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Analyzing the Causes and Impacts of Automotive Production Growth under the 13th Administration of the Islamic Republic of Iran with Emphasis on the Dimensions of the Resistance Economy using the system dynamics method

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Abstract

"This article examines the reasons for and effects of the growth in automobile production during the Thirteenth Government of Iran, with an emphasis on the dimensions of the Resistance Economy. The Iranian automotive industry witnessed a significant increase in the production of passenger cars and commercial vehicles during this period, stemming from overcoming the production shortage crisis. This research identifies the factors influencing this growth by using official statistics and analyzing economic policies. The results indicate that an inward-looking approach to production, the development of cooperation with aligned countries in the supply of parts and technology, and a focus on developing new products have played a key role in improving the situation of the automotive industry. These factors, within the framework of the principles of the Resistance Economy, have led to a reduction in dependence on foreign countries, strengthening domestic production, and increasing the competitiveness of the automotive industry, and can be used as a model for other industries as well."

Keywords: Iran Automotive Industry, Resilience Economy, Thirteenth Government (of Iran), Production Growth, System Dynamics.

Introduction

The automotive industry stands as one of Iran's most strategic and pivotal sectors, having experienced various peaks and troughs throughout its history. A portion of its successes and shortcomings can be attributed to the internal strategies and actions of automakers, while another significant portion stems from governmental interventions in these companies—referred to as "industrial policy." Analyzing these policies is crucial for extracting key lessons and incorporating them into future policymaking by state officials. (Siamak, Mohammad, Ebrahim, & Seyeed Abulfazl, 2025)

As a cornerstone industry in Iran, the automotive sector plays a central role in employment, gross domestic product (GDP), and technological advancement. Following a period of stagnation between 2018 and 2020, production began an upward trajectory at the onset of the 13th government in 2021. This paper adopts an analytical approach, utilizing system dynamics methodology, to examine the industrial policies implemented to boost automotive production and their subsequent impact on the national economy.

1. Theoretical Foundations and Research Background

1-1. Theoretical Foundations

The automotive industry holds significant economic importance, accounting for approximately 3.5% to 4% of global GDP, making it a strategic sector in many countries. In 2019, it represented nearly 10% of global trade (Bart & Dmitry, 2022). In the Islamic Republic of Iran, the automotive industry is also a key strategic sector. Over the past decade, it has contributed to around 6% of total industrial employment (Vice President of Infrastructure Research and Production Affairs, Majlis Research Center, 2015). Currently, it supports approximately 1.9 million direct and indirect jobs, reinforcing its strategic significance Mohammadreza, Shahab, Mahdi & ,Manuchehr (2021). As such, the automotive industry is considered Iran’s second-largest industrial sector after oil (Reza, Nima, Amirhushang, Manuchehr & ,Saeed, 1401). The 13th government of the Islamic Republic of Iran, led by President Hojatoleslam Seyyed Ebrahim Raisi, assumed office in August 2021 under the slogan *"A People’s Government, A Strong Iran."* Its key priorities included addressing economic challenges, combating corruption, and improving public welfare. Major policies and challenges during this period included:

- The elimination of preferential exchange rates.
- Efforts to revive the JCPOA (Joint Comprehensive Plan of Action).

- Strengthening relations with neighboring and non-Western countries.
- Combating inflation and unemployment.

President Raisi's tenure was abruptly cut short by his martyrdom in May 2024, leaving his administration's policies partially unimplemented.

One of the most significant developments under the 13th government was the issuance of an eight-point presidential decree on March 2, 2022, following an unannounced inspection of Iran Khodro's production line. This decree outlined the government's governance model for the automotive industry, as follows:

2. Key Directives of the Eight-Point Decree

1. **Production Expansion**
   - A minimum 50% increase in vehicle production in 2022 compared to 2021.
   - Introduction of at least one new "economy car" with modern design.
   - Discontinuation of three outdated models and replacement with three new high-quality vehicles.

2. **Technological Advancement**
   - Promotion of electric, connected, and autonomous vehicles.
   - Leveraging defense and aerospace technologies and knowledge-based companies for industry transformation.

3. **Inventory Clearance & Parts Supply**
   - Immediate clearance of warehoused vehicles meeting standards within two months.
   - Ensuring timely supply of spare parts.

4. **Market Competition & Export Growth**
   - Removal of legal barriers to vehicle imports within three months.
   - Increasing exports of vehicles and parts to improve the export-to-import ratio.

5. **Sales Transparency & Consumer Rights**
   - Phasing out lottery-based sales in favor of direct, transparent sales.
   - Ensuring immediate delivery of pre-sold vehicles upon full payment.

- Banning non-transparent vehicle allocations to government/private entities.

6. **Fleet Modernization**
   - Annual replacement of 20,000 outdated commercial vehicles (trucks, buses, etc.) with higher-quality alternatives.

7. **Quality & Safety Improvements**
   - Ban on low-quality parts in vehicle assembly.
   - Mandatory 3-year/60,000 km warranty for all new vehicles.

8. **Privatization of State-Owned Automakers**
   - Transferring management of Iran Khodro and Saipa to the private sector within six months. (Iran Chamber of Commerce, 2021).

Although not all directives were fully implemented, this decree reshaped Iran's automotive governance, with lasting policy impacts.

3. Research Background

Despite extensive literature reviews, no prior studies specifically evaluating the industrial policies of Iran's 12th government (2017–2021) in the automotive sector were identified.

4. Research Method

Research Methodology This research was conducted in a descriptive-analytical manner using secondary data. Statistical information was collected and analyzed from sources such as the International Automobile Association (OICA) website, the Ministry of Interior, and the Parliamentary Research Center. Analysis of policy documents in the field of resistance economy was also used.

The Iranian automotive industry can be considered a large and complex system, encompassing social, economic, and technical subsystems. Analyzing the growth factors of private automakers and their impact on the resilience of the national economy cannot be conducted solely through an economic, technical, or social lens. Instead, we require a methodology capable of comprehensively analyzing socio-technical systems while accounting for their inherent complexities.

System Dynamics (SD), with its claim to identify the fundamental structures driving social, economic, and technical behaviors, has attracted researchers across disciplines (Hamidreza و Siamak, 2021). Thus, SD

provides a holistic framework to address the multidimensional nature of this problem.

5. Why System Dynamics?

1. **Causal Modeling Framework:**
   - Captures linear and nonlinear relationships between variables.
   - Analyzes endogenous behaviors of key factors.
   - Supports policy design and decision-making in managerial contexts.

2. **Policy Simulation & Feedback:**
   - Enables simulation-based testing of policies.
   - Provides policymakers with feedback loops to assess policy impacts efficiently (Alireza, Yahya, Jalali Manesh, Sadeghieh, 2020).
   - Identifies policy weaknesses and suggests improvements.

6. Application in This Study

This paper employs System Dynamics to:

- Evaluate macro-level automotive policies under the 13th government, focusing on:
  - Pricing mechanisms
  - Growth of private automakers
  - Economic resilience
- Propose data-driven policy recommendations for optimization.

7. Data Collection

- **Document Analysis**: Review of industrial reports, governmental decrees, and academic literature.
- **Expert Interviews:** 12 semi-structured interviews with industry experts (see Table X for participant profiles).

Table 1. Interviewee Profiles

No.	Position	Years of Industry Experience
1	Former Minister of Industry, Mine & Trade	20 years
2	Former CEO of Saipa Company	24 years
3	Strategy Manager at Iran Khodro Company	15 years
4	Strategy Manager at Saipa Company	15 years
5	Researcher at Parliament Research Center	5 years
6	Automotive Director at Ministry of Industry	20 years
7	Faculty Member, Automotive Engineering Dept.	20 years
8	Chairman of Homogeneous Parts Manufacturers Association	30 years
9	CEO of an Auto Parts Manufacturing Company	25 years
10	Former Automotive Director at Ministry of Industry	30 years
11	Automotive Industry Expert	5 years
12	Mid-level Manager at an Automaker	10 years

8. Research Findings Analysis

The Iranian automotive industry has a history spanning nearly six decades, with its formal activities beginning in the 1960s through the assembly of foreign vehicles. The first domestically produced vehicle, the "Peykan," was manufactured by Iran National (now Iran Khodro). During the 1980s and 1990s, despite the imposed war and sanctions, vehicle production continued through assembly operations. The 2000s witnessed production growth, development of domestic brands like Samand and Tiba, and increased exports. However, from the late 2010s, the industry faced declining production due to sanctions, currency fluctuations, and structural challenges. The 13th government implemented new policies to revive the industry, with observable impacts across various sectors.

Prior to the 13th government, despite challenges including parts sanctions and lack of emphasis on indigenous knowledge, the automotive industry had become so stagnant that annual production fell below one million units. Two chronic issues in the domestic automotive market between 2018-2021 - production below one million units and incomplete vehicles - had disrupted the industry.

According to documented reports from the Ministry of Industry, Mine and Trade, production remained below one million units for four consecutive years (2018-2021), while the number of incomplete vehicles

increased. This led to accumulated demand over four years, creating a supply-demand gap and subsequent price increases in the market.

In the first year of the 13th government, Martyr Ayatollah Raisi issued an eight-point directive to "improve the country's automotive industry status" by empowering the sector and neutralizing sanctions. The directive emphasized:

1. Quality production increases and introduction of economy vehicles
2. Discontinuation of outdated models
3. Parts supply and immediate clearance of warehoused vehicles
4. Enhanced competitiveness and elimination of monopoly concerns
5. Price adjustments and production capacity increases to meet market demand

In the initial phase, through inter-organizational coordination and regulatory oversight, over 26,000 incomplete vehicles in storage lots were completed and rapidly cleared to market after receiving necessary parts.

Subsequently, with emphasis on manufacturer empowerment and supervision, domestic automakers and their supply chains produced 1,348,000 vehicles in 2022, representing 40% growth compared to 2021 - an unprecedented production increase during the 13th government's first year. This achievement gave Iran the highest automotive production growth rate among the world's top 20 automakers in 2022.

Production-oriented policies led to a 42% increase in vehicle deliveries, reaching 1,325,000 units in 2022. Furthermore, production stabilization enabled implementation of an innovative plan to eliminate lottery systems and allocate vehicles to all applicants through a prioritized, transparent integrated platform, successfully ending years of random vehicle allocation practices.

Production reached 1,338,856 units in 2023, with corresponding 42% growth in deliveries (approximately 1,325,000 units), leading to increased production and market competition while achieving market equilibrium (Irna Egency , 2024).

9. Vehicle Production Trend (2019-2024)

According to statistics published by the Ministry of Industry, Mine and Trade, Iran's automotive production figures are as follows:

Table 2: Iran's Automobile Production Trend (Solar Year)

Year	Number of Cars Produced	Growth Percentage
1398	832,000	14-
1399	992,000	19+
1400	964,000	2-
1401	1,236,000	28+
1402	1,338,000	8+
1403 (11 Months)	1,181,474	4-

Ministry of Industry, Mines and Trade, (2024).

These statistics indicate a continuous growth in automobile production under the 13th government, which occurred after a severe decline in the years 1398 and 1399 (Solar Calendar). Furthermore, according to the latest ranking published by OICA in 2025, Iran has ranked 16th globally with the production of over 1,077,839 vehicles in 2024. This is significant, as Iran was ranked 20th globally in 2019, and a four-place climb demonstrates remarkable progress in the country's automotive industry.

The chart below shows Iran's automobile production trend from 2018 to 2024:

Table 3: Automobile production trend in Iran (year)

Year	Number of cars produced	Growth percentage
2018	1.095.526	-27
2019	821.060	-25
2020	880.997	+7
2021	894.298	+1
2022	1.064.215	+20
2023	1.089.827	+3
2024	1.077.839	-1

(OICA, 2025)

10. Causal Loop Diagram Analysis: Drivers of Automobile Production Growth in Iran (13th Government Era)

The provided Causal Loop Diagram (CLD) illustrates the interconnected factors and feedback loops driving the growth of automobile production in Iran, particularly during the 13th government's tenure. This diagram, a foundational tool in System Dynamics, helps to visualize the complex

relationships between various elements within the system and identify reinforcing (positive) and balancing (negative) feedback loops.

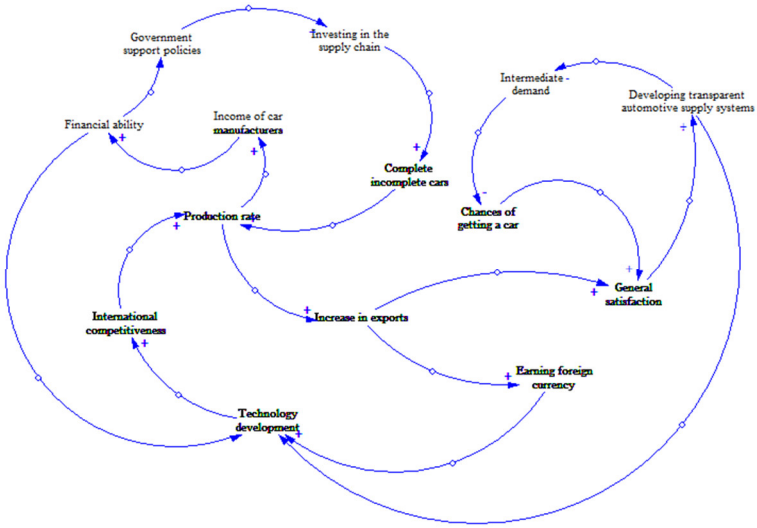

Figure 1:Causal Loop Diagram Analysis

11. Key Variables and Relationships:

1. **Government Support Policies:** This is depicted as an initial driver, directly impacting "Financial Ability" and, implicitly, other aspects of the industry. Strong government support can provide financial resources, incentives, and a conducive regulatory environment for car manufacturers.
2. **Financial Ability:** Directly influenced by "Government Support Policies." Increased financial ability for car manufacturers leads to higher "Production Rate" and enables "Investing in the supply chain."
3. **Income of Car Manufacturers:** A positive feedback loop is observed here. An increased "Production Rate" leads to higher "Income of Car Manufacturers," which in turn further enhances "Financial Ability," creating a virtuous cycle (Reinforcing Loop).
4. **Production Rate:** This central variable is positively influenced by "Financial Ability" and "Complete Incomplete Cars." A higher production rate also contributes to "Increase in Exports."
5. **Investing in the Supply Chain:** Driven by "Financial Ability," investment in the supply chain directly contributes to the ability to "Complete Incomplete Cars." This is a crucial element, reflecting

efforts to overcome past issues of parts shortages and incomplete vehicles.

6. **Complete Incomplete Cars:** Positively impacted by "Investing in the Supply Chain," completing incomplete cars directly increases the "Production Rate." This also negatively impacts "Chances of getting a car," suggesting that as more incomplete cars are completed and available, the difficulty in obtaining a car (due to scarcity) decreases.
7. **Chances of Getting a Car:** This variable is negatively influenced by "Complete Incomplete Cars." A higher availability of complete cars reduces the "Chances of getting a car" (i.e., makes it easier to get one due to less scarcity or lottery systems). This in turn positively impacts "General Satisfaction."
8. **General Satisfaction:** Directly influenced positively by a decrease in the "Chances of getting a car" (meaning easier access to vehicles). "General Satisfaction" also positively contributes to "Developing Transparent Automotive Supply Systems." This suggests that a more satisfied populace might push for or enable better systemic reforms.
9. **Developing Transparent Automotive Supply Systems:** Positively influenced by "General Satisfaction." Transparent systems enhance "Intermediate Demand" by building trust and efficiency. This also positively influences "Investing in the Supply Chain," indicating that a more transparent system encourages further investment.
10. **Intermediate Demand:** Enhanced by "Developing Transparent Automotive Supply Systems." This variable, in turn, positively influences "Investing in the Supply Chain," signifying that healthy demand drives further investment in the automotive ecosystem.
11. **Technology Development:** Driven by "International Competitiveness." As technology advances, it also contributes to "International Competitiveness," forming a reinforcing loop for innovation. Furthermore, "Technology Development" is shown to contribute to "General Satisfaction" (likely through improved vehicle quality and features) and to "Earning Foreign Currency" (through more competitive products).
12. **International Competitiveness:** Positively influenced by "Technology Development." Increased competitiveness is a desired outcome, but its direct impact on "Production Rate" is not explicitly shown, though it would likely be an implicit positive link.
13. **Increase in Exports:** Directly influenced by "Production Rate." A higher volume of exports leads to "Earning Foreign Currency."

14. **Earning Foreign Currency:** Positively impacted by "Increase in Exports" and "Technology Development." Earning foreign currency enhances "Financial Ability," forming another crucial reinforcing loop that can fuel further growth.

12. Identified Feedback Loops:

The diagram highlights several key feedback loops:

- **Reinforcing Loop (R1): Financial Ability → Production Rate → Income of Car Manufacturers → Financial Ability:** This is a core growth engine. As financial ability improves, production increases, leading to higher manufacturer income, which further boosts financial ability, creating a cycle of growth.
- **Reinforcing Loop (R2): Technology Development → International Competitiveness → Technology Development:** This loop suggests that advancements in technology lead to greater international competitiveness, which in turn incentivizes and enables further technological development.
- **Reinforcing Loop (R3): Production Rate → Increase in Exports → Earning Foreign Currency → Financial Ability → Production Rate:** This loop indicates that higher production fuels exports, generating foreign currency, which enhances financial ability and further boosts production.
- **Balancing Loop (B1): Complete Incomplete Cars → Chances of getting a car (-) → General Satisfaction → Developing Transparent Automotive Supply Systems → Investing in the supply chain → Complete Incomplete Cars:** This is a balancing loop that aims to stabilize the system by addressing the issue of incomplete cars. As more incomplete cars are completed, the "Chances of getting a car" improve (become easier), leading to higher "General Satisfaction," which drives "Developing Transparent Automotive Supply Systems." This transparency encourages "Investing in the Supply Chain," which in turn enables the completion of more incomplete cars.

13. Insights and Implications:

The CLD suggests that the 13th government's strategy for boosting car production heavily relies on:

1. **Direct Government Support:** Providing financial and policy backing to bolster manufacturers' capabilities.

2. **Addressing Supply Chain Bottlenecks:** A key focus on completing incomplete vehicles through targeted investment in the supply chain is critical for increasing output and satisfying demand.
3. **Enhancing Consumer Satisfaction and Transparency:** Recognizing that consumer experience and trust (through transparent supply systems) are vital for sustained demand and industry health.
4. **Promoting Exports and Technological Advancement:** Seeing these as long-term drivers for foreign currency earnings and improved financial health, ultimately fueling further production growth and competitiveness.

14. Reasons for Automobile Production Growth under the 13th Government

1. **Implementation of Resistance Economy Policies:** The 13th government practically implemented resistance economy policies in the automotive industry. Its most important components include:
   - Increasing localization and reducing dependence on imports.
   - Supporting knowledge-based companies and technological institutions.
   - Utilizing the capacity of domestic specialized forces.

2. **Cooperation with Friendly Countries:** Iran was led towards developing industrial cooperation with non-Western countries. The 13th government leveraged this opportunity and signed contracts with China, Russia, Venezuela, and Belarus, which included:
   - Assembly of joint products.
   - Export of vehicles and parts.
   - Provision of necessary parts to improve production.

3. **Reconstruction of Production Lines and Productivity Improvement:** By securing liquidity, removing production obstacles, and updating equipment, the production capacity of major car manufacturers like Iran Khodro and Saipa increased. The share of incomplete production and “cars on the factory floor” also significantly decreased.

4. **Phasing out Old Vehicles and Offering New Products:** Vehicles such as Pride, Tiba, Peugeot 405, Peugeot 206, and Peugeot Pars were discontinued, and new products like Rira, Tara, Shahin, Sahand, and

Atlas were introduced, which comply with safety and emission standards.

15. Economic and Social Impacts of Automobile Production Growth

With the return of a new round of sanctions in 2018, Iran's automotive industry once again faced a very major crisis, similar to that in 2012. This was to such an extent that all foreign parties and partners of Iranian car manufacturers rapidly exited Iran, ending their cooperation with Iranian partners. The situation progressed to a point where car production in Iran reached half of its good years, leading to the shutdown of many car and auto parts production lines. The closure of production lines, the inability to meet existing market demand, and a shortage of liquidity led to numerous public gatherings and protests by people and those who had lost their investments concerning the automotive industry.

Job Creation: According to a report by the Ministry of Industry, Mine, and Trade (وزارت صمت), over 350,000 people were directly and indirectly employed in the automotive supply chain in 2023.

With the 13th government coming to power, and by adopting a strategy of maximizing the capacity of production lines and replacing Chinese partners for car manufacturers, over two years we witnessed a significant portion of the demand in the thirsty car market being met. Also, in the commercial vehicle sector, where the country was facing a crisis, we saw an increase in the production of car manufacturing companies. Companies that in 2019 had 7 trillion Tomans in accumulated losses following the production of two thousand vehicles, celebrated the production of eighteen thousand commercial vehicles in 2023, having overcome the recession and accumulated losses of previous years, and achieving profitability by year-end.

Economic Growth and Industrial Growth: According to data from the Statistical Center of Iran, the country's economic growth was -1.9% in 2020, which increased to 4.3% in 2021, 5.5% in 2022, and according to the preliminary report by the Central Bank, to about 5.7% in 2023. During the same period, the industrial sector's growth also increased from -0.3% in 2020 to over 6% in 2023.

This increasing trend, especially in the industrial sector, has occurred due to significant growth in areas such as automotive manufacturing, chemical industries, basic metals, and food industries. In the automotive industry, the 13th government's supportive measures, increased production volume, export growth, and localization of parts have played a prominent role in this growth.

According to the Deputy Governor for Economic Affairs of the Central Bank, the industrial sector's share in the country's economic growth in 2023 was over 30%, which indicates the pivotal position of this sector in revitalizing the country's economy.

Sources: Statistical Center of Iran (Quarterly Economic Growth Reports 2020-2023), Central Bank of the Islamic Republic of Iran (Macroeconomic Developments Report 2023).

Despite the advancements, challenges such as mandatory pricing, lack of electric vehicle infrastructure, and limited financial resources remain. By continuing the implementation of the resistance economy and resolving these challenges, Iran's automotive industry can return to the top 15 global producers.

16. Conclusion and Recommendations: The Resurgence of Iran's Automotive Industry

The analysis of recent trends in Iran's automotive sector reveals a significant turnaround, particularly under the policies enacted by the 13th government. Following a period of decline marked by the re-imposition of international sanctions and subsequent withdrawal of foreign partnerships, the industry has demonstrated a notable recovery and growth trajectory. This resurgence is attributed to a multi-pronged strategy encompassing the implementation of resistance economy policies, strategic collaborations with non-Western nations, revitalization of production infrastructure, and modernization of product lines.

The adoption of "resistance economy" principles, emphasizing domestic production and technological self-reliance, has been instrumental in mitigating the impact of international sanctions. The forging of partnerships with countries such as China, Russia, Venezuela, and Belarus has facilitated the diversification of supply chains and access to essential resources and technologies. Simultaneously, targeted investments in upgrading production facilities and streamlining operational inefficiencies have resulted in increased output and a reduction in the backlog of incomplete vehicles. Furthermore, the replacement of outdated models with newer, more compliant vehicles reflects a commitment to improving product quality and meeting evolving consumer demands.

The positive economic and social ramifications of this growth are evident in increased employment figures, a substantial contribution to national economic growth, and the revitalization of related industrial sectors. The automotive industry's resurgence has not only addressed

pent-up market demand but has also played a crucial role in offsetting the negative impacts of sanctions on the broader economy.

However, despite these achievements, several challenges persist that warrant attention to ensure the long-term sustainability and competitiveness of the Iranian automotive industry. These challenges include:

1. **Price Controls:** Government-mandated price controls may stifle innovation and limit the profitability of manufacturers, potentially hindering future investment and growth.
2. **Electric Vehicle Infrastructure:** The nascent stage of electric vehicle infrastructure development poses a significant obstacle to the adoption of cleaner, more sustainable transportation technologies.
3. **Financial Constraints:** Limited access to financial resources may impede necessary investments in research and development, technological upgrades, and expansion into new markets.

17. Recommendations:

To consolidate the gains achieved and propel the Iranian automotive industry towards greater global competitiveness, the following recommendations are proposed:

1. **Liberalize Pricing Mechanisms:** Gradually transition towards market-based pricing mechanisms to incentivize innovation, improve product quality, and attract both domestic and foreign investment.
2. **Invest in EV Infrastructure:** Prioritize the development of a comprehensive electric vehicle charging infrastructure to support the adoption of electric vehicles and align with global trends towards sustainable transportation.
3. **Enhance Financial Access:** Facilitate access to affordable financing options for automotive manufacturers and suppliers to enable investments in research and development, technological upgrades, and export promotion activities.
4. **Strengthen R&D and Innovation Ecosystem:** Foster collaboration between industry, academia, and research institutions to drive innovation and develop indigenous technologies that enhance the competitiveness of Iranian automotive products.
5. **Promote Export Diversification:** Expand export markets beyond traditional partners and explore opportunities in emerging

economies to reduce reliance on specific regions and mitigate geopolitical risks.

6. **Address Supply Chain Vulnerabilities:** Strengthen domestic supply chains, promote localization of critical components, and diversify sourcing strategies to enhance resilience against external shocks and disruptions.

By proactively addressing these challenges and implementing the proposed recommendations, Iran's automotive industry can solidify its position as a key driver of economic growth and technological advancement, contributing to the nation's broader development goals. Further research and analysis are warranted to assess the effectiveness of ongoing policies and identify emerging opportunities for sustainable growth and innovation in the sector.

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