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DYNAMIC MULTICRITERIA ANALYSIS DEVELOPMENT OF THE ELECTRIC VEHICLE MARKET AND THEIR INFRASTRUCTURE IN UZBEKISTAN

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Abstract– The development of the electric vehicle industry in the world, as well as in Uzbekistan, is one of the promising directions in the field of transport aimed at improving the environment. The development of this industry requires solving a number of problems, including the development of regulatory documents, the formation of solution methods and infrastructure development. The formation of infrastructure for electric vehicles requires the creation of new markets for innovative products and therefore needs active support in various industrial and social sectors of the state. It is also necessary to constantly analyze the state and dynamics of the development of the electric vehicle market in the world and in Uzbekistan. This article is devoted to the analysis of the dynamics of the development of the market of electric vehicles and their infrastructure for 2018-2023. Due to the steady growth in the number of electric vehicles and charging stations in Uzbekistan, the analysis is based on a multifactorial assessment of the technical characteristics of the vehicle, including the type of electric motor, drive topology (front/rear/full), range on a single charge, etc.

Key words– Electric car, development prospects, statistics, ecology, transport.

I INTRODUCTION

The development of the electric vehicle industry in the world, as well as in Uzbekistan, is one of the promising directions in the field of transport aimed at improving the environment. The development of this industry requires the solution to several problems, as well as the development and formation of solutions and infrastructure improvement. The formation of infrastructure for electric vehicles requires the creation of new markets for innovative products and therefore needs active support in various productive and social sectors of the State [4]. Constant analysis of the state and dynamics of the market for electric vehicles in the world and in Uzbekistan is also necessary. A study of individual companies and analysts on the prospects for electric vehicles and their components is needed [8;10]. Conducting research and studies in this area will contribute to the solution of tasks outlined in the Decree of the President of the Republic of Uzbekistan № PP-4477 of 04.10.2019. "On approval of the Strategy for the transition of the Republic of Uzbekistan to a "green" economy for the period 2019 - 2030", as well as the Decree of the Cabinet of Ministers № 812 of 2020. "On additional measures to support the rental and leasing of motor vehicles, as well as the expansion of the use of electric cars, motor vehicles and bicycles to move around the country [1;8].

II MAIN PART

Figure 1 shows a diagram of statistics of imported cars in Uzbekistan. [7].

Figure 2 shows the statistics of imported cars for the period 2019-2020-2021-2022-2023 Jan-Mar

In 2019 and 2020, sales of electric vehicles in China grew, and while total passenger car sales recovered only 4.6% compared to the crisis year 2020, the growth of electric vehicles by 108% means a doubling of their market share. However, the differences between market regions are strong: in Europe, the share of electric vehicles increased from 10% to 17%, peaking at 26% in December, with a consistently weak overall market. In North America, the share of electric vehicles was 4.4% (2.3% in 2020), in China their share increased from 5.5% to 13.3%. For the remaining 70 markets we track, the combined share of electric vehicles was 1.5% [5].

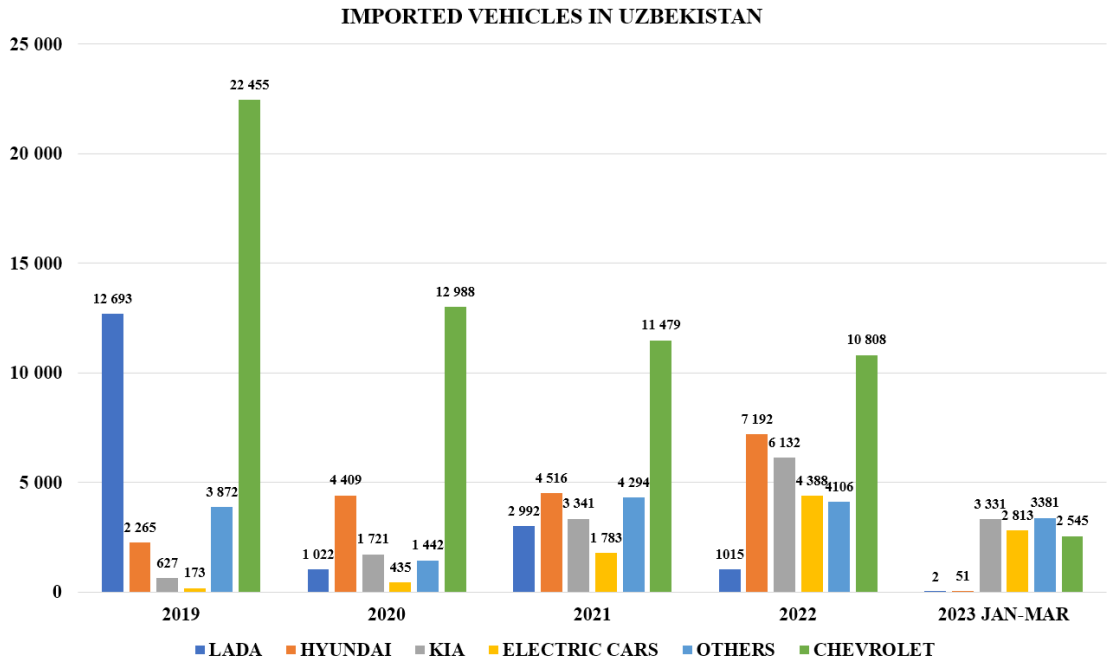

Fig. 1: Chart statistics of imported cars in Uzbekistan [7]

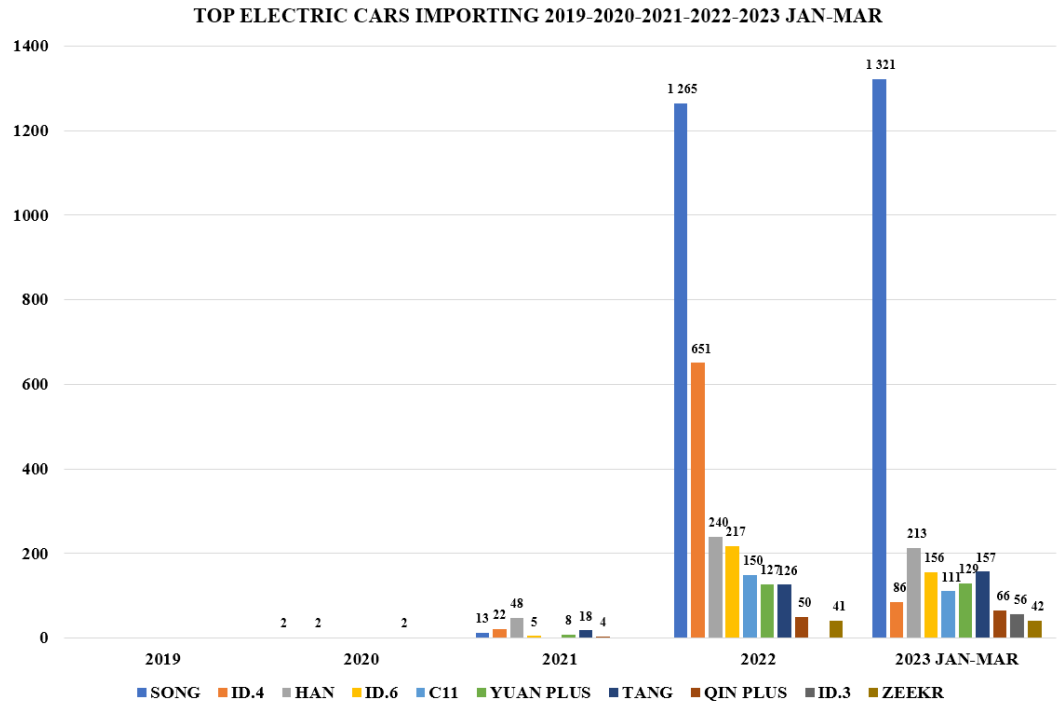

Fig. 2: Statistics of most popular cars by model for the period 2019-2023 [7]

Figure 3 shows the diagram with the most popular electric cars by quarter.

Figure 4 shows the statistics of the most popular cars presented on the domestic market.

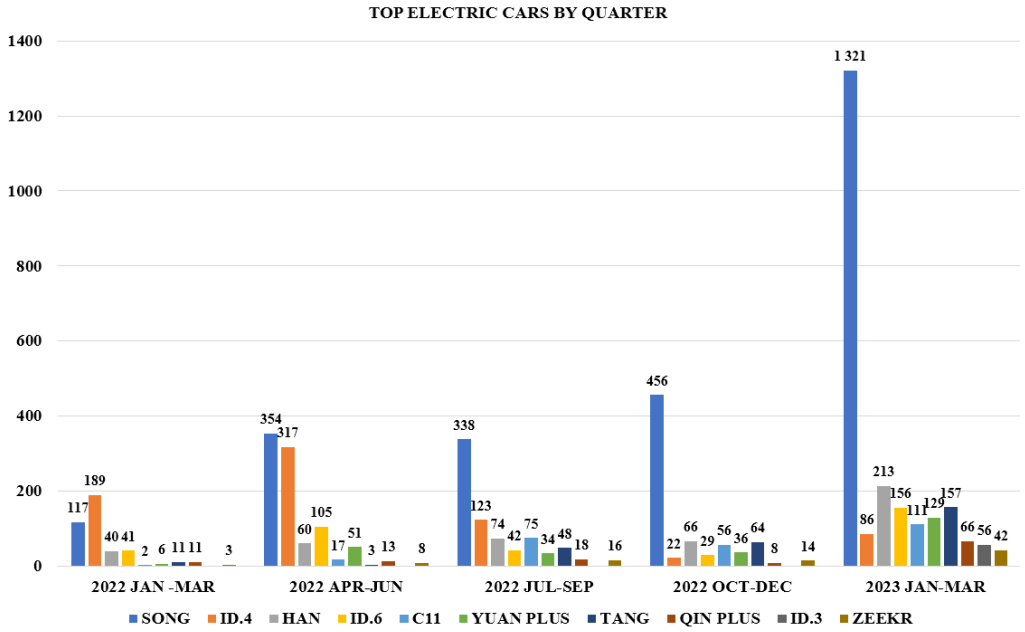

Fig. 3: Statistics of most popular cars by model by quarter 2019-2023 [6]

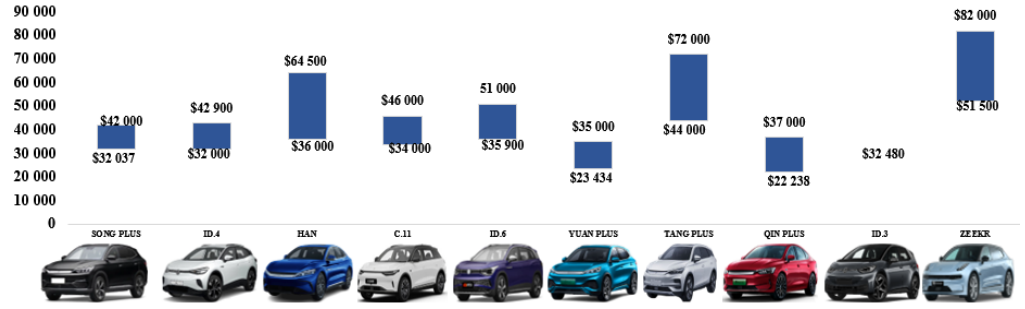

Fig. 4: Statistics of the most popular cars presented on the domestic market.[7]

Manufacturer	The volume of planned investments, bln. dollars	Model number
FORD	11	24 PHEV & 16 BEV
GM	8	20 BEV & FCEV
Toyota	13,3	10 BEV
Volkswagen	40	BEV
Daimler	11,7	
Changan Automobile Co	15	12 PHEV & 21 BEV
SAIC Motor	3	
Great Wall Motor	10	
BMW	10	13 PHEV & 21 BEV

TABLE 1: DISTRIBUTION OF ELECTRIC VEHICLE MODELS BY MANUFACTURERS.

By 2030, by some estimates, all new cars sold will be electric. Table 1 shows the plans of automakers.

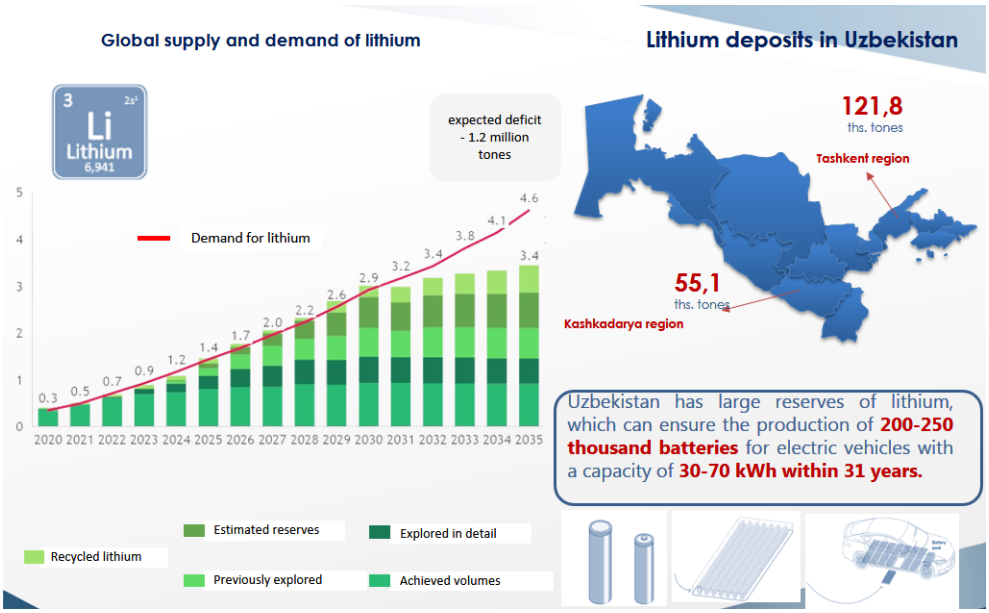

Fig. 5: Share of lithium reserves in Uzbekistan [5]

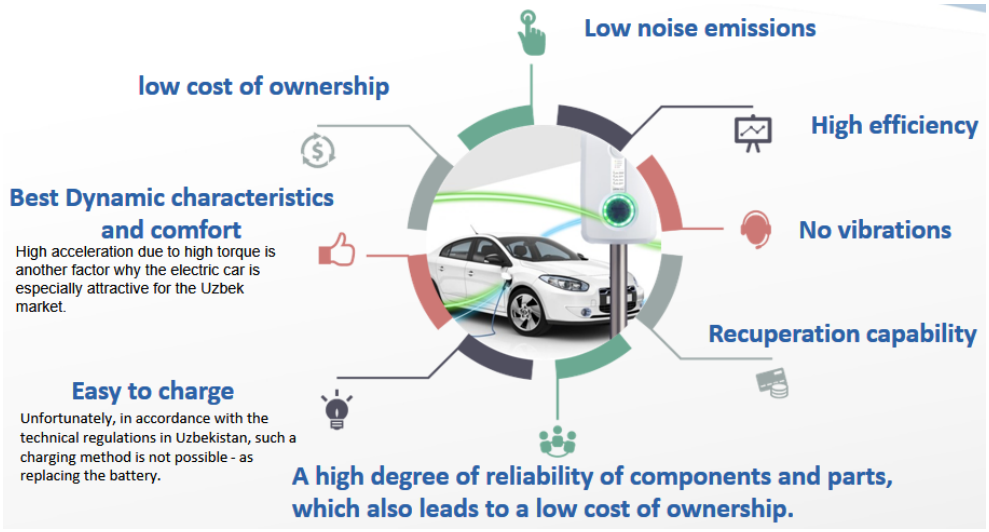

Fig. 6: Advantages of electric vehicles [1]

The share of lithium reserves in Uzbekistan is shown in Figure 5. Lithium is the main element in the production of batteries for electric vehicles [6].

The main advantages of electric vehicles are shown in Figure 6.

The electric motor generator is very reliable and does not require expensive maintenance. The transmission device is simpler, because such components and parts as the gearbox, clutch, muffler, particulate filter, fuel tank, starter, alternator, and spark plugs, missing. With the exception of the gearbox on the electric motor generator, the electric vehicle does not require oil for lubrication.

Zero CO_2 emissions. If the high-voltage battery is recharged from renewable energy sources, then the electric vehicle can be operated without CO_2 emissions.

Barriers preventing the expansion of the use of electric vehicles:

- high cost of an electric car. Not everyone can afford such a luxury;
- operation is possible only within the city limits;
- such a serious load as an electric car will most likely

require changes in the requirements for electrical wiring inside houses and structures;

- lack of infrastructure. For mass recharging of electric vehicles, it is necessary to create appropriate refuelling stations;
- the probability of overload of the power system. Mass recharging can lead to an overstrain of the power grid during peak load hours.

III CONCLUSION

As a result of the research, the authors formed the following conclusion:

1. topical problems of electric transport development in Uzbekistan were considered;
2. the basic concepts, as well as the functions and possibilities of infrastructure development were studied;
3. using an electric car as a generator/consumer of electricity allows you to achieve a positive effect both for an individual motorist and for the entire energy system of the country as a whole.

Based on the forecasts of the analysis carried out in the automotive industry, the approximate intensive development of the infrastructure of electric vehicles in Uzbekistan will be possible in 4-5 years, taking into account the interest of the population in the transition to electric vehicles, infrastructure development and the creation of relevant regulations for the successful implementation of their individual areas.

IV REFERENCES

[1] Umerov, F., Inoyatkhodjaev J., Asanov S., The prospects for the development of electric vehicles in Uzbekistan. Acta of Turin Polytechnic University in Tashkent, 12(2).

[2] Decree of the President of the Republic of Uzbekistan dated 04.10.2019, No. PP-4477 "On the application of the strategy for the transition of the Republic of Uzbekistan to a "green" meeting for the period 2019-2030".

[3] Umerov F.Sh., Juraboev A.Z. Analysis of the block diagram of the traction drive and the stages of calculation of a mechatronically controlled hybrid vehicle. Scientific journal of the Tashkent State Technical University (TSTU) named after Islam Karimov, "Yulduzlari Technique", Tashkent 2022. No. 1 - P. 29-33.

[4] Spot.uz. Electric vehicles in Uzbekistan: how this market is changing and what to expect in the future, https://www.spot.uz/ru/2022/07/18/megawatt-motors/

[5] Gazeta.uz. Import of electric vehicles, https://www.gazeta.uz/ru/

[6] Ben Kilbey, Rocco Canonica. Electric vehicles to make up 50% of new autos by 2040: Platts analytics // S&P Global Platts - https://www.spglobal.com/platts/en/market-insights/latest-news/electric-power/120419-electric-vehicles-to-make-up-50-of-new-autos-by-2040-platts-analytics, 04.12.2019.

[7] Electric Vehicle Market: Battery Electric Vehicle, Hybrid Electric Vehicle, and Plug-in Hybrid Electric Vehicle – Global Industry Size, Share, Trends and Forecast 2019-2026 // Acumen Research and Consulting website – https://www.acumenresearchandconsulting.com/electric-vehicle-market

[8] UZA.UZ. Strategy for the transition to a "green" economy: goals and objectives // Website of the National News Agency of Uzbekistan – http://uza.uz/ru/society/strategiya-po-perekhodu-na-zelenuyu-ekonomiku-tseli-i-zadach-08-11-2019, 08.11.2019.

[9] Annex No. 1 to the Decree of the President of the Republic of Uzbekistan dated October 4, 2019, No. PP-4477.

[10] Press service of the President of the Republic of Uzbekistan. The issues of the development of the machine-building industry were considered // Official website of the President of the Republic of Uzbekistan – https://president.uz/ru/lists/view/4077, 13.01.2021.