR 756 thousand and PKR 444 thousand, respectively

Table 7.11: Average Lifetime Cost of Used EV Bikes - Household Rate

('000 PKR)

Bike	Estimated Life (years)	Costs						
		Charging	Purchase	Maintenance	Time	Co2 emissions	Total	Total Per Year
	3	54	123	11	193	64	444	148
	4	60	223	22	347	104	756	189
	5	53	418	35	286	156	947	189

Currently, the total up front cost of an Electric Vehicle is on the higher end in Pakistan, particularly when compared to its ICEV equivalents. This not only makes purchasing an EV difficult for a large segment of the population, particularly the already vehicle owners in Pakistan, but also makes the cost recovery period longer for those willing to shift to the EVs. It is therefore essential that the cost of vehicles must come down in order to reduce the total upfront cost of EVs and hence the lifetime cost of owning an EV as well. For this purpose, it is important that the scale of production is increased. Pakistan has to date failed to increase its ICEVs production levels to the point where per unit costs could be lowered due to large production levels, but the opportunity for doing so in the EV segment is present. The only way that Pakistan can push through a quick adoption of EVs is through increasing the production size to the point where the EV producers achieve economies of scales and hence are able to reduce the per unit cost of each EV.

This is however, not possible if we continue to policy of localization in our automobile industry and detach from the global value chain. Instead, the benefit of the automobile industry and the EV segment is in collaboration with global players to become part of the global value chain. Pakistan automobile assemblers and manufacturers though need to a two pronged approach for the purpose. The first being collaborating with foreign companies for capital input due to the large investments required

to enhance production. Secondly, the country's automobile industry lags far behind in its technological approach as well and hence the shift of technology and human capital resources both are necessary for uplifting the automobile industry as a whole but also the EV segment specifically.

There cannot be any meaningful EV adoption in the country without reduction of the upfront cost, and there cannot be any significant decrease in the upfront cost without significant increase in the production. Therefore, increasing the production must be the supply side focus for EVs in Pakistan.

7.5.2.2. Lifetime Cost of ICEVs

Tables 7.12 to 7.15 break- down the average lifetime costs of both new and used ICEVs in Pakistan.[9] In new ICEVs, the analysis showcases a consistent pattern where larger vehicles, both cars and bikes, tend to incur higher total costs compared to their smaller counterparts. The analysis of used ICEVs shows a perspective, revealing that lower purchasing costs are juxtaposed with significant overall expenses over the vehicles' lifespans. The data collectively highlights the intricate economic considerations tied to the size and type of vehicles in the Pakistani market, underscoring the multifaceted nature of evaluating the financial viability of ICEVs.

The average lifetime cost of new combustion engine cars sheds light on the comprehensive financial implications associated with different car sizes. The large category stands out with the highest total cost at PKR 106 million, followed by medium and small categories at PKR 27 million and PKR 9.5 million respectively. Interestingly, the cost per year is highest for the large category at PKR 11.8 million, underlining the long-term financial impact of larger vehicles.

Table 7.12: Average Lifetime Cost of Passenger ICEVs

('000 PKR)

Cars	Estimated Life (years)	Costs					
		Fuel	Purchase	Maintenance	Co2 Emissions	Total	Total Per Year
Small	7	2,380	5,900	221	949	9,450	1,350
Medium	8	3,587	21,500	890	1,215	27,192	3,399
Large	9	6,120	95,500	2,569	1,660	105,849	11,761

The data highlights variations among small (5-years life), medium (6-years life), and large (7-years life) ICEV motorcycles. The Large category stands out with the highest total cost at PKR 2.3 million, followed by medium and small categories at PKR 1.8 million and PKR 1 million, respectively. Interestingly, the cost per year is highest for the large category at PKR 335 thousand, indicating the long-term financial implications of larger motorcycles.

Table 7.13: Average Lifetime Cost of ICEV Motorcycle

('000 PKR)

Bike	Estimated Life (Years)	Costs					
		Fuel	Purchase	Maintenance	Co2 Emissions	Total	Total Per Year
Small	5	408	158	50	456	1,072	214
Medium	6	783	380	72	556	1,791	298
Large	7	762	775	105	703	2,344	335

The analysis of the average lifetime cost of used ICEV cars reveals significant variations among different car sizes. The data underscores that the large category, with a total cost of PKR 57 million, exhibits the highest overall expenses, followed by medium and small categories at PKR 13 million and PKR 5.9 million, respectively. The large variation is on account of the differences in purchase price for vehicles in each category. Notably, the cost per year is highest for the large category at PKR 6.4 million.

Table 7.14: Average Lifetime Cost of Used Passenger ICEV

('000 PKR)

Cars	Estimated Life (years)	Costs					
		Fuel	Purchase	Maintenance	Co2 Emissions	Total	Total Per Year
Small	7	2,479	2,200	309	949	5,938	848
Medium	8	3,776	7,000	1,246	1,215	13,237	1,655
Large	9	6,580	45,500	3,597	1,660	57,337	6,371

The analysis of the average lifetime cost of internal combustion motorcycles across different sizes provides insights into the comprehensive financial considerations for consumers. The large category stands out with the highest total cost at PKR 2.1 million, followed by medium and small categories at PKR 1.7 million and PKR 993 thousand, respectively. Interestingly, the cost per year is highest for the large category at PKR 303 thousand, indicating the long-term financial implications of larger motorcycles. This analysis provides valuable information for motorcycle buyers, emphasizing the importance of considering various cost factors beyond the purchasing price when evaluating the economic viability of different-sized motorcycles.

Table 7.15: Average Lifetime Cost of Used ICEV Motorcycle

('000 PKR)

Bike	Estimated Life (years)	Costs					
		Fuel	Purchase	Maintenance	Co2 emissions	Total	Total Per Year
Small	5	416	56	65	456	993	199
Medium	6	808	203	94	556	1,660	277
Large	7	793	475	147	703	2,118	303

7.6. Inside Pakistan's EV Shift: What You Need to Know

There are range of policy instruments and incentive mechanism being employed to encourage EV adoption across the globe. These include financial incentives in terms of rebates, tax cuts and subsidies. Besides, complementing policies, such as raising fuel prices, more taxes on conventional cars, environmental regulations, giving exclusive incentives for investments in charging infrastructure of EVs, banning combustion engine vehicles from major urban centers as a starter and so on. Let us have a look at different policy tools in context of Pakistan.

First and foremost, policy instrument is financial. It wields a substantial influence in steering the course of developments in the automotive landscape. Studies focused on electric vehicle (EV) market shares underscore the critical role that subsidies play, constituting around 50% of the EV market. Despite the marked reduction in battery prices since 2015, a trend projected to persist, the continued importance of incentives remains obvious, until electric vehicles achieve cost parity with their traditional internal combustion engine (ICE) counterparts.

Moreover, it is pertinent to note that incentives extended at the juncture of purchase, such as immediate rebates, prove to be more persuasive than deferred benefits like income tax credits. This nuanced approach not only bolsters the appeal of EVs for consumers but also strategically addresses the economic factors that impact their adoption. As the automotive industry undergoes a transformative shift towards sustainability, the judicious application of financial incentives emerges as a linchpin in fostering widespread acceptance of electric vehicles on the road.

However, in Pakistan's case it is neither feasible nor advisable to call for subsidy at least for foreseeable future. The country has limited financial resources, and allocating subsidies for EVs will strain the budget. Plus, for a country such as Pakistan with low-income levels, owning any kind of automobile, let alone EVs still remains a luxury for most of the population, and shall remain so in case of EVs even after subsidy.

On the other hand, increased fuel prices can serve as a catalyst for accelerating the adoption of EVs. As the cost of traditional fossil fuels, such as petrol, rises, consumers are likely to become more financially conscious and seek alternative, cost-effective transportation solutions. Higher fuel prices make the operational costs of ICE vehicles more burdensome, thereby making electric vehicles, which often have lower maintenance and fueling costs, a more attractive option. The increased economic incentive to save on fuel expenses may prompt consumers to seriously consider EVs as a viable and economical choice. Moreover, elevated fuel prices could stimulate regulatory measures and government policies favoring EVs, such as increased subsidies, tax incentives, and investment in charging infrastructure. This confluence of economic pressures and supportive policies creates a favorable environment for boosting EV adoption, encouraging a shift towards more sustainable and environmentally friendly transportation options.

Yet, implementing a policy of raising fuel prices solely to boost EV adoption in Pakistan may face several challenges that could limit its effectiveness. Firstly, Pakistan's economic landscape, characterized by a diverse demographic and varying income levels, may render higher gasoline prices disproportionately burdensome for certain segments of the population. For many, the immediate impact of increased fuel costs could overshadow the long-term benefits associated with transitioning to electric vehicles, particularly if the upfront costs of EVs remain high. Secondly, the success of such a policy would hinge on the availability and affordability of electric vehicles, which may be constrained by factors such as import dependencies, limited manufacturing capabilities, and a developing charging infrastructure. If EVs are not readily accessible or competitively priced, consumers may find it challenging to make the switch, even in the face of escalating gasoline prices.

For expediting the EV penetration into the mainstream through a "stick" policy, the governments across different countries may also impose a ban on ICE vehicles in varying degrees and time frames or heavily disincentive the ICE manufacturers and assemblers. Though, this policy may backfire in Pakistan, where even trivial things are politicized and be easier in the absence of alternate ecosystems for EVs. Further, the absence of an alternate ecosystems for EVs also makes immediate discouraging of ICE vehicles production a poor policy consideration. Also, price would again be a critical factor here. So, banning or phasing out the ICE vehicles can be the last elements in the chain, that too would require a gradual approach instead of an immediate one.

Moreover, the existing energy mix in Pakistan, where a significant portion of electricity is generated from fossil fuels, could diminish the perceived environmental benefits of EVs. Without a simultaneous emphasis on transitioning towards cleaner and renewable energy sources, the environmental appeal of EVs may be less pronounced.

Cultural and behavioral factors also play a crucial role. Pakistan has a well-established automobile market with a strong preference for traditional vehicles. Changing consumer attitudes and habits, especially in the absence of a robust public awareness campaign, might prove challenging.

Range anxiety is another concern for consumers of EVs globally and further aggravates in Pakistan. Consumers often worry that electric vehicles do not provide a sufficient driving range on a single charge to meet their daily commuting needs or accommodate longer journeys. This concern is amplified in countries with varied landscapes, such as mountainous regions or remote areas, where the perceived limitations of electric vehicle range become more pronounced. In addition, the fear of being stranded without a charging station nearby contributes to range anxiety. If charging infrastructure is not widely available or accessible, consumers may hesitate to adopt electric vehicles, fearing the inconvenience of finding charging points during their journeys. Thus, consumers may be reluctant to switch to electric vehicles if they believe that the existing technology cannot reliably support extended journeys without frequent stops for charging. The government and the automotive industry can collaborate to build a comprehensive charging infrastructure network, especially along highways and in remote areas. Such initiatives can significantly reduce concerns related to range anxiety by providing EV users with convenient and accessible charging options. Addressing range anxiety is crucial for fostering greater consumer confidence in electric vehicles and promoting their widespread adoption.

In few European countries, battery swapping model is also in use. In this approach, you can have a stop-over when your battery is about to die, swap it at the battery swapping station, which takes few minutes and then resume the journey. Yet, for this model, mainstreaming of electric vehicles is a must, which seems a distant possibility as of now. Moreover, the reliability and consistency of the power supply in Pakistan may affect the confidence of consumers in EVs. If power outages are common, it might lead to concerns about the feasibility of charging EVs regularly. Additionally, policy implementation and enforcement in Pakistan can be complex due to bureaucratic inefficiencies, potential resistance from stakeholders in the petroleum industry, and challenges in consistent regulatory enforcement.

Currently, the argument presented in favor of quick adoption of Electric Vehicles in Pakistan is the decreasing price of renewable electricity generation, predominantly, through solar energy, in the country. This includes the increase of electricity generation through solar systems at household levels as well as the proposals to utilize roofs of existing fuel stations to install solar energy plants to produce electricity for electricity charging stations to be installed at existing fuel stations.

While the cost of installing a solar based electricity generation system is currently on the decrease, it is not a good basis for a long-term policy decisions or plans. Basing policies on frequently varying variables showcases shortsightedness on behalf of the decision makers and evidence of its negative impact is already available in recent history for Pakistan. The installation of oil-based power plants with dollarized payments at a time when oil prices, which fluctuate regularly, and a lower dollar-rupee parity is now posing a serious threat to the fiscal space of the government as the dollar-rupee parity has worsened for Pakistan while oil prices have increased too. This has made a significant dent to Pakistan's ability to pay the liabilities of these IPPs.

Making decisions at governmental level for EV adoption on the basis of a frequently changing variable i.e. the price of solar energy set up, could result in a similarly detrimental approach. The merits or demerits of EV adoption and related policy measures must base on more stringent and consistent factors to formulate lasting and effective policy measures.

Besides, this is not the first time that a shift between the preferred type of vehicle would be happening or that there is a low probability of it not happening again. The electric vehicles are not a new technology, like the hybrid vehicles. Instead, electric vehicles have been commercially available for over a century. In fact, in early 20th century, just a decade after the first commercially viable electric vehicle named as the Electrobat was patented in 1894; one-third of all vehicles on road in the US were powered by electricity. It was when Ford launched the gasoline- powered vehicles that when produced in large quantities proved more efficient than the Electric Vehicles coupled with the discovery of Texas crude oil in the US that the Electric Vehicles started going out of fashion by the mid-20th century.

However, when during the 1960s and 1970s the US faced its first oil crisis, the US Congress passed the Electric and Hybrid Vehicle Research and Development and Demonstration Act. Following this, the world saw great development in the field of electric and hybrid technologies for automobiles resulting in Toyota launching the hybrid vehicles for the first time in 1997 and introduction of Plug-in Electric Vehicles (PEVs) in the 21st century (Mehra, 2023).

The world has seen the shift from electric to gasoline and then back transition in just over a century. What has helped the leading nations advance is the vision to adapt to changing circumstances through R&D backed innovation, something that is entirely missing from Pakistan's automobile sector. To adapt to the changing trends of the global automobile industry is the right and necessary approach, but to base this change on a frequently variable factor will prove detrimental to say the least.

7.7. Reflections

Pakistan, even with progressive policies in place for EVs, faces significant hurdles. Financial constraints limit the scope for extensive subsidies, and while rising fuel prices might nudge consumers towards electric vehicles (EVs), this alone won't suffice without a solid infrastructure to back it. The shift to EVs is further complicated by range anxiety, sparse charging stations, and a reliance on fossil fuels for electricity, which undermines the environmental benefits of going electric.

The historical ebb and flow of automotive technology from early electric vehicles to the dominance of gasoline cars and back to renewed interest in electrification underscores the need for a stable, long-term strategy. Pakistan must steer clear of short-term fixes based on unpredictable factors like fluctuating solar energy costs and instead craft a robust, strategic framework.

For Pakistan to truly leap into a sustainable automotive future, it must adopt a comprehensive approach. This means investing heavily in infrastructure, enacting supportive regulations, and making a deliberate shift away from conventional vehicles. Only with such a visionary and multi-faceted strategy can Pakistan successfully navigate this transition, ensuring a cleaner and more sustainable transportation sector for generations to come.

7.8. Key Takeaways

- Despite the initiation of an electric vehicle policy in 2019, almost zero progress suggests a lack of serious commitment from the government, potentially hindering the necessary support for EV integration
- Higher prices of electric vehicles (EVs) compared to conventional vehicles make them less accessible for the majority of the population in Pakistan, where affordability is a significant concern
- Economic challenges limit the government's ability to provide subsidies for EVs, further impeding their affordability and widespread adoption
- Lack of a well-established charging infrastructure is a major hurdle. Without sufficient charging stations, consumers are deterred by concerns about the feasibility and convenience of regularly charging EVs
- The reliability and consistency of the power supply in Pakistan may undermine consumer confidence in EVs, particularly if power outages are common, raising concerns about the feasibility of regular charging
- Well-established preference for traditional vehicles in Pakistan's automobile market creates cultural resistance to embracing electric vehicles, making behavioral changes challenging
- Concerns about the limited driving range of electric vehicles on a single charge, especially in areas with varied landscapes, contributing to range anxiety and hesitancy in adoption
- Pakistan heavily relies on imports for EV components, including batteries. Import-related costs, taxes, and logistical issues, make EVs attractive to consumers
- The substantial reliance on fossil fuels for electricity generation in Pakistan compromises the perceived environmental advantages of EVs. To bolster the environmental appeal of electric vehicles, a parallel emphasis on transitioning to cleaner and renewable energy sources is imperative.

CHAPTER 08

The Economics of EV Transition

Saddam Hussein & Mohammad Shaaf Najib

8.1. Introduction

For a transition towards EVs, comparing EVs and ICEV is very important for a developing country. Generally, it is assumed, EVs have higher upfront costs, their operational expenses are often lower due to lower maintenance and fueling expenses. In contrast, ICE vehicles may have a lower initial investment but tend to incur higher long-term fuel and maintenance costs. The evolving economics of both technologies underscore the importance of considering the lifetime[10] costs associated with EVs and ICE vehicles.

The cost of owning a vehicle in Pakistan is exorbitant due to high costs, import dependency high taxes and the practice of selling automobiles at "On", the black-market premium among other factors. Additionally, while cars are generally depreciating assets worldwide, in Pakistan, they are considered appreciating assets due to inefficient market dynamics and the economic conditions of the country.

8.2. Macro- Perspective: Why Electric Vehicles at all?

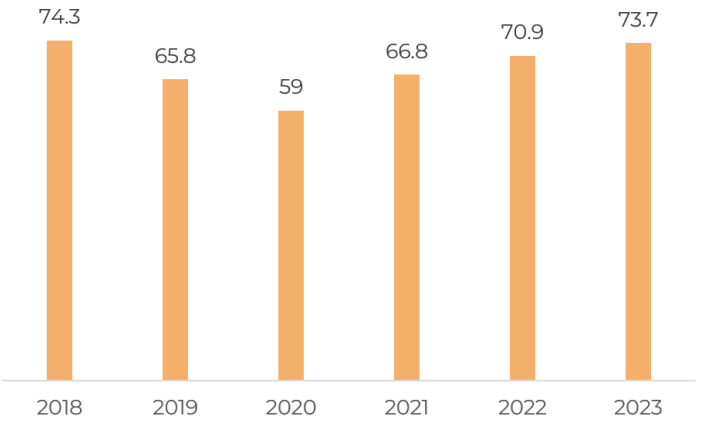
In 2015, when the Millennium Development Goals were replaced by the Sustainable Development Goals (SDGs), tackling climate change while working for the prosperity of the people and the planet earth became focus of the resulting global efforts. The transition to Electric Vehicles is an essential component of multiple SDGs such as SDGs 7, 9, 11, 12 and 13. It also indirectly impacts the success of achieving a few other SDGs and related sub-goal including SDGs 3 and 8.[11] Consequently, greater energies have been utilized to speed up the adoption of EVs globally.

As a signatory of the SDGs, Pakistan too is encouraging the adoption of Electric Vehicles in the country. For Pakistan, however, the reasons for considering the transition extend far beyond just being the SDGs signatory. As per the Global Climate Risk Index, Pakistan is the 5th most vulnerable country to climate change and their disastrous impacts, with the floods in 2022 a major indicator of the same (UN-Habitat Pakistan, 2023). The Climate Change Performance Index (CCPI) puts Pakistan on 30th out of 59 countries and the EU in climate protection performance, ranking Pakistan's performance in climate policy category as low while very low in Renewable Energy with a high in GHG Emissions and Energy Use. This contemplates the high risk that Pakistan faces at hands of climate change in coming decades if adequate measures are not adopted in time. The risk though is not only in the future but also in the present.

10. lifetime cost of vehicle including purchase, maintenance, time, fuel/charging and CO2 emissions.
11. https://sdgresources.relx.com/electric-vehicles-evs

The air quality in the recent years has significantly worsened with increase in pollution. As per the available data from 2018-2023, Pakistan is ranked as the second most polluted country, with the average Air Quality Index exceeding WHO guidelines by over 10 times the maximum limit. The average AQI for Pakistan from 2018-2023 is given in the Figure 8.1

Figure 8.1: Average Annual AQI - Pakistan



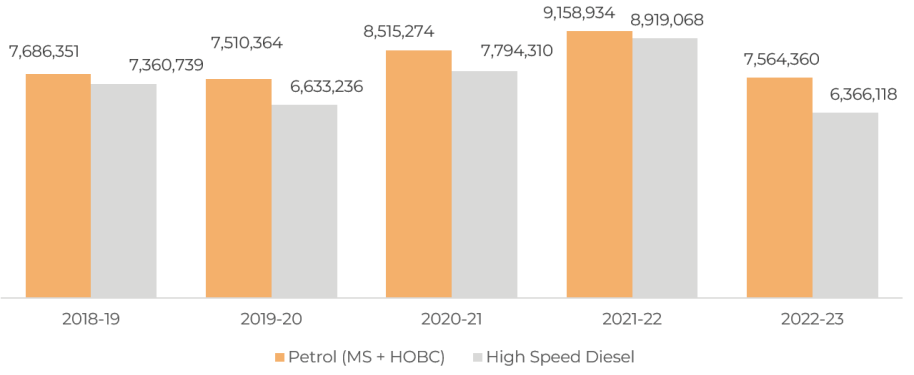
Source: IQAir (www.iqair.com)

While many factors can be attributed to the increase in pollution in the country, vehicular emissions remain a major source. As per estimates for just Lahore, one of the most polluted and recipient of dense winter smog in the country, the transport sector contributes to 83.15% of the pollutants in the city's atmosphere (Nissar & Nissar, 2023). The sectoral contributions of pollutants will not differ significantly from the estimates of Lahore. This is a direct consequence of constant deforestation, uninterrupted urban sprawl and car centric development and urbanization.

Furthermore, it is not just the environmental reasons that are making Pakistan look towards transitioning to EVs, instead the economics at a macro-level give it a good push as well. Pakistan has a high demand of petroleum products to fuel its road transport. Transport sector utilizes more than three-fourths of the total sale volume of petroleum products in Pakistan. Petrol fuel, is used in two qualities i.e. Motor Spirit (92 RON) and HOBC (95/97 RON) along with High Speed Diesel for vehicles in Pakistan. Figure 8.2 shows the sale of petrol and diesel for in Pakistan from 2018-19 to 2022-23.

12. PM 2.5 legend: 0-5 (meets WHO Guidelines), 5.1-10 (Exceeds by 1 to 2 times), 10.1-15 (Exceeds by 2 to 3 times, 15.1-25 (Exceeds by 3 to 5 times), 25.1-35 (Exceeds by 5 to 7 times), 35.1-50 (Exceeds by 7 to 10 times), >50.1 (Exceeds by Over 10 times)

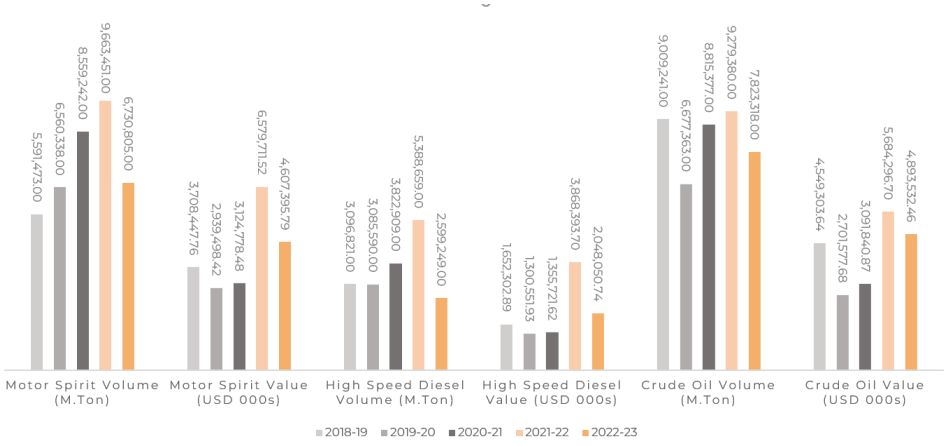
Figure 8.2: Annual Fuel Sales - Pakistan (M.Tons)



Source: Pakistan Oil Report 2022-23

While Pakistan has three local refineries that are capable of extracting petrol and diesel from crude oil, their capacity and efficiency are not up to the standards to ensure timely availability of adequate petroleum products supply for the transport sector. As a result, Pakistan imports majority of its fuel as motor spirit and high speed diesel instead of crude oil, which forms a smaller proportion of petroleum imports. Due to importing more fuel as MS and HSD, the import bill for the country significantly rises than it would have in the case if local refineries had the capacity of timely extract the required volumes of fuel for the transport sector as well as others. Figure 8.3 shows the value and volume of fuel imports during the period 2018-19 to 2022-23 for Pakistan.

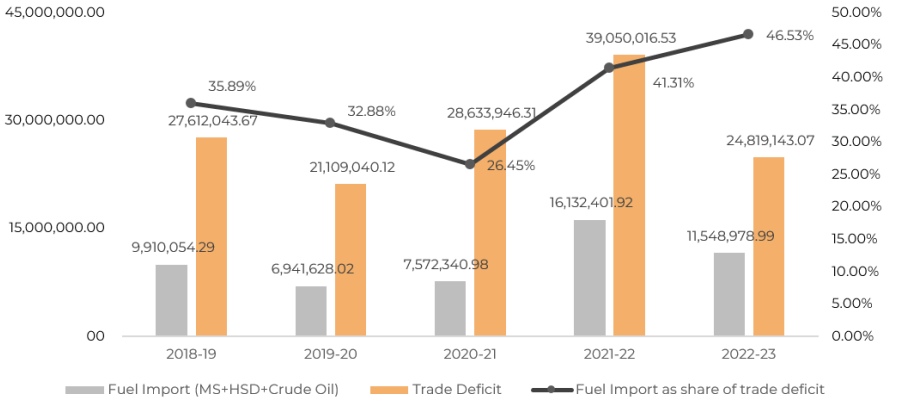
Figure 8.3. Petroleum Imports - Pakistan



Source: Pakistan Bureau of Statistics

Pakistan's economic woes are neither new nor unknown. Instead, Pakistan has repeatedly been facing the same economic issues for decades now. The currency crisis particularly is a severe threat to Pakistan's economic growth, and the large trade deficit is at helm of it. The oil imports make up a large chunk of Pakistan's import bill, with oil imports equaling a major proportion of the country's trade deficit. Figure 8.4 shows Pakistan's oil (Motor Spirit, High Speed Diesel and Crude Oil) import expenditure and trade deficit during the period 2018-19 to 2022-23.

Figure 8.4. Pakistan Oil Imports and Trade Deficit (USD 000s)



Source: Pakistan Bureau of Statistics

Considering this, a reduction in oil imports due to decrease in demand from the transport sector will provide the external sector of the economy much needed breathing space as well as provide the government with a major fiscal space to redirect expenditures towards sectors and areas that can help bolster economic growth.

Subsequently, not just as a signatory of the SDGs and with the intention of staying at par with the world; but also for environmental and economic benefits, the transition towards Electric Vehicles sounds a promising prospect for Pakistan at least on the macro level. However, for the transition to successfully transpire, it is essential that shifting from ICE vehicles to Electric Vehicles is a financially and practically viable solution on the micro level i.e. individual and household levels as well. This is discussed and analyzed in the section below.

8.3. The Micro-Perspective

Transitioning to EVs presents a pivotal step towards sustainable transportation in Pakistan. A crucial aspect of this transition involves estimating the energy requirements associated with EV adoption. This section aims to provide insights into the energy consumption of EVs in Pakistan, with a

focus on estimating the energy demand for 7 million EVs (as Pakistan has currently around 7 million cars on roads), if we have to transition completely.

EVs exhibit a different energy consumption pattern compared to conventional vehicles. On average, an EV consumes approximately 34.6 kilowatt-hours (kWh) per 100 miles (160.9 km), which translates to 0.346 kWh per mile (or 0.215 kWh per km) (James, 2024). However, let's for the sake of simplicity and to be on the safer side, we assume that an average EV consumes about 35 kWh per 100 miles (160.9 km). Assuming an average annual mileage of 12,427.424 miles (20,000 km) and 31,068.56 miles (50,000 km) per EV, in two different scenarios. Also, note that average unit of price at an EV charging station is PKR 80 per unit.

Table 8.1: Wallet Impact of EV Transition

	Scenario I **20 K Annual Mileage**	**Scenario II** **50 K Annual Mileage**
Total kWh per EV	20,000 x 35/160 = 4375	50,000 x 35/160 = 10937.5
Total kWh per for 07 million EVs	30,625,000,000	76,562,500,000
Energy Consumption in KW	3,496,004	8,740,011.41
Energy Consumption in MW	3,496	8,740.01
Total Cost Per EV = Total kWh x unit price	**PKR 350,000**	**PKR 875,000**

It is pertinent to note that maximum installed power generation capacity is 46,035 MW. So, in Scenario I, only 7.59% of that will be used. However, if we are to consider peak demand which is 31000 MW, then the number is 11.27%. However, these are modest calculations, based on 20 thousand kilometer mileage per year. Yet, we know that due to urban sprawl and lack of public infrastructure, the average mileage can go higher than this. Suppose Scenario II, where 18% and 28.19% of the total installed generation capacity and peak demand will be used. This doesn't paint a good picture, given that Pakistan is for a long-time facing grave energy challenges.

Besides, charging electric vehicles (EVs) in Pakistan poses few more but significant challenges beyond the capacity of electricity generation. Firstly, Pakistan faces challenges related to its transmission infrastructure. Even if the generation capacity is sufficient, the existing grid may not be equipped to handle additional loads from EV charging stations. Upgrading and expanding the transmission infrastructure would be necessary to accommodate the increased electricity demand from widespread EV adoption.

Secondly, supply distortions, such as voltage fluctuations and intermittent power outages, are common in Pakistan. EV charging relies on a consistent and reliable power supply, which may be compromised due to these issues. Addressing supply distortions would be crucial to ensure

uninterrupted charging for EV owners.

Thirdly, distribution networks in Pakistan often struggle with inefficiencies and losses during electricity transmission. These losses can exacerbate supply-demand imbalances and affect the reliability of electricity supply to EV charging stations. Improving distribution networks to minimize losses and enhance efficiency would be essential for supporting widespread EV charging infrastructure.

Fourthly, integrating a large number of EVs into the grid can impact its stability, especially during peak demand periods. Without proper management strategies and infrastructure upgrades, EV charging could strain the grid and lead to reliability issues or even blackouts.

In a crux, while the energy demand for charging EVs in Pakistan may seem manageable in isolation, addressing the broader challenges related to transmission infrastructure, supply distortions, distribution inefficiencies, grid stability, charging infrastructure development, and renewable energy integration is crucial for successful EV adoption and sustainable transportation transformation.

Now let us calculate the consumption of petrol, with four different scenarios: Two scenarios in annual mileage of 20,000 km with 10km/liter fuel consumption and 15km/liter fuel consumption. Similarly, two scenarios with an annual mileage of 50,000 km with 10km/liter fuel consumption and 15km/liter fuel consumption. Now as we can see that consumption of petrol is not significantly higher than that of EV energy in terms of monetary value. The cost is 40-60% higher of petrol in ICE than in energy consumed by an EV. However, to recover and balance out the upfront cost of EV with that of ICE, 10-15 years would be required at least. This is a setback for those who wants to own EV. Who would want to experiment and buy an EV with way higher upfront cost, and also paying at least 40-50% of what ICE engine is consuming in terms of cost and wait for 1-15 years to cancel out the higher upfront cost through savings in charging cost. This is the key reason that transition is unlikely to happen anytime soon.

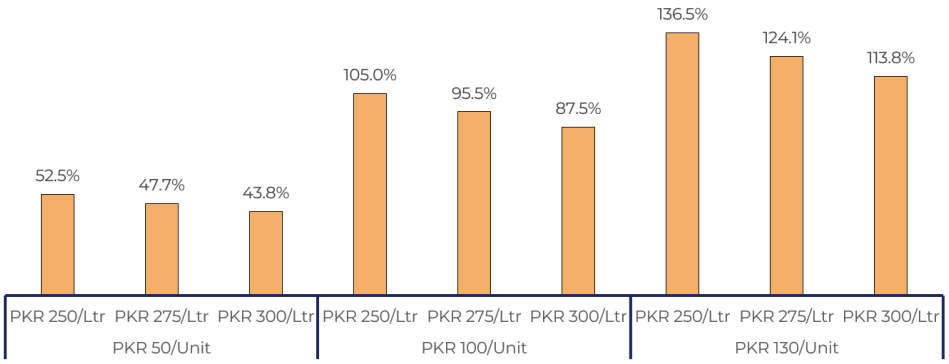
Table 8.2: Fuel Expenses for an ICEV

Total Annual Mileage	**20,000 km**	**50,000 km**
Total Annual Petrol Consumption = Total Annual Mileage/Average Fuel Efficiency per Car	= 20,000 km / 10 km/liter = 2,000 liters = 20,000 km / 15 km/liter = 1,333.33 liters	= 50,000 km / 10 km/liter = 5,000 liters = 50,000 km / 15 km/liter = 3,333.33 liters
Total Annual Petrol Cost = Total Annual Petrol Consumption x Petrol Price per Liter	= 2,000 liters x 293.94 PKR/liter **= 587,880 PKR** = 1,333.33 liters x 293.94 PKR/liter **= 391,919.02 PKR**	= 5,000 liters x 293.94 PKR/liter **= 1,469,700 PKR** = 3,333.33 liters x 293.94 PKR/liter **= 979,799.02 PKR**

Note: It is important to acknowledge that this estimation is subject to variations influenced by factors such as driving patterns, charging efficiency, and other variables inherent to EV usage. Nevertheless, this estimation provides a foundational understanding of the potential energy demand associated with the transition to electric vehicles in Pakistan.

To better understand the impact of switching to electric vehicles (EVs), let's explore three scenarios with varying energy and petrol prices. We'll assume unit energy prices of PKR 50, 100, and 130, and petrol prices of PKR 250, 275, and 300 per liter. Additionally, we'll consider three different annual mileages: 15,000 km, 30,000 km, and 45,000 km. This analysis aims to provide a clearer picture of the financial implications.

Figure 8.5: EV Running Cost as Percentage of ICEV Running Cost



For our calculations, we'll use a fuel efficiency of 12 km per liter for internal combustion engine (ICE) vehicles, and an average energy consumption of 4.62 units per km for EVs. When energy costs PKR 50 per unit, the cost of charging an EV is nearly half of what one would spend on petrol, as shown above in Figure 8.5. With the energy price at PKR 100 per unit, the cost difference between charging an EV and fueling an ICE vehicle becomes negligible. As the energy price reaches PKR 130 per unit, charging an EV becomes more expensive than fueling an ICE vehicle. This contradicts the common belief that EVs are always cheaper to run than petrol cars.

By examining these scenarios, we can better understand how fluctuating energy prices impact the cost-effectiveness of transitioning to EVs. While EVs may seem cheaper initially, rising energy prices can quickly change the equation, challenging the perception that EVs are always the more economical choice.

8.4. Cost of Providing EV Charging Infrastructure

EV charging stations are available in three varying power tiers: Level 1, Level 2, and Level 3, alternatively recognized as DC fast charging. Level 1 serves as the basic home charging option, utilizing a 120-volt wall plug, offering the slowest charging rate. It can take 08-20 hours to fully charge an EV.

Then comes Level 2 chargers which are prevalent, operating at 240 volts for faster charging, these can be used at homes, offices and public as well. DC fast chargers, the most potent among the trio, operate at 480+ volts, providing the quickest EV charging solution available. These are purely commercial.

The price structure of an electric vehicle (EV) charging station hinges on numerous variables. These encompass the charger's type, the quantity of chargers, and the potential electrical enhancements that might be requisite. It's imperative to weigh these factors comprehensively when assessing the installation expenses of an EV charging station.

Broadly speaking, a Level 2 charger typically commands a price ranging from $1,000 to $5,000, while a Level 3 charger could incur costs ranging from $30,000 to $80,000 and beyond

Table 8.3: Estimating EV Charging Infrastructure Cost

Charge Time	Charger Type	Voltage	Estimated EV Charger Cost		Total Cost in billion (in PKR)*
			In Dollars	In PKR	
4-8 hours	Level 2	200-240V AC	700 – 2,000	194,600 - 556,000	**97.3 – 278****
2-5 hours	Level 2	200-240V AC	1,800 – 5,000+	500,400 - 1,390,000+	**22.5 - 62.5**
1-2 hours	Level 3	480V+ DC	30,000 – 40,000+	8,340,000 - 11,120,000+	**375.3 - 500.4**
30-60 min	Level 3	480V+ DC	55,000 – 65,000+	15,290,000 - 18,070,000+	**688.05 - 813.15**
15-30 min	Level 3	480V+ DC	65,000 – 75,000+	18,070,000 - 20,850,000+	**813.15 – 938.25**

*Pakistan has roughly 7500 petrol stations across the country. With each station having 06 filling points on average. So, 7500 x 06 = 4500. The estimated cost in PKR is multiplied by 45000, to get an estimate if we are to provide an alternate EV charging infrastructure, catering to the needs of the whole and across the country.

**Here, we multiplied the estimated cost of a single charger with 500,000, as the policy aims to get this much penetration of EVs in Pakistan till the end of 2025. So, this cost is bit affordable for the ones who are already purchasing expensive EVs. So, assuming, if we have 0.5 million EVs then the cost will be PKR 97.3 - 278 billion overall.

The overall costs of installation can escalate, contingent upon a multitude of factors. These factors encompass, but are not confined to, the intricacy of the project, the materials utilized, the area's dimensions under consideration, and any supplementary services necessitated. It is crucial to meticulously scrutinize these elements and evaluate the unique prerequisites to precisely ascertain the comprehensive installation outlay. Some of the considerations might include: quantity of chargers, charger brand, charger level classification, labor costs, permitting fees, tax implications, site location, landscaping and lighting requirements etc.

8.5. Solar Energy and EV Ownership

The two biggest challenges in Pakistan, other than the global range anxiety phenomenon, acting as barrier to the EV adoption are the upfront cost and the cost of charging as electricity prices continue to increase. The issue regarding upfront cost has been discussed in detail in earlier sections, but the question regarding the reduction of vehicle running expense still remains.

The electricity charges in the country are on an upward spiral and there seems to be no end to it at least in the near future. With increased electricity charges, charging at home and industrial chargers both keeps getting expensive. As the charging cost increases, the gap between the fuel costs of ICEVs and charging cost of EVs continues to decrease. This reduction in the cost gap is a disincentive for EV adoption from the consumer perspective.

Furthermore, for households with a low daily average drive of vehicles, the increase in charging cost further increases the recovery period of the additional expenditure on purchasing an EV instead of its equivalent ICEV. Consequently, the shifting to the EV could start to not look as a financially viable decision anymore. Section 5.10 depicts how the varying fuel consumption and prices of fuel and electricity impact the difference in running costs of the EVs to the ICEVs.

Based on these, we can understand that a reduction in the price of electricity for charging EVs as well high daily drive of a vehicle are two important factors in making EVs running cost significantly lower to ICEVs. This brings forth the question as to who stands to benefit immediately and the most from shifting to EVs in Pakistan as things stand?

Considering the information and analysis above, the biggest winners in EV adoption as of now in Pakistan are those with solar energy plants installed at homes and a daily drive average of over approximately 50 km. Daily average drive of over 50km means a significant reduction in running costs when ICEV is replaced by an EV, while using solar based electricity generation at home to charge vehicle completely eliminates the charging

cost thus making shifting to EV despite higher upfront costs a no brainer at all.

8.6. The Opportunity in Conflict

While EVs have been present for well over a century, they have never been as big a preferred choice of mobility as in the present. Not only has the technology advanced manifolds, the productions have increased significantly globally. While various automobile companies in many countries are producing electric vehicles now, the real boost to EV adoption though has been driven by two competitors at the opposite ends of the globe. US based Tesla and Chinese automobile giant BYD have in recent times become the world's largest Electric Vehicle producers and penetrated markets in both the right hand and left-hand drive countries.

The two companies continue to fight to be the largest EV producers globally to capture the largest market share worldwide. Tesla despite being BYD's main global competitor has great presence in the Chinese market, however, BYD is yet to enter the US market for EVs. However, many other Chinese firms sell their EVs in the US market as well as other western markets. The Chinese companies have successfully managed to present a competition to other EV manufacturers in various countries.

Just like Tesla and BYD, the US and Chinese economies have been locking horns with each other for a while now. Various Chinese products from textiles to high-tech products have gained ground in the western markets including the US. This has resulted in a significant pressure repeatedly from few ranks in the US to protect the local firms and industries from Chinese competitors. The US has on occasions imposed high tariffs on products manufactured in China to tilt the weight in favor of its local firms.

The latest victim of US protectionism is the Electric Vehicles manufactured in China, as the former imposed a 100% duty on Chinese EVs. It is essential to note that any such move by the US must not be confused to be a standalone decision. Instead, more often than not, other western countries follow suit in this trade war. Resultantly, Canada has reportedly launched consultations on preventing what it terms as unfair Chinese trade practices in the EV industry while the EU also imposed 37.6% tariffs on EVs manufactured in China. While China seems to be unmoved by these policy measures and has decided to take this trade war heads on and not lose the market share it has already gained, however, it cannot be denied that this does pose a serious challenge to EV manufacturers based in China.

In Pakistan, whenever the automobile and parts industry is encouraged to increase production to target export markets and become part of the global value chain; the major argument presented against export vision

for the automobile industry is 'How do we compete with China?'. While it displays their lack of will and vision to innovate to become a major global player, it also depicts a false sense of enmity with the Chinese when there is also present the option of collaboration and partnering with the neighbor. The US-China trade conflict presents the country with the same opportunity once again, given it is smart enough to cash in on it.

With the US and hence other western countries trying to uneven the field for disadvantaging China based EV firms, it presents Pakistan with an opportunity to jump in the EV industry. China has been long said to be looking for relocation of few of its industries which either due to rising labor and other input costs, high tariffs in importing countries or any other factors such as textiles. Pakistan failed to grasp onto that opportunity due to its internal economic, regulatory and other related issues.

However, with the US and other western countries imposing tariffs on Chinese EVs, Pakistan must look to collaborate with the Chinse to benefit from the conflict. Relocation of China based EV manufacturing companies to Pakistan can benefit China and Pakistan both. The relocation terms however, must be carefully designed and not as the JVs with the Japanese firms in the 1990s which have limited the automobile production in country to just assembling for the local market, no export vision, and no technology transfer. Instead of localization, the focus for partnering with the Chinese firms must be enhancing production to increase EVs penetration in Pakistan as well as targeting the global markets. Furthermore, technology transfer and human capital resource development must be the key aspect for sustaining the benefits of the partnership between local firms and Chinese manufacturers.

It must be acknowledged that partnering with Chinse firms on this will not be an easy task, primarily due to the huge gap in the technical and technological level of the automobile industries of both countries as well as the poor regulatory environment. However, Pakistan and China have developed a good working relationship over the past decades and if Pakistan presents itself as a viable option before other countries jump in for relocation of China's EV industry, there is a great opportunity in this conflict for Pakistan.

8.7. Final Thoughts

The analysis of Pakistan's landscape reveals several critical challenges that impede the country's transition towards EVs. Despite the initiation of an electric vehicle policy in 2019, the lack of progress signifies a significant gap in government commitment, potentially hindering the necessary support for EV integration. This lack of commitment undermines the foundation for EV adoption and discourages investment in infrastructure and incentives essential for widespread usage.

Besides that, one of the primary barriers to EV adoption is the higher upfront costs of electric vehicles compared to conventional vehicles. This pricing gap makes EVs less accessible to the majority of the population in Pakistan, where affordability is a significant concern. Economic challenges further exacerbate this issue, limiting the government's capacity to provide subsidies for EVs, thereby impeding their affordability and widespread adoption.

Moreover, the absence of a well-established charging infrastructure presents a major roadblock. Without sufficient charging stations, consumers are deterred by concerns about feasibility and convenience, significantly impacting adoption rates. Additionally, the reliability and consistency of the power supply in Pakistan are questionable, potentially undermining consumer confidence in EVs, particularly if power outages are common.

Concerns about the limited driving range of electric vehicles, especially in areas with varied landscapes, contribute to range anxiety and hesitancy in adoption. Addressing this issue necessitates advancements in battery technology and the establishment of charging infrastructure along key transportation routes. Not to forget that the infrastructure gap is further compounded by the limited availability of auto workshops for electric cars compared to combustion engine vehicles, potentially leading to longer downtimes and higher maintenance costs for EV owners.

In parallel, cultural resistance also poses bit of challenge, as the country's automobile market has a well-established preference for traditional vehicles. Overcoming this resistance and fostering behavioral changes towards electric vehicles requires targeted interventions and public awareness campaigns. Furthermore, Pakistan's heavy reliance on imports for EV components, including batteries, results in import-related costs, taxes, and logistical issues, which can deter consumers from choosing EVs.

It is essential to reemphasize that in no way is this a proposition against the transition to Electric Vehicles. Instead, the environmental and economic impact for the country collectively of transition to EVs has been explained in detail earlier. However, the analysis here pinpoints the possible reasons that in the status quo make EVs a less attractive option for the consumers. The government, though, must not be the one making this decision on behalf of the consumers. On the contrary, the government must redirect its focus towards providing a fair playing field to automobile firms willing to introduce EVs in Pakistan market while allowing consumers to decide their vehicle of choice. A fair playing field for the firms will create the necessary competition that will help overcome the current issues faced in the EV market place. If the transition seems a viable option to the consumers, the shift to EVs will be undertaken organically. If not, the competition among EVs, HEVs and ICE vehicles will draw out the winners themselves. The decision though must be taken in the market

place through a fair competition which currently seems to not be present, and not through the bureaucratic circles.

To bolster the environmental appeal of electric vehicles in the long-run, Pakistan must prioritize transitioning to cleaner and renewable energy sources. This parallel emphasis is imperative to mitigate the substantial reliance on fossil fuels for electricity generation, which compromises the perceived environmental advantages of EVs.

In terms of strategy, starting with the introduction of EVs in public transport, such as intra and inter-city buses, presents a viable option. This approach leverages the predetermined routes of buses, simplifying the provision of charging infrastructure. In the medium run, mainstreaming hybrid and plug-in electric vehicles can serve as a transitional phase; this shoots down the range anxiety factor to a large extent and saves the fuel cost as well. This would pave the way for a comprehensive shift to electric vehicles in the long run, contingent upon the implementation of comprehensive and multi-pronged policy tools, at the core of which should be renewable energy sources. Otherwise, emissions will not be reduced but would undergo displacement from roads to manufacturing sites.

8.8. Key Take-Away

- Comparison reveals petrol costs 40-60% higher in ICE vehicles than energy costs for EVs. It would take 10-15 years to offset upfront EV cost with savings from charging, hindering EV adoption.
- High upfront cost and lengthy payback period deter potential EV buyers, delaying transition.
- Pakistan can start with introducing EVs in public transport i.e. intra and inter city buses. This is more viable as these buses run on a pre-determined route, so provision of charging infrastructure would be comparatively easy
- Hybrid and plug in electric vehicles are the way to go. Transition to electric vehicles can be adopted in the long run, after initiating comprehensive and multipronged yet complementing policy tools
- As the energy price reaches PKR 130 per unit, charging an EV becomes more expensive than fueling an ICE vehicle. This contradicts the common belief that EVs are always cheaper to run than petrol cars.
- Pakistan's infrastructure is not equipped for an immediate transition from ICEVs to EVs.
- The government focus must be on providing a fair playing field to EV producing companies.
- Consumers must have the option to choose from, as across the globe, what they deem as the best fit for their mobility.
- Competition among the automobile firms must be promoted, protection from foreign competition and different category vehicles such as PHEVs, HEVs and EVs must be eliminated.

CHAPTER 09

Getting the Wheels Turning

Usman Qadir

The state of Pakistan's automobile industry reflects significant shortcomings in volume production, efficiency, and competitiveness. Our current approach, marked by an overemphasis on localization, has led to low output, high prices, and limited consumer choices. This approach has not only stunted industry growth but has also resulted in consumer welfare losses. The lack of a competitive environment and the protectionist policies have created a market isolated from global standards and advancements.

Globally, the automobile industry is a cornerstone of economic development, driving technological advancements and providing significant employment. However, Pakistan's industry has failed to capitalize on these global transformations, instead remaining stagnant with limited innovation and output expansion. The government's protective policies have prevented the industry from achieving competitiveness and scaling production, resulting in poor quality and high-cost vehicles that do not meet international standards.

Despite the long-standing presence of the automobile industry in Pakistan, ownership rates remain low, and the sector has not integrated into the global value chain. The dominance of a few major players, limited policy effectiveness, and a focus on import substitution have not yielded desired results, such as increased production or export capabilities. This has led to higher consumer costs and fewer choices, highlighting the failure of existing policies.

Moreover, efforts to transition to electric vehicles (EVs) have been hampered by high costs, inadequate infrastructure, and inconsistent policy support. Without a robust framework to support EV adoption, including subsidies, charging stations, and a reliable power supply, the shift towards cleaner transportation remains a distant goal. Additionally, the current approach to EVs must be reassessed to ensure it aligns with the broader objective of reducing emissions through renewable energy sources.

As Pakistan stands at the crossroads of a new automotive era, the electrification of vehicles presents both a beacon of hope and formidable challenges. Embracing EVs could propel the nation towards a greener, more sustainable future, significantly reducing its carbon footprint and dependence on fossil fuels. The environmental benefits are clear: EVs offer a promising solution to the persistent problems of air pollution and greenhouse gas emissions that plague Pakistan's major cities.

However, this transition demands meticulous planning, robust infrastructure, and a comprehensive strategy to address the myriad of challenges, ranging from energy supply constraints to electronic waste management. The current state of Pakistan's power sector, characterized by inefficiencies and dependency on fossil fuels, raises questions about its capacity to support a large-scale shift to electric mobility. Investing in renewable

energy sources and modernizing the grid will be crucial to ensure that the adoption of EVs does not exacerbate existing energy shortages.

Another critical aspect is managing the environmental impact of EVs throughout their lifecycle. The production of EV batteries involves significant carbon emissions, and the generation of electronic waste poses a new set of environmental challenges. Establishing efficient recycling processes and promoting the use of sustainable materials in battery production will be essential to mitigate these issues.

As we drive towards this electrified horizon, Pakistan must balance innovation with practicality, ensuring that the journey to a cleaner future is both sustainable and inclusive. The government, private sector, and civil society must work collaboratively to overcome these obstacles and create a conducive environment for EV adoption. Public awareness campaigns can play a vital role in educating citizens about the benefits of EVs and the importance of sustainable practices.

Pakistan, even with progressive policies in place for EVs, faces significant hurdles. Financial constraints limit the scope for extensive subsidies, and while rising fuel prices might nudge consumers towards EVs, this alone won't suffice without a solid infrastructure to back it. The shift to EVs is further complicated by range anxiety, sparse charging stations, and a reliance on fossil fuels for electricity, which undermines the environmental benefits of going electric.

The historical ebb and flow of automotive technology from early electric vehicles to the dominance of gasoline cars and back to renewed interest in electrification underscores the need for a stable, long-term strategy. Pakistan must steer clear of short-term fixes based on unpredictable factors like fluctuating solar energy costs and instead craft a robust, strategic framework. For Pakistan to truly leap into a sustainable automotive future, it must adopt a comprehensive approach. This means investing heavily in infrastructure, enacting supportive regulations, and making a deliberate shift away from conventional vehicles. Only with such a visionary and multi-faceted strategy can Pakistan successfully navigate this transition, ensuring a cleaner and more sustainable transportation sector for generations to come.

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