

CAR AFTERSALES MARKET DYNAMIC MODEL

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Abstract. Currently, in Latvia, as it has been for years in Western Europe with increased competition, the largest share of profits for the industry companies is brought in by car aftersales activities, which make the significance of aftersales market grow. Therefore, it is important to research the Latvian aftersales market of passenger cars and to create an instrument for its practical application to project its development. In order to forecast the number of passenger cars, volumes of aftersales market, and number of employees necessary for it in the Latvian regions, the car aftersales dynamic model was designed. Subsequently, by using this model it was possible to project the volume of passenger car fleets in four age groups, the aftersales market volume in each group by five product groups, and the number of productive employees required for the aftersales market. This article describes the aftersales market dynamic model, its modules and three possible aftermarket development scenarios looking at the period of 2013 to 2018.

Keywords: aftermarket, car service, aftersales volume.

Introduction

Prior to the global economic crises the major portion of profits of the Latvian cars, their spare parts sales, and service companies was brought by car sales. The aftersales market (spare parts and maintenance) was not developed. In Latvia, most car manufacturers' representatives had not created servicing networks; for example, Audi and BMW authorized workshops are only in Riga. Likewise, the aftersales market independent from manufacturers had not grown outside simple spare parts sales, and neither spare parts wholesalers nor manufacturers had developed an aftersales market. However, in Western Europe as it had been the case for years, the largest share of profits for industry companies was originated by aftersales market activities. For example, in Germany one-half to two-thirds of the total contribution margin in the automobile business had been and continues to be generated by aftersales. With profits of 18.5 % for workshops and 16.4 % for parts and accessories, aftermarket sales were considerably more profitable than the 4.2 % achieved in the new car business and 0.2 % in used cars business [4]. In Western Europe wholesalers and spare parts manufacturers had created service concept chains, thus attracting clients and providing small workshops with information, equipment and training. However, in Latvia there is only one service concept (Bosch Car Service), with only seven automotive workshops.

Now in Latvia, as a result of increased competition, the largest profits are generated by car aftersales activities, and similar to Western Europe, the significance of car aftersales in industry companies increases. Therefore, it is important to research in the Latvian car aftersales market and to create a practically applicable instrument to project its development. In addition, until now, the Latvian automotive aftersales market had been insufficiently studied and described, and the instruments for forecasting its growth had not been designed.

The objective of this research is to design and describe the analytical instrument for modelling of automotive aftersales market projection and to create three scenarios for its growth.

Methods

The aftersales market dynamic model, applying software Powersim Studio Enterprise, was designed to forecast the number of passenger cars, aftersales market volumes, and the number of employees required for it in the Latvian regions. It was created as a flow diagram which is an actual dynamic model that can be further used to generate results.

The automotive aftersales market dynamic model is comprised of modules, see Fig. 1, for projection of the following in the Latvian regions:

- number of passenger cars;
- aftersales market volume;
- demand for productive employees (mechanics);
- aftersales market spare parts sales.

The aftersales market module has five dimensions, or Latvian planning regions, 350 variables, and 1750 variable elements.

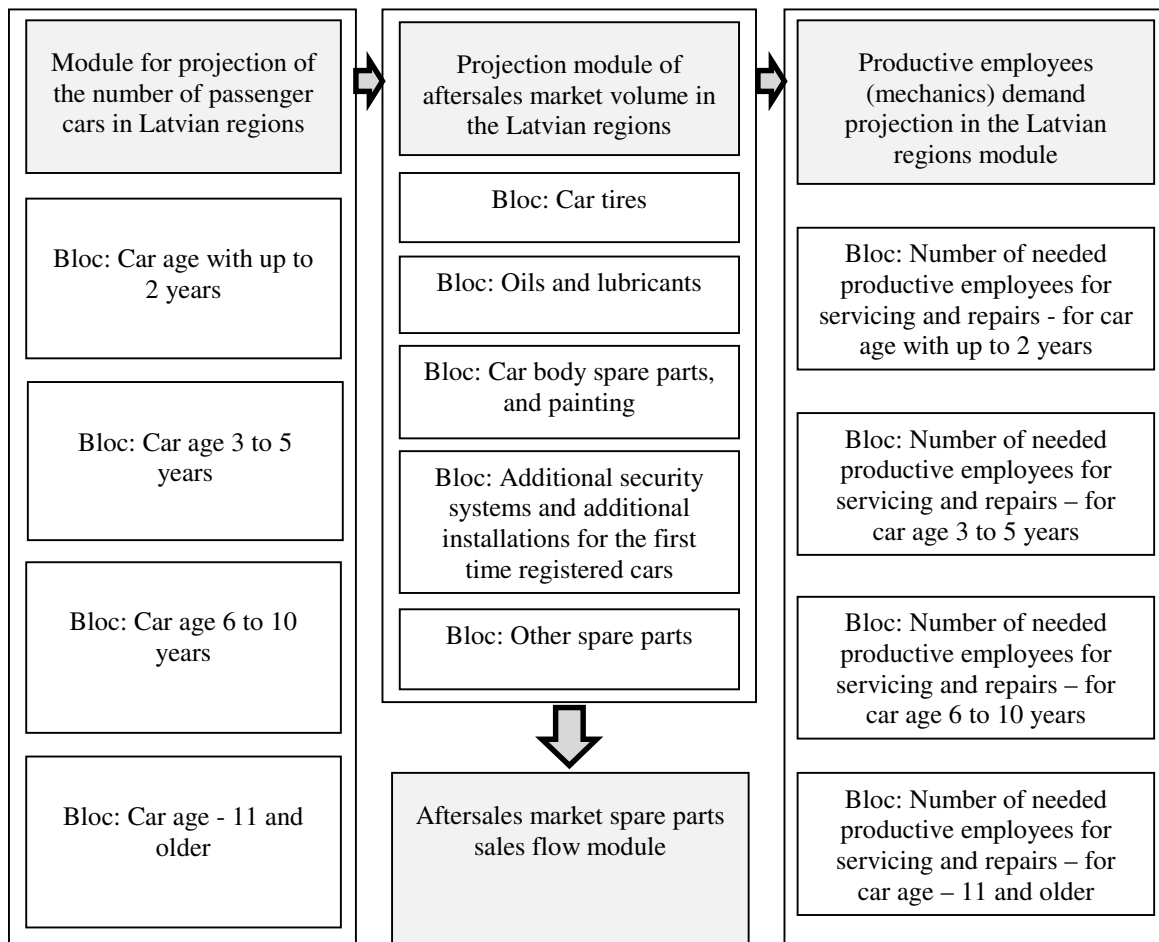


Fig. 1. Modules of car aftersales market dynamic model

One of the major factors affecting the aftersales market is the number of registered passenger cars, their first time registration and division by age groups. The indicators in the module are divided in five dimensions and four age groups. Further, there is a calculation per each age group of cars of the aftersales market volume (in car drivers' prices, shown in five product groups), the number of productive employees in the market, in addition – the flow module of spare parts sales and the volume in manufacturer's sales or importer's purchase prices.

For the purpose of testing of the dynamic model of the aftersales market of passenger cars and in order to calculate the potential market development scenarios, the industry experts (including managers of the Latvian Authorized Automobile Dealers Association and the Association of Importers of Spare Parts of Latvia) were interviewed, and the Latvian Authorized Automobile Dealers Association projections on increase of the first time registered cars and the data of industry companies applied (balance, and profit losses calculations, and unpublished information). The corresponding author surveyed the members of the Latvian Authorized Automobile Dealers Association to obtain additional data, and used the unpublished data of the industry companies.

Results and discussion

A module for projection of the number of passenger cars in Latvian regions

One of the major factors affecting the aftersales market is the number of the registered passenger cars, their division by age groups, and the number of the first registration – its module for the Latvian regions was designed as a flow diagram, dividing the indicators in five dimensions or Latvian planning regions. It allows inputting the indicators and obtaining the results by the Latvian planning regions.

In addition, in accordance with the methodology applied by the CSDD (Road Traffic Safety Directorate) – both the first time registered passenger cars, and registered passenger cars are divided in four blocs or age groups (by years):

- up to 2;
- 3 to 5;
- 6 to 10 years;
- 11 and older.

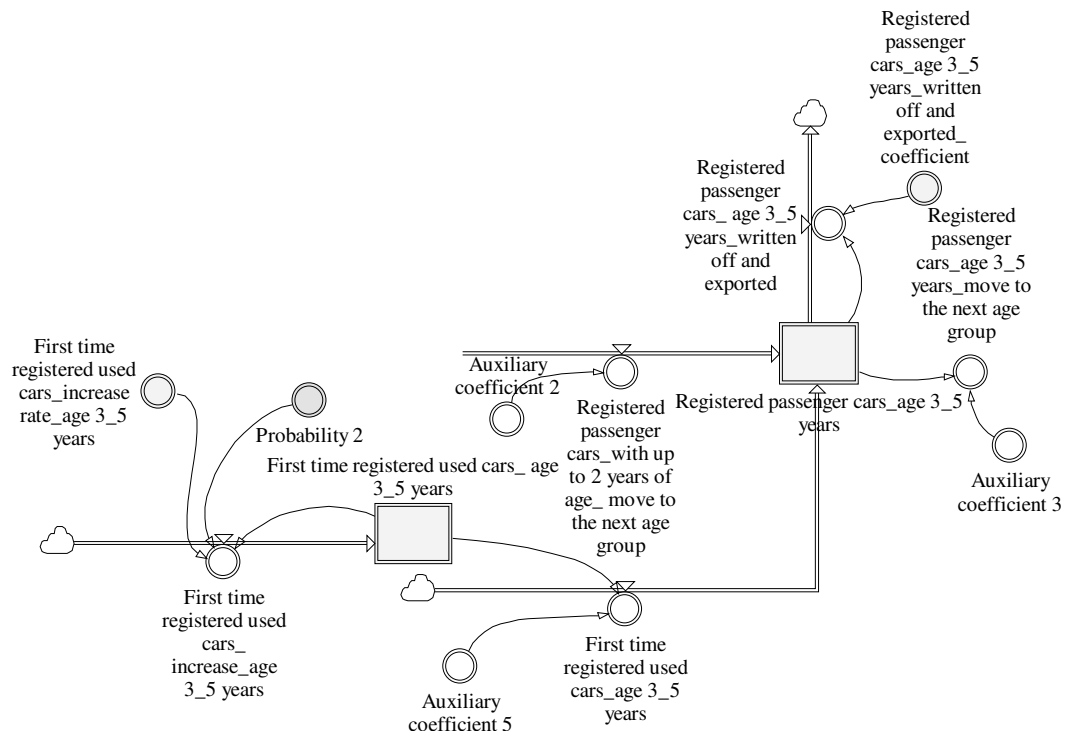


Fig. 2. Aftersales market dynamic model – the bloc for passenger cars in the age group 3 to 5 years

In order to organize calculation of time in a module or for the purpose of input of indicators the authors created auxiliary coefficients.

As the input data for passenger cars in each bloc (car age group), separately, divided by the aforementioned five dimensions, the following is applied in the model:

- first time registered new cars in the age group up to 2 years and the first time registered used cars in the next age groups;
- possible increase rate for the first time registered new or used cars, by age groups;
- probability 1 – defined borders of normal division of increase speed of the first time registered new or used cars, per age group, or automatic selection of random numbers by the system within the defined borders;
- registered passenger cars by each age group;
- number of written off and exported registered passenger cars in percentage from passenger cars per age group.

Thus, in the first age group the increase of the number of cars depends on the first time registered new cars, it drops with the number of written off and exported cars, and with cars getting older than two years, they move to the next age group in a dynamic model. In the second and the third age group the number of car increase is originated by the first time registered used cars of the age group and decreases with the written off and exported number of cars of the age group. With the cars aging they move to the next age group/bloc in the dynamic model, see Fig. 2. Likewise, in the fourth age group the increase of the number of cars depends on the first time registered used cars of the age group and reduces with the number of written off and exported cars.

Projection module of aftersales market volume in Latvian regions

For more accurate calculations of the aftersales market volume, the authors divided the aftersales market not only by the mentioned age groups and dimensions, but also in five following aftersales product groups:

- tires;
- oil and lubricants;
- auto body spare parts, and painting;
- additional security systems and additional installations for the first time registered cars;
- other spare parts.

Further, each bloc of the aftersales market product group is divided in four sub-blocs by car age groups, see Fig.3. In each aftersales market product group sub-bloc, separately by dimensions and car age groups, it is necessary to input the following indicators:

- annual average aftersales market product group spare part volume in Lats per car;
- annual average hours required for aftersales market spare part replacement and repair per car;
- coefficient for potential price increase or decrease of aftersales market product group spare parts;
- average hourly labour pricing of aftersales market product group spare parts replacement or repair;
- coefficient for potential hourly labour pricing increase or decrease of aftersales market product group spare part replacement or repair.

The unpublished data of industry companies, interviews with experts, the corresponding authors' research on the car drivers' repair habits and the experience gained by participating in the research "the car aftermarket in Europe" were used in order to make a calculation of average annual spare part volume per car of the aftersales market product group, the number of repair labour hours required for it, and an average hourly rate.

For computation of the necessary volume of the tiremarket per car age groups/blocs it was taken into consideration that the age group "up to two years" requires half the volume of tires be added since the (new/newer) car is already coming with one tire set (usually summer tires) and generally, in the aftersales market, only winter tires are purchased for such new cars.

As regards the oil aftersales market volume, similarly, as with tires, it was taken into account that, in the age group up to two years the car needs the first maintenance only after 15000 km and some portion of these cars do not need maintenance service during the first year. With regard to oil, usually during the first car maintenance – only engine oil has to be changed, but with higher mileage in the next car age groups, additionally, also transmission, brake and other oils need to be changed. It should also be noted that older cars (with higher mileage) usually need more engine oil, and oil and lubricants are needed also for repairs of other items.

In computing the volume of auto body spare parts and repairs aftersales market, it was taken into consideration that the largest portion of repair costs incurred as a consequence of a car accident are covered by insurance companies. Therefore, in this case, the survey of the car drivers' repair habits and repair expenses could not be used. In Latvia, in average 60 % of the repaired auto bodies are with minor damage, 30 % with average, and 10 % with a heavy damage level [3]. In accordance with the LTAB (Traffic Bureau of the Republic of Latvia) data, in 2011 the average insurance reimbursement payment by OCTA (third Part Liability Insurance for inland motor vehicle owners) was 551 LVL and the total of those payments made LVL 16764522, which had been covered on vehicle damage (not only passenger cars) [8]. Here, additionally, the KASKO and various special insurances' paid damage reimbursement, including the damages which had originated as a result of criminal activities (for example, theft of mirrors should be added), which are usually not considered by the Western experts in aftersales market calculations. However, only in 2010 just one insurer's (insurance company "Balta") amount, which was paid solely for the theft of mirrors and their glass made a total of 254,500 LVL [2]. Furthermore, damages caused by climate and winter road spreading material (salt) and, definitely, car anti-corrosion protection and car drivers' expenses needed to address it should be factored in. In calculating the auto body spare parts and expenses for their repair, it was assumed that in the first age

group and, partially, also in the second age group – the cars are repaired in the manufacturer's authorized workshops, and in the next age groups – in independent workshops.

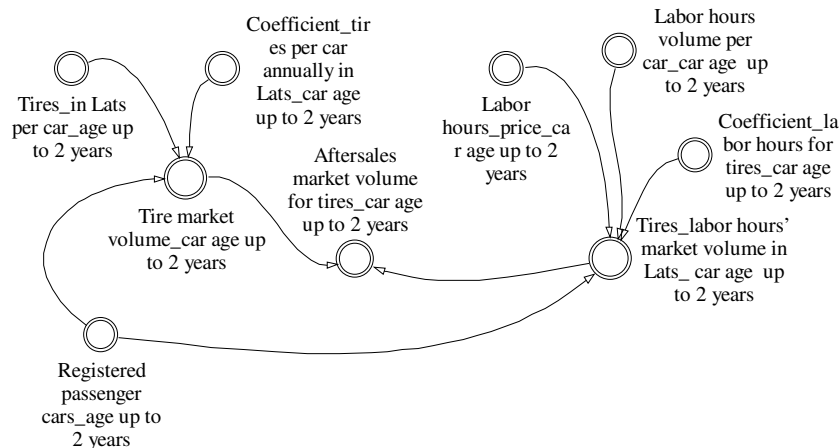


Fig. 3. Aftersales market dynamic model for car age group up to two years – tires sub-bloc

In calculating the aftersales market volume for other spare parts, both the bad conditions of the Latvian roads were considered, which directly affect the car running gear, and cause its damage and climate as a result of which electric equipment and corrosion damage (for example, exhaust, and brake systems etc.), which increases the aftersales market volume. On the other hand, in Latvia compared to Germany, the movement speeds are lower, which means less engine and turbine damage; however, the average annual car mileage is greater. In Latvia, in 2011 the average annual passenger car mileage was 15869 km [6], while in Germany 12500 km per year [9]. Another noteworthy distinction between Germany and Latvia - in Latvia the largest portion of cars have larger capacity engines and there are fewer small class cars [1].

In Latvia equipping of cars also with auto gas feed systems is developing comparatively successfully - in the first half of 2012, according to the CSDD, there were 6635 cars registered with auto gas feed systems. If it is assumed that the average price of installation of the auto gas feed system is 500 LVL, then the potential market for auto gas feed systems in the aforementioned period would be 3.3 LVL million.

Separately, the blocs of security systems, and additional installations for the first time registered cars were outlined in the aftersales market volume projection model, as, mostly, the various additional security systems (alarms, immobilizers, “secret switches”, etc.) are installed only for the first time registered new and used cars in the country. Thus, the input data shall be multiplied by the number of the first time registered cars and not with the number of cars in technical order. Furthermore, various installations for specialized cars cannot be omitted, for example, installations of radars for police vehicles, for which it was planned to use almost half a million Lats in 2012 [10], and installation of car fleet with GPS equipment.

Productive employees (mechanics) demand projection in the Latvian regions module

Similarly, as in the aftersales market projection module, also in the productive employees projection module there are 4 blocs by car age groups, each with five dimensions which show the Latvian planning regions.

It is necessary to input the following indicators in the productive employees (mechanics) demand projection bloc – separately, by the dimensions and car age groups, indicators shall be inputted in a variable dimension with the title “regular number of hours” (8 hour work day):

- average number of hours (present in the workshop) of productive employees;
- average employee productivity in %;
- average employee effectiveness in %.

As a result, the potentially necessary number of employees is calculated by the car age groups and product groups.

Aftersales market spare part sales flow module

Aftersales market spare part sales module is comprised of four blocs:

- flow of spare parts needed for manufacturer's authorized workshops;
- flow of spare parts needed for independent workshops;
- market of spare parts needed for repairs performed by drivers themselves, acquaintances or friends;
- wholesaler spare part sales and purchase flow.

The market share of each of the aforementioned blocs was calculated in the module and further the spare part market flow was designed. Each of these blocs has a different flow of spare part supply from the manufacturer, gross profit and the number of wholesalers/dealers.

As a result the calculation and projection are made on automotive spare part market volume of the cars imported in Latvia in manufacturer's sales or importer's purchase prices, divided as the volume of the spare parts purchased from:

- manufacturers;
- independent spare part manufacturers/wholesalers.

Possible aftersales market development scenarios

In order to test how the aftersales market dynamic model works and outline the potential trends for its development – three possible scenarios were created for the next five years:

- pessimistic;
- realistic;
- optimistic.

The coefficient (probability) was created in a dynamic model and with its help the modelling software in designing the projection selects numbers within borders of 20 % from the main parameters input by the author. It means that, for example, an increase of passenger cars was projected as 5 % annually then the modelling software chooses random numbers within the borders from 4 % to 6 %.

The figures created by software PowersimStudio show the data in five dimensions or the following Latvian regions:

- 1 = Rīga region;
- 2 = Zemgale region;
- 3 = Latgale region;
- 4 = Kurzeme region;
- 5 = Vidzeme region.

For January 1st, 2018 the Realistic Scenario projects - 354391 cars in Riga region, 64841 in Zemgale region, 65822 in Latgale region, 74117 in Kurzeme region and 56225 in Vidzeme region with the total number of passenger cars in technical order in the country under Realistic Scenario – 615396, Pessimistic – 594450, and Optimistic - 634200.

The next module, which automatically uses the projection of passenger car increase, is the aftersales market volume in the Latvian regions, which forecasts spare parts and labour hours needed in each age group of cars by the aforementioned product groups. The aftersales market volume is calculated by summarizing the volume of labour hours and spare parts volume.

The aftersales market volume (spare parts and workshop services) projection for January 1, 2018 is – under Realistic Scenario in Riga Region 148,350,290 LVL, in Zemgale region –24,457,045 LVL, Latgale region – LVL 24,176,410, Kurzeme region –28,621,837 LVL, and Vidzeme region – 21,035,644 LVL; total in the country – LVL 246641226, under Pessimistic Scenario – 235,991,067 LVL and Optimistic Scenario –256,814,955 LVL, see Fig. 4.

Knowing the number of labour hours necessary in the aftersales market, which had been calculated in the previous module, it is possible to forecast the number of the needed productive employees in the Latvian regions. The realistic aftersales market development scenario projects that in 2018 the Riga region 3724 productive employees would be needed, Zemgales region – 658, Latgale

region – 660, Kurzeme region – 759, and Vidzeme region – 568. Thus, the total number of the productive employees demand in the country in 2018 will be – 6369, current demand – 5366 (base increase rate – 19 %); under pessimistic scenario – 6115 (base increase rate – 14 %), and under optimistic scenario – 6596 (base increase rate – 23 %), see Fig. 5.

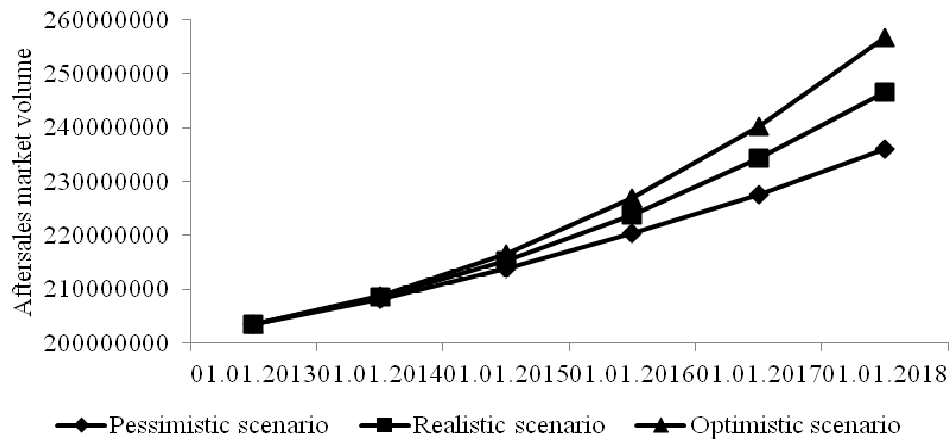


Fig. 4. Latvian aftersales market volume scenarios for 2013-2018

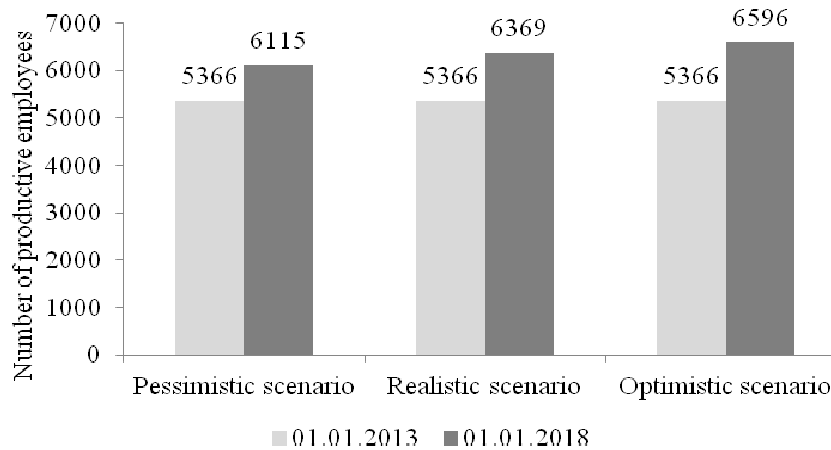


Fig. 5. Projection of the number of the needed productive employees in the aftersales market in Latvia in 2013 and 2018

Modern contemporary cars require new skills and additional knowledge in electronics, and not only in mechanics. In accordance with the authors’ observations in Latvia, there currently exists a shortage of automotive electronics specialists. In Germany, the researchers mention as one of automotive industry future problems the lack of engineers and specialists, and according to forecasts Germany alone will have a shortage of 1.8 million automotive specialists by 2025 [5]. In the future automotive industry employees will be expected to handle an enormous array of new vehicle technologies in areas such as seamless integration of code, engine control units and integration of multiple systems [7].

The aftersales market spare part market flow module forecasts the volume of spare parts purchased from the manufacturer or purchased by a dealer of some other country in wholesalers’ and workshop purchase prices. The realistic aftersales market development scenario projects that the mentioned volume in 2018 will be 87,899,456 LVL, including the amount of 69,522,205 LVL if spare parts are purchased from wholesalers of other countries, independent from the car manufacturers or spare parts manufacturers, and the amount of 18,377,251 LVL from the car manufacturer.

Conclusions

1. As a result of the research an analytical instrument is designed to model the passenger car aftersales market imitation within the context of development of the Latvian regions, and three potential aftersales market development scenarios are created.

2. With the help of the mentioned instrument it is possible to forecast the increase of passenger cars by age groups, to project the volume of aftersales market and the number of the necessary productive employees for it, and also to model the aftersales market spare part distribution flow and volumes.
3. The aftersales market development scenarios show the passenger car aftersales market potential in the Latvian regions and the fact that it is possible to develop in Latvia aftersales companies which will facilitate employment and the growth of the regions.

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