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Designing a system of anticipative marketing for automotive industry

Oleksiej Kuryliak[1]

[1]National University of Water and Environmental Engineering

Soborna str. 11, Rivne – Ukraine

Abstract — **The peculiarities of the automotive market development are analyzed in view of the increase in the share of connected cars. Prospects for the use of data collected by vehicles for marketing purposes are described. The possibilities of anticipative marketing in the process of meeting the consumers' needs with the traditional product promotion approaches are compared. The relationship between the number of "smart" vehicles and the dynamics of road accidents in the EU is depicted. Approaches to monetization of data for marketing purposes collected by vehicles are singled out. The role of data normalization processes and mechanisms of their application to the enterprises marketing activities are argued. A matrix of consumer needs anticipation has been formed, where four key segments have been identified. The goals of the measures within the framework of the anticipative marketing strategy implementation are illustrated. Based on the differentiation of key areas of activity on the way to the implementation of anticipative marketing, is proposed an approach to designing a system of anticipative marketing of the automotive company.**

Index Terms— anticipative marketing, customer profiles, customer behavior, big data analysis, automotive market.

I. INTRODUCTION

Anticipative marketing, as a process of identifying consumer expectations that have not yet occurred and are expected in the nearest future, or have emerged recently, is a complex systemic process that involves a series of transformations of all entities involved into the creating of added value to a product. The automotive market is quite innovative, as evidenced could be the intensive introduction of information technologies into end products, availability of consumer access to the production processes, modular production processes, collaboration processes of different brands in the area of R&D, increasing the number of systems for monitoring and tracking consumer behavior of drivers and passengers by recording the geolocation, driving trajectory, internet queries searching for certain goods or services, etc. The combination of market innovation and anticipative marketing potential creates the preconditions for fundamental changes in the philosophy of developing and promoting new products on the market; vectors of monetization of products by automakers are expanding, the role of consumers in the development of new products is increasing (Krykavskyy, Kuryliak, Fihun, 2020).

Anticipative marketing, consumer behavior prediction, features and trends of the automotive market, anticipative management as a mechanism of stable economic growth, anticipation of drivers' behavior based on data collected by the car are the subjects of scientific work of many scientists. Thus, the work of A. Shtangret (Shtangret, 2021). examines the issues of anticipative management as a mechanism for ensuring and forming a system of enterprises sustainable development, its security and an effective tool for crisis management of the enterprise. In the works (Lim, Jiu, Ang, 2020) and (Benterki, Boukhnifer, Judalet, Maaoui, 2020) the role of data and the technologies of artificial intelligence in the processes of predicting driver behavior and vehicle movement is highlighted. In (Small, 2018) the possibilities of anticipation of consumer behavior are highlighted, and S. Salenko's research (Salenko, 2019) argues to the role of vehicles as a tools for consumers data recording, their behavior and key preferences, explores prospects of mobile applications for vehicles, opportunities for digitalization of services, the issues of data security, which are aggregated by different systems are raised too.

II. MAIN TRENDS ON AUTOMOTIVE MARKET

The car market is currently in the process of radical change and their sources are completely different. On the one hand, the demand for electric cars and hybrid engines are actively growing, while sales of cars with gasoline and diesel engines are declining. Such vector of changes is dictated by the active direction of automotive companies to reduce the impact of exhaust gases on the environment, as well as significant

progress in the manufacturability of electric cars that can develop significant speeds (completely competitive with classic engines), as well as significantly increased the power reserve of these cars from a single charge. Stimulates the popularity of this type of cars and the rapid development of infrastructure for maintenance and charging of such vechicles. In addition to the popularization of electric vehicles, significant changes are taking place in the capabilities of embedded systems, the share of computerization of vehicles is growing, the level of iteration of vehicles with the environment is also increasing. Vehicles are increasingly becoming intelligent and adaptable to consumer needs. The only trend that has not changed and will only increase in the future is the increase in the level of vehicles saturation. Thus, in the EU countries, on average, there are 569 cars per 1,000 inhabitants, 2019-year data [7]. At the same time, in 2015 the number of cars was 553 units for 1,000 people.

The increasing number of vehicles at the same time with increasing the opportunities to collect consumer data increases the potential for car use in marketing. A large number of sensors that detects the car movement, the nature of driving, stops near shopping malls, route search and general information recorded by vehicle's computer systems allows with a minimal error to form a consumer portrait, helps to understand better the consumer motivation and adapt proposals based on consumer expectations in particular on the basis of anticipative marketing approaches. The opportunities offered by computerization of vehicles are not reaching their maximum today, and the availability of a significant number of vehicles with 10-year mileage and even older exacerbates the problem of mass introduction of full-fledged systems for analyzing and predicting drivers' behavior / consumers. However, the amount of investment and advanced development to increase the level of vehicles computerization shows that car companies prioritize the process of ensuring the most intuitive "communication" between driver and car, as well as the car and surrounding facilities. Thus, analyzing the statistics on research and development in various sectors of the EU economy, the sphere of cars and spare parts for them is covers 29% as of 2018 (as opposed - the medicine and biotechnologies is 19%, and information technology for mass use only 8%). At the same time, the level of investments into the research and development of the automotive industry in 2018 amounted to almost 61 billion euros, while investments into the sphere of medicine and biotechnology were lower by 20 billion euros. If we talk about the global trend, the EU member states took the leading position in terms of investment in the development of new technologies in the automotive industry. Such data are mainly dictated by the fact that a significant number of automakers that are competing in the international market are concentrated in the Eurozone. Investments in the automotive industry are almost twice as low in Japan and the United States as in the EU area.

If we talk about patent activity, an important trend of recent years is the active development of autopilot technologies for vehicles. The number of patents in this field by global share is about 30% each in the EU and the US. However, it should be noted that the registration of patents by a particular country

does not mean that these developments were invented in that country. Remote work features of the IT sector allows a significant number of automakers to delegate to third-party companies the development of product solutions, while patenting them independently. For example, there are many IT companies in Ukraine that develops software and technological solutions to increase the level of computerization of vehicles at the outsource base to order of major automakers. Thus, the progress of the automotive market in the field of intellectualization of the final product is a global trend, where advanced solutions are the result of the work of different companies, both - geographically and in terms of development.

The development of technologies implemented in vehicles is designed to promote not only more efficient promotion of goods and services by anticipating needs. Modern automotive intelligent systems allow:

- Reduce negative emissions by ensuring a uniform driving style.
- Reduce the production of spare parts for cars that will not be in demand by the relevant consumer, while ensuring the production and delivery of spare parts that will soon be in demand by customers (achieved by automated analysis of the level of wear of spare parts);
- Reduce the number of accidents thanks to warning sensors and driver support in crisis situations.
- Improve road infrastructure by identifying problem areas on the road.
- Ensure more efficient route planning taking into account bigger amount of driver movement parameters.
- Improve the development of new products, as it increases the understanding of consumer needs for certain services and products.
- Improve insurance packages, taking into account the individual characteristics of each driver.

The current advantages of the development of intelligent systems, which are implemented in modern vehicles, outline the key vectors of progress in the automotive industry. In an environment where, according to open databases on road accidents, the number of fatal road accidents per 1 million population was 182 people worldwide. - the role of accident prevention systems is critical. Thus, there is a close relationship between the number of new cars equipped with intelligent systems, the availability of developed road infrastructure and the number of accidents. EU countries have the lowest fatal road accidents in the world. But in Africa, the number of accidents per 1 million population in 2016 was 266 people. Figure 1 shows the volume of road fatalities in the EU and the number of cars in the period from 2007 to 2019. The figure clearly shows the positive dynamics of reducing the volume of accidents with a parallel increase in the number of cars since 2007.

This trend was primarily dictated by the improvement of infrastructure, improvement of car safety systems, increased liability for traffic violations. However, with the advent of vehicles with autopilot or accident risk analysis and preventive warning functions, this trend will only intensify. The

highlighted fact clearly indicates the multi-vector benefits of the development of information systems that are implemented in vehicles. Scientific progress has increased the number of intelligent machines, strengthened the role of information in decision-making, provided the basis for the creation of an ecosystem that would allow the collection of significant data on the behavior of people behind the wheel and identify features of their behavior in order to improve living standards.

FIGURE 1. NUMBER OF MOTOR VEHICLE AND ROAD FATALITIES IN THE EU IN 2007-2019
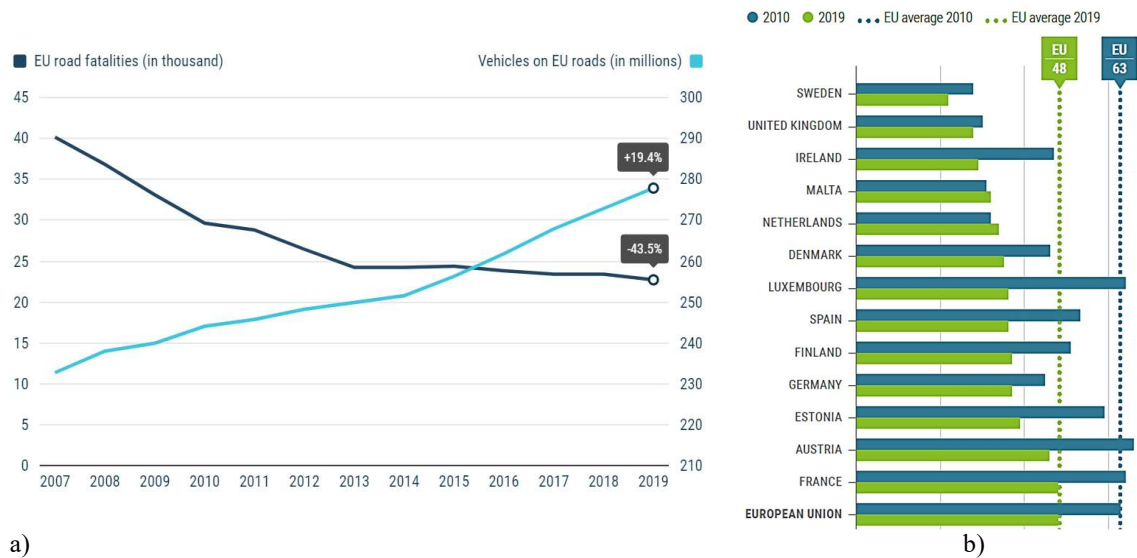

Source: acea.auto

Note. (a) - number of motor vehicle and road fatalities in the EU in 2007-2019; (b) - number of road fatalities in the EU in 2010-2019 per million inhabitants

III. CAR DATA MONETIZATION AND THE ROLE OF DATA FOR ANTICIPATION

It should be noted that the growth of the ecosystem of data collection and exchange between vehicles for marketing or design purposes mainly depends on two factors - demand and the ability to monetize the information collected about the consumer. Thus, the data that contribute to the formation of a holistic portrait of the consumer are not only useful for car assembly companies but are an important element of partnership with 3rd party companies. Figure 2 shows the types of approaches to monetizing data for marketing purposes collected by vehicles. As shown in the figure, market opportunities created by modern vehicles and implemented technologies are extremely valuable in the process of anticipating consumer expectations. Opportunities are being created that directly have the resources to reduce the cost of goods, related services, increase the speed and quality of service at the service station, improve insurance offers for drivers with good insurance history, improve road control services, optimize logistics infrastructure through more effective identification and further elimination bottlenecks in supply chains, strengthening driving safety and security of passengers through objective identification of unscrupulous drivers, etc.

FIG. 2. TYPES OF APPROACHES TO MONETIZATION OF DATA FOR MARKETING PURPOSES COLLECTED BY VEHICLES
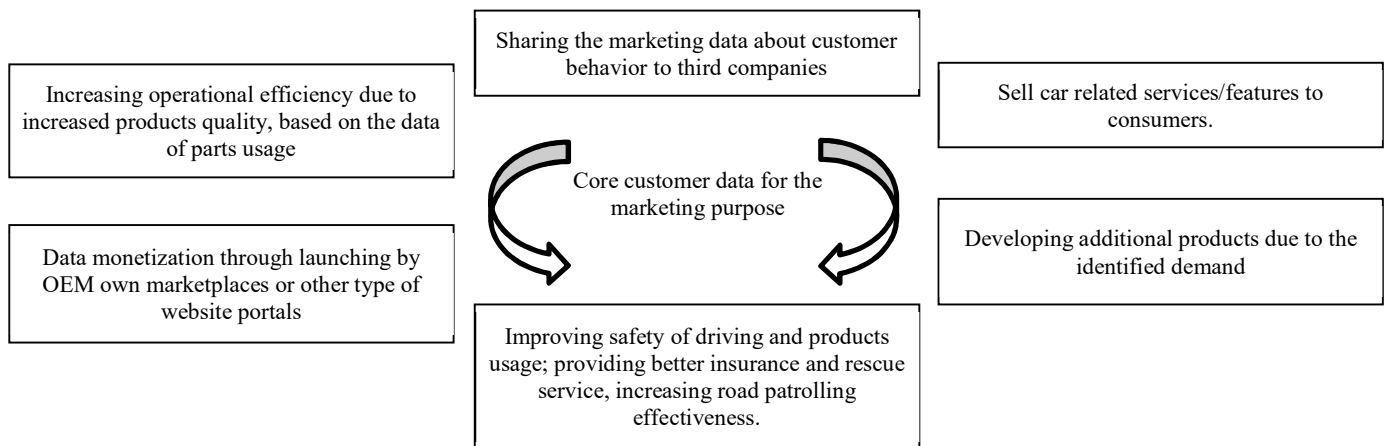
Source: investopedia.com

Monetization of data collected by vehicles is one of the key elements to stimulate the development and implementation of information technologies at the household level. However, the greatest value for the automotive market and end users understands the needs and opportunities reaching them on time and in full amount. Thus, anticipation of consumer needs is possible solely based on a detailed portrait of the consumer, structuring the importance of their needs and identifying the key market trends. It should be noted that in the process of collecting data about consumers, their expectations, behavior, preferences, social status, level of needs satisfaction based on the Maslow pyramid - appears a problem of data diversity, its incompatibility in direct comparison and respectively controversy, often there is a correlation between data, which traditionally should not take place. Under such conditions, in the process of planning and organizing anticipative marketing there is a problem of data processing, their systematization and, above all, normalization. Only after bringing the data collected from different sources to common features - you can carry out the process of analysis and identification of certain patterns of behavior, potential expectations of consumers and identification of future trends in consumer behavior. The main stages in the process of data normalization for further use in marketing includes:

4. Data collection and unification
5. Formation of the consumer profile taking into account the data of third-party sources
6. Depersonalization of data in accordance with the requirements of the legislation (unless otherwise provided);

7. Separation of data according to the goals of the marketing campaign.
8. Segmentation of consumers and the formation of typical patterns of behavior.
9. Formation / adaptation of anticipative marketing strategy according to the results of data analysis.
10. Evaluation of marketing results and making adjustments.

Thus, the use of data in marketing requires not only market and the product (service) expertise which are promoting, but also skills in working with data, ability to operate with processes of modelling and normalization, knowledge of the weight of sources, based on which could be conducted the prediction of future consumer needs. On the figure 3 is highlighted the stages of data normalization in the implementation of anticipative marketing strategy.

As a result of data analysis and the formation of anticipative marketing strategy should be formed a clear hierarchy of added value for the company as well for the consumer as a result of the sale and purchase of goods (services). The utopian market result of anticipative marketing is the achievement of maximum consumer benefits while achieving the maximum benefits of the enterprise. However, this market trade-off cannot be achieved, and each of the market participants must compromise. According to the results of consumer needs anticipation, four market situations can be identified: (Fig. 4):

1. Underestimated customer needs
2. Underestimated company's needs
3. Overestimated customer opportunities
4. Overestimated products opportunities.

FIG. 3. STAGES OF DATA NORMALIZATION IN THE PROCESS OF ANTICIPATIVE MARKETING
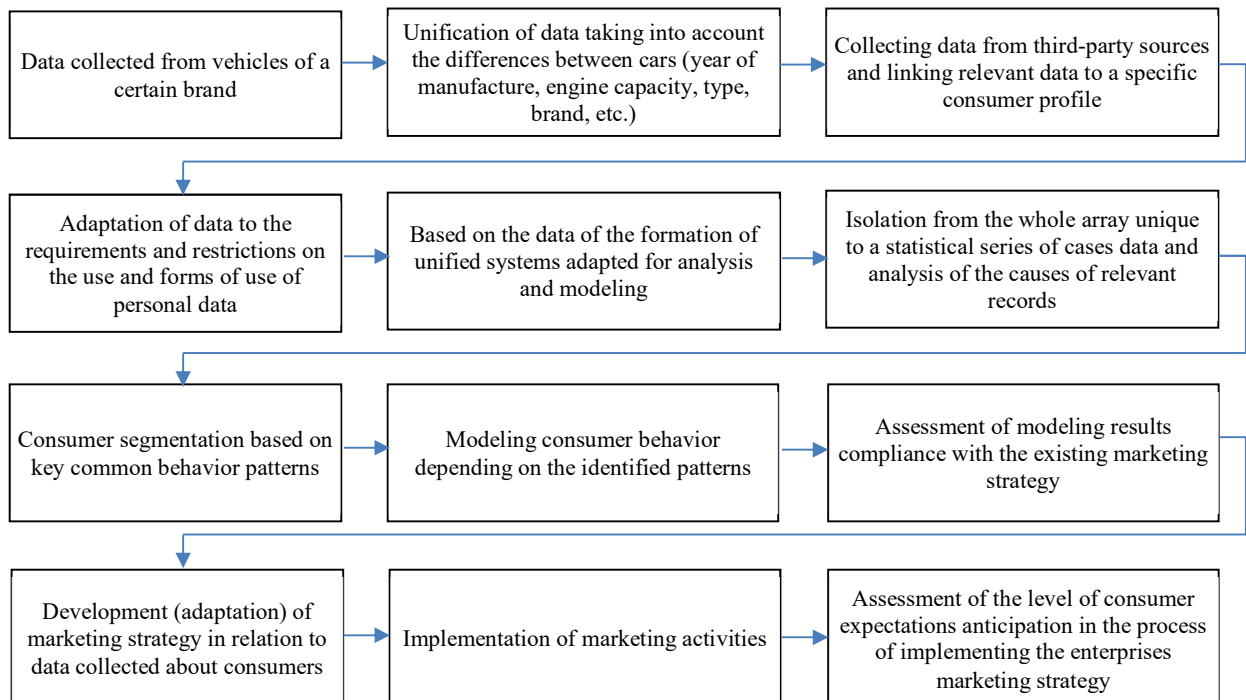
Source: own development

FIG. 4. MATRIX OF CUSTOMER NEEDS ANTICIPATION

Source: own development.

The anticipation matrix of consumer needs covers a number of cases involving situations where in conditions of low cost of goods, added value for the consumer is also low. Under such conditions, market risks are significant and data collection and analysis processes n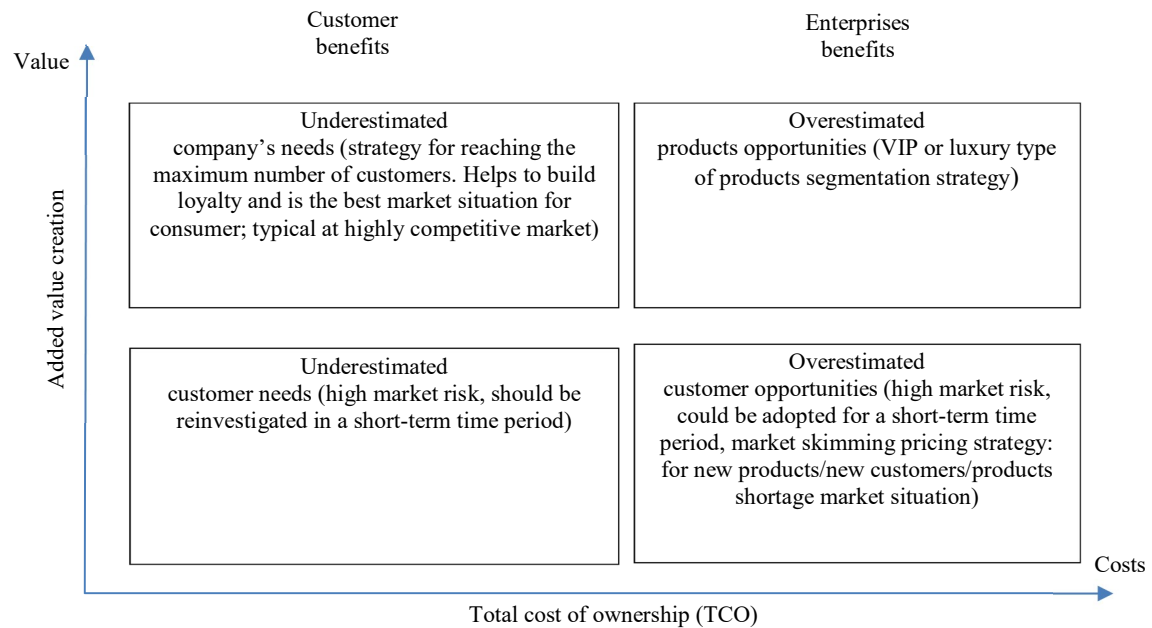eed to be continued in order to anticipate needs more effectively; when the value of the product and its use is high and the added value for the consumer is low - market risks are the highest, because consumer opportunities are overestimated, such strategy can take place only in the short term period; under conditions when there is a high added value of goods for the consumer, and the TCO (total cost of ownership) is significant - the company gets the opportunity to position goods as premium type. Given the anticipation of this market situation - the company has the best prospects on the market. For consumers, the most profitable development of market relations is the underestimated needs of the enterprise (high added value of goods for the consumer with low level of total costs of ownership (TCO) for these goods). Thus, by identifying the future customer needs through the data analysis collected by vehicles and other devices of the ecosystem, it is possible to identify key market opportunities and effectively form a strategy of anticipative marketing in the sales process.

IV. CUSTOMER NEEDS AND THE PLACE OF ANTICIPATIVE MARKETING

As highlighted above, the value of data for marketing activities is extremely high. Their relevance, comprehensiveness, the price of obtaining have a significant impact on the final results of anticipative marketing strategy of the enterprise. Changing paradigms of functioning of motor vehicles, increasing the data collection capabilities creates conditions not only to improve customer service but also to increase added value, reduce costs for development, production, maintenance of vehicles, increases road safety. In general, there are several areas that will change significantly in correlation with changes in the spread of IT technologies in vehicles. These include:

- – Information direction;
- – Expenditure direction;
- – Safety direction;
- – Partnership direction.
- – The direction of saving time.

The information direction includes the field of marketing, where the role of information flow between consumers and producers, as well as between all market participants is growing. The exchange of information is significantly intensified, the preconditions for anticipation appear, the number of obsolete market offers decreases, and the mechanisms for achieving market equilibrium in terms of supply and demand are improving. The speed of response to inquiries is accelerating, and thus the number of irreparable production errors is reduced, the level of consumer dissatisfaction is also decreases. There are opportunities for effective monetization processes based on the availability of data on consumer expectations and preferences, increasing the personalization of proposals (for example, recommendations for the best route to the nearest service station, taking into account the level of critical wear of a particular part).

The cost direction covers the reduction of costs of manufacturers to develop new or improve existing models of cars or their parts. Wear level data transmitted online from the on-board computer provides a better understanding of bottlenecks in parts designs under appropriate operating conditions and locations of use. Thus, appear opportunities to develop customized solutions depending on the geographical

affiliation of the consumer, the nature of his driving, the quality of roads or fuel. In addition, understanding the level wear and tear of car parts in a particular region provides opportunities to plan JIT (Just in time) replacement parts processes, which reduces warehousing costs and reduces consumer waiting times for certain critical parts. The process of developing new (improved) parts can also be significantly reduced. From the consumer's point of view, the availability of driving data, wear, fuel consumption, air conditioning usage, etc., and the on-board computer's recommendations for cost optimization scenarios will reduce the final TCO and increase the final market added value of the vehicle.

The area of safety direction includes increasing the level of road safety for all traffic participants. Thus, the systems for monitoring the potential risks of accidents, sensors that helps to identify drivers' black zones, autopilot systems – that all helps to reduce the number of accidents on the road. In addition, identifying the most risky sections of the road creates a bridgehead for road services in developing better road conditions, improving lighting, repairing or changing trajectories, and so on. Vehicles computerization reduces the risk of theft, as well as increases the sense of security and control of the car for consumers. The number of sudden breakdowns is reduced, and the work of Service becomes more planned and clearly regulated.

The partnership direction involves strengthening the level of cooperation throughout the value chain. The availability of data and its exchange in an effective format is possible only if there is an openness and willingness to share critical data for the benefits of consumers and the market. Only the formation of common databases, the smooth exchange of them, the compatibility of systems for collecting, analyzing and using information helps to achieve market synergy and offer the market competitive cost-effective solutions. The involvement of various enterprises (car manufacturers, dealers, repair

companies, insurance companies, financial institutions, road services, retailers, marketing agencies, etc.) to the close collaboration will allow the end consumer to obtain extremely valuable market solutions that will be timely and accessible to specific customers.

The direction of time saving indicates the reduction of time spent on R&D of new goods and services by enterprises, as information about the expected needs based on the collected data allows to effectively ensure the anticipation of consumer needs. In addition, the service life of vehicles could be reduced, due to the fact that service stations and other repair companies will obtain information in advance about the needed spare parts for maintaining. For consumers, a waiting time for spare parts delivery, repairs, searching for the relevant products or locations that meet their expectations could be reduced. The relevance of commercial offers of both automakers and partner companies that are part of the ecosystem is improving.

Given the above, increasing the trend towards computerization of vehicles will make changes not only directly in the vehicle itself, but also improve the experience of consumers, strengthen the role of consumer expectations in the market under the formation of relevant proposals, improve road safety, increase the effectiveness of anticipative marketing, allowing to effectively reach a balance between consumer benefits and enterprise benefits (Fig. 5).

Achieving a balance between the benefits of the enterprise and the benefit of the consumer is an ideal market situation, and the likelihood of its occurrence depends largely on the effectiveness of anticipative marketing measures and the quality of the ecosystem.

Thus, given the potential for the development of anticipative marketing, it is expedient to consider the main stages of designing a system of anticipative marketing of the automotive company (Fig. 6).

FIG. 5. THE GOAL OF ANTICIPATIVE MARKETING ACTIVITIES

Source: own development

FIG. 6. DESIGNING A SYSTEM OF ANTICIPATIVE MARKETING OF THE AUTOMOTIVE ENTERPRISE

Stages of formation of anticipative marketing structure			
Identification of key sources for detection of major consumer trends with a goal of anticipative marketing development	Creating systems for collecting, normalizing and analyzing consumer data and consumer preferences	The assessment of compliance of consumer needs and capabilities of the enterprise	Development and implementation of anticipative marketing; analysis of market results, evaluation of main KPIs, adjustment of strategy

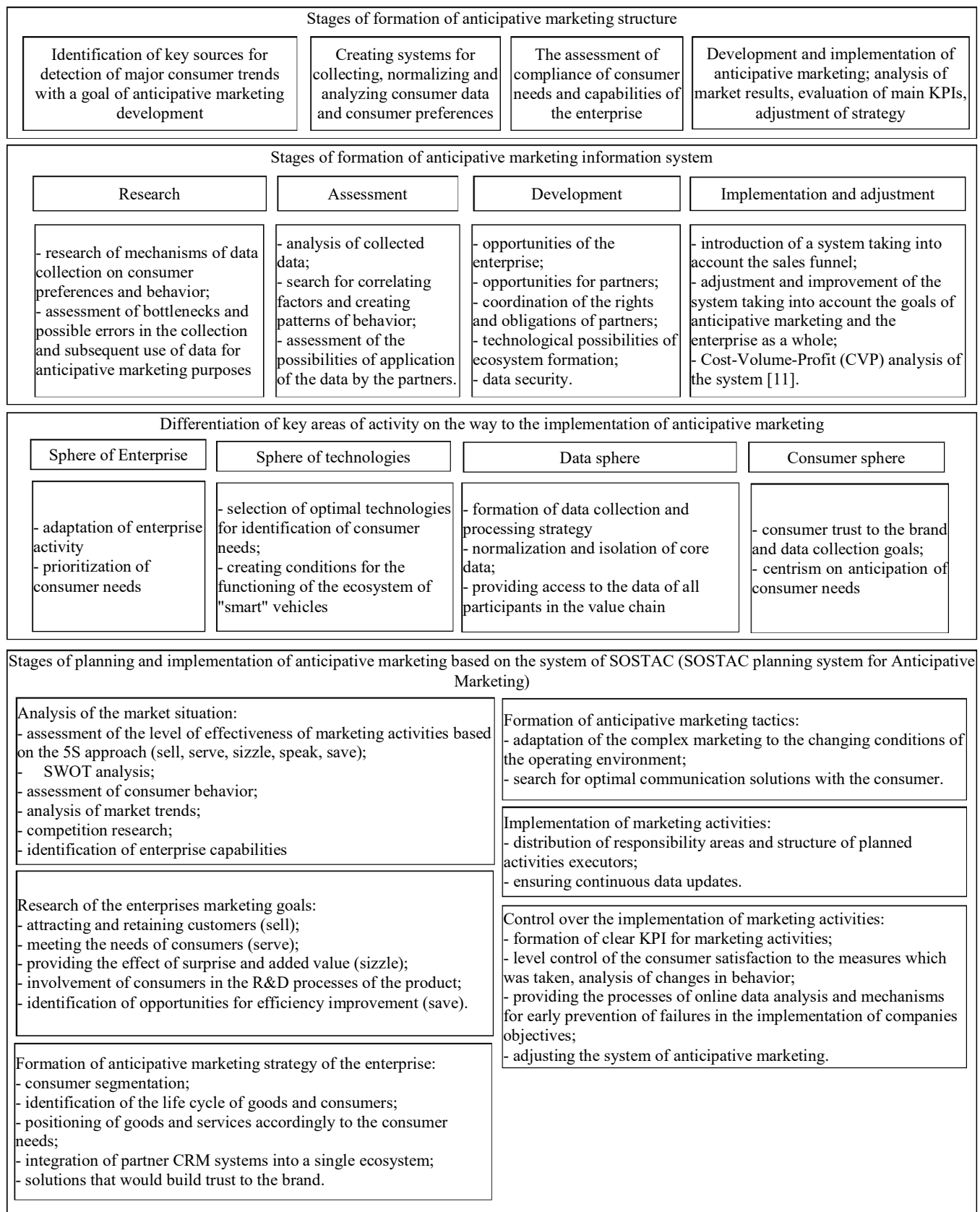| Stages of formation of anticipative marketing information system			
Research	Assessment	Development	Implementation and adjustment
- research of mechanisms of data collection on consumer preferences and behavior; - assessment of bottlenecks and possible errors in the collection and subsequent use of data for anticipative marketing purposes	- analysis of collected data; - search for correlating factors and creating patterns of behavior; - assessment of the possibilities of application of the data by the partners.	- opportunities of the enterprise; - opportunities for partners; - coordination of the rights and obligations of partners; - technological possibilities of ecosystem formation; - data security.	- introduction of a system taking into account the sales funnel; - adjustment and improvement of the system taking into account the goals of anticipative marketing and the enterprise as a whole; - Cost-Volume-Profit (CVP) analysis of the system [11].

Differentiation of key areas of activity on the way to the implementation of anticipative marketing			
Sphere of Enterprise	Sphere of technologies	Data sphere	Consumer sphere
- adaptation of enterprise activity - prioritization of consumer needs	- selection of optimal technologies for identification of consumer needs; - creating conditions for the functioning of the ecosystem of "smart" vehicles	- formation of data collection and processing strategy - normalization and isolation of core data; - providing access to the data of all participants in the value chain	- consumer trust to the brand and data collection goals; - centrism on anticipation of consumer needs

Stages of planning and implementation of anticipative marketing based on the system of SOSTAC (SOSTAC planning system for Anticipative Marketing)

Analysis of the market situation:
- assessment of the level of effectiveness of marketing activities based on the 5S approach (sell, serve, sizzle, speak, save);
-    SWOT analysis;
- assessment of consumer behavior;
- analysis of market trends;
- competition research;
- identification of enterprise capabilities

Research of the enterprises marketing goals:
- attracting and retaining customers (sell);
- meeting the needs of consumers (serve);
- providing the effect of surprise and added value (sizzle);
- involvement of consumers in the R&D processes of the product;
- identification of opportunities for efficiency improvement (save).

Formation of anticipative marketing strategy of the enterprise:
- consumer segmentation;
- identification of the life cycle of goods and consumers;
- positioning of goods and services accordingly to the consumer needs;
- integration of partner CRM systems into a single ecosystem;
- solutions that would build trust to the brand.

Formation of anticipative marketing tactics:
- adaptation of the complex marketing to the changing conditions of the operating environment;
- search for optimal communication solutions with the consumer.

Implementation of marketing activities:
- distribution of responsibility areas and structure of planned activities executors;
- ensuring continuous data updates.

Control over the implementation of marketing activities:
- formation of clear KPI for marketing activities;
- level control of the consumer satisfaction to the measures which was taken, analysis of changes in behavior;
- providing the processes of online data analysis and mechanisms for early prevention of failures in the implementation of companies objectives;
- adjusting the system of anticipative marketing.

Source: own development

V. CONCLUSION

During the implementation of anticipative marketing system, it is critical to understand that it is necessary to provide the analysis of opportunities and prospects of:

- – enterprise and all entities involved in the ecosystem of vehicles data collection and its use for the purposes of anticipation of consumer needs;
- – available technologies used by the enterprise, partners and consumers (availability of a sufficient number of vehicles with appropriate technologies; equivalent means of data collection with commensurate errors, etc.);
- – data collection and exchange: all ecosystem partners should have mechanisms in place to read and send information that would be useful for anticipative marketing decisions. Technological unification involves the simultaneous transition of enterprises to new technologies, joint software updates, change of reading devices to identical among all partners. This kind of actions correlation will minimizes the possible occurrence of inaccuracies in the process of anticipation and increase the effectiveness of marketing activities.
- – consumers, who are directly the center of analysis and presentation of updated data on their preferences and needs. Consumers do not always trust the company, especially those companies that are partners of the automaker. In this situation, marketing decisions to identify the brands that the consumer trusts the most is one of the priorities of the anticipative marketing system. In addition, consumers do not always understand the added value of data collection, the opportunities that open up through the improvement of future consumer experiences. Under such conditions, in addition to trust, companies should focus their efforts on informing consumers about the importance of data dissemination and at the same time emphasize on high level of security, which is guaranteed by the most trusted brand in the eyes of consumers.

Given the above, the design of anticipative marketing system of the automotive company is an important step towards implementing effective algorithms for anticipating consumer expectations, unification of information systems of all participants in the value chain, improving control over information, its analysis and application in relevant areas of business. The introduction of anticipative marketing by automotive companies will allow more efficient development of new goods and services, improve customer service, change the speed of introduction of new solutions to the market, and thus the life cycles of goods and services will coincide with the life cycle of consumer needs; the potential for data commercialization by all participants in the automotive market will increase, and the cost of production for final goods and services can be reduced due to fewer errors in the process of identifying consumer needs.

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