

The development of industrial infrastructure during the industrial modernization of Russia

Irina Yu. Gedgafova *, Zalina H. Shogentsukova, Genrietta A. Efendieva,
Svetlana S. Sijajeva, Janna M. Mirzoeva

*Kabardino-Balkarian State University Named After Kh.M. Berbekovrussia, 360004, Kabardino-Balkarian Republic,
Nalchik, Chernyshevskogo St., 173*

Abstract

The modern phase of the national economic and financial crisis clearly shows the world economy institutional transformation, increasingly reducing the competitiveness of the Russian industrial complex in particular. According to retrospective analysis carried out by specialists in techno-economic paradigms, this kind of changes occur primarily when the role of the dominant energy resource and, subsequently, the role of other production and infrastructure resources changes in all sectors, including industry. In this regard, the effectiveness of the aggregate production infrastructures of industrial enterprises, hereinafter referred to as the industrial infrastructure, is of theoretical and practical importance at the current stage of economic transformation, and therefore is an appropriate topic for a research. In this article, the authors tried to develop the theoretical issues of modern trends in the industrial infrastructure development, to define methods and mechanisms for its implementation. The article presents the structure of industrial enterprises infrastructure, identifies the problems in managing the production structure and suggests ways to solve the identified problems.

Keywords: *Infrastructure; Industrial Development; Modernization; Reproduction; Production Infrastructure*

1. Introduction

The world crisis observed today fits into an overall picture of change of long waves of an economic environment and replacement of the technological ways making their basis. Sharp growth and the subsequent, sharper falling of share indexes and energy costs is a characteristic sign of the structural crisis mediating replacement of technological ways.

The splash in the prices of the energy carriers dominating in way makes the most important element of the mechanism of replacement of technological ways. The similar phenomenon leads to sharp rise in price of costs of production and consumption of the developed productions and, respectively, decline in demand for their production. Costs of power products involve also costs of other infrastructure resources – logistics, repair of fixed assets and other. The falling of profitability of the production sphere happening at the same time attracts decrease in investments into development of production and concentration of the capital in financial sector. It attracts emergence and the subsequent crash of financial bubbles. The financial crisis which is followed by depreciation of the capital forces it to look for new spheres of application which center of gravity are innovations of new technological way. «The storm of innovations» paves the way to its formation – rise in innovative activity involves spare capital a new long wave of economic growth on the basis of expansion of the corresponding technological way.

2. Methodology

The methodological basis of work was represented by key requirements of system approach. During the research, such methods of

economic researches as abstract and logical, economical and statistical, monographic, experimental, settlement and constructive, economic-mathematical and some other were applied.

3. Results

3.1. Genesis of the concept «infrastructure»

It is not difficult to notice that the sharp increase in prices for oil happening in the current decade with simultaneous increase of financial speculation and emergence of financial bubbles at stagnation of the production sphere in the leading countries of the world represents a typical picture of ripening of structural crisis in a final phase of life cycle of the dominating technological way which reached a phase of a maturity. The rapid growth of prices of oil happening within seven years, gas and the electric power entailed the change of structure of the prices which broke the developed reproduction processes and stereotypes of consumption. At the same time, in full accordance with the theory the financial capital began to play the leading role in formation of a trajectory of further economic development. To the contrary, the industrial capital concentrated in traditional branches depreciated and lost ability to reproduction. Not incidentally for the last two decades the hypertrophied growth of financial speculation created feeling of domination of the financial capital over industrial. It is manifestation of release of the capital from technological sets of the outdate technological way which further expansion is not supported by the market any more. Information revolution in the financial sphere and elimination of a number of legal restrictions for carrying out speculative operations stimulated this process by creation of opportunities of infinite strengthening of speculative operations in the form of virtual transactions on an occasion of future obligations and the rights, starting

with oil contracts. The last played a crucial role as in formation of financial bubbles, unprecedented on the scales, and in synchronization of their growth with increase in prices for oil. This synchronization was shown also in the subsequent simultaneous crash of a global financial bubble and drop in oil prices which created the resonance which caused the global financial crisis. Simultaneous self-damage of a financial pyramid of obligations of the issuer of world currency, crash of a global financial bubble and the 28th related financial bank crisis, create the dangerous resonance fraught with disintegration of world monetary system. At all complexity of the current world crisis which some scientists and politicians already called system an exit from it assumes formation of new technological way. Its expansion will create a material basis for a new long wave of economic growth and will provide technological updating of the depreciation of the production capital which remained later, will inhale new life in the stopping productions due to their modernization and expansion of opportunities of development.

Very important subject in studying of world economy is that which is connected with a research of functional problems of Global infrastructure. This infrastructure realizes process of globalization in practice and provides the main forms of motion (goods, information, the capitals, energy, etc.) in world economy.

Separate interest (scientific and practical) represents regional aspect of this subject. Globalization opens, certainly, possibilities of the accelerated development. At the same time, a number of factors make also negative impact. Global infrastructure functioning involves in development those branches, economic complexes and the whole countries which are of interest to it, and ignores the others. These last falls into very difficult situation. Five former Soviet Central Asian republics are among such countries.

Before transition to identification of essence of production infrastructure of the industry as component of national economy, it is worth addressing definitions.

According to the <http://www.glossary.ru/> Internet dictionary the term «Infrastructure» formulated as connection of two Latin words *infra* and *structure* which translation can be designated as «below», «under» and «structure», «arrangement», it is possible to define as – «a complex of the interconnected serving structures or objects making and/or providing a basis of functioning of system». [2]

In the studied works of the 2000th years, in particular in dissertation researches Glushich N.G., Tregubovich I.V., Troshina A.S. [3-5], authors unanimously agree in opinion that the term «infrastructure» appeared in the western scientific literature only in the late forties of the XX century. In military terminology of the NATO alliance it designated a complex of rear constructions which provided action of shock military connections (warehouses of ammunition, food, regimentals, and also airfields, rocket bases, platforms for start of rockets). Soon, already by the beginning 50kh years the term accepted classical, the specified concept is higher, and entered a scientific turn of the countries of SEV by the end 50h. However, as the mentioned authors note, an economic perspective of essence of classical understanding of the term infrastructure political economic thinkers began to be engaged earlier. Authors mention as a fundamental principle - work of the American thinker John Maurice Clark – «Economy of social expenses» in which the author specifies that public costs for creation of goods are much higher, than costs of certain businessmen for production of these goods. The author of the specified work designated a difference between these expenses as «the public laid on capital», «the social laid on capital», and effect of its acquisition – «external economy». Researches of the social laid on capital (overhead capital) was that nutrient medium on which grew economic theories of infrastructure grew. The most extensive works in the field of a research of the social laid on capital were written in the sixties the XX centuries by A.O. Hirschman, P.Kh. Kurtner, A. Yangson. In the Soviet Union, these years the most significant works on this subject come out from such authors as M. L. Shukhgalter, B.Z. Milner, B. V. Vlasov, etc.

In a number of sources including from open access, it is possible to meet, the asked definitions of this term, for example such as «Infrastructure is a set of the branches, enterprises and organizations entering into these branches of the types of their activity designed to provide, create conditions for normal functioning of production and the address of goods and also activity of people. Distinguish a production and social infrastructure. Include in infrastructure roads, communication, transport, warehouse economy, external power supply, water supply, sports constructions, gardening, the enterprises for service of the population. Sometimes carry science, education, health care to infrastructure» [6]. As we see, here authors carry a concept of infrastructure as some production object of service trade. And it is not isolated case of this sort of terminological assumptions, for example in work of 1979 professor Chernyavsky formulates the term Infrastructure as «a complex of the branches of economy serving industrial and agricultural production: construction of highways, channels, reservoirs, ports, bridges, airfields, warehouses, power economy, railway transport, communication, water supply and sewerage, education, expenses on science, health care, etc.» [7].

In the most complete worked dissertation research where the theory of Production infrastructure from the author Glushich N.G. [8] is considered the author shows that in the Soviet economic thought there were two visions on understanding of essence of production infrastructure – the first of the directions, in the person of A.G. Mileykovsky, S.S. Nosov, G.V. Polunin, Yu.I. Rigin, G.P. Solyus formulated it from the point of view of structural and competence-based approach, and the second as a complex of the technical constructions and objects providing in a certain territory the uninterrupted movement of freights, people, information, energy. Or if it is expanded, in the first case it is the sum of different types of transport, power, the means of communication and water supply, and in the second are buildings and constructions where these kinds of activity function. Except the specified intrinsic distinction in understanding to production infrastructure there are also discrepancies in connection with dimension of the studied object. So, for the level of researches in the field of world economy, production infrastructure will represent system of the branches providing development and functioning of the world economy in general or trade, military, economic interstate blocks. For macrolevel, this object will be already defined as set of the branches providing effective functioning of national economy in general - for example power industry, transport networks and so forth. For the lowermost, a nanolevel, the level of the individual entrepreneur this infrastructure will be only a sum of leased premises and payment for housing and communal services.

3.2. Classification of production infrastructure

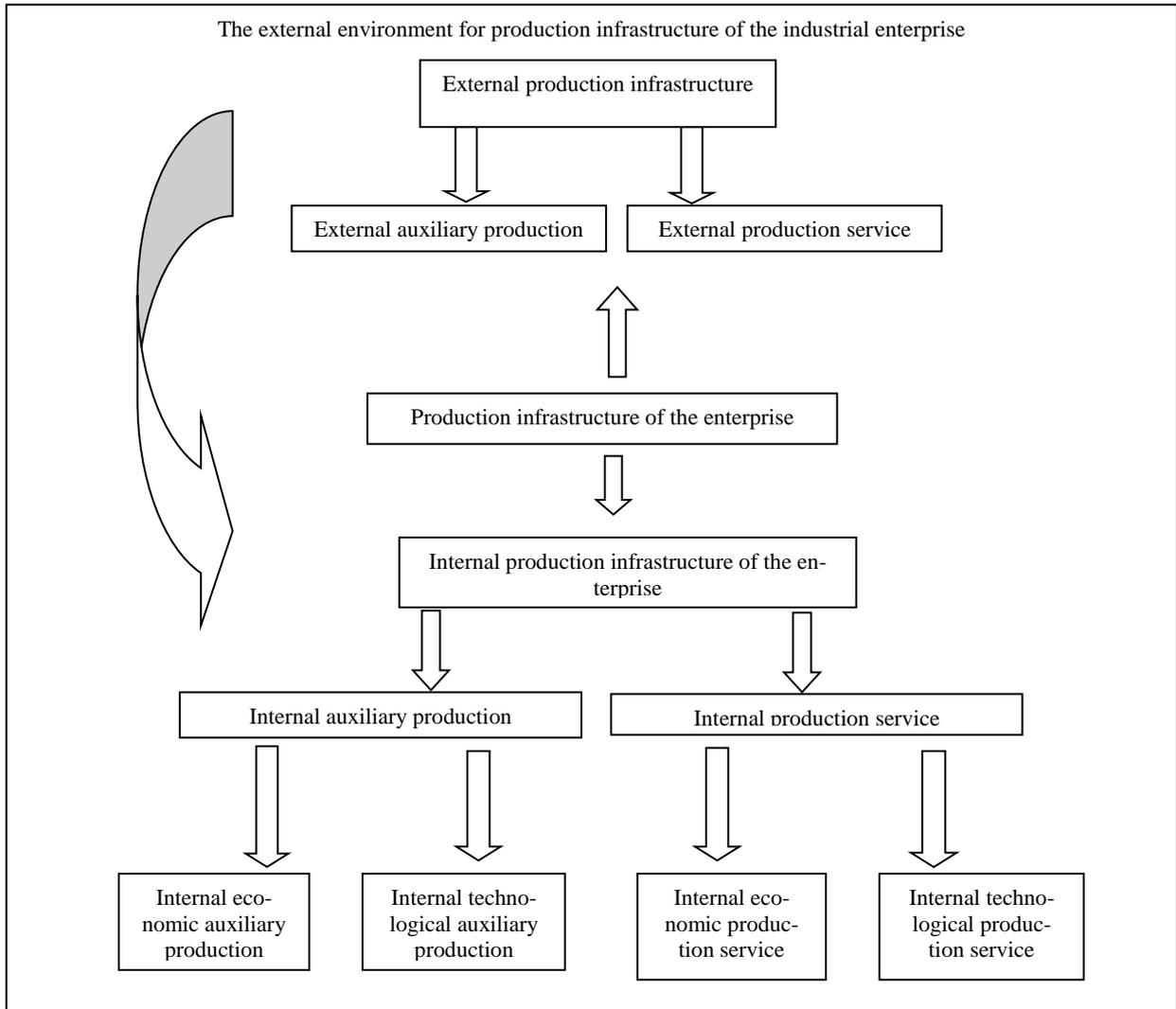
On the basis of the above, the author offers the following gradation of the production infrastructure concerning the size of an object located in table 1:

Within the real work the main applied character regarding a research is studying of questions in the directions macro - meso - (branch) and elements of micro economies. Within the specified direction It should be noted that production infrastructure of the industrial enterprise will be understood as set of the serving kinds of activity directed to creation of operating conditions of this enterprise. At the same time, within need of work authors enter also such term as production infrastructure of manufacturing installations as the sum of sets of the serving kinds of activity directed to creation of operating conditions of the industrial enterprises.

The general structure of production infrastructure of the industrial enterprise it was interesting and it is most truly presented in work as Filippova M.G. [9] and it is duplicated within fig. 1.

Table 1: Production Infrastructure Concerning the Object Size

Economy	Production structure	Production infrastructure
Mega-economy	Industrial complex of world economy, including within the WTO, EEU, the EU, Mercator	Interstate: transport communications, gas pipelines, communication lines, including information industrial function
Macroeconomic	Industrial complex of national economy	Electric networks, lines of communications, gas- and oil pipelines (pipeline transport) of federal level, national transport system, satellite communication of industrial function
Mesoeconomy	Regional and branch economies	Regional communication networks, interfactory branch and interindustry infrastructure facilities and companies
Microeconomics	Economy of the enterprise	Internal and external logistics of the company repair of the equipment and buildings of the organization, power engineering specialist of the enterprise, container and packing, tool departments and so forth.
Nano-economy	Economy of the individual entrepreneur	Housing and communal services

**Fig. 1:** Structure of Production Infrastructure of the Industrial Enterprise

Passing to the description of subsection of Production infrastructure of the enterprise - to auxiliary production, it should be noted. «Auxiliary production is the production intended for ensuring smooth functioning of the main production». Problems of auxiliary production are: repair of the power, transport and mechanical equipment; control instrumentation; repair of buildings, constructions and economic stock; acceptance, storage and delivery to shops of the enterprise of raw materials, materials and semi-finished products; providing enterprise with all types of energy; transport and warehouse economy. In use processing equipment is exposed physical and to obsolescence and demands continuous maintenance. Operability of the equipment is restored by its repair.

And, during repair the initial condition of the equipment has to not only be restored, but it is necessary and to improve considerably its main technical characteristics due to modernization. The essence of repair consists in preservation and high-quality maintenance of the equipment by replacement or restoration of worn-out details and

adjustment of mechanisms. The main objective of repair economy – to provide uninterrupted operation of the equipment at the minimum costs of a remontoobsluzhivaniye. This problem is solved by the national organization of routine maintenance of the equipment in the course of its operation for the prevention of the progressing wear and accidents, timely scheduled preventive maintenance of the equipment, modernization of the outdated equipment, increase in organizational technological level of repair economy. The main objective of power economy is reliable and uninterrupted providing the enterprise with all types of energy of the set parameters at the minimum expenses. The volume and structure of the consumed energy resources depend on enterprise capacity, a type of products, the nature of engineering procedures, and also communications with regional power supply systems. The task of power economy includes also implementation of service regulations of the power equipment, the organization of its maintenance and repair, holding the actions directed to economy of energy and all types of fuel, and

also actions for improvement and development of power economy of the enterprise [10]. Modernization and reconstruction of electrical facilities, and also input of the new generating capacities have to be carried out on the basis of new effective production technologies of the electric power. Achievement of optimum use of the existing platforms is possible due to installation on them the modern equipment of bigger power. Thus, development of power economy depends on allied industries, first of all, from power machine-building branch which functioning has to be aimed at ensuring the needs of power industry for the equipment and service conforming to the international standards of quality, efficiency and reliability at competitive prices. The structure of the auxiliary and serving productions includes transport economy. The transport economy serves production by vehicles on cargo transfer during production. The structure of transport economy depends on many factors, the following is basic of which: the volume of intra factory and external transportations, production type, weight and dimensions of the made production, level of the cooperated communications. These factors influence structure of divisions of service of transport economy of the enterprise. One more type of auxiliary production is the warehouse economy. It is intended for reception and storage of stocks of a finished product, raw materials, main and auxiliary materials, fuel, the equipment, spare parts, work in progress and other types of means and objects of the labor. The organization of warehouse economy includes establishment of necessary structure, the sizes, placement and equipment of warehouses, establishment of an order of acceptance, storage, a holiday and the accounting of the material resources in a warehouse ensuring their safety, control and obtaining information. Production of auxiliary production is generally consumed by shops and services of the enterprise. The role of auxiliary production in the conditions of a production intensification considerably increases and consists, first of all, in creation of conditions for modernization and reconstruction of the enterprises, increases in technical economic level of the main production. The research of efficiency of functioning of auxiliary production and development of programs of its development demands the accounting of change of both external, and internal factors, the majority of which are connected with uncertainty. It is the standard of discounting, initial capital investments, the price of the consumed resources, costs of production, inflation, level of energy consumption and others. The most important problem of development of auxiliary economy is development of optimum methodical base of an assessment of the investment projects implemented to shops of innovations. On the basis of indicators of an assessment of efficiency decisions on the choice of alternative options of re-equipment of non-productive departments, their modernizations and reconstruction are made.

3.3. Problems of management of production infrastructure

The main problem of management of production infrastructure of the enterprise for managers of an infrastructure complex, is need of finding of an optimum ratio in the services in criteria received from infrastructure – quality, reliability, speed and profitability. Despite importance of a question, in scientific literature the opinion concerning structuring this problem and its reflection in the theory of strategic management was not created. For the Soviet scientific thought in development of infrastructure of the enterprise (auxiliary production) decrease in expenses at not decreasing quality which could be reached only by unification was considered as a main goal, mechanization, automation of processes, and these processes were respectively possible to be made only at their integration in an interactor format. Respectively all strategic points of development of production infrastructure of the enterprises were left on a payoff of the common decisions of plenums of Party. The western and domestic Post-Soviet thought tries to reduce this perspective only to the theory of self-organization. According to this theory maximum efficiency for the enterprise from functioning of production infrastructure is reached only when exploitation of infrastructure facilities for the specified criteria is brought most closer to functioning in market conditions.

If in more detail, then for the Soviet scientists (questions of increase in effective management of production infrastructure of the industrial enterprises were considered in works of such prominent domestic scientists as Vlasov B.V., Karpov L.D., Oriyentlikher G.F., Shukhgalter M.L., etc.) [11-14] development of production infrastructure looked as follows: I - in process of production development the translation of subsidiary work from the basic to the auxiliary worker; II - formation among the sum of auxiliary workers of the shop (site) on performance of work of an infrastructure order; III - formation from the centralized works in shops on technical and economic service of the enterprise, so-called, general production auxiliary production from the beginnings of standardization, rationing, mechanization, automation and computerization of the performed works; IV - transfer of this production by functional parts or in the whole set to the large specialized third-party organizations, in connection with scale effect, i.e. transfer of auxiliary production to industrial rails.

In practice, the first two stages of development during the Soviet period were carried out almost in 100% option, with the third point there were already difficulties of an administrative order when works on service of the main production, for ensuring production efficiency, remained under the authority of managers of production of the main product. The fourth stage of development was not fully executed on one of branches of the national economy.

Thoughts of the Western theorists on teleologic development of structure of production infrastructure of an industrial facility among the checked scientific works us are not found, but according to the analysis of historical and economic literature, on practical development of this process, it is possible to formulate this development as follows: I - in process of production development the translation of subsidiary work from the basic to the auxiliary or service worker; II - formation among the sum of auxiliary and service workers of the shop (site) on performance of work of an infrastructure order; III - formation from the centralized works in shops on technical and economic service of the enterprise of management for operation of production infrastructure (facility-management). The main task of this management is control of developments of production infrastructure of an object, for more effective development of the object, regardless of integration or disaggregation of services of management of infrastructure.

In socialism, political economy in questions of an assessment and increase in efficiency of functioning of PI among the main indicators it is possible to list the following (as reduction of their importance):

- 1) A share auxiliary (own, infrastructure) workers in the total amount of industrial and production personnel of the enterprise;
- 2) Extent of mechanization and automation of PI;
- 3) Specific indicators of transfer of auxiliary works to the third-party specialized organizations;
- 4) Quantity and extent of equipment downtimes and the main workers because of auxiliary workers;
- 5) Level of introduction of programs of technical rationing of infrastructure works at the enterprise;
- 6) Level of costs of service of production in product cost.

Now in the theory of the matter the indicator of «the level of expenses», according to the author, has to become fundamental. During the Soviet period of development at most the enterprises these costs of infrastructure were made, as a rule, by own forces of the organizations. This phenomenon was considered negative in connection with its economic inefficiency and was exposed to criticism throughout all the 20th century, in practice the situation did not change up to crash of the USSR.

A number of theorists of the matter by the beginning of the last decade the XX centuries assumed that laws of the market will be able to solve this problem within several years of «young capitalism» if to laws of planned economy, it appeared not in power. However, during the modern period, according to calculations of a number of scientists, restructuring of these processes, especially in the province, did not accept large-scale character. The main reason for the events should be considered mistrust of industrial producers to

third-party representatives concerning a possibility of providing infrastructure services with necessary quality, efficiency and cost. It is necessary to create such model which would allow to transform without serious consequences management of production infrastructure at the industrial enterprise.

For the solution of the put problems in large volume questions territorial vertically and horizontally the integrated structures (on an example, the cluster principle of creation of the enterprises) and their production infrastructures are entered. Within similar introduction some kind of production infrastructure of the integrated economic structure which can be designated as «set of the works and services of infrastructure character aimed at effective providing efficiency of participants of the integrated economic structure» will be created. Purpose: Effective development of the enterprise of the Condition of effective development of the enterprise: - maximum conditional and annual economy; - preservation of quality indicators of the final product.

Ways of achievement of effective development of the enterprise:

- Intensification of use of infrastructure potential;
- Vertical and horizontal integration of economic structures [15], [16].

Ensuring dynamic process of complex change of a condition of the industrial enterprise at transformation of management of its production infrastructure. Specification and expansion of the concept «effective development of the enterprise» has to be formed through definition of conditions of effective development of the enterprise. In article conditions of effective development of the enterprise are understood as the following: maximum conditional and annual economy and preservation of quality indicators of the final product. Performance of two of these conditions are necessary for effective development of the enterprise.

- Achievement of this purpose is based on a basis
- Intensifications of use of infrastructure potential
- Vertical and horizontal integration of economic structures.

4. Conclusions

Effective development of the enterprise at observance of these conditions will provide dynamic process of complex change of a condition of the industrial enterprise at transformation of management of its production infrastructure. Summarizing the pro-analyzed theoretical and methodological thematic material, it is worth specifying and expanding theoretical essence of the economic concept «effective development of the industrial enterprise» considered from the point of view of transformation of management of its production infrastructure and defined as dynamic process of complex change of a condition of the industrial enterprise on the basis of an intensification of use of infrastructure potential, and also through vertical and horizontal integration of economic structures for the purpose of receiving the maximum conditional and annual economy without decrease in quality indicators of the final product. As criterion for evaluation of efficiency of transformation of management of production infrastructure of the industrial enterprises reflecting the main indicators of development of the enterprise it is offered: level of a share of costs of service of production in cost of products of rather last years, average on branch in the region at the level of an assessment of quality of the provided services.

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