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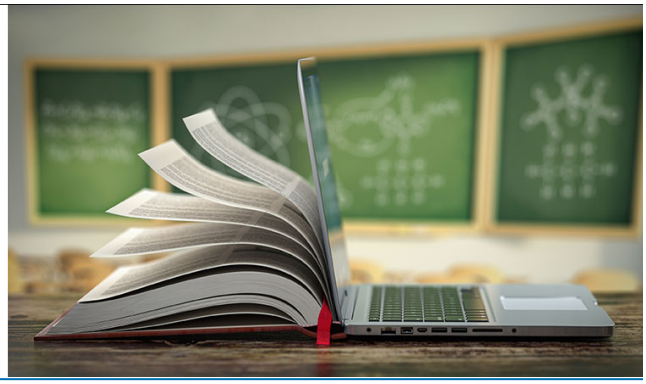

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Peculiarities of the foreign manufactures cars recycling in Russia

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Abstract. The main elements of the vehicle recycling system in Russia are considered on the example of passenger cars. The main problems of decommissioned vehicles recycling in the context of a cyclical economy development are described. The article presents a critique of the current state recycling policy. The strategy for the development of recycling projects that can be implemented both by the state and by private companies entrusted by the state is suggests. The article presents a structural analysis of imported cars, foreign brands of Russian production and domestic cars from the total sales for 2017 and 2018. Data on sales volumes of the best-selling car models in Russia are presented. The main advantages of the production of foreign cars in Russia in terms of the impact on the emerging Russian recycling system for decommissioned vehicles are identified. Recommendations on implementation of projects related to recycling and calculation of recycling fees are offered. The study developed two ways to use recycled material from car recycling, which can recoup some of the costs of recycling, increase the percentage of import substitution of components for the automotive industry and create a closed-cycle economy.

1. Introduction

The demand for the organization of disposal and recycling processes increases every year. It is relevant for all commercial products, starting from the simplest household goods – for example, disposable tableware, and ending with products of heavy industry-machines and aggregates. Now it has become clear that any commercial products must eventually be safely disposed of with minimal impact on the environment, and better – to recycle and to use as raw materials for the manufacture of a new product and lead the production processes to closed cycles. In fact, a lack of Russian producers have moved to a closed cycle in their production facilities. In general, the recycling sector is developing rather slowly in Russia.

In this article, we will consider the recycling system of vehicles in Russia on the example of passenger cars, identify the main difficulties related to the development of recycling and develop some recommendations for improving the organization of the cyclical economy in the processing of passenger transport.

The passenger transport fleet in Russia was 46,887,000 vehicles at the end of 2017, of which 47.5 % have a service life of more than 10 years [1]. Every year there is an increase in the additional input of passenger cars, only in 2017 the total number of cars in the country increased by 1,724,000 units, an increase compared to the previous year, 2016, was 3.8%.

The recycling system of vehicles in Russia began to take shape in 2011 with the introduction of a recycling fee for vehicles [2]. When implementing the recycling fee, domestic producers were exempted from paying them, but only until January, 2014 due to a complaint against Russia from countries that are members of the WTO, because of the infringement of foreign companies and the provision of advantages to domestic producers [3]. All recycling deductions go to the Federal budget, but money for recycling projects was not received until 2019. The fact of using these funds for real projects is still unknown [4].

The basis for determining the amount of disposal deductions is the physical values of vehicles. In fact, there is no relationship between the amount of utilization deductions and the cost of utilization, so payments for recycling vehicles may be incorrect when real utilization capacity is realized [5]. For today, there is the lack of utilization capacity, the absence of a unified system that would be able to dispose and recycle vehicles that are out of service, or at least some of them. Utilization deductions have been in effect for 9 years, but the required production capacity has not yet appeared. The state has not yet developed a clear strategy for a recycling system creating. The money collected over 9 years is not important today because of the depreciation of funds (if they are accumulated anywhere at all), changes in the technical characteristics of cars, new environmental standards for enterprises, and the meaning of fees laid down in 2011 [6,7]. Recycling projects should be implemented as soon as possible after the first deductions, otherwise there will always be insufficient funds. The state (or trusted private companies) needs to implement an investment project that will then pay for itself through utilization deductions, and not follow the path of "accumulation, and then - implementation" [8,9]

So, to promptly establish a system of disposal and recycling, increasing the existing production capacity for the processing of end-of-life vehicles, should combine the production, operation and recycling vehicles in a single closed chain of the circular economy. [10,11]

2. Materials and methods

In Russia, for 2016 – 2018, the annual growth in new car sales averaged 12.35%. However, according to the results of 2019, the car market declined by 2.3% compared to 2018. Data for the best-selling models is shown in table 1.

Table 1. Sales volume of the 11 best-selling new passenger and light commercial vehicles in Russia by model over the past 4 years.

Brand	Model	2016	2017	2018	2019	Total	Structural share, %
Lada	Granta	87726	93686	106325	135831	423568	13.92
KIA	Rio	87662	96689	100148	92475	376974	12.39
Lada	Vesta	55174	77291	108364	111459	352288	11.58
Hyundai	Solaris	90380	68614	65581	58682	283257	9.31
Hyundai	Creta	21929	55305	67588	71487	216309	7.11
VW	Polo	47702	48595	59450	56102	211849	6.96
Renault	Duster	44001	43828	41409	39031	168269	5.53
Lada	Largus	29341	33601	44072	43123	150137	4.93
Renault	Logan	29565	30640	30285	35391	125881	4.14
Škoda	Rapid	25931	29445	35089	35121	125586	4.13
Toyota	RAV 4	30603	32931	31155	30627	125316	4.12
Toyota	Camry	28063	28199	33700	34017	123979	4.07
Lada	4x4	27274	29091	32949	31923	121237	3.98
Renault	Sandero	28557	30210	31559	30496	120822	3.97
Lada	XRAY	19943	33319	34807	28967	117036	3.85
Total		653851	731444	822481	834732	3042508	100

* Sample data from the Association of European business reports - access Mode: https://aebrus.ru/ru/

The top 11 for 2018 represents 49.3% of total sales for 2018.

The top 11 best-selling cars include 5 models of the domestic Lada brand and 6 models of foreign brands. In the presented sample, 38.27% of the number of cars sold is occupied by cars of domestic brand and 61.73% by cars of foreign brands. However, all the foreign cars listed in table 1 have a Russian assembly, and not all components are delivered from abroad, many parts are of domestic production. As for cars that are completely manufactured abroad and imported to the Russian market, they account for an average of 17% of total sales. This is evidenced by the data in table 2.

Table 2. Passenger car sales Data by production category.

Passenger car category (excluding LCV)	Sales, th. of units					Sales , billion rubles				
	2017	Struct. share	2018	Struct. share	Growth rate	2017	Struct. share	2018	Struct. share	Growth rate
Domestic brands	323	21.9	369	22.11	114.24	188	9.54	231	9.73	122.87
Russian-made foreign cars	897	60.81	1030	61.71	114.83	1018	51.68	1196	50.36	117.49
Imported new cars	255	17.29	270	16.18	105.88	764	38.78	948	39.92	124.08
TOTAL	1475	100	1669	100	113.15	1970	100	2375	100	120.56

*Sample data from PricewaterhouseCoopers reports. Mode of access: https://www.pwc.ru/ru/industries/automotive.html

The majority of imported passenger cars purchased belong to a higher class, as evidenced by the large difference between the structural share of imported cars in terms of quantity and the structural share of imported cars in terms of cost. Imported new cars account for 16.18% of total sales for 2018, and in terms of value, the share increases to 39.92%. The average cost of one imported car according to 2018 data is 3.5 million rubles, while the domestic brand and foreign cars of Russian production are 626 thousand rubles and 1.16 million rubles, respectively [12,13]. When recycling, luxury cars need more complex disassembly, sorting and recycling due to high technical equipment, so it is necessary to work out in detail the calculation of the man-hour requirements of technological operations for recycling. And according to this , calculate the recycling fee, which will lead to an even greater increase in the cost of new imported cars [14,15].

3. Results and discussion

The result of the analysis of the market structure of cars purchased by car owners is the conclusion that in Russia most of the sales are represented by foreign cars, but their assembly and part of the components are made in Russia To create a recycling system, this fact represents more advantages than disadvantages, which are as follows:

(for government agencies):

1. more affordable cars of the foreign brands create competition for the domestic manufacturer, thereby forcing it to improve its product in such areas as reducing CO_2 emissions, improving technical parameters and traffic safety;
2. construction of car manufacturing enterprises in Russia: this means an increase in the number of jobs, a decrease in the unemployment rate in the regions and an improvement in the country's economic indicators;

(for Russian citizens):

3. decrease in the cost of cars due to increased competition. In order to compete in the Russian market, many foreign manufacturers must have their own production facilities on the territory of Russia

and constantly improve them to reduce their cost. Domestic manufacturers should also improve their production processes, since now foreign cars have become much more affordable and are approaching to the prices of the domestic brand;

4. a large number of varieties of cars. All manufacturers, due to strong competition, try to have not only the most attractive cost of their cars, but also offer the consumer the largest range of choices depending on the intended tasks of the vehicle. Thus, a new type of car has recently appeared – the "crossover", which has become popular all over the world due to its versatility, by combining off-road qualities, spaciousness and economical engine operation.

These advantages contribute to the development of the automotive industry in Russia, an increase in the total number of vehicles put into operation and timely updating of cars by owners due to the availability of buying a new car. This process should be accompanied by the creation and maintenance of a proper vehicle recycling system, which even today cannot cope with the volume of vehicles that are out of service. In these examples, k_i was determined by expert means. A further development of the methodical approach is to determine the method of calculating the coefficient based on the ranking of clients and their score.

4. Conclusion

The creation of enterprises for the recycling of vehicles that have been decommissioned will form a closed- cycle economy in the automotive industry, but it is also necessary to decide who and how will use the recycled material that is the result of recycling. About 60% of the total market volume of new cars is occupied by foreign brands. The production of foreign cars on the territory of Russia makes a great contribution to the development of the automotive industry, so the recycled material from recycled vehicles can be used to improve their performance.

There are two ways to use recycled material.

The first option involves selling the recycled material as raw materials to countries that supply some of the components to Russia. The sale must be carried out in the volume of supplied components, but taking into account the expenditure coefficient of subsequent technological operations. This option will allow to recoup the processing of components and return some of the funds from the purchase of components from abroad.

The second option concerns the construction of additional workshops at recycling plants for the production of automotive components that are imported into the country. Option 2 is aimed at full import substitution for components in the production of cars of foreign brands that do not have a full cycle of Russian production.

The above options can recoup some of the costs of recycling, increase import substitution in the automotive industry, and create a closed-cycle economy. Both options can be implemented together or separately, depending on the economic efficiency.

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