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The Republic Period of the Turkish Automotive Industry and Product Design

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Abstract

After the First World War, during the transitional period the Republic of Turkey from the Ottoman Empire, this qualitative research that sheds light on changes and variations were the focus of the industry, for the conservation and use of located original value in the historical development, it has been compiled with archival-tracer information. The Ottoman Empire, after the industrial revolution, these historical studies that discussed the effects of the touch industry has ceded to the Republic of Turkey, in the automotive assembly industry realized the product development and product design activities, with examples of significant diffraction in all, were transferred with qualitative data. The main objectives of the study are how and why the automotive industry, which was established before the world wars and restructured afterwards, came to life in the global context and the regional developments it showed. Therefore, in the coming days, the study was carried out in a narrow field in order to understand the global integrity where geographical regions converge, and the structure in which full integration has been completed in companies and organizations in the automotive industry. In this context, the geographical continent transition taking place among Turkey's automotive industry, within the limits of qualitative studies, creating a historical perspective, the region, released today stems from the importance of global integration centers. In this context, Turkey is located between geographic continent transitions to create operating limits of the automotive industry, the global integration of the indicator is due primarily to the fact that the reveal. The study evaluated two different development structures in the automotive industry: mass manufacturing and vehicle design, product development. Therefore, examining the development of the automotive assembly industry in the light of original product design studies, which constitute the basic requirement of mass manufacturing, strengthened the cause and effect flow. Under the new technology-oriented, original product design, the enhancement or sustainability of global competitiveness, regional mass manufacturing indus-

try, specific applications for the automotive sector were included in the findings and main results of the research. In addition, the use of common platforms and parts between global companies in the automotive assembly industry or a common design approach in cost-oriented mass manufacturing has been determined within the scope of the research boundaries. The global competition that shapes the basic development of the automotive industry, the brand and model memory of regional markets, short product life cycles, product diversity and increasing consumer demands, predictable implementation of similar basic strategies have shaped the background of the study. Research limits built-in, well situated Turkey's automotive assembly industry in the 1960s to set up and under liberal policies in the mid-1980s to be included with mass manufacturing capacity with a special agreement with the European customs union, today, global integration, to be completed by Asian companies cannot stay away from the expected in this sector in the working axis is revealed.

Keywords

Turkish Automotive, Industrial Design, Design Management, Turkish Automotive Industry, Historical Development of Industry, Vehicle Design

1. Introduction

Under the development of science and scientific methods, the 18th and 19th centuries witnessed new political, intellectual and economic formations along with inventions. These changes, which took place under scientific approaches, led to technical developments, and as a result, these inventions, which were commercialized and spread, revealed the birth of the industrial revolution. The invention of steam engines in-vehicle technologies in the previous period and their taking place under global practices created the elements of migration from rural life dependent on the settled order in societies to city life, which became the center of industry and trade (Fuss & Waverman, 1990; Haiss et al., 2009). The changing and dynamic life model in the social field in question has restructured human life and basic needs. Therefore, in the light of these developments, the initial purpose of the research is to reveal the structure of the rapid transport culture, which has emerged as a result of socialization or radical change in the social structure, that has changed the effect of industrialized products on individual life or the social structure, in its natural environment. The dynamism that constitutes modern culture, the increasing need for acceleration of humanity, came to life in this period when historically intense discoveries and scientific methods came to life (Williams et al., 1987; Hudson, 1994). Along with the remote access, transportation sector, ships and railways provided by steam engines, new criteria such as vehicle speed, amount of vehicle load, need for vehicle roads, number of vehicle employees, gave birth to the automotive industry at the

beginning of the 19th century (Williams et al., 1987; Veloso & Soto, 2001). The first **trackless** vehicle produced by the French Captain Nicholas Joseph Cugnot, powered by steam power, stems from the need to transfer military cargo to areas other than the railway track. The low efficiency of steam engines, easier use of horse carriages than steam vehicles made it difficult to spread steam vehicles. François Isaac Rivas first internal combustion engine trial, Samuel Brown first internal combustion engine patent industrialized in practice, Said Carnot's first laws of thermodynamics, four-stroke cycle in practice has ensured the rapid development and spread of internal combustion engines in the industry (Sayer, 1989; Veloso & Soto, 2001). At the beginning of the last century, the vehicle industry, which was shaped under the structural developments on the functional efficiency of the horse carriage, gave birth to the mass and mass production techniques formed by Ford with the concept of competition. At the same time, this approach has transformed the automotive industry into a sector with the most important economic return of countries with high manufacturing numbers in various regions of the world. Looking at the periodic diffractions in the automotive industry, it is the product differentiation approach of General Motors, another major automotive industry company after Ford, to evaluate the different demand patterns of consumers in different regions and tastes. The lean production system, which was last implemented by Toyota automotive company in the mid-last century in the vehicle sector and which structurally affects the functioning of all industries; It has created an orientation where instantaneous stock accumulation is prevented and efficient use of resources is adopted as a principle (Lee & Anderson, 2006; Womack et al., 2002). These developments in the last century, increasing product variety and variable customer demands have created a severely competitive environment in which companies are active in global markets.

European automotive manufacturing companies, which managed to overcome the effects of the Second World War to a great extent from the late 1950s, have started to spread and invest in neighboring countries such as South America, Africa and Eastern European countries, similar to the strategic model applied by the American vehicle industry (Bedir, 2002). While many European automotive industry manufacturers were only in the European market until the mid-1950s, many European brands, especially Volkswagen, started to export extensively outside their regions, especially in North and South America, since 1955 started (Doner, 1991; Womack et al., 2002). With the said import success, the establishment of local automotive assembly production facilities in South America accelerated in the early 1960s (Shimokava, 1985; Sayer, 1989). In the 1960s and 1970s, while the assembly lines and assembly parts manufacturing companies were set up in South America, which was preferred by the American and European automotive industrialists, Japanese automotive manufacturers opened a new model for regional expansion with new production facilities that are mainly focused on Asia. The sample outside the mentioned model; GM and Ford's investments in Taiwan, Japan's investments in Brazil, Peru, Ecuador and similar

countries, in the South American continent, and the American and European automotive companies' preferences for a cost-oriented structure rather than similar investment strategies (Doner, 1991). Small-scale automotive industry companies of European and Japanese origin started to enter the North American market under vehicle designs focused on fuel economy in the late 1960's and early 1970's. With the first oil crisis in 1973, it was observed that North America directed its market with small car designs, and in 1979, with the second oil crisis that permanently increased oil prices, North American automotive companies turned to the small and economical automobile market (Shimokava, 1985; Sayer, 1989). Japanese automotive industry companies exported their product designs to the North American market under the oil crisis, under small, energy-efficient, lightweight, economical vehicle concepts, as well as the quality, durability, after-sales costs of the vehicles produced, the products of these market customers for many years, provided reasons for permanent preference (**Figure 1**). When the seasonal sales graphics specific to the subject in **Figure 1**, are examined the new and permanent situation created by the world oil crisis has deeply affected the automotive industry sector (Shimokava, 1985; Sayer, 1989).

In the North American automotive sales graph given in **Figure 1**, the global impact created by the unexpected world oil crisis directed the vehicle manufacturing companies to global competition and global strategic product design variables. In the second half of the last century, the globalized competitive environment in the automotive industry has led to the questioning and constructing of product-oriented design factors that increase and trigger competitiveness. In the structural template of the automotive industry predicted by Porter (1980), Smitka (1991); global vehicle demand (market-product classifications, customer-demand forecasts), global supply-side effects (cost pressures, supply chain management, overcapacity), rapidly changing technology (flexible manufacturing, shortening product lifecycle) and environmental concerns, he described it as mutually interactive factors that shape the automotive industry structuring and thus the formation of competition conditions (Cooney & Yacobucci, 2005). Therefore, the ability

%	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total Sale	11.4	11.7	11.4	11.9	13.1	14	14.7	15.3	15	15.1	15.2	12.6
N. America	21	23	23	22	22	22	21	22	22	23	23	24
Europe	69	67	66	66	66	66	67	66	66	64	65	63
Japan	10	10	11	11	12	12	12	11	12	13	12	12
S. Korea	0	0	0	0	0	0	0	0	0	0	1	1

Japan automobile market (0.000.000)												
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total Sale	5.3	5.4	5.4	5.6	5.7	6.0	6.7	7.3	7.8	7.5	7.0	6.4
N. America	0	0	0	0	0	0	0	0	0	0	1	1
Europe	1	1	1	1	1	1	2	2	2	2	2	3
Japan	99	99	99	99	99	98	98	98	97	98	98	97
S. Korea	0	0	0	0	0	0	0	0	0	0	0	0

North America automobile market (0.000.000)												
	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Total Sale	10.4	12.2	14.4	15.7	16.3	15.2	15.9	14.9	14.2	12.7	13.1	14.2
N. America	76	76	77	76	74	72	74	74	72	71	72	74
Europe	5	6	6	5	5	4	4	4	3	3	3	3
Japan	18	18	18	19	20	21	20	21	24	25	24	23
S. Korea	0	0	0	0	1	2	2	1	1	1	1	1

Figure 1. North American automotive sales after the world oil crisis (Sayer, 1989).

of global automotive industry companies to reach and maintain an equal or higher level of efficiency than their competitors, or to produce products at equal or lower cost than their competitors, or to design and develop products. In addition, researcher Williams et al. (1987), argued that global competitiveness is not only the ability to sell goods abroad and balance foreign trade, but also that a country's new technology and product design capability is the ability to continuously increase the quality of life and increase its spread in international markets (Williams et al., 1987; Hudson, 1994). Therefore, competitiveness appears as the ability of a country to create an environment that can continuously increase its value creation, the effect of product, production or design development concepts on the development of competitiveness.

The biggest diffraction in today's automotive industry is the global company mergers and structural design variations brought about by the flexible assembly line that serves various brands under these mergers. The company mergers or company and brand acquisitions of European and American automotive companies have now entered the last stage of globalization by integrating with companies in the Asian vehicle industry. The nature of the tendencies of automotive companies towards regional market globalization from their current position in local and regional markets is seen as the determining strategy in today's automotive industry. Company-wide globalization has been perceived primarily as rapidly entering new emerging markets (Shimokava, 1985; Sayer, 1989). The untouched wide market appeal of the continental countries in Asia, Europe and America triggered the approaches of automotive industry companies to establish local production facilities. The close-to-market cost-oriented assembly manufacturing approach that creates similar approaches and its integration with local assembly part suppliers have led to the establishment or investments of new assembly plants in low-income peripheral countries of the current markets, as well as in the world's immature, promising automotive markets (Cooney & Yacobucci, 2005). On the same axis, Tiryakioğlu (2004), examining the impact of automotive products' design and new product development activities on competitiveness from a different perspective, emphasized that product design studies can increase global production capability as well as affect production efficiency and quality positively (Tiryakioğlu, 2004). However, new product design investments in the automotive industry also raise the direct product and production costs and thus cause a decrease in the amount of profit, revealing the possibility of creating a negative cycle.

2. Development of the Turkish Automotive Industry

In this research, Turkey's automotive industry has been examined under three main headings. Therefore, the first defined period in question is the period from the craft sector, which completed its life in the Ottoman Empire, to the establishment of the republic. The second period, on the other hand, is the years when industrial installations were realized and planned with the republic. The

last period, on the other hand, is the period from the establishment of the republic to the present day after the Second World War, when it was integrated into global industry and free markets. Turkish automotive industry, which started with the development of the assembly industry in the 1950s after World War II, with the import-substitution policies applied intensively in the 1960s and 1970s (production and assembly of a certain proportion of the product in the domestic market) it has matured to the main automotive companies of foreign origin with its high production capability and the spread of vehicle parts manufacturing (**Figure 2**). The first automotive industry registered investment realized in Turkey, in 1954, began with Turkish Willy Overland Jeep and truck assembly Comp. for the defense industry (Çetin, 2000; Bedir, 1999). Then, in 1955, the truck assembly line of Turkish Automotive Industry Inc. and the establishment of the second and third truck factories of Ford Otosan and Ciftciler Company (**Figure 2**).

Bus manufacturing, another public transport product involved in the establishment of the Turkish automotive assembly industry, was founded in 1963 by Istanbul **Coach-bus BodyInd. Comp**. by Magirus (**Figure 2**). As shown in **Figure 2**, still in the same period of 1968 and 1969, TOFAS & FIAT and OYAK & RENAULT firms, has built its assembly lines in Turkey (Bedir, 2002). On the other hand, these developments in the vehicle assembly industry triggered the first Turkish automobile initiative (Devrim) among state policies, and the first examples were created in the state railway factory in 1961. Since the annual demand of the passenger car, which was created with the Devrim brand, was calculated to be less than 5000 units at that time, it was not manufactured due to insufficient demand. In the said period, the assembly industry instruction, which was created according to the clause "benefiting from the driving force of the automotive industry in industrialization" included in the first five-year development plan prepared for the development of industrial policies, directed the automotive industry to the assembly-oriented development.

Company	Location	Founding	License	Invested Capital
Anadolu Honda	Kocaeli	1997	Honda	50%
Anadolu Isuzu	Istanbul	1966	Isuzu	30%
BMC	Izmir	1966	Cummins	00%
Askam	Kocaeli	1964	Chrysler	00%
Otosan	Istanbul		Ford	41%
	Eskisehir			
	Kocaeli			
Assan	Kocaeli	1997	Hyundai	50%
Karsan	Bursa	1966	Peugeut	00%
MAN		1966	MAN	98%
Mercedes Turk	Istanbul	1968	Mercedes	85%
	Aksaray	1985		
Otokar	Sakarya	1963	LandRover	00%
Otoyol	Sakarya	1966	Fiat	27%
Oyak	Bursa	1971	Renault	51%
Temsa	Adana	1987	Mitsubishi	00%
Tofas	Bursa	1971	Fiat	38%
Toyotasa	Sakarya	1994	Toyota	75%

Figure 2. The republic period of the Turkish automotive companies (Bedir, 2002).

The Turkish automotive assembly industry has reduced the imported parts input until the 1980s and developed the domestic assembly part industry. The secondary diffraction experienced in the 1980s has passed into liberal economic policies. In this period, the automotive domestic assembly part industry has entered an approach that is export-oriented, open to the outside, has the use of up-to-date manufacturing technology, has a production target in an economy of scale, and has global competition requirements in cost and quality compliance. In this period, the increase in the number of assembly in the automotive main industry, the activation of regional mass production centers in the global automotive sector, led the Turkish automotive industry to tend to commercial vehicle models that require high labor. Therefore, keeping the import part protection rates of automotive assembly parts experienced in the domestic market high under the state policies, a steady increase in local production has been achieved, but has led the sector to create an environment with limited product range that meets the assembly part needs of domestic main industry companies.

In the second period of the 1990s it made special customs agreement with the European Union, in the manufacture of automotive parts assembly, has led to partnerships with global firms in Turkey. As in the world, Turkey has turned to mass production in the automotive industry in the 2000s. In this period, model-based mass production centers were defined in the main global automotive industry companies and the production of commercial vehicle models with low labor costs and high labor rates constituted the model-based weight of the Turkish automotive industry. In the 2000s, global partnership transforms the experienced model-based mass-production centers of automotive companies, the country was headed for the commercial vehicle assembly, manufacturing expertise in the automotive sector, and thus the propagation of light and heavy commercial vehicle products to world markets, Turkey has achieved a significant increase in the exports. In the same period, it is seen that state-supported research and development incentive policies came into effect, and the emphasis was placed on original product, value creation, product development and industrial design activities in order to increase the international competitiveness of the Turkish automotive industry. Under the global crises until 2010, company mergers in the main automotive industry companies, common product platforms between brands, specialization in main assembly parts and mass production of these basic parts (engine, axle, etc.) for all brands have removed the geographical boundaries in the industry. State-supported research and product development centers, which started to be established in the 2000s and continued to spread from 2010 to the present, benefit the development of original parts in supply companies instead of original vehicles in the automotive main industry. In the 2010s, companies in the Turkish automotive main industry have undergone structural changes, under the global developments, upon capital increase and equalization of partnership rates in the domestic market. If we evaluate the global development of the last decade, we observe that there are similar structural

developments in the Turkish automotive sector. Regardless of brand and company, light commercial vehicles of different brands are produced on the same assembly line. Different vehicles of different brands are manufactured on the same assembly line in mass production centers close to the market, under global company associations. The main automotive company mergers that started in the 2000s have resulted in the same assembly line serving different brands today. In addition, the main industries located in Turkey, which develops and produces mounting, suppliers in an intensive cooperation with companies, said the process has been carried out for more extensive integration of global assembly lines. Therefore, in addition to capacity increase on a global scale, especially for competition, technology innovation and research and development, product design studies have gained great speed. Today's ongoing research and development supported by government incentives structure in local politics, their affiliated research and development centers located in major global automotive company in Turkey, has included into the global strategic product development projects (Tezer, 2007). Thus, global company of technology and research and development potential, along with the incentive structure of the automotive sector in Turkey, preferred by other industries has benefited. Development of new technologies and products used in their production technologies, alongside new investments are commonly found life at the global level to support the industrial development in Turkey and manpower training. Today, in the Turkish automotive main industry, there are more than 15 companies established with global capital partnerships and manufacturing assembly under their license. In addition, there are more than 1000 domestic supplier automotive supplier industry organizations that meet the assembly part needs of the global main automotive companies. Among these, it is thought that around 250 - 300 companies have reached a scale that can compete in the international market (Paker et al., 2018).

2.1. Pre-Republic Period of the Turkish Automotive Industry

Developments in our country at the end of the 18th century, which was the establishment and expansion period of the world automotive industry, caused the late structuring of this industry (Paker et al., 2018). The meeting of Turkish people with automobiles coincides with the last period of the Ottoman Empire. Therefore, the declaration of the Constitutional Monarchy in 1876, which constituted the breaking point of this period, was planned by preparing an independent industrial organization of Anatolia, and by preparing seaway, railway and road maps aimed at structuring the city-town-village transportation in the country (Bedir, 2002). Considering the geographical spread of the Ottomans in 3 continents in this period, it can be concluded that these and similar plans or studies included the fiction of a large part of the world transportation network. At the end of the 18th century, the Ottoman Empire showed an industrial development on the spread of rail and seaways rather than highways in the transportation of these vast lands. During this period, the production of horse carriages,

which were considered as personal transportation vehicles, was carried out by small enterprises producing furniture, textiles and metal products in Bursa, Istanbul, Konya, Kayseri and similar industrial zones. These small enterprises, which were divided into specialties within themselves, carried out the different parts and assembly stages of the horse carriages or sea and land vehicles to be produced, with the guidance of the guild organizations. Therefore, motor vehicles, tram wagons, boats and ships, omnibuses, phaetons and railway wagons in the last period of the Ottoman Empire were produced by small businesses in these regions (Küçükerman, 1999). Between the declaration of the Second Constitutional Monarchy in the last days of the Ottoman Empire and the First World War, the number of motorized road vehicles entering the country did not exceed 100 - 150. Therefore, with the end of the First World War, although many small businesses in the regions engaged in the purchase and sale of motor vehicles or the supply of spare parts started to operate, no significant development was achieved due to the inadequate conditions created by the post-war economy (**Figure 2**). In addition, after the First World War, in 1927, with a special law enacted by the state administration of the period, Ford Motor Company was granted a 25-year concession in the Istanbul Kasımpasa free zone, targeting the **Union of Soviet Socialist Republics** market, and mounting trucks, vans and tractors (**Figure 3**). This initiative, located in the Istanbul free zone, took the structure of importation from the assembly industry and the factory was closed due to the economic crisis that shook the world in 1929 (**Figure 3**).

Since establishment of the Republic in Turkey, a transport system which is preferred for the motor vehicle and highway outside rail is carried out by supplying import. Occurrence in the real sense of the automotive industry products in Turkey, in 1954, the Turkish defense industry Willy Overland Ltd. began with producing jeeps and vans (**Figure 3**). This investment was followed by the truck factory of the Turkish Automotive Industry and the second and third truck factories of Ford Otosan and Ciftciler Company Bus production was started in 1963

The First Automotive Activities (The Ottoman Period)					
1888	The first automobile date of dispatch to II. Abdülhamid.				
1906	The first official automobile imports (Züheyrzâde Ahmet Pasha and Stavrolu)				
1913	Mahmut Şevket Pasha's automobile in the assassination.				
1916	First automotive road and traffic regulations in the Ottoman.				
The First Automotive Companies (Pre-Republic Period)					
Automotive Company Name	**Foundation Year**	**Factory Capacity (per a year)**		**Company Capital (mil. TL)**	**Foreign Capital (%)**
Ottoman Transport Vehicles Inc. Company	1916	-	Truck	-	0
		-	Jeep		
Ford Motor Export Istanbul Inc. Company	1927 1944	-	Truck	$0.018	100
		-	Car		
Turk Willys Overland Inc. Company	1954	5.800	Truck	-	25
		7.500	Jeep		
		1.000	Bus		
Turkish Automotive Industry (TOE) Inc. Company	1955	400	Truck	20	10
The European Customs Union Reference, 1959 (Republic Period: EU Agreement)					
Ford Otosan Inc. Co.	1959	200	Truck	1	License
		400	Minibus		
Çiftciler Inc. Co.	1959	1.800	Truck	0.25	License
Turk Askam Inc. Co	1964	6.000	Truck	20	License
Istanbul Bus Carocer Inc. Co	1963	320	Bus	5.4	License
Genoto Inc. Co.	1963	3.000	Truck	5	License

Figure 3. Historical development of the Turkish automotive industry (Paker et al., 2018).

by **Istanbul Coach-Bus Body Industry Company** by the assembly of Magirus **mini-buses** (Figure 3).

In the census conducted in the Ottoman industry in 1921, as a result of the census, which did not include the important cities under occupation, there were 33,058 small enterprises, employing only 76,216 people within the national borders (Figure 4). In addition, when the whole country is taken into consideration, a kind of light industry, where the character of the said small business or atelier is revealed, and concentrations on the textile and textile industry in general are observed (Figure 4).

After the First World War, the environment, developing countries located in Europe and Asia, which provides orientation on import substitution in the industrialization moves and setups with international companies with internal market dominance with companies' turnover, regions led to the development of domestic industry (Figure 4). Such as Turkey the fact that countries have started to follow protectionist and industry-oriented policies is an important development for the export balances of countries with strong industries. Therefore, after the world wars, international companies have chosen to increase their international investments and establish an export balance by moving certain parts of their production to emerging markets. After the world wars, which entered into force in the industry's restructuring targets of developed countries and the European Marshall plan was activated after the installation of the Republic of Turkey. Within the scope of the Marshall Plan, agriculture and agricultural equipment were imported and distribution of agricultural machinery was also provided in the same period.

2.2. Republic Period of the Turkish Automotive Industry

The Turkish automotive industry, which was established with import or import-substitution (semi-finished product assembly) after the First World War for defense industry needs, was used extensively in the 1960s and 1970s with the establishment of factories in partnership with international companies in the 1950s. It has become a sector that tries to develop its own production capability, mass production center and its own supply channels with import-substitution government policies. Following an export-oriented policy with the liberalization experienced after the 1980s, the Turkish automotive industry reached global competition and product standards in the 1990s, with partnerships established

Ottoman Industry	Workshop	Industry Force (&)	Worker	Labour (%)
Textile Industry	5.347	60.7	33.316	46.3
Cutaneous Industry	20.057	16.2	27.964	23.6
Extractive Industry	3.273	9.9	8.021	10.5
Wood Industry	2.067	6.3	6.007	7.9
Food Industry	1.273	3.8	4.493	5.9
Chemical Industry	337	1.0	803	1.1
Argy-Food Industry	704	2.1	3.612	4.7
Total	**33.058**	**100**	**86.216**	**100**

Figure 4. 1921 ottoman industry (Bedir, 2002).

with international investors. In order to increase the global competitiveness of the Turkish automotive industry, in the 2000s, it has focused on the development and design activities of assembly parts that create value with state-sponsored research and development investments. As of 2020, today's state-supported, original automotive product design efforts, Turkey is situated in the focus of the automotive industry. This current development has also been experienced in the establishment of the Turkish automotive industry. Thus, after the Second World War and the establishment of the Republic in Turkey, with the passage of state-backed international automotive assembly plant life, unique vehicle designs under government management has been the scene of the trial. In 1961, under the project schedule of Prime Minister Cemal Gursel, studies were carried out in the state railway workshops for the design and manufacture of a passenger car, all parts of which were domestic production. In the vehicle design and manufacturing project of the "**Devrim**" branded passenger car under the aforementioned government, 25 engineers completed the production of four prototype cars in 6 months. Therefore, since the "Devrim" project was structured as a political indicator without commercial concerns and the focus of its feasibility, production numbers, investment costs and similar values were not calculated, there was no attempt for mass production. When the Republic of Turkey examined after the original vehicle design in the automotive industry, manufacturing firms are emerging model based automotive ongoing product designs.

In 1965, Ford Group and Koc Group in partnership with the board, the report submitted by the Ministry of Industry, Ford Otosan Automotive Company has been requested to support the implementation of a new car in Turkey. The "Anadol" brand passenger car of Ford Otosan Comp., which was introduced to the market with a unique design and manufacturing process in terms of mass production, emerged. With its commercial concern and cost-oriented approach, the Ford Otosan "Anadol" brand vehicle project made of fiberglass material was undertaken by the British Reliant and Ogle Design firm. The passenger car, which continued to be manufactured with the "Anadol" brand until 1982, was produced 87,000 in total (Bedir, 2002). Another automobile project that started to be manufactured in consecutive periods is the "Serce" model, which was commissioned in 1971 by the TOFAS assembly plant of the Koc group and Fiat partnership. TOFAS, produced the project in European factories have performed at the same period, "Serce" mark passenger cars to Turkey has been realized under special local improvements.

With the same development project approach, the TOFAS automotive company started manufacturing, "Fiat 131", "Murat 131", "Kartal", in 1983, "Sahin" and "Dogan" **trademark**'s in 1988. Turkey's automotive industry assembly industry realized an installation of other companies OYAK Group (Armed Forces Pension Fund) in partnership with Renault, Oyak & Renault, in 1971, "Renault 12TX" **trademark** has started the production of passenger cars. Oyak & Renault, which manufactured the passenger car models "Renault 9TX" mark in 1985 and

"Renault 11TX" brand in 1987, realized an automobile export in 1980 for the first time (Tiryakioğlu, 2004). In 1961, companies manufacturing similar agricultural vehicles such as Verdi Comp., Ciftciler Comp., Minneapolis Moline Comp., Turkey Tractor Factory Comp., Gumus Motor Factory Comp. and Uzel Tractor Factory Comp., were included in the Turkish automotive industry in the same period. The number of companies in the Turkish automotive industry, which was 7 in the early 1960s, rose to 15 at the end of 1968. The Turkish automotive industry development, which guides the five-year development plans of the state policies, has drawn a traceable path after the republic, due to its significant economic return.

In the 1970s, the efficiency of the Turkish automotive assembly industry and its place in the total economy provided a significant increase. Therefore, as a result of the structuring and cooperation between the automotive industry and the state planning organization, a special expertise commission was established to direct the sector. This trend has periodically created a planned structure in automotive industry production and domestic engine development. At the beginning of the 1980s, various regulations were planned in the Turkish automotive industry in order to ensure the export orientation of the import-oriented structure in the production of assembly parts and material supply. In this context, localization efforts in manufacturing have come to the forefront by establishing factories under the licenses and patents of international supplier companies in the Turkish automotive assembly sub-industry. At the end of the 1980s for the development of Turkey's automotive assembly industry, maintaining classic customs barriers, the development of manufacture of the assembly parts are provided.

In the 1990s, after the development of automotive assembly part manufacturing under protection matured, the frozen European Union full membership process initiative was revived by the government of the period, and the full membership negotiations provided a transition to the liberalization period under special customs-tax reductions. The Turkish automotive industry, which had a planned development between 1980 and 2000, was delayed in capacity increase and modernization efforts due to unplanned tendencies and economic instability, instead of transitioning to a free market economy in the next period. Therefore, as a result of the import-substitution assembly industry policies that lasted until the 1980s, the automotive sector has a structure that is oriented towards the domestic market and consists of many assembly vehicle companies (**Figure 5**). With the policies of transition to liberal economy adopted and planned in the 1980s, it is aimed that the sector is open to the outside, using global manufacturing and new product technologies, capable of mass production at economic scales, and having a global competitive power in terms of price and quality (**Figure 5**). However, despite the steady growth in the automotive assembly industry, with the continuation of protectionist policies in the said period, the vehicle sector realized a production style with a small number of product diversity towards the domestic market (**Figure 5**).

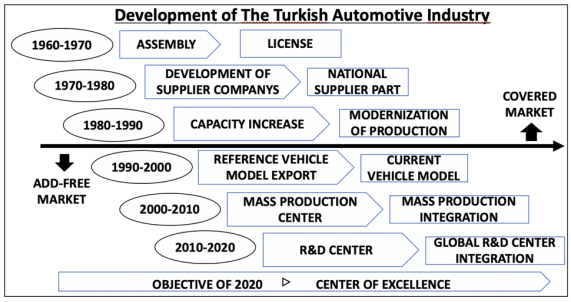

Figure 5. Development of the Turkish automotive industry (Tezer, 2007).

In the early 1990s, the steady increase in demand has created global competition-oriented technology renewal and new model investments in the main and subsidiary automotive assembly industry, under very intense investments, with capacity increase (**Figure 5**). In the mid-1990s, it was aimed to structure organizations that support new product design and Research and Development activities focused on global competition development. Therefore, for this purpose, the R & D installation works of Turkish automotive assembly industry companies have been defined as the period in which the R & D awareness, which includes new product design and new product technology development, started in the late 1990s. This development in the early 2000s did not create sufficient level of government incentives in R & D initiatives due to some legal obstacles in licensed parts assembly of Turkish automotive companies. This approach, which has continued until today, continues with the efforts of licensed automotive assembly industry companies to establish their own R & D units, mass manufacturing technology investments and new product design investments.

During the same period, a factory with an annual/vehicle capacity of 100,000 was established in 1994 between the SABANCI Group and Toyota Motor Corporation. Consecutively, in 1997, automotive assembly factories were established between Honda Motor Corporation and ANADOLU Group and under the partnership of KIBAR Group and Hyundai Motor Corporation. In the 2010s, the mass production capability in the Turkish automotive assembly industry has developed in tandem with model-based flexible assembly lines in the world industry. This period continued under the international firm structures of the Turkish automotive assembly industry, which has become an important supplier of design and technology transfer, supported in accordance with government policies. In the 2010s, new product design and R & D focused investments made significant improvements in state incentive structuring with financial support, enterprise modernization in the transition to mass production of the Turkish automotive assembly industry, and R & D investments. The last decade in the Turkish automotive assembly industry has encouraged state-sponsored investments in robotic manufacturing technologies, assembly line modernization or flexible assembly line installations, as well as new product design and up-to-date vehicle model technology development centers. Today, the automotive assembly industry, which has a high economic return, supports the technology import and

international capital structure by facilitating within the scope of priority sectors in the incentive. In order to take part in the global product and production standardization in the global competitive environment, the establishment of common norms or the basic condition of existence in the world geography, whose development limits are lifted.

3. Turkish Automotive Products' Design

When the history of the Republic is examined, in the period until 1955, the Turkish vehicle industry has not developed a registered approach in the local or global automotive main brand initiative, due to the development of import and imported spare parts. Until this period, the Turkish vehicle industry has produced horse carriages and parts in Bursa and Istanbul regions and after the establishment of the automotive industry, the sector has come to life in these regions. This situation is the biggest indication that the soil in the world geography is a memory of the products produced from the soil.

Founded in 1955 within the Oyak Group, Turkish Automotive Industry Company (TOE), first project-met with Volvo for Turkish automotive production, but later agreed with the British Triumph Automotive Company for the design-project and manufacture of this vehicle project called "Zafer" trademark (Paker et al., 2018). The first Turkish automobile design and manufacturing initiative in question remained at the project stage for various reasons. For the establishment of this industry with high economic returns and global product spread, the President of that period, Cemal Gursel, decided to design and manufacture products with state resources. This initiative, which was the first domestic automobile project, started at the state railway factory with a budget of 1.500.000 TL and a team of 20 people, was carried out in a six-month period on 29 October 1961 (Paker et al., 2018). The "Devrim" mark automobile project, which takes place as an initial initiative in the sector-specific historical development, was carried out by ignoring the necessary manufacturing factory establishment or mass production investments, after which 5 pieces remained at the prototype stage (**Figure 6**). When the design inputs of the project were examined, it was started with a building setup that appeals to general use, with 4 or 5 people, a total body weight of 1000 - 1100 kg, 4-stroke and 4-cylinder, 50 - 60 horsepower gasoline engine (Tiryakioğlu, 2004).

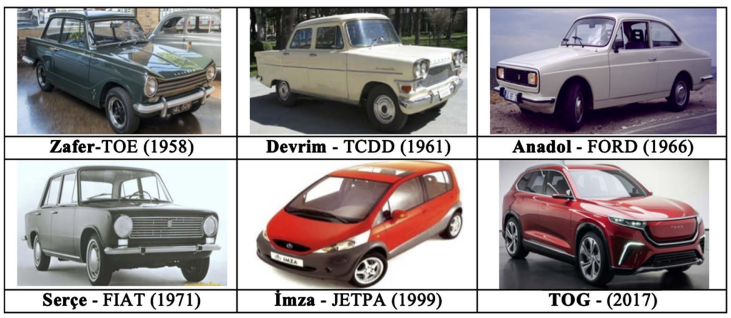

Figure 6. Historical of Turkish automotive projects (Tiryakioğlu, 2004).

Nowadays, the working prototype of the "Devrim" trademark automobile projects produced is exhibited in the Eskisehir wagon factory. The "Devrim" brand automobile project in question is the first vehicle project that can be described as a domestic and original product design in Turkish automotive history (Figure 6).

Although the state-supported, international Turkish automotive assembly industry carried out domestic automotive projects after the factory setup, it did not have as much impact as the "Devrim" project (Figure 6). Ford Otosan, one of the companies with international partnership structure, which started manufacturing after the establishment of the Republic, was realized with the brand "Anadol". This project, which has the goal of realizing it with all domestic facilities, was not accepted by the public, as the product design was carried out by the British company Reliant and Ogle Design. Although product diversity projects were carried out later in order to support the "Anadol" mark automobile project of Ford Otosan, it was not adopted by the public. With the development of the Turkish automotive industry in the 1970s, undergraduate departments that provide industrial design training for the formation of manufacturing technologies and original product design were opened. On the same axis, the first R & D center was established within Ford Otosan in 1973. Passenger car projects carried out under the promotion of the "Anadol" mark vehicle model, which the company continues to invest in, resulted in an insufficient demand structure (Figure 6). Since 1984, TOFAS Automotive Company **(Turkey Automotive Factory Company)** has achieved a successful breakthrough with the automobiles they have realized under cost-oriented manufacturing approaches with their "bird series" brand name projects. In the same period, Renault Oyak Automotive Company showed itself with the passenger cars and engine accessories it assembled. In the same period, imported vehicles took part in the domestic market with the domestic assembly industry production.

Today, Turkish automotive main industry companies carry out production under foreign license with their international partnership structures. It is observed that companies that manufacture medium and small-scale assembly parts customize their licensed product ranges with industrial design activities under government-supported R & D incentives. When Turkey Given the automotive industry, particularly commercial vehicles and public transport vehicles as well as vehicle for use for the defense industry, armored personnel carriers and jeeps like the class consisting of automotive product licenses example domestic vehicle design developed within our own brands independently of the company it has been increasing rapidly. Commercial minibuses and military vehicles uniquely designed by Otokar Automotive Company, which has the sample firm structure, and the "J9-Premier" model minibuses developed by the Karsan Automotive Company of the same structure, independent of Peugeot license, are also similar; Commercial vehicles designed by BMC Comp., Tezeller Comp., Gozukara Comp., Guleryuz Comp., Turkar Comp., Dorteller Comp., are manufactured in the domestic market.

When Turkish automotive industry companies are examined, it has not been possible until now to create a local brand or model with mass production that can compete in the global market. indigenous design contribution in today's automotive products, mostly foreign international companies under license of commercial vehicles produced at the plant in Turkey, product design or assembly parts manufacturing in the supplier of the product designer pieces produced by the company is limited to the role (Paker et al., 2018).

Even if it is accepted that the Turkish automotive industry has achieved a certain level of knowledge and technical level in terms of product design, the number of main industrial companies decreasing as a result of company mergers in the world automotive sector, the necessity to produce at economic scales, the risk of not creating enough demand in the domestic and foreign markets or for the consumer. The necessity of reaching a certain level of trust and similar reasons cause deep doubts about the productivity of a completely locally designed automobile brand that can adapt to the global competitive environment today.

4. Conclusion and Recommendations

In the period until the establishment of the Republic of Turkey; In the domestic market, the automotive industry survived with services, semi-finished products or import substitutes. Since the early periods of the history of the Republic, an independent Turkish automotive brand initiative comes to the fore with political approaches at certain periods. In fact, when this situation is analyzed retrospectively until today, it reveals the fact that none of the automotive brands that started or continued their lives under purely commercial concerns and commercial organizations were realized under the planned establishment of states and nations (**Figure 7**). Considering the state-sponsored establishment of automotive industry brands under different conditions (World Wars) in the past, and today, multinational capital structures, the creation of this sector can be planned with different methods today. It is a remarkable and important approach that especially Asian automotive industry companies take their place in this sector by buying the brands of automotive companies that have completed their life, high recognition and brand value, which are implemented within the scope of current strategies. In addition, the positioning of well-known automotive brands under global crises under the company partnerships as sub-brands in their regions is a harbinger of significant developments in this sector in the upcoming period. Founded within the army in 1955, Turkey Automotive Industry Company (TOE),

Local project of the Turkish automotive industry (historical)						
Car Design Brand Owner	**Design Name**	**Design Date**	**Design Locatio**	**Design Firm**	**Investment Amount (TL)**	**Productio n**
Turkih Automotive Ind. Inc. Co. (TOE)	Tayfun	**1958**	British	Triumph	5.000	1
Turkey President Cemal Gürsel	Devrim	**1961**	Turkey	TCDD	1.500	3
Ford Otosan Inc. Comp.	Anadol	**1966**	British	Reliant	-	Serial
Jetpa Motor Inc. Comp.	Imza	**1999**	Turkey	Jetpa	5.000.000	5
Turkey President Tayip Erdoğan	-	**2017**	Turkey	Pininfarin	-	-

Figure 7. Historical development of the Turkish automotive project (Paker et al., 2018).

the first Turkish automobile initiative "Zafer", followed by the "Devrim" that took place under state policies in 1961, and the "Anadol" brand, which was realized within the multinational Ford Otosan company, and lastly the "Imza" brand, in the cooperation structure of Jetpa Group and Proton in 1999, was the projects constitutes the first domestic automobile initiatives (Figure 7).

"TOG", which was initiated by the government as of 2017 and whose projecting continues under state policies until today, is the first domestic automobile project to be repeated; It continues without investments in manufacturing equipment, manufacturing molds or parts, procurement, assembly (Figure 7).

The main role in the automotive industry in developing countries such as Turkey or without a brand name in this sector take place, lies in the creation of new technology and design capability. Being in the automotive industry, which has completed the century and is now changing its direction with alternative energy or autonomous technologies, is possible with design and technology management.

5. Findings and Discussion

Along with globalization, the transformation of local markets into global markets has led companies operating in the automotive sector to develop competitive strategies in accordance with the targeted market conditions. Increasing regulatory pressures as a result of economic and environmental factors, increasing or diversifying technology and customer demands at global level, decreasing product life cycle as a result of rapidly developing manufacturing technologies, product development processes are seen as the reasons that trigger global competition.

Therefore, global company mergers or brand acquisitions, which have been observed intensively in recent years among automotive industry companies, the development of flexible assembly lines where various brands and models are manufactured, transition to low-cost or cost-oriented product development processes shape today's automotive industry. The shifting of the application area of these developments to developing countries or the understanding of common platform between companies and models from product design, the trend from value creation to new product development activities constitute important concepts that emerge in order to gain competitive advantage in automotive industry companies. **The concept** of international competitiveness has gained a new dimension with the globalization **of the automotive** industry. The competitiveness of a company in any region of the world develops depending on its position in other regions.

Therefore, competitiveness at the firm level, being in a position equal to or superior to its competitors in terms of cost and product spread performance, new product design, product quality, service and attractiveness of the product and similar criteria compared to its competitors in national or global markets, innovation and technology development is the ability. Until today, still contin-

ues within the framework of state policies, continues without part investments (Figure 7).

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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