THE USING OF PROCESSING METHODS FOR QUALITY MANAGEMENT OF HOUSING AND COMMUNAL SERVICES IN SAMARA REGION

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The article reveals the processing methods as the basis for power intensity decreasing which is considered the urgent problem in the housing and communal services in Samara region.

The analysis of up-to-date economic publications showed and proved that energy resources have become one of the prime sources of life support in the country. The low-effective energetic segment of our national economy ledas, as a result, to the highest public expenses for power-supply of the housing and communal services, which in turn causes the misbalance within the power-supply and the energy security and stability of the country[1].

The housing and communal services (HCS) are for the present moment the largest consumer of power and energy in the country, one of the most expensive and low-profitable branches of the national economy which favors quite an unwise usage of power and energy resources[2].

Power intensity of the HCS in our country is likely to be determined by a set of problems of which there are some the most striking ones:

♦a complete monopolization, low quality of the delivered services, low fail-safety of communal service networks, a considerable number of breakdowns;

♦High tear-and-wear of the basic equipment, out-of-date equipment and communication networks, lack of effective ways and systems of account and calculation;

♦Low-skilled staff of the present branch.

With the existing system o financial interrelations between enterprises, which are to provide power and energy services, institutions of local governments and citizens, with complete absence of competitiveness, fuel suppliers are not interested in reducing of their own operating costs and in the delivered services to fall in price. Due to the monopolistic position of the communal companies, undeveloped mechanism of how to supervise over their activities, legal vulnerability of citizens, the quality of the delivered services leaves much to be desired and dos not cover the people's needs completely. The basic reason of the rise of financial expenses and the cost of all levels' budgets for subsiding of the delivered housing and communal services is the low energetic effectiveness of this problematic sector in the region[3].

Looking at Samara region, one should remark that the basic energy source of the region is natural gas. Regular supplies of natural gas to consumers are primarily carried out due to timely service and repairs of the internal gas networks and gas equipment both within the city and within districts[4].

Deficit of natural gas during certain periods of fall-winter on-peak rate of energetic load, as a rule, comes with rapid falls of temperature. At the same time, heat delivering companies quite often do not provide the required temperature conditions of a heat-carrier, because of which one can witness a rapid rise of natural gas' consumption which under such condition re forced to make it a common practice to use gas heater and burners in order to heat up the apartments.

When the temperature both of water in networks and outside air fall down consumers, in order to warm themselves up, also get to use heating devices; consequently, there is a considerable rise of consumption of electro energy within the living sector, which leads to reloads and the liability degradation of the power-supply system.

The survey on the structure and principals of the organization of the housing and communal services showed that:

1. The HCS system do not come as a social-economic system, effective and qualitative work of which is required and important both for an individual consumer and the state's image and position on the world arena.

2. Qualitative work of the HCS can not be carried out without settling the existing prob-

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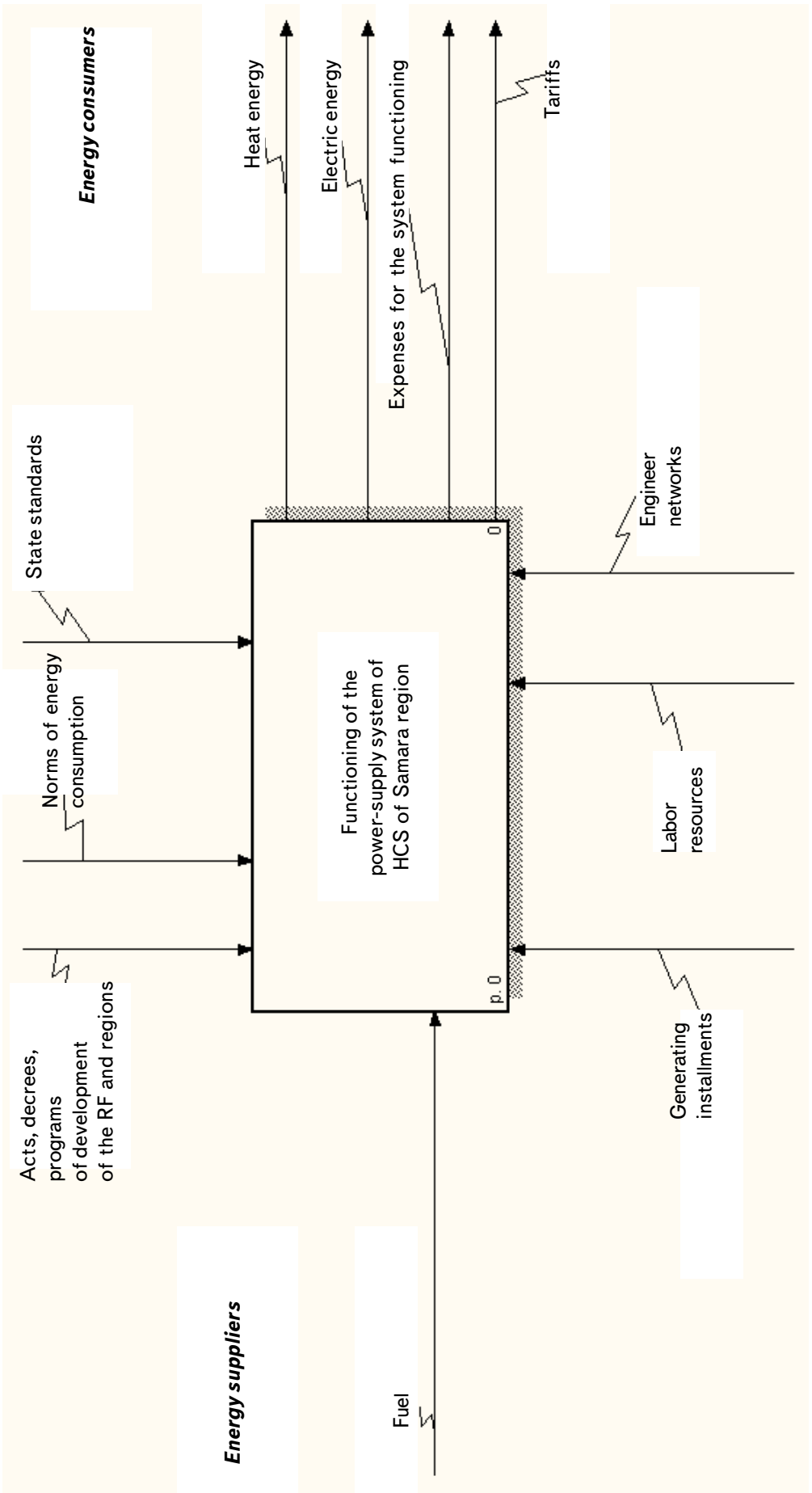
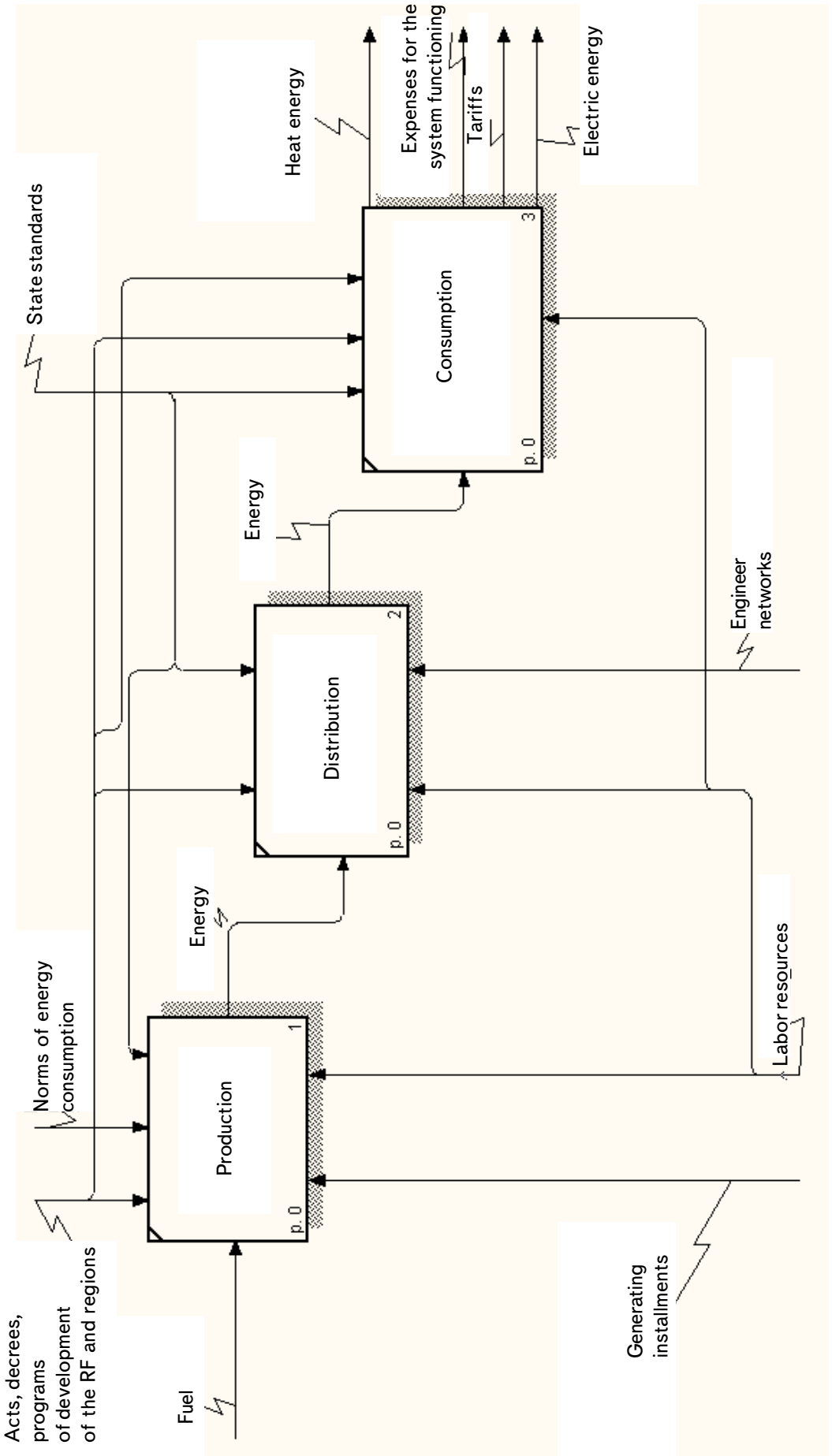


Pic. 1. **Contextual diagram of the model of the HCS power-supply system functioning within Samara region**



Pic. 2. **The diagram of detailing of the HCS power-supply system functioning within Samara region**

lems within the branch where one of the fundamental ones is the total absence of the system which would account the criteria of the optimality of functioning of the HCS power-supply system.

3. The optimality of the whole HCS functioning is seriously affected by the optimal functional of each sub-system.

The way of the present run of things might become adopting the state policy which would be aimed at the increasing of efficiency of fuel-and-energy resources usage in order to cut down energy intensity within the present economics sector.

For a more detailed analysis of the potential to rise efficiency of each HCS sub-system functioning it is necessary to make a model of the application domain. The process of modeling starts with the structural analysis of the power-supply system within the HCS of Samara region. Then one should turn to considering the process of the system's functioning. The model of the functioning process organization is recommended to work out in accordance with the standard IDEF0 the methodological basis of which is represented by the graphic language of business processes description[5]. While making a model of power-supply system functioning within Samara region it would be reasonable to divide it into parts which form the system of power-supply and are connected between themselves input and output data, controlling and mechanisms. Picture 1 illustrates the contextual diagram of the model "The HCS Power-supply System Functioning within Samara Region".

Different types of fuel (basically, it is gas) serve as input information; come in from the energy suppliers. More detailed output informational streams are available on the contextual diagrams of a lower hierarchy level.

The basis output streams of the power-supply system functioning within Samara region are:

- Energy of various kinds;
- Expenses for the system functioning on the whole;
- Tariffs.

The control data for the process to be modeled are legislative, normative and normative-reference documents.

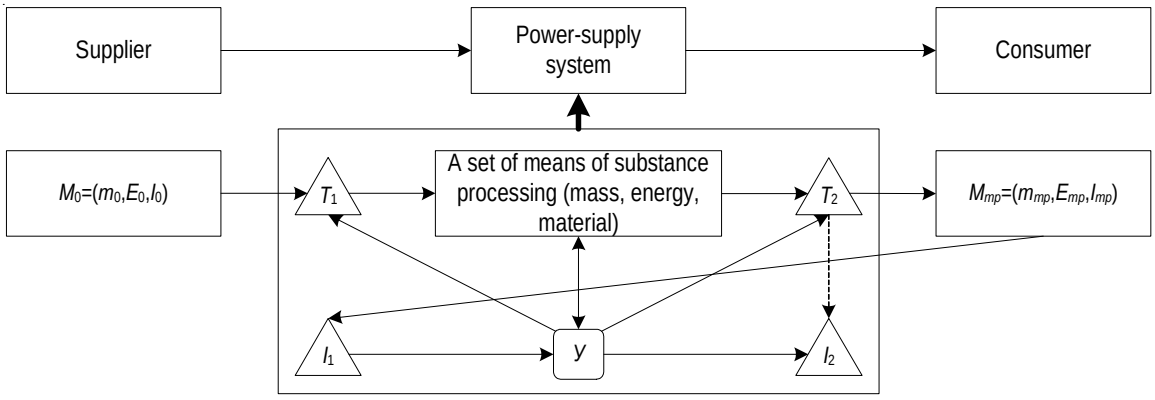
Organization and provision of the required level of the power-supply system functioning are performed by the generating installations and engineer networks and also by the labor resources.

Picture 2 presents the diagram of detailing of the whole process of the HCS power-supply system functioning within Samara Region. It demonstrates the basic functional parts.

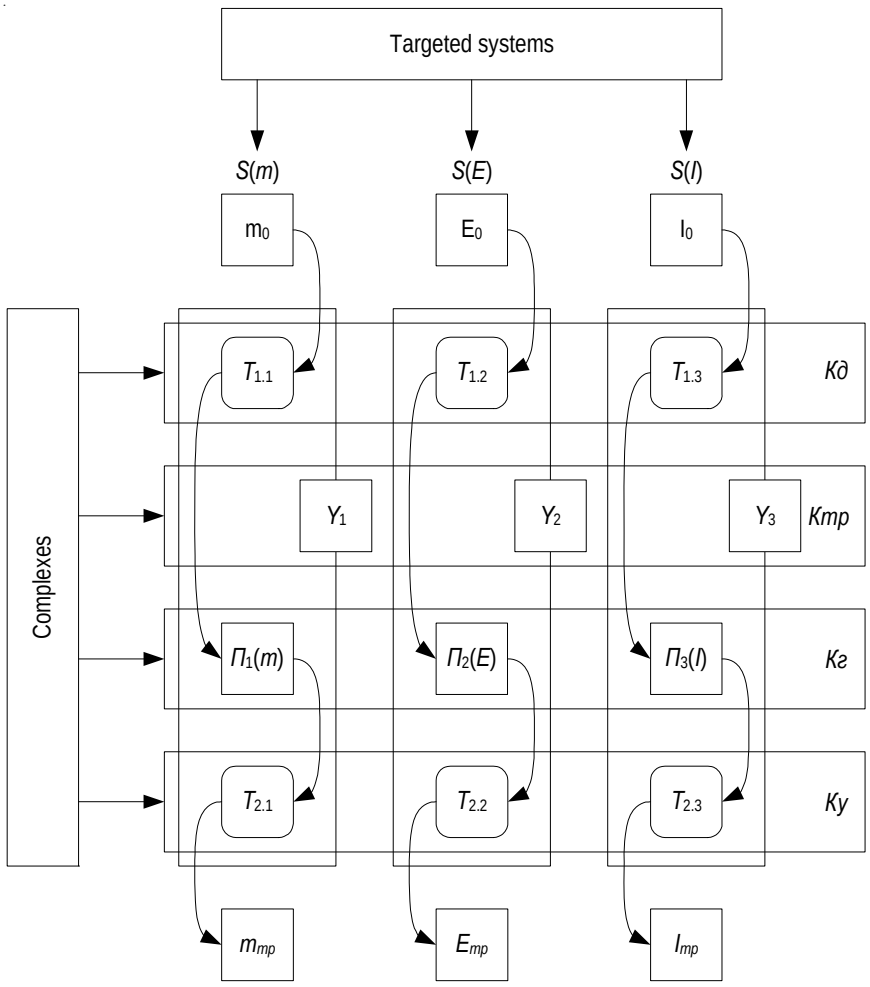
The part called "Production" is characterized by the input data in a form of fuel. The mechanism of the production process realization is left to the generating installations and the labor resources. The energy production is massively affected by the norm of consumption of energy, normative-legal acts and standards of energy production.

The produced energy comes to the sub-system of energy distribution where energy is distributed among its consumers. The key mechanism of realization and distribution of energy are the engineer networks.

The sub-system of energy consumption is influenced by the existing regional normative regulations of energy consumption. As a result of the energy consumption sub-system functioning it becomes necessary to compose and fill in the report documents about costs:



Pic. 3. **The functional scheme of three-dimensional system of power-supply**



Puc. 4. **Decomposition of the power-supply system into complexes and target systems**

- ♦Costs for heat and electric energy;
- ♦Costs for tariffs;
- ♦Costs for the system functioning.

By the HCS energy intensity management we mean a purposeful impact on the factors which might improve the process of the region's power-supply system functioning. For that purpose, there is used a process approach in a form of standard IDEF0 and consequently such problems were identified as irrational placement of generating installations.

In the course of the realization of the Program in Samara region there appears a necessity to optimize the placement of generating installations and their normalization on the capacity in order to maximum reduction of heat and energy networks with appropriate saving of high reliability of heat-and-energy supply of consumers. Taking into consideration the planned system of power-supply is quite a complicated one there is an arousing necessity to observe the relations mini-heat station and the power-supply system on the whole. We are to consider this system and its constituent sub-systems according to the point of component under practice within three single-purpose classes:

1. Informational class *S*(*I*) deals with acquisition, handling, transformation and storage of information. For instance, this class in the system of power-supply commonly contains all automated systems which form and handle the informational streams of data between both suppliers and consumers.

2. Mass - treating class *S*(*m*) - treatment and transportation of masses of various raw materials. For instance, within the system of power-supply this class includes processing of fuel.

3. Energetic class *S*(*E*) - acquisition, accumulation, transformation and transmission of energy (for example, high-voltage lines).

Here it is necessary to mention that in nature there exist only three-dimensional systems in which there is a simultaneous processing of mass of raw material, energy and information.

We intend to consider a three-dimensional complex system of power-supply (*SEO*): *S*(*SEO*)

$= S(m - E - I)$ from the view point of relations within triad (supra-system, system, supra-system) "Supplier - System - Consumer". The functional scheme of the three-dimensional complex system of power-supply is shown on pic. 3.

Initial data about the existing power-supply system (PSS) are presented by the zero vectors of the quantitative characteristics $M_0 = (m_0, E_0, I_0)$ while the final results - in the projectible SEO - by vectors $M_{mp}=(m_{mp}, E_{mp}, I_{mp})$. In this complex system of power-supply as a basic element there is a set of means of materials processing the basic function of which is to perform connecting-separating operations over mass, energy and information. Consequently, from the energy system functioning we arrive to discover new desired combination of components (M_{mp}).

The set of transport means is indicated on the scheme by the letter "T while the set of means of management - by the letter "Y". With a basis on the informational streams there are portions of controlling influence on the respective technical complexes.

For the optimal prediction of the process of their control development and estimation of the PSS efficiency we recommend to apply three kinds of decomposition (pic. 4).

Decomposition on sub-systems: energetic ($S(E)$), informational ($S(I)$), processing ($S(m)$) - each of them contains the following complexes:

- Delivery of resources ($K_д$);
- Transportation of energy (K_{mp});
- Generating means ($K_э$);
- Means of management ($K_у$).

The above presented decomposition consists of processes, by considering which following the notation IDEF0, one can manage each constituent of the process and minimize the problems which arouse during the process. For instance, transformational constituent can be optimized following the integration of methods of linear and dynamic programming[6].

Thus, practical application of the process approach for the HCS activities will surely allow us to choose a rational and reasonable usage of nonrenewable sources of energy and to manage energy intensity of this sector in Samara region.

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