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FORMULATION OF PREREQUISITES FOR THE FORMATION OF QUALITY ASSURANCE SYSTEM FOR CONSTRUCTION PRODUCTION IN THE REPUBLIC OF LITHUANIA

J. Parasonis

1. Introduction

After the restoration of independence of the Republic of Lithuania, the whole of its economy management system is being reorganized from the command system into market-based conditions. The building construction branch is also being restructured in the fields of its industry and objects under construction. The goals of managing institutions of the branch, the sphere and directions of their activities also undergo changes. The former construction quality control system, owing to the reasons mentioned above, is now functioning inadequately, and the new one is still in the stage of formation. Lately, the quality of projects has distinctly fallen down, as after the crumbling of large designing institutes and appearance of many small designing enterprises the building designing as well as a considerable part of construction contracting became unmanageable for state institutions. The customers for the lack of their own competence, and especially now when advantages and shortcomings of the newly set up construction enterprises have not cleared up, are at a loss to find their orientation. So, the more frequent become cases when enterprises fall victims to unqualified work. Complication of the situation is also aggravated by the fact, that while a considerable part of quality-regulating normative documents from earlier times is still in force and new ones are appearing, very often neither of them are observed.

Besides, under market conditions when specific weight of private sector in building procurement process is constantly increasing, it is very important together with state quality control institutions to form and develop non-state institutions (acknowledged and legitimated).

This paper gives an analysis of the present situation of quality control at different stages of building procurement process in the Republic of Lithuania and also looks into the participants of the process and their functions (responsibility). The prerequisites for the formation of quality assurance system for construction production have been formulated on the base of this material as well as on experience accumulated in the United Kingdom and Denmark.

2. Main causes of defects

Construction quality investigation in the countries of the former USSR and Middle Europe indicates that the reasons of defects and violations of buildings' bearing structures are the following:

- 41% - at brief and designing stages, including:
 - 41% - calculation and dimensioning errors;
 - 15% - wrong estimation of loads and effects;
 - 28% - wrong selection of structural arrangement;
 - 16% - incompatibility of some engineering solutions and separate project parts.
- 31% - at construction stage, including:
 - 77% - inferior quality of materials, manufacturing and erection inaccuracies;
 - 16% - deviations from project requirements;
 - 3% - faulty organization of work;
 - 4% - faulty storing and transportation.
 - 28% - faulty maintenance and unforeseen circumstances, including:
 - 30% - corrosion;
 - 27% - shocks, vibration;
 - 12% - overload factors;
 - 6% - climatic impact;
 - 6% - underwashings, breakages;
 - 19% - unknown properties of materials.

The above statistics cover a comparatively narrow field of construction (though a very important one, because the mentioned defects often cause breakdowns) and cannot be extended over the whole production of construction. But there are more general data indicating that 2/3 of all defects in construction can be accounted for of construction and erection work, and this gives quite close confirmation of the above data.

Further analysis of construction quality control is carried out according to the stages of building procurement process in chronological order of their realization: project brief ⇒ object designing ⇒ object construction ⇒ object maintenance. The participants and their responsibility to quality control is discussed at each stage.

3. Brief stage

The participants of brief stage and their functions in quality assurance are shown in Fig 1. There are 3 main participants at this stage: the customer, consultants and state institutions. Naturally, other participants are also possible at this stage. For instance, if the designing organization is known in advance, so it can manifest its activity already in the brief stage.

The most important task of the customer at brief stage is correct formulation of his aims and aspirations. In most cases the customer has only the idea. Hence, he uses the services of consultants for the formulation of goals and forecasting calculations of project realization. Such a practice is now constantly increasing in extent, and this, undoubtedly, serves for the sake of quality.

It is very important that the customer correctly assesses his own financial capabilities and foresees ways for the search of potential investors. This is a very important event in at brief stage because its correct solution practically decides the success of the project. The customer at this stage needs the help of experts. They prepare the so-called business plan of the project which shows profitability of the project, its vitality, payback capability and, finally, its expediency.

Evidently, in the conditions of the Republic of Lithuania it would be worth adopting the practice used in the United Kingdom and Denmark when the owner (customer) hires a manager for the realization of the whole project. The project manager represents the interests of the customer from brief stage to the end of construction. There also exists a universal practice of another kind: private firms, authorized by owners (actual project customers), specialize themselves in the execution of customer's functions. Both of these forms are acceptable for our country.

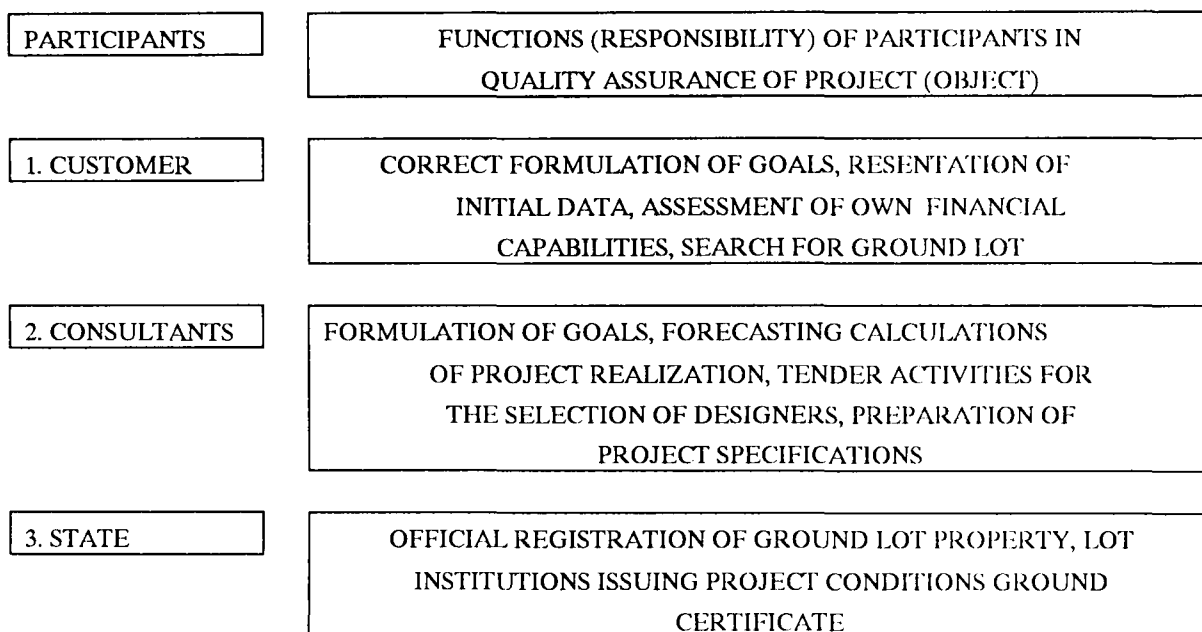


Fig 1. The participants of brief stage and their functions in quality assurance

4. Designing stage

As it has been mentioned before, even 41% of errors falls on brief and the following (designing) stages. That is why the selection of a designing organization is so important. It should be noted that in the Republic of Lithuania the selection of designers for larger objects by the way of tender is constantly growing in extent. The customer, naturally, also uses the services of consultants.

Having determined project goals, performed necessary market research, carried out forecasting economical calculations and selected a designing enterprise, a fair possibility arises for correct preparation of project specifications. Namely here begin customer's immediate contacts with State institutions. The ground-lot problem at this stage should be already cleared up. The customer together with project specifications must hand over to the designers also the project conditions and ground lot certificate.

The main participant of designing stage (see Fig 2) is the designing organization. Its activities determine the quality of the object. However, the level and forms of designers' cooperation with the customer also exert influence on quality. It is necessary to note that larger firms have possibilities to hire corresponding specialists, the so-called project managers, whose duty is to keep constant contacts with the designers. Such a practice has begun to be used in the Republic of Lithuania and, seemingly, will acquire a wider extent in time. At present, more frequent are cases when designing quality is controlled by means of expertise. However, this is mostly done in objects financed from state budget.

It can be ascertained that under new conditions in the Republic of Lithuania the state monopoly in project expertise is gradually vanishing, and other enterprises, having been granted this right, are appearing. This also serves for the sake of quality.

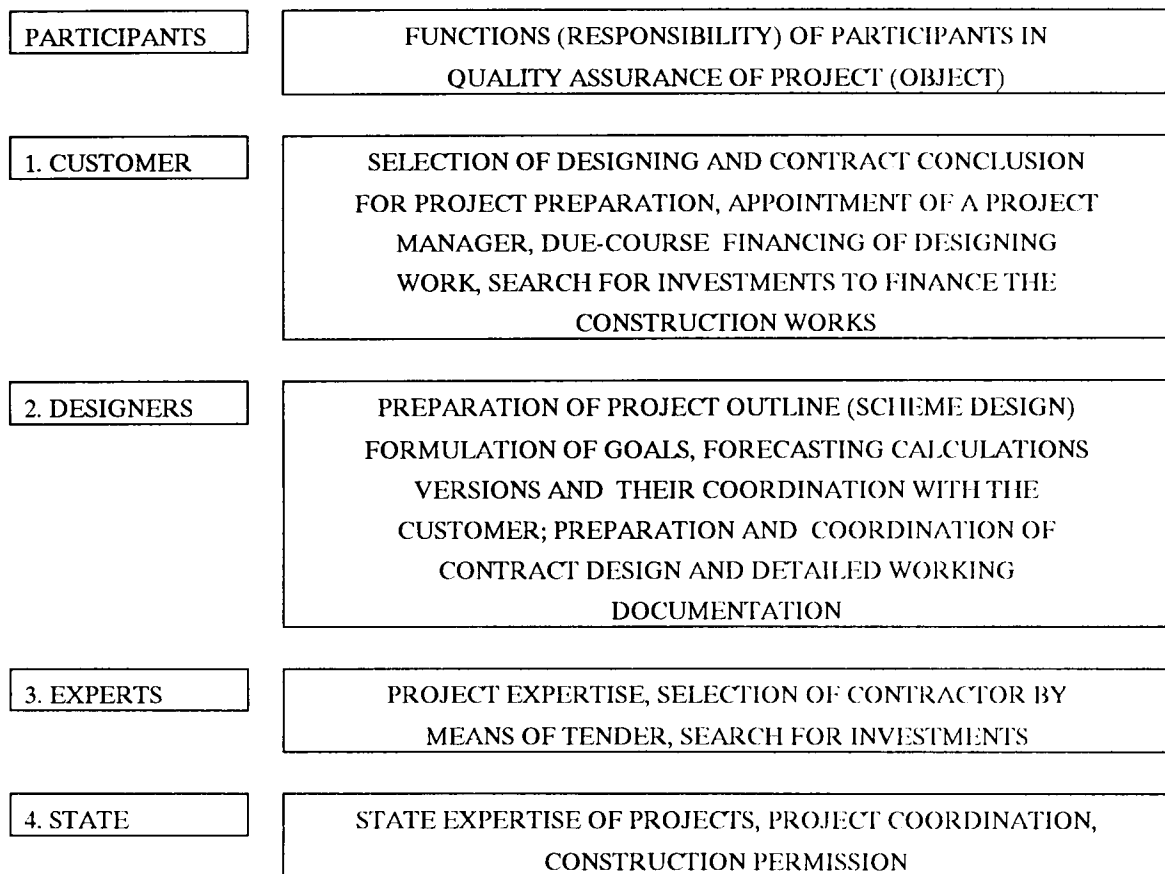


Fig 2. Participants of designing stage, their functions in quality assurance

Having concluded a contract with the designers and appointed a project manager, the customer together with experts can focus his attention on the selection of future contractor and, what is most important, on the search of investments. Project cost, technological, technical and other object functioning conditions grow clearer in course of designing stage, so the economical calculations can be reworked on more precise base and intensive search for investment sources carried on.

At designing stage, the main function of state institutions in project quality assurance is the coordination of the project.

As constructional and technological wazzu peculiarities of the building are cleared up, the customer together with experts, practically at designing stage possessing not only project outline (or scheme project), gets a possibility to conduct a tender action for the selection of a contractor.

5. Construction stage

Having approved the coordinated and endorsed project, the customer makes his final decision concerning the contractor organization and concludes with it a contract. This done, he starts the construction stage. Naturally, the main participant at this stage (see Fig 3) is the contractor. It is his actions that decide the quality of the object. A considerable role, however, is played by technical supervision carried out by the customer. As mentioned before, a specific problem of this stage is the fact that even 3/4 of defects in construction stage are caused by the use of materials and products of inferior quality. This stresses the importance of inspection of used materials and products in which state institutions appear together with the contractor and the customer.

It is necessary to remark that under new conditions this problem is gradually fading away as the expanding market of imported materials and products constantly widens the possibilities of choice.

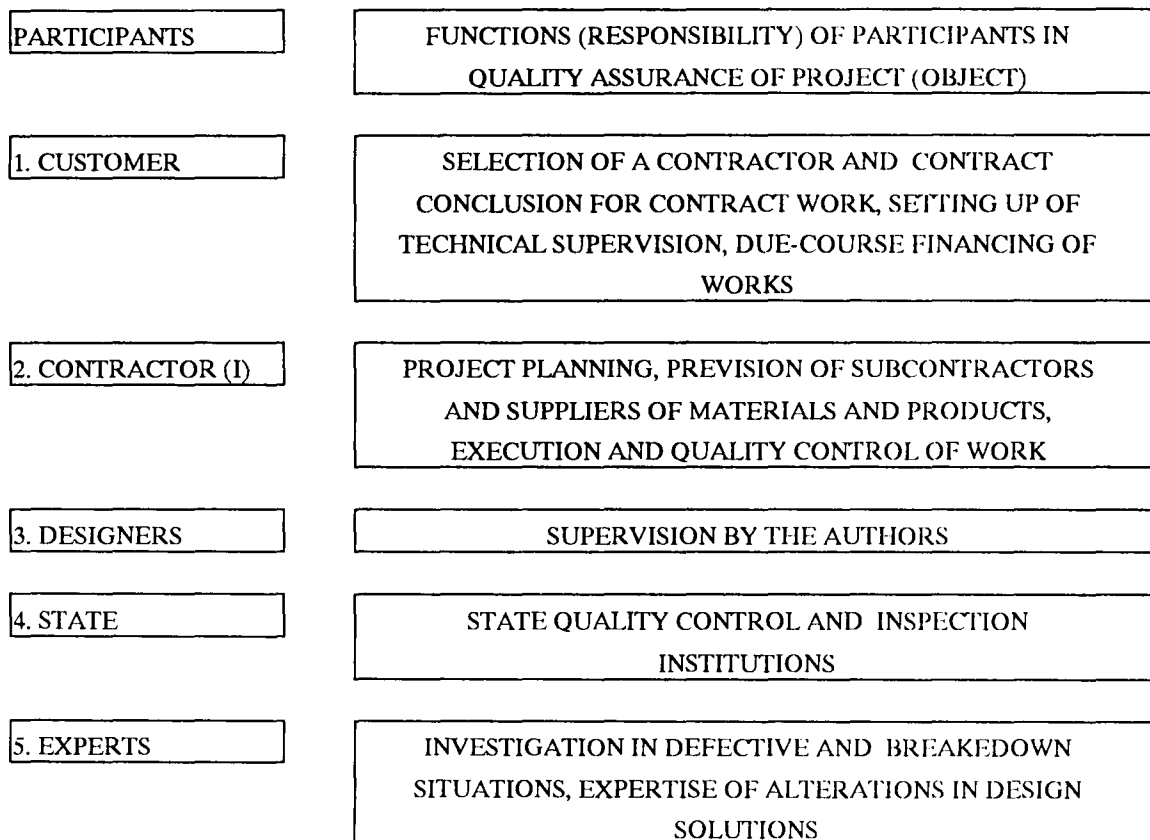


Fig 3. Participants of construction stage, their functions in quality assurance

In our opinion, quality assurance at this stage in the Republic of Lithuania is the matter which is neither systematized nor ordered. State institutions join in only in controversial cases when the defects are already revealed. So far the problems of materials and products certification are not solved yet. Only the first steps are taken in the creation of normative base for quality assurance of materials and products. Therefore at present such a great role is played by consultants. Naturally, the supervision by authors, when it is performed, also serves for the sake of quality.

In our opinion, it would be worth gradually introducing in the Republic of Lithuania the construction quality auditing system. It should be a non-state independent institution, but acknowledged and authorized in the construction branch. The expenses for this purpose should be included in project cost. In countries where construction quality problems are not so acute as in Lithuania, the quality auditing practice of construction production is existing and justifying itself.

There are specialists in Lithuania having ample experience in the investigation of defective and break-down situations, in consolidation of project preparation, in quality control of construction production (products and structures) and in diagnosis of buildings under construction as well as of finished buildings (buildings in use). However, they are neither united nor officially registered in legal sense. The SPS centre laboratory for the testing of structures could be mentioned here as a good exception, however, when orientating it to the discussed problems, it should be extended and supplied with appropriate technical equipment.

6. Maintenance stage

At maintenance stage (see Fig 4), quality of the object and its longevity mainly depends on the customer. If the customer carries out technical maintenance of the building, takes care of its proper use (especially avoids overloading the bearing structures), eliminates petty defects in due time and takes experts' advice in more serious cases, there will be no additional worries on account of quality.

Different situation arising in case of buildings serving for different purposes should be mentioned here. For the survey of industrial objects in the Republic of Lithuania there have been issued Lithuanian norms RSN 148-92 "Regulations for Survey and Technical Maintenance of Industrial Buildings". There are no such regulations for buildings intended for other purposes. The situation is especially complicated and eventually is getting even worse in regard to dwelling houses. The flats in the Republic of Lithuania are by 95% privatized, but flat communities are setting up very slowly. That's why commonly used premises (staircases, boiler rooms, roofs, fronts etc) were left under nobody's care and are looked after only in case of serious defects.

Briefly about quality assurance normative base in the Republic of Lithuania. At present the Building Law is not passed yet, and the old Fundamental Building Regulations are still in force. There exists only a draft version of Territorial Planning and Construction State Normative Control Regulations. These facts alone are enough to assert that the construction branch in Lithuania, including its quality control, is still lacking the necessary normative base. But separate stages of building procurement process are partly provided with norms. A number of recommendations are in force for brief stage; norms of the former USSR are temporarily in force in design and construction stages, but they are being gradually replaced by new ones. In force are the following and other normative documents: State Project Supervision Regulations, State Supervision Regulations for the Construction and Maintenance of Buildings, Authors' Supervision Regulations.

The quality of building maintenance could considerably be improved by Danish practice when customers, taking over finished buildings for use, receive Maintenance Instructions.

7. Prerequisites for quality assurance of construction production in the Republic of Lithuania

It can be seen from Fig 5 that in the Republic of Lithuania, while managing construction under new conditions, the necessary non-state institutions have not almost completely been formed yet.

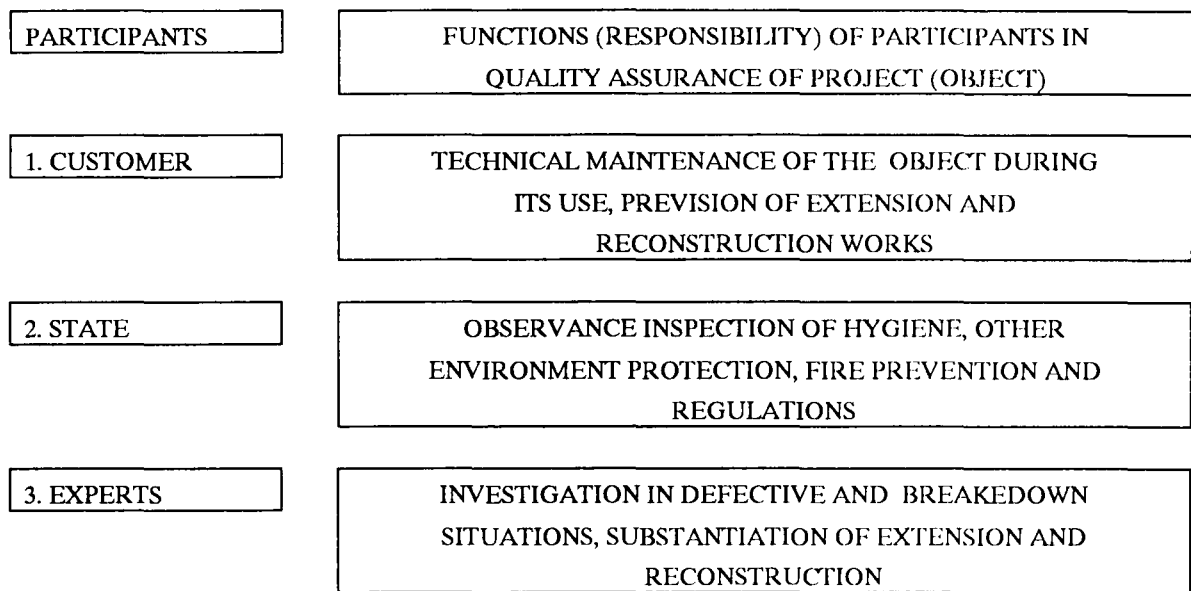


Fig 4. Participants of maintenance stage, their functions in quality assurance

The construction quality control and assurance system in the Republic of Lithuania is still in the stage of its formation. Fig 5 shows the participants of building procurement process directly exerting (or able to exert) influence on the quality of production.

Their formation is especially important when more and more construction enterprises are being privatized and private financing sources are constantly increasing their weight in building procurement process. The former directive quality control of state institutions should gradually transform itself and pass over mostly to the methods of regulation; quality formation and assurance should become in time the care of enterprises directly manufacturing construction products and quality control - the care of non-state institutions.

It is necessary to prepare the normative base in the Republic of Lithuania. The Bill of Building Law and of Territorial Planning and Construction State Normative Control Regulations have been already prepared. Evidently, in the sense of normative provision the brief and designing stages are better off. A number of norms and regulations of the former USSR are provisionally in force for the execution of works at construction stage and for the manufacturers of products and structures. However, in most cases these documents need adaptation. It has been already mentioned that maintenance stage also lacks full provision of norms.

Lithuania is preparing itself for the certification of construction production. This also calls for corresponding norm provision; and in organizational sense it is necessary to call into being a new independent non-state institution, the Certification Centre.

The appearance of construction quality audit in Lithuania can be, apparently, initiated by the preparation and passing of corresponding legal acts. As it has been mentioned above, the Republic of Lithuania possesses the potential necessary for qualified execution of the job.

A complex approach is therefore necessary in the formation of quality assurance system for construction production. It is necessary to prepare legal, economical and technical-technological norm provision. Appropriate managerial (organizational) solutions are necessary in the same plane, so it is necessary to form and develop the activities of corresponding institutions. This requires a considerable expenditure of labour, so the experience accumulated in other countries should be used without fail.

Surely, the assurance of construction production quality would be more efficient, if a mechanism of financial insurance of all participants of the building procurement process was created in the Republic of Lithuania.

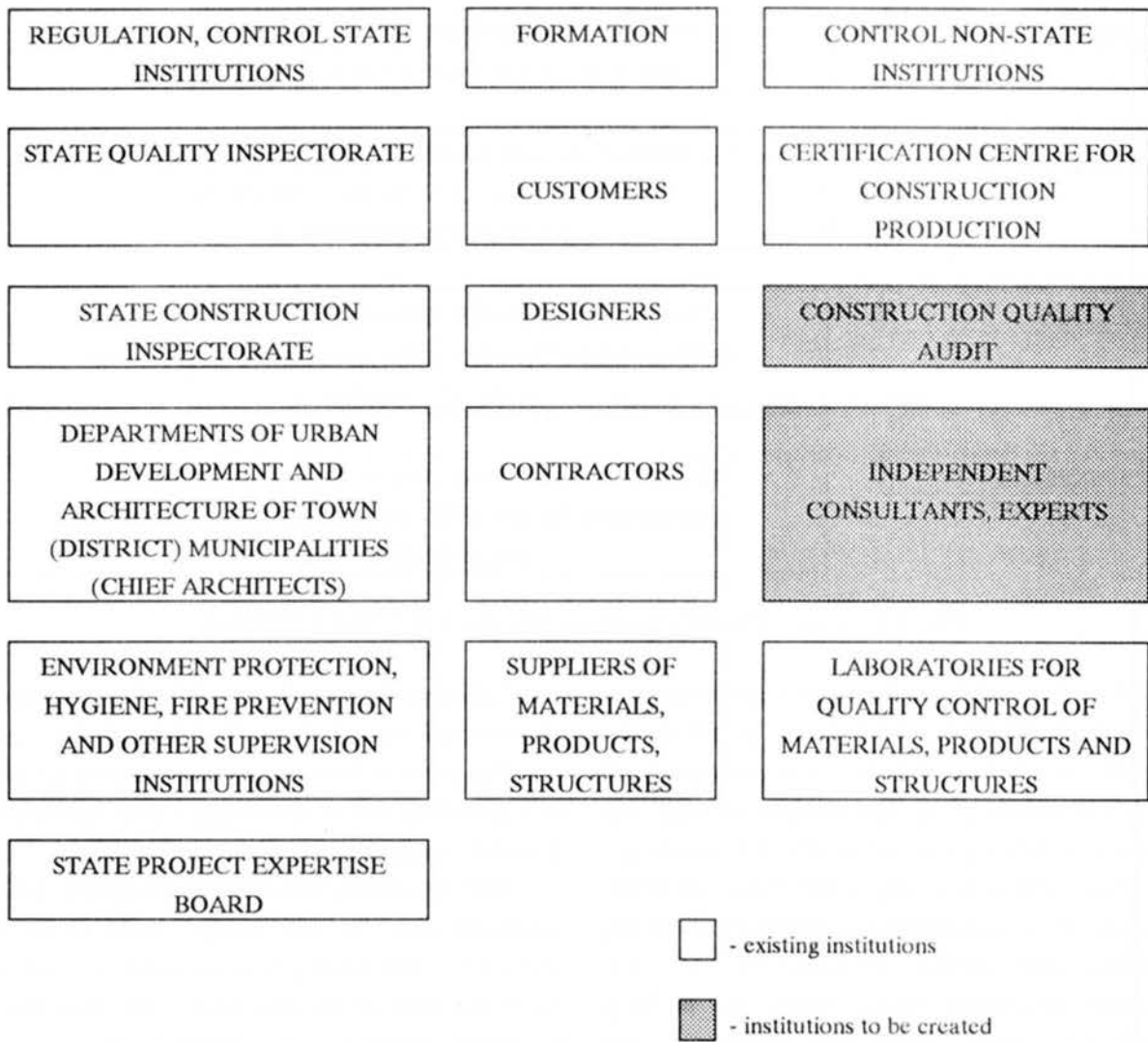


Fig 5. The functions of building procurement process participants in quality assurance of construction production

Developing this topic, it would be worth accumulating a database intended to find out the differences between the construction quality assurance systems of various European countries as well as of methods used for the search of inferior-quality causes. The same can be said in the sense of normative basis and organizational structures. This would enable a well-founded consideration of peculiarities prevailing in the Republic of Lithuania. Surely, while looking into the experience of European countries, it would be worth accumulating a database on quality assessment criteria. This would later enable, having assessed specific features in the Republic of Lithuania, to prepare an efficient our own database on quality assessment criteria.

Naturally, the realization of construction production certification is not possible without technical equipment of laboratory basis on a level meeting the requirements of international standards.

Įteikta 1997 01 10

STATYBOS KOKYBĖS KONTROLĖ LIETUVOS RESPUBLIKOJE

J. Parasonis

S a n t r a u k a

Straipsnyje nagrinėjama statybos produkcijos kokybės kontrolės būklė šakos restruktūrizavimo laikotarpiu. Aptariamos pagrindinės avarinių ir defektnių situacijų priežastys įvairiose investicinio proceso stadijose (tikslai - projektavimas - statyba - eksploatavimas).

Statybos produkcijos kokybės užtikrinimas nagrinėjamas taip pat pagal investicinio proceso stadijas. Aptariami kiekvienos stadijos dalyviai ir jų atsakomybė atliekant kokybės kontrolę.

Tikslių nustatymo stadijoje galimi 3 pagrindiniai dalyviai: užsakovas, konsultantai ir valstybės institucijos. Pažymima, jog teisingam savo idėjos formulavimui, finansinių galimybių įvertinimui užsakovui tikslinga naudotis konsultantų paslaugomis. Šios stadijos pagrindinis produktas yra projektavimo užduotis. Valstybės institucijų vaidmuo šioje stadijoje - žemės sklypo valdos įforminimas, projektavimo sąlygų bei sklypo paso išdavimas.

Projektavimo stadijos svarbiausi dalyviai - projektuotojai. Būtent jų kvalifikacija ir bendradarbiavimo su užsakovu lygis bei formos lemia projektavimo dokumentų kokybę. Pažymėtina, jog Lietuvos Respublikoje pradedama praktika užsakovui skiriant atstovauti savo interesams vadinamąjį projekto vadybininką. Šioje stadijoje valstybės institucijų pagrindinė funkcija, užtikrinant projekto kokybę, yra projekto derinimas.

Statybos stadijoje užtikrinant produkcijos kokybę pagrindinis vaidmuo tenka rangovui. Tačiau kokybei turi įtakos ir kiti dalyviai: techninė priežiūra, autorinė priežiūra, valstybinė ir inspekcinė kokybės kontrolė, ekspertai. Pažymima, jog būtent šioje stadijoje kokybės užtikrinimas Lietuvos Respublikoje nėra susistemintas ir sutvarkytas. Valstybės institucijos įsitraukia tik ginčytiniais atvejais, kuomet defektai jau išryškėję. Formaliai vykdoma techninė, dažnai ir autorinė priežiūra. Siūloma šalyje laipsniškai įvesti statybos kokybės auditą (nevalstybinė nepriklausoma institucija, pripažinta ir juridiskai įteisinta).

Eksplotacijos stadijoje kokybė, statinio ilgalaikiškumas daugiausia priklauso nuo užsakovo (vartotojo). Nagrinėjamas skirtingas įvairių paskirčių statinių norminis eksploatavimo stadijos aprūpinimas.

Straipsnyje siūloma statybos kokybės užtikrinimo sistema Lietuvos Respublikai, esanti formavimosi stadijoje. Akcentuojama nevalstybinių institucijų formavimosi svarba, laipsniškas perėjimas nuo direktyvinės kokybės kontrolės prie reguliavimo metodų. Kokybės formavimas bei užtikrinimas laike turėtų tapti statybos produktus tiesiogiai gaminančių įmonių, o kontrolė - nevalstybinių institucijų rūpesčiu.

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