General model of production' process in the auto enterprises

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Abstract

The concept of the improvement factor is used to measure the extent of the restoration for a deteriorating system in this paper. In modern conditions of several competition for world markets the success of the service road in the developed countries of Western Europe and the U.S. is determined by the organization and management of maintenance. It is an integral part of the system of production and sale of automobiles and providing them with spare parts. Auto service business is a set of interrelated factors-people, technology, acting as a whole in relation to the effective implementation of technical services. For "technology" given the complex of specific combinations of experience, knowledge, skills, materials, machines, tools, etc.. equipment used by the people in the production of goods and services.

Key words: *auto enterprises, specific combinations of experience, equipment used by the people in the production of goods and services.*

Introductoin

Auto service business is a set of inter-related factors: people, technology, acting as a whole in relation to the effective implementation of technical services. For "technology" given the complex of specific combinations of experience, knowledge, skills, materials, machines, tools, etc. equipment used by the people in the production of goods and services.

Maintenance and repair is carried out in violation operational parameters of the vehicle and include the following activities:

- control - diagnostic;
- disassembly - assembly of components, systems and assemblies;
- Adjustable /corrective/;

- machining - assembly;
- electrical and electronic;
- activities restoring the passenger compartment;
- tinsmith;
- mount and balance tires;
- painting;
- upholstery and more.

Fig. 1 is a diagram of the interaction between technical, social and environment auto service company.

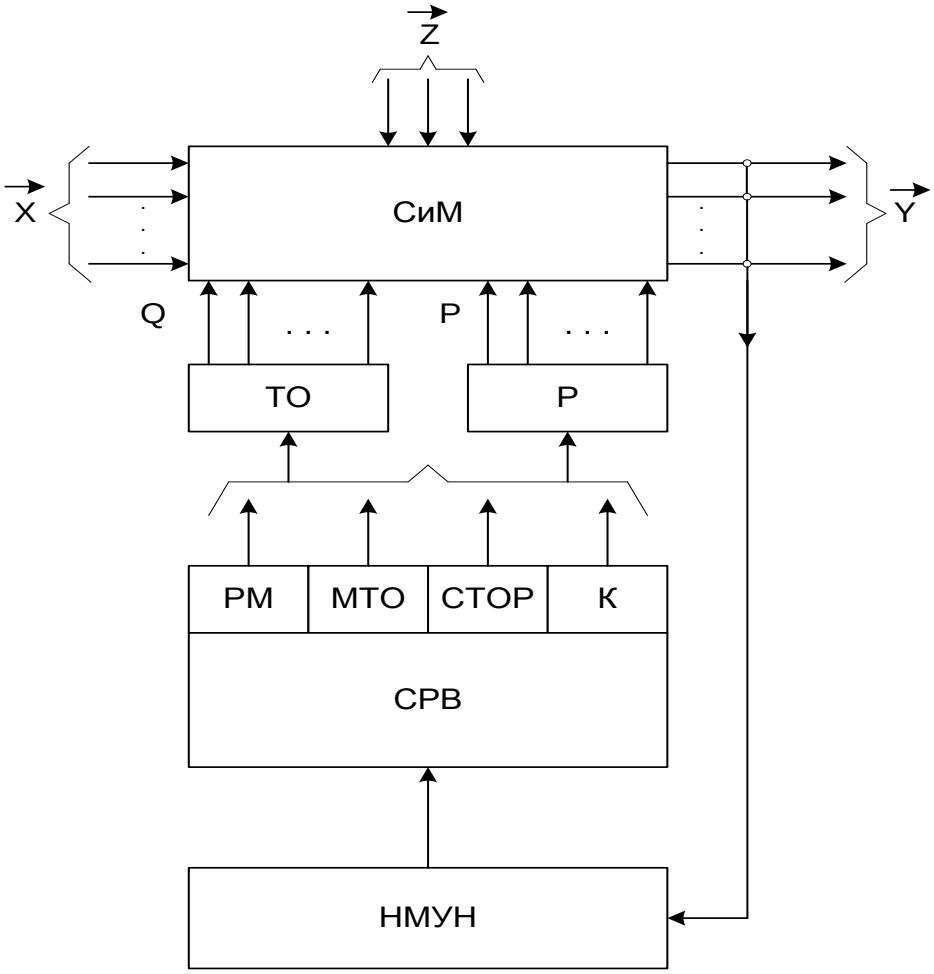

Fig. 1. Complex system: human-machine-environment in auto-organization

where:

СИМ-Machine Service Centre;

X - vector function of the factors that provide the machines (labor, fuel, oil);

Volume 1, ISBN 978-619-203-015-5

Z - vector function of the factors deteriorating the characteristics of indicators of reliability (working conditions, training of staff, etc.);
Q - vector function of the factors, the influence of internal factors;
Y - technical condition of cars and baseline characteristics of the indicators of reliability;
НМУН - ways and means to control the level of reliability;
СРВ- system repair impacts
RM - repair materials;
СТОП - technical support;
МТО - Material - technical support and personnel;
ТО- technical support;
P - repair operations.

Specifics of the workshop activity results in achieving goals, performing a service that is related to the repair, restoration, removal or replacement of damaged items, hereinafter collectively referred to repairs. Both definitions focus on the technical aspect of the concept not tied to customer satisfaction with the quality of service and cost-effectiveness of activities. Therefore, the author's ambition to further fair cover by modeling the complex interaction between the activities carried out in the auto service business and the impact of the external environment. The modeling of the various activities and their organization called her space and time is performed in order to facilitate the process of their learning and improvement. Scientists present classifications of patterns in various criteria, but it can be concluded that the models are divided into physical and mathematical.Use of a specific model requires explaining its components. As unknown variables are endogenous variables, determine the quantities of different types of services that can be performed with the available resources, including equipment. These resources, in turn, are known parameters or variables (exogenous variables), which now can be used in process operations. Then as a criterion (ie objective function) is determined from the following options:

- minimal cost;
- maximize profits;
- maximum volume of production;
- minimum time for the operations.

Choosing any of these options also depend on the characteristics resulting from the conditions under which the model is developed; of information that is available; the goals that we set for ourselves. It should be stressed that all three are equally important for any enterprise and somewhat complement each other. Put another way, in order to maximize profits is generally necessary to lower the overall costs and back - cost minimization is an important prerequisite for the realization of higher profits. At the same time minimizing costs and maximizing profits can be achieved in establishing and preserving optimal duration of the production process [1].

Stocks of different types of resources appear restrictive conditions that must be considered by any company which, together with the conditions for non-negativity of unknowns must be laid in the development model. It should be pointed out that under the resources given raw materials, machinery and equipment, manpower, financial resources. In this respect, modeling should focus on material resources, including raw materials, semi-finished products as well as machines and devices used to perform various operations.

An important point is that the choice of a single techno-economic indicator (eg profit) in the development of a specific model parameter should be optimized, reduces the adequacy of the developed model. By thus removing the artificial mnogokriterialnostta characteristic of the operation of any organization. This mnogokriterialnost is determined by many techno-economic performance and environmental requirements surrounding the operation of each business unit.

Optimality criterion depends on the target, which is why there are many formulations. For example, such criteria may be divided as follows: optimal allocation of various resources for use by various sectors of the national economy and / or the individual units within an organization; optimal use of available resources of different nature - material, financial, labor; producing optimum volume production at minimum cost; meet the needs of customers in the shortest time and in the highest degree; minimize the time unit production / service; optimization of transport routes, etc. [1].

Important point which needs to be addressed when considering modeling operations is that the movement of material flow should be consistent with the production scheduler, based on that developed route and limit cards. Develop a schedule itself is a complex and laborious process, which requires the search for

Volume 1, ISBN 978-619-203-015-5

ways and means of implementation. Operation of each production structure in a global environment requires not only providing the resources necessary for the conduct of the production process, but also comply with the highest environmental requirements set out in the strategic directives of the European Union.

Economical analys of system maintenance and repair

Conducting pure experiment with system maintenance and repair of cars is difficult to implement, so its study the dynamic properties will be accomplished using a mathematical model of the process of operation of the components of the system, ie channels of centers of service of automobiles, where they performed maintenance and repair.

Center for service vehicles (CS) is a system in which machines can be in different states (Si) (maintenance, repair, diagnostics, etc..) And randomly change from one state to another. We assume that the pre-walk system is probabilistic, and the process of change according [3].

Subject to economic evaluation in this case are of CS (Peugeot, Skoda, Citroen, Nissan), which is used in a strategy for IT and P with different possible states, namely: conduct full or partial diagnosis of cars; technical inspection of cars and car repair.

The mode of operation in these CS, can be represented by means of early-oriented graph (Fig. 2), where the conditions are indicated by Si,, wherein: S0 is a position, of the CS, where in there are no requests for cars, ie equipment is in working condition; S1, S2, - are respectively the conditions in which the CS is performed in the partial and complete diagnostics; S3 - a condition in which CS is out maintenance of vehicles; S4 - a condition in which CS is performed repair of machines.

We assume that the object of study (CS) changes respective to-stantly with constant intensity and marked in Fig. 2, where in the first in-dex is CS, and the second index is a state in which it crosses.

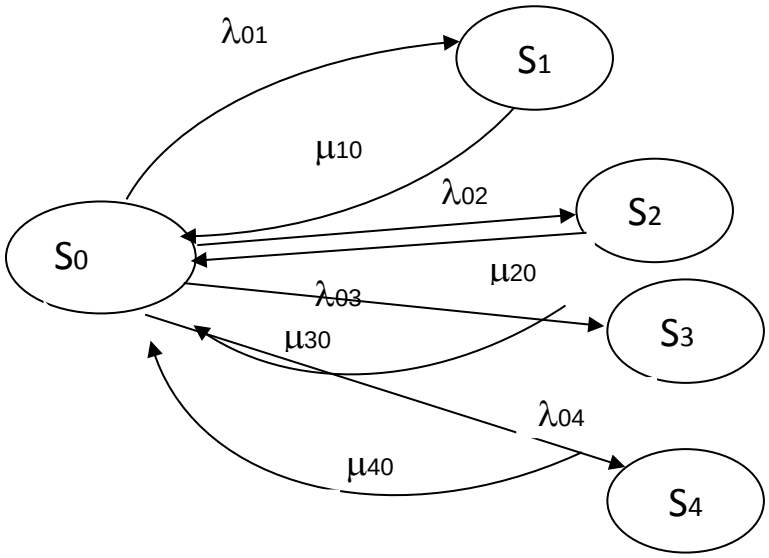

Fig. 2 Count of conditions of service center for cars

S0 - no applications;

S1 - Partially diagnosis;

S2 - Complete diagnostics;

S3-Maintenance;

S4 - Repair.

Table 1. Values of inflow of orders and the intensity of the outflow of queries centers car on activities performed before optimizing of service to them

Service centers-CS	**Values of inflow of orders and the intensity of the outflow of queries centers car on activities performed before optimizing of service to them**								**Values of the probability P0,%**
	λ_{01}	**μ_{10} h^{-1}**	**λ_{02}**	**μ_{20} h^{-1}**	**λ_{03}**	**μ_{30} h^{-1}**	**λ_{04}**	**μ_{40} h^{-1}**	
PEUGEOT	0,314	0,288	0,097	0,143	0,204	0,109	0,094	0,138	18,79
SKODA	0,264	0,267	0,088	0,152	0,227	0,243	0,152	0,171	22,78
CITROEN	0,192	0,443	0,069	0,203	0,178	0,164	0,131	0,136	26,16
NISSAN	0,184	0,392	0,053	0,184	0,171	0,181	0,144	0,133	26,42

After being held optimization studied CS, which consisted in performing the following activities:

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1. Agreement with the leadership of the CS surveyed in 2013 amount of channels in them (which actually prevailed 4 of 3, ie essentially perform a reduction of the directions in which to provide service in these CS.
2. Agreement with the leadership of the CS surveyed performed experiment in these CS in which reduce the amount of service workers working in these CS for their busiest period of the quarter in 2009, which has previously been clarified yet in the study in previous years, 2011 to 2013. Some of the available service workers were placed under a scheme respectively in paid and unpaid annual leave, thus the management of these CS kept these workers to conduct their experiment;
3. Through advertising activities of its business, reducing the cost of some of the services performed, the introduction of various types when carrying out the comprehensive services and others., Manuals surveyed in CS managed to raise the flow of requests who does the vital centers;
4. Some CS introduced commissioning modern computerized diagnostic tools that are received from an official distributor for Bulgaria of the brand, which reduced the time for service requests relating to partial and full diagnostics of cars.
Once these events in the surveyed CS for the three month period during which they are most loaded with servicing found new evidence of density values inflows query and intensity of outflows from these applications in CS in performing activities of table 2.

Table 2. Values of inflow of orders and the intensity of the outflow of queries centers car on activities performed after optimizing of service to them

Service centers- CS	**Values of inflow of orders and the intensity of the outflow of queries centers car on activities performed after optimizing of service to them**								**Values of the probability P0,%**
	λ_{01}	**μ_{10} h^{-1}**	**λ_{02}**	**μ_{20} h^{-1}**	**λ_{03}**	**μ_{30} h^{-1}**	**λ_{04}**	**μ_{40} h^{-1}**	
PEUGEOT	0,332	0,301	0,099	0,201	0,275	0,181	0,121	0,196	21,13
SKODA	0,292	0,377	0,101	0,188	0,347	0,412	0,182	0,316	26,81
CITROEN	0,211	0,622	0,107	0,414	0,534	0,656	0,197	0,334	33,32
NISSAN	0,228	0,586	0,110	0,387	0,254	0,611	0,189	0,373	38,52

Conclusion

From the results shown in Table 2 for servicing of the study of CS Rousse district for their busiest three months of work in 2013 after an optimization them in conducting various types of repair services and the use of open model (a model with an unlimited stream of requests) compared with the results of Table 1. it is seen that in all four tested CS: PEUGEOT, SKODA, CITROEN, NISSAN is increased as the density of the incoming flow of requests, and an increase in the intensity of the outgoing flow of processed requests. This indicates that the process used in these optimization CS has led to positive results.

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