

*Engineering*

## Priorities of Development of Building Science in Transition to Market Economy

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**ABSTRACT.** The declared demand for the economy of building materials with strict requirements and accordingly restriction of standards yielded a paradoxical result. The height of storeys, floor space, auxiliary premises etc. were reduced. It was a wrong policy that led to discomfort and loss, bestowing doubtful benefits on industrial building. This article is devoted to the solution of this problem. © *Bull. Georg. Natl. Acad. Sci.*

**Key words:** *industry, construction, technology, concrete panel construction.*

Construction today faces many problems. Attention in this paper is focused on the development of building science and its priorities, in particular, at the time of transition to market economy.

Building science is of applied character and its purpose is to provide output of quality products as cheaply and quickly as possible, without restriction of their functions and reliability requirements.

Structural mechanics studies the requirements of various character that should meet the operational conditions of the facility by minimum consumption of materials. It does not consider the consumption of power resources and processing, which was even unnoticed, as in the Soviet period remuneration of labour and cost of power resources had no impact on the market economy prices, they were appointed arbitrarily and were too low. Therefore if a scientist or designer tried to reduce these two components of project cost, no considerable effect would be reached in the final analysis. It was caused by negation of technological researches and accordingly the low developmental level of this speciality. As a result we today have no composite materials, flexible and energy-saving technologies, etc.

On the opposite and reasonable side there are countries where building business has been operated by professionals, who have not rejected industrial building, and

on the contrary, have made it extremely effective and large-scale. In particular, researches have continued on the perfection of industrial construction engineering [1-2]. Some studies are devoted to good lay-out of floorage, to more comfort, variety of two-storeyed planning, to application of duplexes and so on. But, on the other hand, their activity has been directed to introduction of flexible technologies, which has essentially reduced the cost of floorage per square meter. It should be noted that, unlike ours, the building industry in those countries has not been destroyed and ruined; on the contrary, it has been transferred to the staff at symbolic prices. Reasonable protection policy has been carried out in relation to them at low-percentage crediting and as a result considerable economic benefit has been reached.

Many assumed that the time of industrial building had come to end owing to the limited lay-out and faded architecture. In confirmation of this examples are listed of luxury villas being built on private orders, without resource to building production.

To return to the basic theme, to the question of development of building science, as noted above, idolization of the question of economy of materials has caused a number of negative deviations in the development of building science. The minds of hundreds of talented re-

searchers and engineers are directed to questions of the economy of building materials. Therefore only structural mechanics has considerably developed in this country.

Search for possibilities of economy of building materials has almost become a norm. It is impossible to achieve any considerable economic benefit by massive application in construction of new progressive constructional processing and having improved parameters of building materials, and perfection of calculation methods. The accent should be transferred to the development and introduction of new constructional processing.

Today accents should be made by building science when there do not exist any co-coordinating bodies of the field, the ministry of urbanization and construction is abolished, as well as the Gosstroy and a number of building research and design institutes. I welcome the doing away with bureaucratic, hierarchical organizations, but I cannot agree with the de-industrialization of construction. On the other hand, tendencies of growth of payment for labour and the prices of power resources are becoming appreciably stronger. This will by all means cause, in the near future, a considerable rise in the price of construction which is already felt.

It is clear that proceeding from the aforesaid there is one answer - the market will regulate everything, but when, due to competition, the market demands progressive production of building business, the country will have no more labour resources to release for this production.

At present building science still exists, being accumulated at the Georgian National Academy of Sciences and Engineering Academy, Technical University and still functioning research and design institutes.

Therefore there is the case for competitors for scientific degrees who desire to work for the perfection of research, design and technological work, forming the basis for obtaining the degree of bachelor, master or doctor.

The accent should be made on the correct choice of the theme, the task of work or the economic benefit from carrying out definite work. The competitors may be asked the first and obligatory question, as to what economic benefit is reached as a result of the novelty proposed by them. Focusing attention on the question is trivial and not new, but transition to market economy makes it highly urgent.

Naturally, the choice of correct reference points for quantitative estimation is easier to approach for the manager than the executor. Therefore first of all it is necessary to enhance the responsibility of the manager. For this purpose discussion and confirmation of the analysis and plan of work should be held at a high level and before a wide audience.

For the orientation of building science development today the activation of search for progressive technologies

and new composite materials developed on local resources as never before is required, which is almost completely motivated by the engineering and scientific personnel.

Some believe that technological service has not been abandoned in Georgia, that the construction of each facility is attended by the development of projects of work production technology and organization, but the error consists in the fact that technology is discussed when the destiny of the structure or facility is already solved by the designer. Therefore it is necessary for the architect or designer to understand before drawing up a project that for the construction of a unique building or complex the architectural part is less important, interaction of design and technological parts – especially at mass civil, industrial, hydraulic engineering construction and at construction of many other facilities – is a necessary condition for the achievement of the maximum economic benefit.

Market economy requirements at the present stage of development when, unfortunately, de-industrialization of the building complex has occurred, pose questions of reasonable deployment of building processes and operations scattered in time and space, to which mechanization, automation and robotization, which will positively influence quality, considerably reduce labor and power expenses and contribute to the general efficiency of construction.

Such versatile and complex approach is technological business and its profile; therefore it is necessary to transfer the basic accent to development of the above-noted directions of building science.

The formula to build cheaply, quickly and qualitatively operates with identical success in the case of any economic and political formation. Here the word “building” is used in a broad sense and includes the process of manufacture of any material product.

If the cheapness criterion functions from the viewpoint only of building mechanics that underlies designing and is its theoretical basis, then two constituent parts of the cost of production are left out of consideration: labor expenses and power expenses. Now, the production cost is made up of the sum of expenses on material, labor and power. I say nothing about the formula requirement – quickly and qualitatively, the fulfilment of which devolves on technologies alone.

I am not simplifying, but am well aware of the value and price of deformable body mechanics; however, the science of “know-how” is not of smaller value, which is necessary for pushing to the form methods of optimization of technological processes including the criteria of efficiency, with their independent variables and restrictions in the form of equalities and inequalities which finally create the model of the system under investigation. Creation of this model is the most expensive stage of op-

timization, as experts of demands know well, the system under investigation is capable of a complex solution of building problems.

If we take into consideration the present situation of the country when the number of refugees has

increased by tens of thousands and there is an urgent necessity of building 6000 houses whose total floor space makes up at least 300000 square meters, we try to find the way to cope with it, using new technologies.

*საინჟინრო საქმე*

**სამშენებლო მეცნიერების განვითარების პრიორიტეტები საბაზრო ეკონომიკაზე გადასვლის პერიოდში**

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სამშენებლო მასალების ეკონომიაზე გამოცხადებულმა მკაცრმა მოთხოვნებმა და, შესაბამისად, ნორმატიული დოკუმენტების შეზღუდულობამ, პარადოქსული შედეგები მოგვცა თავისი შინაარსით. შემცირებულ იქნა სართულის სიმაღლე, საცხოვრებელი ფართი, დამხმარე სათავსოები და სხვა. ეს იყო ყოვლად მცდარი პოლიტიკა, რომელმაც გარდა დისკომფორტისა და ზარალისა, ცუდი სამსახური გაუწია მთლიანად ინდუსტრიულ მშენებლობას. სწორედ ამ პრობლემის გადაწყვეტას ეხება ეს ნაშრომი.

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