A CRITICAL EVALUATION OF MOTOR VEHICLE MANUFACTURING IN NIGERIA

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Abstract

This paper presents a broad analysis on why a truly made in Nigeria vehicle has not emerged on the Nigerian road and what could be done to remedy the situation. More than 60000 motor vehicles are being imported into the country annually of which more than 85% are used vehicles. Automobile plants in Nigeria are merely coupling vehicle parts produced overseas with little input to the component production of major units. These assembly plants will soon close shop due to the precarious nature of their business. This paper is of the opinion that vehicles are not being produced in Nigeria because there is no enabling environment for that to happen. The progenitors need to be mobilized properly towards the objective and the cost imperative of acquiring and sustaining the appropriate technology must be borne by the Nigerian society. The economic value need not to be evaluated without having national pride as an indispensable factor. It is evident that neither the gross domestic product per capita nor the overall literacy level alone promotes motor manufacturing, but the national technological consciousness based on policy thrust.

Keywords: major units, cost of technology, national pride

1. Introduction

I have been confronted by Engineers and non Engineers with the question, why are we not producing vehicles in Nigeria? Unfortunately, my answer to the question at times seem very abridged that my audience finds it difficult to agree with my simple explanation that there is no enabling environment for it to happen. It is not in doubt that Nigeria is blessed with both human and natural resources but we need to improve on our organizational ability to make a better exploits of our natural endowment. Nigeria has what it takes to be a major manufacturer of motor vehicles; there is also a large market taken advantage of by importers, dealers and foreign auto plants. These translate to unemployment for our youths, non growth of our industries and technological backwardness of our society. It is pathetic to discover that in this 21st century many engineering students in the universities find it difficult to get placement for the mandatory industrial attachment before graduation as most of the plants have

closed down shop due to unfair competition with their foreign counterparts.

The auto industry in most economies acted as an engine of growth in national industrial development scheme, especially with regard to the catalytic role of the sector, the diverse nature of its inputs and the unlimited value of its end products. This is a salient feature of such newly industrialized countries of the world as Malaysia, Indonesia, India, Brazil, Mexico and South Korea [1]. Automobile industry is regarded in any economy as a major instrument for technological and social-economic development. It serves as an important stimulus for other types of manufacturing activities such as iron and steel, rubber, plastics, electrical equipment, road construction, urban and rural development [2]. The automobile industry is the cornerstone for establishing a self-sustaining economy and upgrading the standard of living. Only a few other industries cover such a wide range of technology and manufacturing processes, or use so many different raw materials, tools, machinery and equipment like the automobile industry.

All the parts in a vehicle can be categorized into four: the engine parts which include the engine block, top cylinder, crankshaft, piston and connecting rod; the chassis parts which include the frame, gearbox, front axle, rear axle and steering; the body parts which include the vehicles superstructure with trim parts, and the miscellaneous and standardized parts like fasteners, bolts, nuts, screws and washers. However, with the engine and the chassis in place a mobile vehicle is already created. Unfortunately, in Nigeria it is the body of imported truck chassis or bus platforms that has been variously modified using wood for trucks and lorry bodies, and mild steel for tipper and bus body constructions. Nevertheless, vehicles which obtain their vehicle identification number (VIN) from Nigeria Assembly Plants can be regarded as local assemble or manufacture as some of the plants import fully built units as well as completely knocked down and semi-knocked down units.

1.1. Research Aim and Objective

The research focused on the efforts made in the past to develop a made in Nigeria vehicle. It also pointed out why the efforts could not lead to the emergence of a made in Nigeria vehicle. The fate of the Nigerian automobile industry is predicted. There is an attempt to find solution to the absence of a truly made in Nigeria vehicle. Above all this research seeks to prove that motor vehicle manufacturing is synonymous with development.

1.2. Historical Perspective

The invention of the motor vehicle revolutionized the transportation industry. Karl Benz, not much impressed by the steam engine, was so completely dedicated to the proposition that the internal combustion engine would supersede the horse, and revolutionizes the world transportation system that he persisted in his efforts to build a petrol-fueled vehicle in the face of many obstacles, including lack of money and bitter objections of his associates. But his persistence won in the end, he made his first sale to a Parisian in 1887 and by the following year employed 50 workers to build the tricycle car [3].

In Nigeria, the first motor cars, two in number arrived in Lagos in 1902. By 1937, the motor vehicles stock increased to 7,507; bicycles increased to 7,603 while rickshaws and carts were 28. The first public transport system began in Lagos in 1915 with two buses operated by a Greek family which commenced a reliable bus service that was later bought over by the Lagos municipal Authority in 1958. The bus transit system served the sprawling metropolis and carried an average of 10000 passengers per day [4].

Before the first truly luxury bus, the Mercedes- Benz O 362, appeared on the Nigerian scene in 1974, commuters had been travelling mainly with mammy wagons and lorries. The older generation will still remember the then popular Armels Transport which took commuters throughout the length and breadth of the country. After the Nigerian Civil War in the early 1970s, some state governments established mass transit companies to help provide transportation which was disrupted by the war. The Government used large luxurious buses including Mercedes-Benz and Saviem models. The private operators at the time exclusively used Mercedes-Benz buses [5].

According to Amazu, a dealer on motor vehicles, he made his first contact with Mercedes-Benz products in 1954 through Armels Transport and Leventis Motors with Mercedes 319. And after a while, he became acquainted with Austin, Bedford, Morris Commercial and International harvesters, Dodge and other vehicle makes [6].

1.3. Establishment of Automobile Plants in Nigeria

The automotive industry in Nigeria is more than thirty years old. Initially, the industry was left at the hands of private operators who established assembly plants in the early 1960s; the United Africa Company Limited was the first to set up a plant to assemble Peugeot pickup vans. This was followed by the establishment of Federated Motors Industries and SCOA Motors for buses and Peugeot pickup productions respectively. However, realizing the vital role which the automotive industry could play in the economic development of the country, the Federal Government of Nigeria entered the industry in early 1970s with the establishment of two passenger car plants, Volkswagen of Nigeria and Peugeot Automobile Nigeria [2]. On December 12, 1975 the agreement setting up four commercial vehicles plants was signed for the establishment of Mercedes-Benz ANAMMCO at Enugu, Leyland Nigeria at Ibadan, National Trucks Manufacturers at Kano and Styr Nigeria at Bauchi. In 1982 agreement was made for the establishment of five minibus plants for Mitsubishi, Nissan, Peugeot, Isuzu and Mazda vehicles but they did not see the light of the day [7]. How could the proliferation of products generate positive effects when economies of scale are so vitally important in the automotive industry [8]? Different makes generates unhealthy competition and hence can stall investment by companies. The growth in Chinese economy has resulted in many global automobile original equipment manufacturers (OEM) including Honda, Toyota, General Motors, Volkswagen and Ford establishing joint-venture partnership with local car manufacturers [9]. Globalization has revolutionized business, and is forcing changes to every thing from innovation, to Product Development (PD) and manufacturing, and is similarly forcing collaborative and distributed activities and networking [10]. The development of complex engineering systems requires collaboration and negotiation. It is to make correct decisions based on customers needs, functional requirements, design parameters and process variables [11]. This may have informed the establishment of Innoson Vehicle Manufacturing (IVM) Company Ltd, Nnewi in 2007 and commissioned 2010 in collaboration with the Chinese automobile manufacturing business investors.

Nigeria, like many developing nations has hoped through import-substitution strategy to develop technologically the automobile industry and achieve 100% local content within 10 years after the commencement of operation of these plants. But today those that have not

collapsed have achieved less than 40% local content [12].

Why collaboration? Why must we want to replicate what has been done in the developed economies? This is because the cost of new design and, its attendant iterative procedures are enormous. Collaboration will not only enable the local companies draw from the wealth of experience of their foreign counterparts but also aid them in terms of equipment and machinery. As a national pride a project can be commissioned to design and develop a mobile system that can operate on land, sea and in the air. This means, a mobile system that can operate as a car on paved or tarred roads with foldable wings for air operation and properly sealed underneath for water movement. After all some animals do that very effectively to adapt to changing conditions.

1.4. Automobile Spare Parts Manufacturing

National Automotive Council's (NAC) sectoral study of manufacturers of auto parts revealed that about 98 companies are currently engaged in auto and related spheres. Auto component parts manufacturing outfits ought to have taken-off years before the establishment of Auto assembly Plants. This would have remedied the undue dependence of Nigeria on imported CKD parts [13]. A large majority of the 1.5 million vehicles registered by the Federal Road Safety Commission (FRSC) in the country are not new and would require frequent maintenance. This translates to heavy demand for spare parts and components [14]. However, many copied and fake spare parts are in the market, some of these products cause more harm than good. This is because nobody knows a product better than the manufacturer. Unlike some OEMs such as BOSCH GmbH and MAHLE GmbH of Germany that supply electrical parts and pistons respectively to Mercedes-Benz according to specifications and program, Nigerian auto parts manufactures have no such links neither do they have information on the product life cycle for a proper investment plan. They never pass through the quality control measures for the products, set by the manufacturer, for which the parts are being manufactured. Adaptive devices can be produced as retrofits to suit our peculiar environment [15].

2. Economic Indices for Motor Vehicle Manufacturing

Nigeria shares common fate with countries like Saudi Arabia and Iran having crude oil as their main source of budget revenue. She also shares fate with Brazil and South Africa as third world countries but these are emerging motor vehicle manufacturing industrial nations. Countries with track record of established motor manufacturing industry include United States, United Kingdom, Germany, Japan and China. Nigeria imports new vehicles mostly from Japan, France, Germany, China, and South Korea while used vehicles are imported from Belgium, Holland and Germany. Some economic indices are shown in Table 1 and Table 2.

3. Analysis and Results

Saudi Arabia has a population of 27.6 million. She imports finished materials and technology, and crude petroleum is her major source of revenue. Iran has a population of 65.4 million. Though becoming self-reliant, she imports most finished materials and technology, and crude petroleum is their major source of revenue. Brazil has a population of 190.0 million. Most of the finished goods including vehicles have their components manufactured and fully built in Brazil. Brazil forms

Table 1: Economic indices of some countries that share fate with Nigeria

	Saudi Arabia	**Iran**	**Brazil**	**South Africa**	**Nigeria**
Population(million)	27.6	65.4	190.0	44.0	135.0
GDP(billion US $)	309.8	189.8	796.1	239.5	99
GDP/Capita(US $)	13,399.3	2,780.7	4,270.6	5,108.8	752.5
Budget (million US $) Revenue		38,984	190,891	70,951	11,408
Expenditure		67,640	206,407	72,343	11,722
Literacy rate %	80.5	81.3	87.1	87.1	70.7
Number of students per teacher (primary school)	12	24	24	34	42 (2005)
Number of motor vehicles per 1000 people	151(1996)	41(1997)	170(2000)	144(2002)	12(1997)
Manufacturing	Refined Petroleum and Petrochemicals	Textiles, Iron and Steel, Petrochemicals	Machinery and Transport equipment, Textiles	Petroleum and coal products, transportation equipment, iron and steel	Food products, refined petroleum, Iron and steel, motor vehicles
Major Export	Crude Petroleum and Petroleum products	Crude Petroleum and Petroleum products	Road vehicles and parts	Gold, Non Industrial Diamond, Food stuffs	Crude Petroleum, food products
Major Imports	Transportation equipment, machinery, Textiles, Chemicals, Food Products	Machinery, Iron and steel, Refined Petroleum Products, Food stuffs	Petroleum, Industrial machines and parts, road vehicles and parts	Machinery, Transport equipment, crude oil, clothing and textiles	Machinery and Transportation equipment, iron and steel, textiles and paper products, chemicals, Food products

Table 2: Economic indices of countries with track record in motor vehicle manufacturing

Indices/ Countries	**USA**	**UK**	**Germany**	**Japan**	**China**
Population (million)	301.1	60.8	82.4	127.5	1,321.9
GDP (billion US $)	12,400	2200	2,800	4,500	2,234
GDP/Capita(US $)	41,889.60	36,508.70	33,890.50	35,484.3	1,712.80
Budget (million US $) Revenue	2,632,689	902,897	871,524	892,795	143,741
Expenditure	2,289,200	834,928	801,510	1,013,103	171,450
Literacy rate %	99.5	99	99	99	87.3
Number of students per teacher (primary school)	15	17	14	20	21
Number of motor vehicles per 1000 people	808(2001)	442(2003)	578(2003)	582(2003)	15(2002)
Manufacturing	Chemical, Transport equip., Industrial m/c, Fabricated and metal products, food products	Food products, Transport equipment, Chemical products, metals and metal products	Chemical products, Transport equip., Industrial m/c, Fabricated and metal products, food products	General and electrical m/c, food and beverages, transportation equipment, Chemicals, Iron and steel, fabricated metal products	Woven textile fabrics, Heavy m/c, Iron and steel, petrochemicals, fertilizer Cement, manufactured goods
Major Export	Machinery, Transportation equipment, Electrical and electronic equipment, Chemicals, Agricultural products, metal products	Road vehicles, Transportation equipment, Industrial m/c Petroleum and petroleum products, Iron and steel	Road vehicles, Industrial m/c, Iron and steel, clothing	Machinery, Automobiles, steel, chemicals and textiles	Clothing and accessories, Petroleum products, Telecommunications and sound equipment
Major Imports	Transportation equipment, machinery, Crude petroleum and natural gas, Apparels, Chemicals, metal products	Road vehicles and parts, Food products, Industrial m/c Petroleum and petroleum products, Textiles	Road vehicles, Industrial m/c, Iron and steel, clothing	Machinery and equipment, Food, Fuel Chemical ores and metals, and Agricultural raw materials	Machinery, Steel products and other metals, automobiles and synthetics, agricultural chemical, rubber, wheat, Ships

the marketing hub of South America. She has home grown and home adapted technology. South Africa has a population of 44.0 million. She has a good technology base and forms the marketing hub of the South African region; her automobile industry is well ahead in Africa (see figure 2).

Placing Nigeria among these countries one can comfortably argue that with crude petroleum as her major source of revenue just like Saudi Arabia and Iran, she can not, however, import every finished material and technology and still sustain her population of 135.03 million. She can therefore adopt the Brazil approach of having a home grown technology base and be the marketing hub of the West and the Central Africa.

The high Budget revenue, the high GDP, the high literacy level and the presence of iron and steel plants in most of the motor manufacturing and industrialized countries of the world support the growth of the automobile industry.

A linear regression analysis of data in Table 3 gives the following relationships

$$N = 1301778 - 647.3 * Y \quad (1)$$

$$R^2 = 0.865 \quad (2)$$

Where N = Nr of vehicles produced per year, Y = production year and R^2 = coefficient of determination. The ordinate and abscissa in figures 1, 2, and 3 represent number of vehicles and year of production/import respectively.

By this trend (see figure 1), it is predicted that Nigeria Automobile Plants would close shop or convert their production halls to mere rectification bay and dealership showrooms of imported fully built units by the year 2012. It will also be economically unviable to continue to assemble vehicles in Nigeria.

China's economic growth can easily be observed from their rapid vehicle production rate (see Table 4). Moving from 1.8 million vehicles production in 1999 to 13.79 million vehicles in 2009, she became the worlds highest automobile manufacturing country. That was made possible through collaboration which increased production capacity, marketing effort and logistics albeit underdeveloped infrastructure in many parts of China.

The undulations in the graph of figure 3 depict changes in government policy. The troughs indicate period of high import tariffs and ban on certain categories of used vehicles. The size and demographic structure of the country's population as well as the inability of local vehicle plants to meet increasing demand and the unavailability of modified mass transit system are touted for the growing presence of various automobile marques in this market. No fewer than 30 brands of automobile are represented by franchised dealership in Nigeria [16]. Only 15% of imported fully built and completely/semi knocked down units of motor vehicles are new. According to Overseas Marketing Information, India (OMI), more than 60% out of about 80000 vehicles per year imported into Benin republic is re-exported to Nigeria. This portends that Nigeria has become a healthy ground for the dumping and disposal of end-of-life automobiles as legislation bites harder in most of the industrialized nations of the world.

4. Limitations

Limitations exist in the data used in this paper as many vehicles find their way into the country through the activities of smugglers. However this does not preclude the fair analysis done in this work.

5. Recommendation

There should be a policy restriction on imported and fully built units (FBU) in Nige-

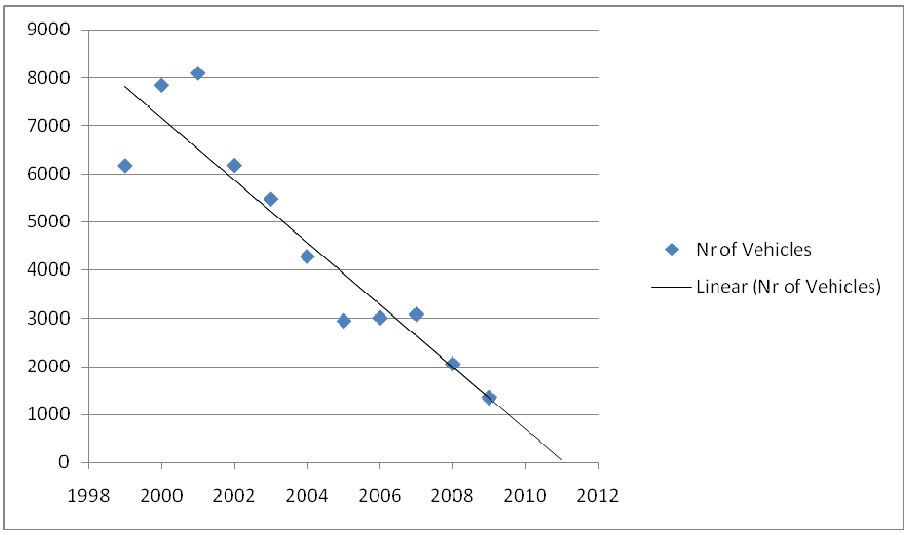

Figure 1: Yearly vehicles production in Nigeria.

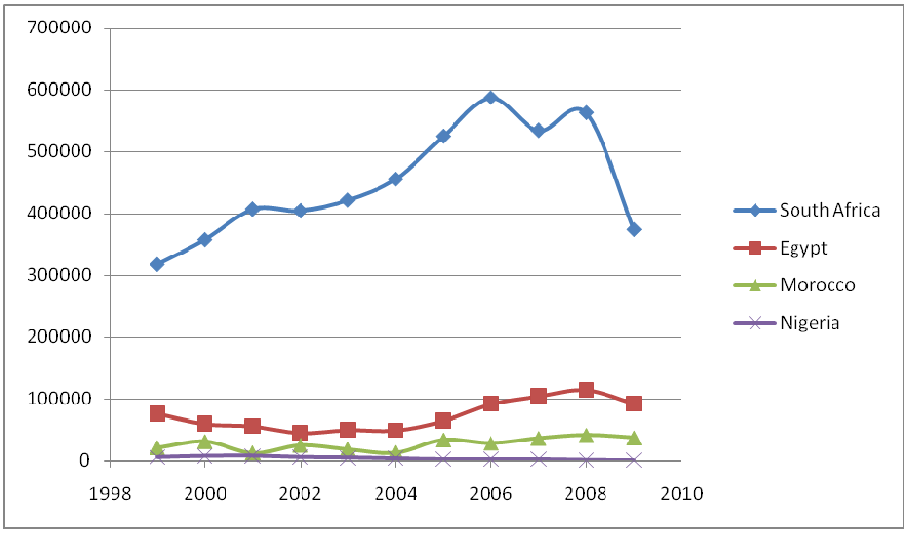

Figure 2: Vehicle Production in Nigeria Compared to the Emerging Economies in Africa (Data source: OICA, Manufacturer).

Table 3: Vehicle production of world top manufacturers associated to Nigeria

Country/Yr	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China	1829953	2069069	2334440	3286804	4443686	5234496	5708421	7188708	8882456	9299180	13790994
Japan	9895476	10140796	9777191	10257315	10286218	10511518	10799659	11484233	11596327	11575644	7934516
USA	13024978	12799857	11424689	12279582	12114971	11989387	11946653	11263986	10780729	8693541	5708852
Germany	5687692	5526615	5691677	5469309	5506629	5569954	5757710	5819614	6213460	6045730	5209857
South Korea	2843114	3114998	2946329	3147584	3177870	3469464	3699350	3840102	4086308	3806682	3512926
Brazil	1350828	1681517	1817237	1791530	1827791	2317227	2530840	2611034	2977150	3215976	3182617
France	3180193	3348361	3628418	3601870	3620066	3665990	3549008	3169219	3015854	2568978	2047658
Iran	119419	277985	323216	452075	582099	788658	817200	904500	997240	1051430	1395421
UK	1973519	1813894	1685238	1823018	1846429	1856539	1803109	1648388	1750253	1649515	1090139
South Africa	317367	357364	407036	404441	421335	455702	525227	587719	534490	562965	373923

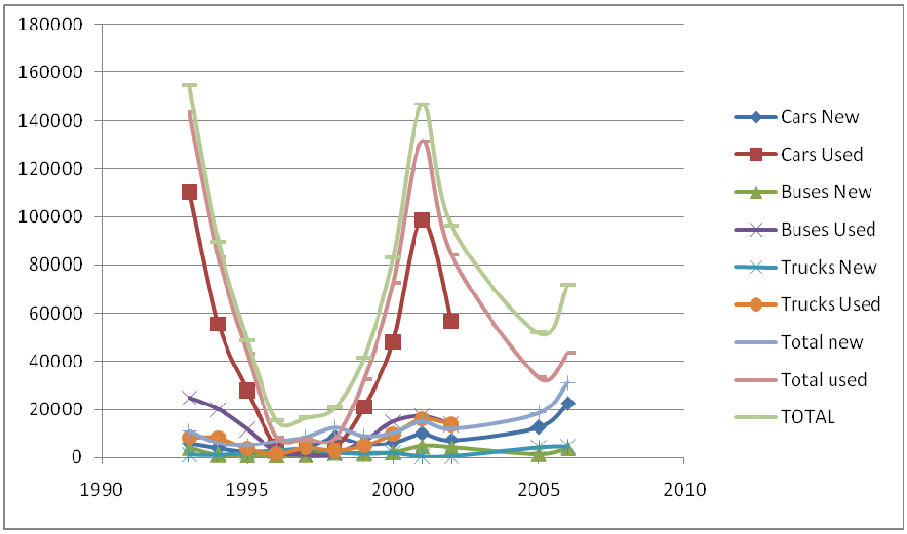

Figure 3: Vehicles import statistics in Nigeria (Data source: Manufacturers, OMI India).

ria. They should not be licensed. Manufacturers of major brands of vehicles such as Mercedes-Benz, Peugeot, Toyota, Honda, Volkswagen, Mitsubishi, BMW, Mack, Styr, DAF, etc should be encouraged to market in Nigeria only vehicles produced or assembled from completely knocked down (CKD) parts in their Nigeria plants and subsequently only vehicles whose components were manufactured in Nigeria. It is only when primary production processes evolve in the automotive industry that we can expect a truly made in Nigeria vehicle. This will automatically stimulate investment in both secondary and tertiary manufacturing processes if a component is to be produced. There should be zero import duties on raw materials such as cast iron ingots, steel billet, aluminum ingots, and alloying constituents like nickel, cobalt, manganese, chromium, molybdenum etc, and equipment and machinery used in vehicle manufacture, such as foundry equipment, forges, presses, machine tools, plastics and reinforced plastics moulding equipment and heat treatment facilities. There should be zero exercise duty on the manufacturing plants. There should be a minimum of 5% and a maximum of 10% expatriates quota in all the technical and management cadre of foreign collaborated companys staff.

There should be a policy making it mandatory for all vehicles plying Nigerian roads to carry with them a maintenance booklet certified by a qualified and COREN (Council for the Regulation of Engineering in Nigeria) registered Engineer showing evidence of maintenance for every three months or 20000 km of operation which ever comes first. This will minimize the activities of charlatans and interlopers.

Our Introductory Technology (Intro Tech) in secondary schools should incorporate basic engineering sciences such as measurements and measuring instruments, emphasizing the use of steel rule, vernier caliper, micrometer, dial gauge and multimeter. There should be emphasis on machine parts identification. A situation whereby students call every part of a machine *this thing* does not augur well for our technological growth. The student to teacher ratio should be reduced to 20 per teacher especially in technology courses where one-on-one

attention is required at times for meaningful instruction.

6. Conclusion

There were attempts to develop the automobile industry in Nigeria. These quests did not address the fundamental issues of macro economics. Motor vehicle companies were established but were not given the necessary support for them to succeed. The platform for the establishment, though encouraging, there was little monitoring on the progress towards the objective. Nigeria should encourage collaboration with foreign partners who are willing to invest in the primary production processes in the automobile industry. The local manufacturers have to be protected from undue competition.

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