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## **INSTRUMENTS TO SUPPORT DECISION COMPETENCIES OF AN INVESTMENT PROJECT MANAGER**

### **Abstract**

*From among many competencies of a manager, the abilities of team, project and organization management become especially important. However, to make right decisions, one needs to have appropriate tools supporting effective company management. In case of companies carrying out investment, modernization or innovative projects, it is especially important. Implementation of those projects takes place in various conditions resulting from changing and turbulent environment. Thus, if the manager does not have sufficient information support, provided in time and allowing for effective decision making, which mitigates negative effects of previous actions, he is basically doomed to failure. In such a case, what decides about the situation in the project execution process is a coincidence, not intentional actions of the staff, based on their knowledge about potential risks. Such a knowledge, gained early enough, allows for taking more effective corrective actions. This paper is an attempt to define an operational model of a company along with principles of monitoring actions of an enterprise that carries out projects and functions in the current economic situation, illustrated by an example of a construction company. Its implementation is supposed to provide the managing staff with stores of information that efficiently support the company management process.*

### **1. Introduction**

During last few years a number of projects co-financed from the resources of the European Union were carried out in Poland. Many of them were significant investments in the country's infrastructure and the development of innovative Polish economy. Those investments, aside from positive effects, showed many weaknesses in the functioning of domestic companies. Some of investment projects turned out to be the beginning of bankruptcy proceedings for companies

and sparked a wave of discussions concerning the causes of such a situation. The problem is complex. It was influenced by the current wording of the Public Procurement Act, high demand on commissions and strong competition on the market, forcing entities to start the partially destructing fight for getting a commission by means of dangerous and irrational lowering of tender prices. In addition, it revealed all organizational and competence flaws of the companies. The consequences of the latter are especially negative when an enterprise completely uses up its simple reserves. Execution of a contract of low profitability should force the companies to take actions improving the management efficiency, which, unfortunately, did not happen in every case.

In 2010-2011, the author had an opportunity to observe and study the situation of enterprises operating in the market conditions when there was a huge demand for commissions and companies had to compete for every contract, even at the cost of drastically lowering the tender price. Those observations were made from the point of view of not only the contractors and executors of orders, but also the ordering party, since the author had an opportunity of taking an active part in tender proceedings. The deliberations on the functioning of the public procurement law and the monitoring system of spending EU resources will not be discussed in this article. It is another topic, which requires detailed analyses and studies. In the author's opinion, the management system of EU resources for the modernization of Polish economy, implemented in the period 2007-2012, requires modification, which will allow to avoid negative effects that can be currently observed. It especially concerns projects connected to implementation of innovations, which, by their very nature, entail more risk. This paper is concentrated on organizational issues along with supporting competences of managers of construction companies, since the companies perform their tasks as typical projects. This study is based on the author's experiences as a consultant of construction companies, which carried out, inter alia, projects financed from the EU resources, as well as his participation as a lecturer in training courses improving competences of managers of construction companies.

## **2. The essence of the project management**

There are many definitions of project management. In fact, every author of a publication creates his or her own definition. Nevertheless, the definitions that are most frequently quoted in specialist literature were formulated by leading management theorists, including J.A.F. Stoner, C. Wankel or R.W. Griffin. Griffin defined management as "knowing exactly what we want from people and then making sure that they do it in the best and the cheapest way"<sup>1</sup>. The terms

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<sup>1</sup> R.W. Griffin, *Management*.

"management" and "directing" are used interchangeably in literature, although one can find opinions that management is a type of directing in a more narrow sense.

According to J. Penc, management is "directing activity based on specifying the goals and fulfilling them by means of using a given organization's resources, processes and information in the current external (legal, social, economical, etc.) conditions of its operation in an efficient and effective way, according to social rationality of economic actions."<sup>2</sup> Thus, enterprise management is a group of processes, along with their legal and institutional aspects, that aims to achieve the expected result. The definitions quoted also point out the complexity of management, which, in the classic understanding of the term, comprises: planning, organizing, stimulating and monitoring. In the context of reaching various goals of an enterprise, one has to consider the complexity of that enterprise's actions also from the point of view of their repeatability. M. Trocki<sup>3</sup> lists four different examples of types of actions undertaken in an enterprise, that are characterized by various levels of complexity and repeatability:

- routine actions, simple, repeatable, performed on the basis of practical and empirically tested patterns by the current organizational structure of the enterprise,
- improvized actions, also simple, but not repeatable, taken according to a given situation and performed on the basis of unrepeatable (improvized) patterns by the current organizational structure of the enterprise,
- functions, complex actions, repeatable, formalized, prepared on the basis of specialist knowledge, experiences, instructions, processes and procedures and performed by the current organizational structure or a new one, established to perform new functions,
- undertakings (projects), also complex and unrepeatable actions, preceded by thorough analysis of a given case and performed using complex and unrepeatable patterns of action by means of time-limited organizational solutions within the current structure or by separate units, also those which are not parts of the enterprise's structure.

Routine or improvized actions, according to M. Trocki<sup>4</sup>, are the basis of the enterprise's operations. Complex actions require a special approach. Good support of the enterprise's organizational structures is necessary, since such actions make the functioning of the enterprise more complex and very often overlap with the enterprise's routine actions, making their performance

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<sup>2</sup> J. Penc, *Strategie zarządzania. Perspektywiczne myślenie, systemowe działanie* part. 1, Agencja Wyd. Placet, Warsaw 1994.

<sup>3</sup> M. Trocki, *Zarządzanie projektami*, PWE, Warsaw 2003.

<sup>4</sup> Ibid.

more difficult. They are expensive, carried out in a specific period of time and involve risk.

Experience and practice indicate that increasingly more complex actions are performed in enterprises. It is a result of the necessity of a number of actions to be taken by enterprises in order to improve competitiveness of their market offer (in terms of prices, quality, assortment, etc.), such as innovative implementations, restructuring, implementing programmes improving the market situation of the company or modernizations.

It means that enterprises often have to concentrate on two courses of action:

- managing the current, repeatable production and routine actions that create the revenue base of the company,
- managing complex actions that require much engagement of the directing staff in their performance, the effects of which will be noticeable later.

There are also many definitions of complex actions, defined above as undertakings. Professor Kotarbiński described undertaking as "a complex multi-subject action performed according to a specific plan, which, due to its complexity, may be created by means of special methods."<sup>5</sup> The definition was created in times when there was little computer support of management of complex undertakings, but nowadays, over 40 years later, it is still valid and important. Currently, such complex undertakings are called projects and project management became the main subject of many publications during last few years.

Thus, a project is a complex, elaborate undertaking aimed to reach a certain goal. **The goal of the project** is one of its fundamental characteristics and can be defined as reaching the required result<sup>6</sup>. The result of the project is crucial to evaluate the effectiveness of its execution.

The second characteristic of a project is its uniqueness. The term "singularity" is also used. Projects are unique and, even if there is similarity between them (for example in the construction industry), conditions of their execution are different. Projects are set in different time and their costs and external surrounding are different as well, which, obviously, influences their effects. The similarity between projects is, however, helpful when planning a project's execution, since the gained experience can be used as the basis to support a new undertaking.

The complexity of projects was mentioned above. According to the quoted definition, project plans can be multi-subject and comprehensive. Usually many organizational units and employees of an enterprise take part in a project. For

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<sup>5</sup> T. Kotarbiński, *Sprawność i błąd*, PZWS, Warsaw 1970.

<sup>6</sup> See: G.D. Oberlander, *Project Management for Engineering and Construction*, McGraw-Hill, Boston 2000.

them, tasks connected to the project (except for routine ones) are often additional and performed during a work day. Complexity is a characteristic which makes the execution of a project more complex and increases the workload of some of the enterprise's authorities.

Another feature of a project is its being time-limited or "of a definite character," however the second term is also understood in terms of costs. The project usually has a specified deadline, which can be closely connected to other plans of the enterprise or depends on financial resources and contractual factors, including penalties calculated for the failure in executing the project plans in a timely manner. It is especially important in case of construction projects carried out as part of projects financed from the national budget and co-financed from the structural funds of the European Union. Hence, we speak about the starting date and the closing date of an undertaking.

The time factor is directly connected to the costs of the undertaking. Hence, another characteristic of a project are its costs or the definite cost character. Every project has a certain budget, which can be calculated and estimated. The costs of the project, especially situations when those costs can be exceeded, are one of the most important aspects of project risk estimation. Experiences of recent years (2010-2012) and months highlight serious problems arising both from the functioning of funds-acquiring mechanisms in the execution of projects (mostly from the EU) and from the provisions of the Public Procurement Act concerning construction projects financed from the resources of the EU structural funds for the period 2007-2013.

In the specialist literature one can also find other approaches to features of projects and their character. Projects can be also autonomous or partially dependant on other measures carried out in an enterprise. In case of complex projects, enterprises decide on establishing separate organizational structure, which performs tasks connected to a given plan. In case of smaller undertakings, additional tasks are given to employees who are directly or indirectly connected to the subject matter of the project or to those, who will be using the effects of the project in the future. There can be also created small separate teams for the purposes of fulfilling tasks related to the project.

The project, as a series of human actions aimed to reach a specific effect can be described by means of three key parameters<sup>7</sup>. These are:

1. fulfilling requirements – effect of the project's execution,
2. costs of its execution,
3. time of its execution.

To correctly execute the project, those three parameters have to be fulfilled.

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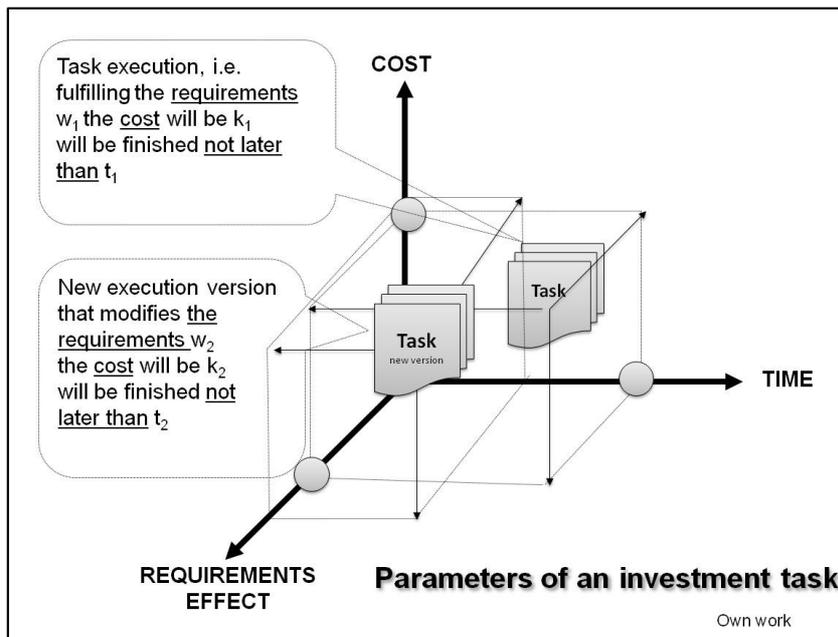
<sup>7</sup> M. Trocki, *Zarządzanie projektami*, PWE, Warsaw 2003, pp. 20-21.

Requirements are the goal which we want to reach. In this article requirements will be synonymous to the scope of project. In case of construction projects, it is described in a formalized way by means of an architectural and technical design or through a functional application programme containing detailed scope of requirements established by the investor for the contractor (in the "design and build" mode). Execution costs assessed or calculated in the form of an estimate contain the work input of people, machines and equipment, as well as material costs and mark-ups. The investor and the contractor perceive the estimated costs in different ways. The investor, estimating the costs of a given project, considers resources which should be set aside for it and whether he can afford the investment. The contractor, preparing to make an offer or to begin negotiations and during cost planning, should take into consideration certain reserves on account of possible rise in prices of the resources during the execution. In case of construction projects, especially long-term ones, the problem of correct estimation of offer costs, taking into account the risk of a rise in prices in the conditions of tumultuously changing external environment, meets with difficulties and, recently, was the reason of bankruptcy of many construction companies. It is also a consequence of the interpretation the provisions of the Public Procurement Act, especially in case of carrying out projects co-financed from the resources of the European Union. Pursuant to the Act, tender procedures presume that the offer price specified in the agreement is constant during the whole period of the project execution, regardless of significant negative changes in the environment, which also cause changes of market prices of construction materials and can be the reason of errors and flaws in projects and other situations, which cannot be predicted at the stage of selecting the contractor.

The execution time specifies the date of the project's execution. In case of construction projects, it is usually given as the dates of starting and finishing the investment or, less often, as the number of days/weeks/months during which the project is supposed to be finished, counting from the date of concluding the agreement.

What is important is the fact that those parameters are dependant on one another and should not be considered separately. Thus, if the project is launched with parameters:  $w_1$  – specifying requirements;  $k_1$  – specifying the planned cost of the investment and  $t_1$  – defining the execution time of the project, changing even one of them forces altering the others (one or both) to estimate them correctly. It means that, if we increase (or decrease) the requirements (the scope of the project), the result should be the change of one (or both) other parameters, i.e. time and costs.

It is illustrated by the following picture 1.



Picture 1. Task in the context of time, costs and effects

Subject literature mentions a "magic triangle" of a project. If the correlations between basic parameters of the project were shown graphically as a triangle whose sides correspond to the three parameters:  $w$ ,  $k$  and  $t$ , changing one of the parameters (increasing or decreasing it) would result in altering the shape of the triangle.

Hence, project management is based on specifying the project's parameters using appropriate methods and on supporting the execution with directing actions through assistance units that do not participate in the execution directly. M. Trocki quotes the definition of the American Project Management Institute<sup>8</sup>, according to which project management is "a branch of management that deals with applying the available knowledge, skills, tools and techniques for the purposes of fulfilling the ordering parties' needs and expectations."

Especially worth attention is the huge quality change concerning tools used in project management. Network methods, which were being improved over the years, were finally used in currently available personal computers. Those methods allow for quick calculation of entered project schedules and point out risks (e.g. overloading the resources or exceeding the deadline). They allow for dynamic multiple simulations of various situations and obtaining data concerning

<sup>8</sup> M. Trocki, *Zarządzanie projektami*, PWE, Warsaw 2003.

key parameters of the project. Software supporting project management was available in Poland as early as in the seventies of the last century. Programs run on computers such as ODRA, ICL or RIAD, due to long and problematic methods of data preparation (paper carrier), long time of data processing and printing the results and low flexibility of the systems in the context of data modification, were seldom used. It was not until popularization of PCs that using software supporting both preparation and execution of project plans was largely facilitated. However, practice proves that popular applications (such as MS Project® by Microsoft®) not always are able to meet the conditions and expectations concerning the projects. Despite their good performance within the scope of creation and modification of execution schedules, the programs' options concerning resources, especially their monitoring and dynamic application, are of little use.

Construction industry, particularly the so-called contracting, is a branch of economy that handles mostly project tasks. Each construction is a separate project of different level of complexity. A construction enterprise in a specific period of time can perform one or more investment tasks, often individual, not connected to one another and located at different sites. It means that the contractor's construction company can carry out several projects simultaneously and has to coordinate the use of own and foreign resources in such a way so as to guarantee the execution of those projects. This is quite a difficult task, taking into account the fact that each construction is different and almost everyday causes different problems that need to be solved.

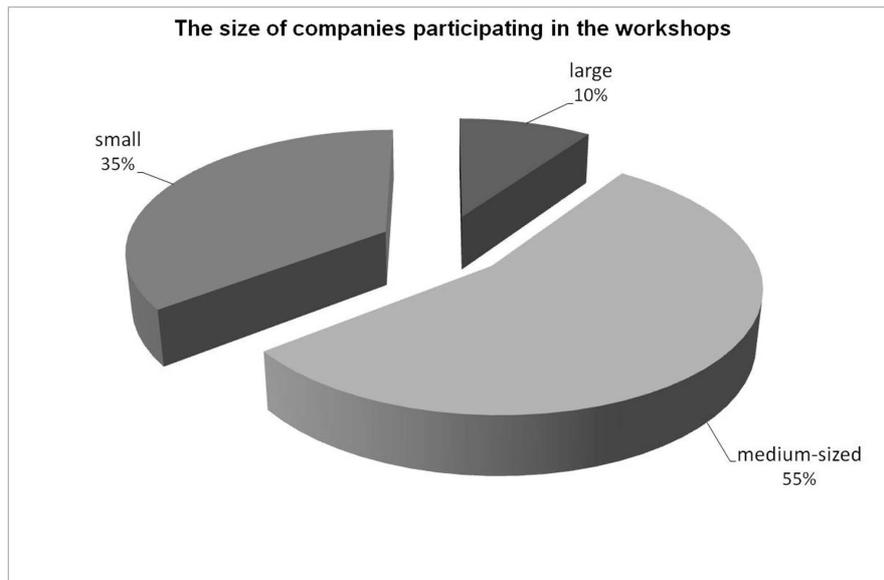
Hence, several crucial questions should be asked:

1. On what leading methods of actions a construction company should be focused?
2. What are the characteristics of those methods and what tools are used to support and manage them?
3. What operating model of a construction company should guarantee its effective functioning in the current market conditions?

Answers to those questions will indicate to the managers of construction companies main methods of restructuring their enterprises, that should help them to survive on the exceptionally demanding and difficult construction market, especially in the nearest future.

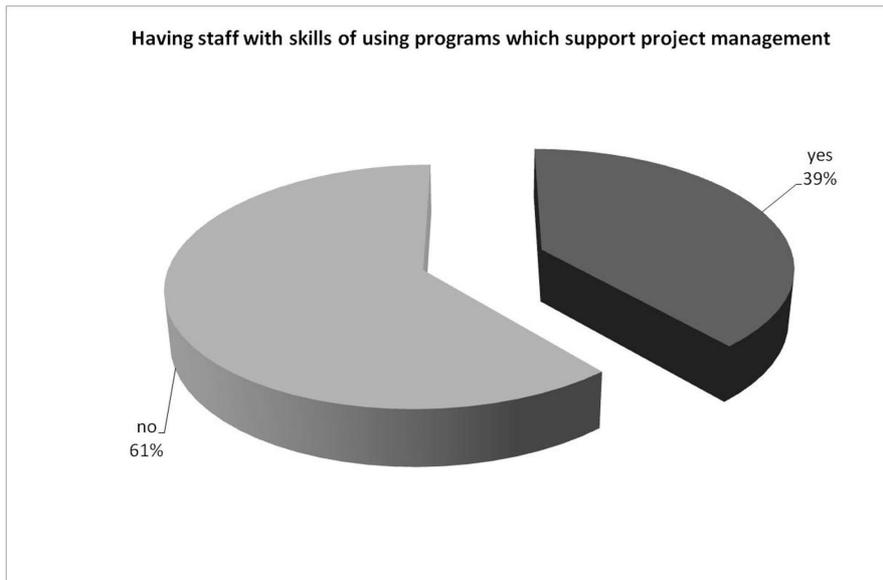
### **3. Survey Research**

In the period 2010-2011, the author participated in the execution of a project co-financed from the resources of the European Union and aimed to improve the competences of the managing staff of construction enterprises. Selected staff from 31 companies, mostly medium enterprises, took part in the trainings and workshops.

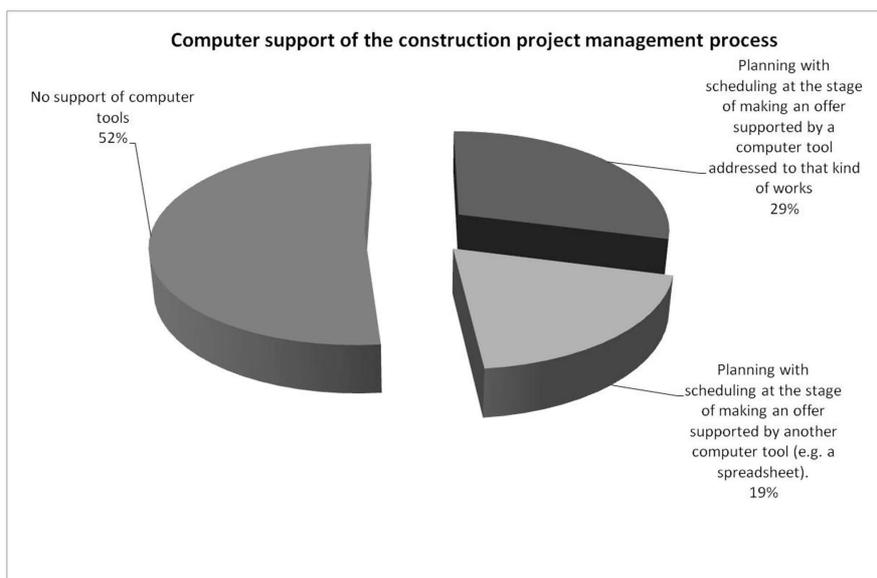


An important goal of the workshops and the training was to prepare the management staff of construction companies to more effective construction management, particularly emphasizing the processes of construction planning and monitoring. During the workshops, a survey research was made among the participants. One of the goals was evaluation of support methods applied in investment projects carried out by the companies, including computer programs.

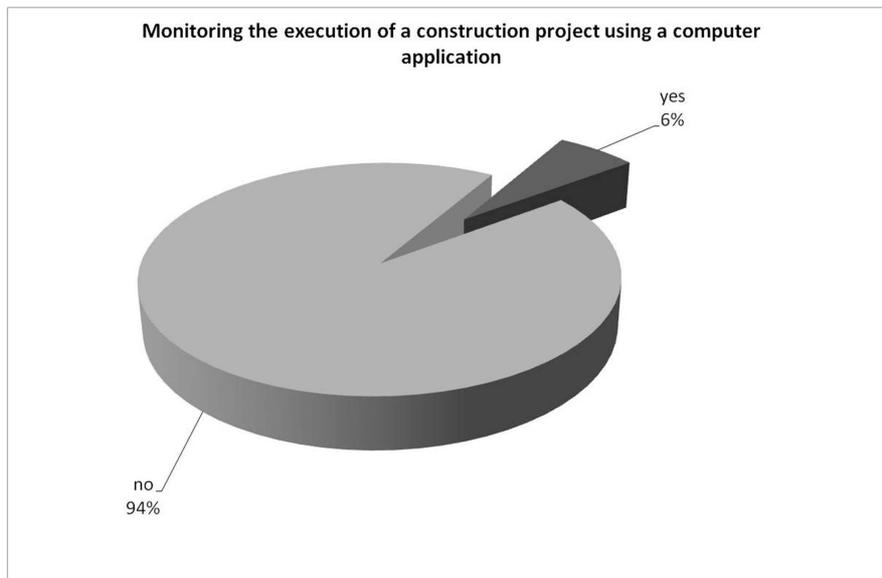
Currently, there are many applications supporting project management processes. Some of them are addressed mainly to the construction industry (for example "Planista"), including free software or programs to harmonize execution of projects that are available for relatively low prices and quite popular commercial programs, such as MS Project® by Microsoft®. Knowledge of those applications is much more common than in previous years. 39% of surveyed people claimed having been trained in using them. That means that many companies saw to the training of their employees, who have at least basic skills of creating schedules using computer programs. However, discussion proved that the main reason of training the staff was not related to the need of using those applications in practice in enterprises, but to the investors' requirements. Investors demand from contractors investment execution schedules and often expect it to be generated by means of a specific application (usually MS Project®).



In practice, that means that the contractor establishes a schedule for the purposes of the agreement and starting the investment and then modifies it only if negotiations regarding deadlines or scope of works are necessary. In fact, during execution of investments, schedules are not updated dynamically, according to the course of works.

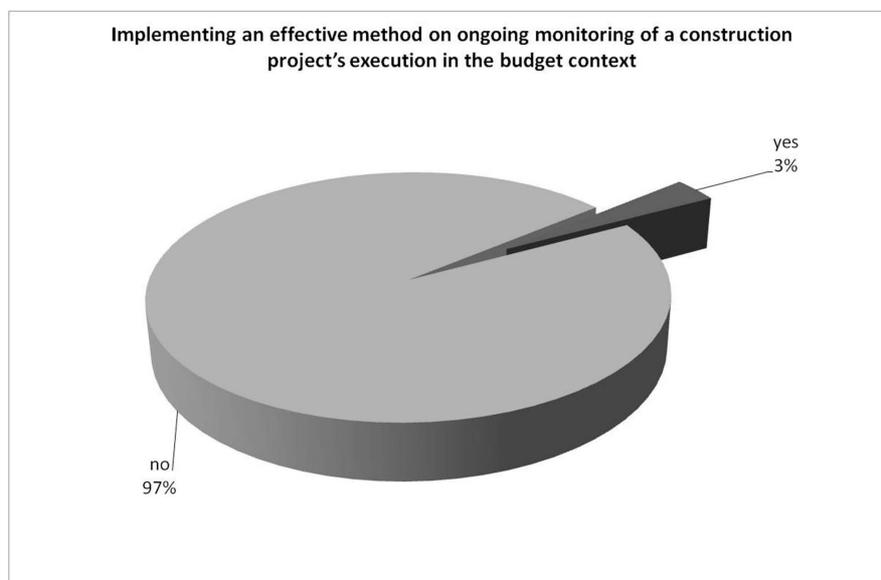


It is confirmed by another survey. Over 52 per cent of the respondents answered negatively for the question whether computer support of construction project management is present in their companies. If any tools are used, they are based on own tables and analysed by means of simple methods, using spreadsheets. 19 per cent of the respondents claimed that they support the process with well-constructed spreadsheets and prepare offers based on them, while the rest (29 per cent) uses specialist tools (for example MS Project®) at the stage of tendering.



Modern programming allows not only for effective harmonizing of investments, but also for monitoring in real time. It means that, in the context of progress status of the construction process, it is possible to obtain satisfying data that can support project management. However, it turns out that those opportunities are rarely used. Few participants informed that they are trying to monitor the course of investments by means of computer tools. Others said that there is no need of those tools in their companies and it is sufficient that the manager of constructions/works notifies about their progress on a regular basis. Nevertheless, discussion concerning that issue provided different conclusions. It confirmed previous observations of the author: the system of notifying management boards of companies by the management of construction works is liable to distortions and oblique statements. Thus, the decision-makers are informed about a serious risk when it is too late to intervene and eliminating the consequences sometimes largely increases the planned costs.

Monitoring the budget of investments turns out to be even less common. It is not conducted in relation to individual tasks, but registered holistically, for the whole investment. It means that the contractor very often has little control over the costs and manages them intuitively, without knowing exactly where and why they are increased. Discussions with the participants of the training course confirmed that it is one of the weakest links in the construction project management process.



However, results of the survey research should be evaluated from the point of view of selecting the participants. They were people from companies that on the one hand show certain shortages in this regard, but on the other hand express their interest, at least formally, in improving competences of the management staff. Thus, a question arises: to what extent is that survey reliable and to what extent does it reflect the above-described situation in Polish construction industry?

The author's experiences as a consultant of construction companies definitely confirm the data quoted. Construction companies, especially small and medium-sized, are poorly equipped with tools necessary to effective construction management. It arises from the fact that there is gap between the offer of basic programs and systems supporting enterprise management, since there are no applications of medium implementation and operation complexity that would be addressed to the construction industry and aimed at companies which are not

prepared to use advance programs (such as ERP systems) yet, while software they use is now insufficient.

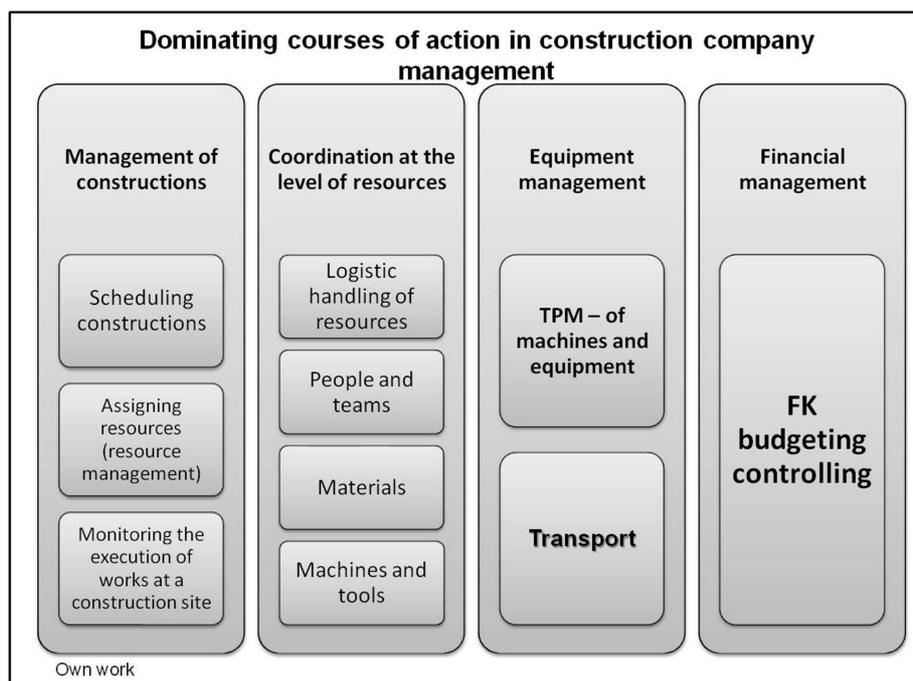
For example, there are no applications monitoring the course of the investment process, including its costs, that would serve as an early warning system informing about disruptions on the construction site and possible risks (regarding terms and costs). The companies handle that problem in various ways, but solutions which the author saw, are either not very precise or have a very delayed effect.

To summarize the results of the survey research and observations of the construction market, it should be emphasized that especially small and medium enterprises are insufficiently prepared to competitive operation on the difficult and demanding market. There are no implemented methods of supporting the management of constructions in progress, not only in the form of good organizational solutions, but also computer tools allowing for effective monitoring of the course of works and sufficiently early reaction to negative aberrations. Those companies are often engaged in large projects as subcontractors. They hardly ever analyse all parameters of their part of works and pay a high price for that. Strong entities that are well-prepared for such actions and win tenders take advantage of every situation to settle all details of the works performed by the subcontractors and charge them with penalties for every breach of the agreement. It should force many construction enterprises to prepare their subcontracting offer carefully.

#### **4. Key Lines of Action in Construction Company Management**

Execution of investment projects requires that entrepreneurs should establish proper organizational structures of their companies. In the author's opinion, such a structure must guarantee focusing on 4 key areas of operation and mutual coordination between them (see: picture 2).

The above-listed crucial lines of action, when properly organized and prepared, are the key to success of every construction company. Without effective support of management, application of those lines of action is impossible, or at least hindered. Such a support and the courses of action related to it are connected with the construction company's operation model adopted by the entrepreneur. The leading area is **construction management**. It comprises: **construction scheduling, resources assignment and monitoring of work performance**.



Picture 2. Lines of action in construction company management

A construction company exists only if it meets its obligations correctly and in a timely manner. Construction management requires careful preparation of constructions on the one hand and proper monitoring of work performance in order to be able to react quickly and effectively to any aberrations and their consequences on the other hand. The starting point is **the investment project's execution schedule**, established by specialists on the basis of the investment documentation and the knowledge about mutual correlations between individual tasks. However, it does not mean that establishing the correct schedule should be based on showing the linear relationship between successive tasks linked by the technological process. Such a schedule, although simple to design, not only limits the possibilities of resource management at the construction site, but also leads to wrong decisions, which often makes it impossible to successfully execute emergency plans forced by various, often difficult to predict, factors (such as weather). A correct schedule, in the author's opinion, must meet the following criteria:

1. taking into account possible options of simultaneous, technologically possible fulfilment of tasks to make the emergency plan as undemanding as possible.

2. the project deadline specified in the agreement or a contract must be set for a later date than indicated in the schedule to provide the contractor with reserve time in case of unforeseen events, disruptions or damages. The time difference between the deadlines of the project and the schedule should result from the type of project and the contractors' experience gained during other constructions of similar scope. It will be different in case of road investments and in case of buildings.
3. there is no final and unchangeable schedule – the investment process is liable to many imponderables and much uncertainty. It means that every change that causes a deviation in meeting the schedule should be entered into it and taken into account to make it possible to see its influence on the project's deadline. Thus, the schedule is stable until the first disruption.

During the execution of the project, a correctly established schedule is supposed to be used to make the first attempt of **resource allocation**. In practice, resource management means drafting a good plan of works for teams and equipment and eliminating overloads. If the same resource should be assigned to several tasks, which may happen when a construction company carries out several project simultaneously, the same resource (for example a team) may be assigned to work on different projects in the same time. A problem will occur when, planning various schedules, we do not take into account their mutual correlations in case of using the same resources. Such cases were observed by the author in practice at various construction sites, where for example the company's transport was used. It was not an isolated case when the transport was needed in the same time at different sites. Attempts to control the situation, for examples by the reservation system of own resources and optional use of other entities' services in case of large amounts of accumulated work not always led to successful elimination of stoppages due to the lack of transport. There were also cases of incorrect planning when a contracted vehicle had to be handled despite the fact that own transport had just been released and was available. There is no need to explain what a negative effect it had on the project execution costs.

To successfully carry out the investment, it is necessary to **monitor it**. The process must take place at two levels:

- a) the advancement of the schedule (progress of works),
- b) use of human, equipment and material resources.

Experience suggests that, although the execution status of the investment is monitored by the company's management, mostly due to the fear of exceeding the execution deadlines and potential contractual penalties, the costs themselves are not so closely monitored. In practice, some companies were informed about their loss and profit accounts only after finishing the investment and receiving all invoices. Such a situation makes any repair actions or interventions impossible in the period when the changes still can be made. Faulty organization of performing

an investment task caused also that the teams were particularly subject to work on Saturdays and statutory holidays and were paid extra on that account. Again, practice proves that the staff's earnings contributed much to the increase in overtime working, which often exceeded permitted limits. The problem cannot be solved without system monitoring of the project execution.

Another key line of action is **coordination on the level of resources**. It is connected with the following problems: **logistic service of resources, coordination of assigning tasks to teams, ensuring material supplies and coordination of making the machines and equipment available for individual projects**.

One of key tasks in this line of action is **material supply of the construction site**. The materials are the most important part of the investment costs. Literature sources<sup>9</sup> point out that materials, depending on the type of investment project, constitute from 50 to 72 per cent of all costs. It means that incorrectly organized material management can be the main reason of the increase in investment execution costs. Monitoring planned and actual costs of materials is an extremely important element of effective control over costs during the investment cycle. A question arises: how to organize supply of constructions to be able to control the increase in material costs? Assuming that we act in conditions of a market not subject to sudden and unexpected increase in material prices resulting from the situation on global markets, it is possible to organize an efficient system of acquiring materials that would ensure reliable supplies and savings in costs.

Such a system will function on condition that diversification of supplies and competitiveness will be ensured. However, it is necessary to clearly separate projects that require large assortment diversity (for example those concerning industrial and residential construction business) from projects in which case diversity of materials is low, but quantity consumption very high (for example projects of road construction industry). In the first case, especially small and medium companies are prone to "stick" to dependable suppliers. These are wholesale companies or building depots operating in the investment area. They offer deliveries to the construction site, also in the form of regular supplies (replenishment of supplies, also at night). Are these the cheapest deliveries? Not necessary. Suppliers of the investment's contractor should establish a good, reliable and effective supply model for their company. It must be based on mechanisms ensuring:

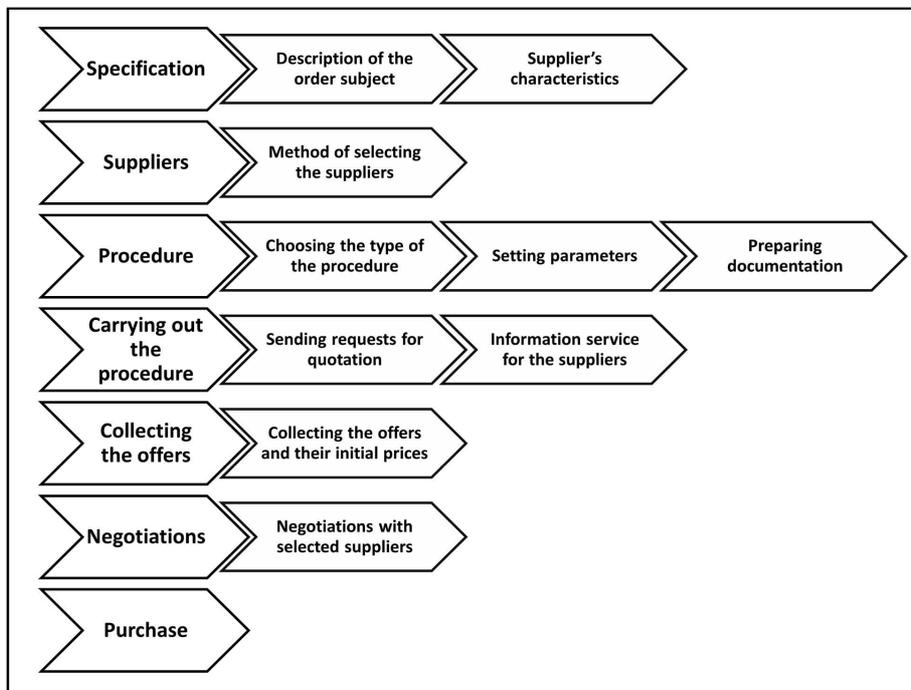
- a. diversification of offers,

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<sup>9</sup> J. Górecki, *Analiza struktury kosztów w budowlanych przedsięwzięciach inwestycyjnych*, Budownictwo – czasopismo techniczne, Wydawnictwo Politechniki Krakowskiej; journal 2 1-B/2010.

- b. efficient system of searching for new suppliers that are trying to find their place on the market,
- c. competitive prices within the system of shopping platforms.

It is useful to establish a clear procedure of material supply of an investment project. The author believes that in such a case it is possible to use a few years' experience arising from the application of the Public Procurement Act.



Picture 3. Diagram of the course of action when selecting the supplier  
*Source: own work.*

The key element of that process is the correct description of the order (see: picture 3). The contractor of the investment should not have any troubles with that, since the material specification is a part of the detailed design documentation. Problems may occur in case of investments carried out as part of projects co-financed from the resources of the European Union. Disputable and, in the author's opinion, incorrect interpretation of the statutory provision concerning the use of proper names causes that the contractor will not find the detailed specification of a material that, according to the designer, should be used in a given moment in the project. What he will find will be a more or less specific

description of its parameters and he will be forced to choose such a material that will not only comply with the parameters specified in the documentation, but will be also relatively cheap for the contractor. It often causes conflicts at the stage of construction.

The material must be linked to the suppliers. Wide selection of suppliers allows for realistic price negotiations and diversification of deliveries, which may also be needed as an effective negotiation tool. However, at this point we reach the phase of selecting the supplier or suppliers. The more we limit the selection of suppliers, the lesser are our chances to get satisfying offers. It means that open and widely available procedures of getting offers are more effective, especially when the ordering party does not have to apply, sometimes very restrictive, provisions of the Public Procurement Act.

The criterion of selecting offers does not have to be limited only to price. The ordering party is given many options of distinguishing suppliers (terms of deliveries, the system of deliveries, the system of returning the unused material, etc.). Everything depends on a specific case and the rationality of actions taken by people responsible for construction supplies.

The method of sending requests for quotation should be formalized. Documents of the offer that are prepared according to a clear outline facilitate their evaluation and accelerate the choice of the best one. Requests for quotation can be replaced with increasingly more popular tender platforms. They are Internet portals allowing for making a purchase-sale transaction via the Internet. The idea of linking seller's and buyer's interests using the Internet is not new. Auction portals have been functioning online for many years and are extremely popular among the Internet users. They were invented as tools allowing for selling items, which are no longer necessary at home, but they became a powerful market for companies, which place their articles there and gain high sales volume. The Internet market is specific and probably deserves many specialist studies. In this article the author will only highlight its benefits for commercial purposes in relation to B2B (business to business) contacts. According to their creators, tender portals that are addressed to companies, guarantee:

- obtaining the lowest prices for delivery/service/construction works, while observing the correct technical parameters of the offer,
- using the Internet to make efficient purchases and sales,
- facilitating B2B contacts.<sup>10</sup>

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<sup>10</sup> see: <http://www.platformazakupowa.pl> – Open Nexus shopping platform;  
<http://www.faveo7.com> – Faveo shopping platform

The author got himself acquainted with the functions of two platforms: Open Nexus and Faveo. Their main ideas are similar, but the portals differ in execution methods and additional options. In both cases it is underlined that the following benefits are notable for both buyers and sellers:

- purchase price discount from 5 per cent to as much as 40 per cent,
- new market for sellers,
- lower costs of getting to the customer,
- transparent purchase proces,
- clear cooperation rules,
- elimination of the cooperation-negotiations conflict,
- economies of scale in case of summing up the demands,
- economy of time spent on searching for suppliers, negotiations and control,
- an opportunity of finding more suppliers.

Additionally, some solutions available online offer options of supporting the work of suppliers and allowing for "quotation" of their services. The software also provides tools to create one's own databases of suppliers, transactions and tenders. Such additional tools and functions are offered by Open Nexus.

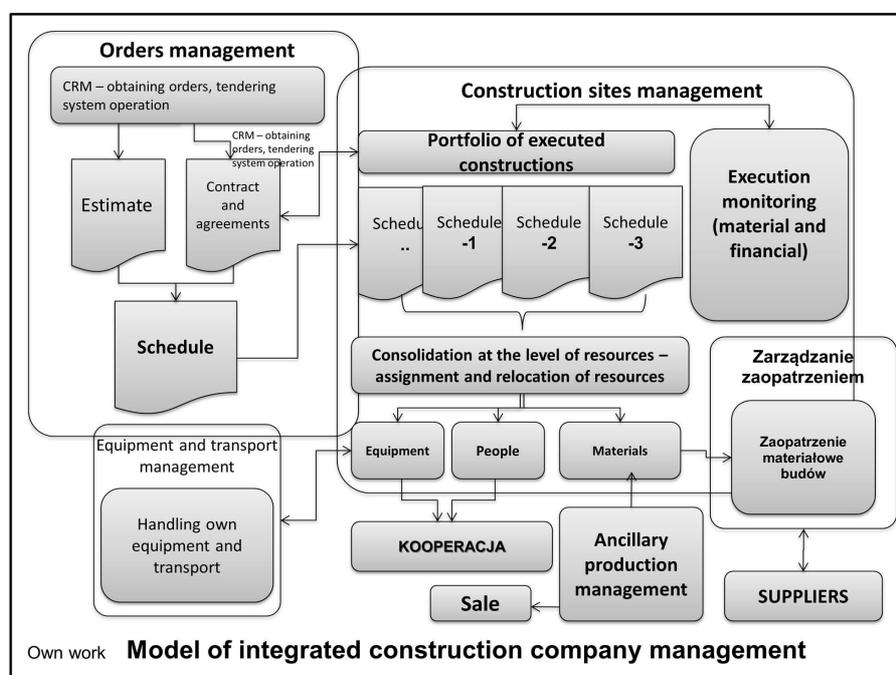
Undoubtedly, one of key tasks of a project execution manager is establishing a well-thought procedure of supplying construction sites in materials.

Construction company often have large bases of tools, including machines and devices necessary to carry out the project, as well as smaller equipment of individual sites. Moreover, they often use their own vehicle transport. Nevertheless, in this regard, changes focused on outsourcing were made. More and more often, hired equipment is used when performing a given task, while vehicle transport is limited to necessary minimum. However, in case of having own stores of equipment, it is necessary to focus not only on their appropriate workload (or renting them, when they are free), but also on their constant operation, proper maintenance, monitoring faults and getting into the habit of daily checks of basic parameters.

Financial management is budgeting of investments and careful monitoring of its execution. Costs should be assigned to specific tasks. Registering their fulfilment must be as detailed as in case of tasks. If we have a good schedule of tasks performance and assign costs to it, it is easy to create a model of the investment's execution costs incurred in time. It will be visible, what resources should the contractor have at his disposal when carrying out the investment. Investment projects are seldom executed according to original plans, which results in the necessity of taking into account changes and revising the costs. Monitoring the status of the costs of the investment, both as a whole and for each individual task, is the basis of an efficient controlling system.

## 5. The model of integrated construction company management

In such a context, it is useful to look at a construction company according to the model ensuring integrated management. That model is based on practical experiences and comprises several management blocks connected to one another, which together create an effectively operating construction company. It is shown on the following diagram.



Picture 4. A model of construction company management

The process of construction sites management must be preceded by actions defined as the system of getting commissions. Commissions for construction works are to large extent obtained by participating in tender procedures. Another, very common, phenomenon is giving commissions to subcontractors of leading companies, i.e. companies which dominate on the market and win tenders. The tender system, no matter if it concerns public procurement or if it is outside the public system, is the main source of commissions. Hence, the system of getting commissions is crucial for the integrated construction company management model. It was called "**Orders management**" and should be supported by means of a good computer CRM (Customer Relationship Management) system, which would be adapted to the needs of construction companies and would take into

account the main sources of commissions, i.e. public tenders for construction works. It means the support of the tendering process conducted in every company that competes for orders on a public tender basis. Every tender offer must be prepared carefully and well-thought. It has to be pointed out here that tender procedures are formalized and require providing the ordering party with specific documents characterizing the entity (e.g. constructions done, references), specifying the offer and paying the bid bond. It is very important that those works should have appropriate support, otherwise the entity may be excluded from the proceedings. Tendering is expensive and does not guarantee success. Companies often keep statistics of won and lost proceedings, which show that a success is paid with several and even a dozen or so failures.

What should be understood by this quite general phrase: "careful and well-thought preparation of the offer"? It is a set of actions aimed to create the system support of project management. In this article, deliberations concerning the initialization of the project, setting goals and estimating the risk are skipped. Decisions concerning those issues are usually made by highest-level governing bodies and line managers, while people responsible for the project execution generally have no influence on them. They are supposed to act according to top-down decisions, not necessary justified by detailed analyses and execution variants. It is a fact that such a situation is quite often fraught with consequences resulting from underestimation of the project costs or too optimistic assessment of the feasibility of finishing the works in a specified term. This mostly concerns projects carried out on a public procurement basis, in which case the time for analysis and submitting an offer is very short and insufficient to perform reliable, well-thought and checked calculations.

At the stage of obtaining the commission, a schedule is not necessary. Usually the ordering party requires it upon signing the agreement. However, we must be prepared to create the schedule of works quickly, if our offer proves to be the winning one. Creating an offer without recognizing more or less how we can fulfil the task entrusted to us by the investor within a specified term is not a good solution. Contractors tend to believe that the most important is to get the order and the problem of performing the task in a timely manner is a side issue, since, even if the contracting entity itself should not be able to finish the works on its own, it can always hire subcontractors. Such a course of action may be taken only when we are sure that the investment can be finished within the term specified by the ordering party.

Assuming that the order was obtained, creating a schedule is absolutely necessary. The core of a good schedule is its appropriate division into individual tasks. A task is the basic unit of the schedule and a set of tasks that are interconnected create the project execution plan. The task should be in accordance with the SMART concept (Specific, Measurable, Achievable, Realistic, Time Bound).

Specific – meaning that the description of the task should specify in a clear and precise way what should be done and what results are expected. Measurability is connected to the assessment of a specific tasks' feasibility. If we are able to determine the level of its advancement, it means that the task is measurable. Achievability is connected to execution possibilities. Tasks planning must be supported with the evaluation of current possibilities of their execution. It is easy to imagine a situation when a formally well-drafted plan of tasks is unachievable within a given term due to the lack of appropriate resources that are required for its execution. Achievability of a task depends also on contractors and to what extent they are prepared to perform it. Being realistic is a feature of a task that determines a chance of its correct execution by the contractors in current conditions and taking into account the required limits. Time of the task's execution is given in specified units (e.g. days) and determines the term within which the task should be accomplished.

The second block of the presented model is **construction management**. It requires consolidation of resources needed to carry out constructions, coordinate supply of materials, equipment and workforce and ongoing monitoring of the tasks' execution. In case of accumulating works or the lack of necessary resources in terms of staff or equipment, it is possible to use cooperative support (subcontractors). Monitoring is necessary for correct construction management. J. Penc writes: "To ensure constant inflow of information, an enterprise should create a system of environment observations and even more – an early warning system that would signalize (warn of) chances and risks".<sup>11</sup> Developing that thought, one has to start from the basic actions of a company. Systematic monitoring of their performance is one of key aspects of enterprise management, since it allows for relatively quick localization of aberrations and risks. Monitoring will provide correct information only when it is conducted exactly according to the tasks planned in the schedule.

In the above model there is also highlighted **equipment and transport management**, which should be organized taking into account the economic calculation. It means such a resource management that would fulfil the company's own needs on the one hand and bring revenue in periods of lower demand in the form of services provided to external entities on the other hand. **Ancillary production management** should be treated in a similar way. It is an activity carried out by construction enterprises in order to fulfil their needs. Manufacturing products in ancillary units is reasonable only when the cost and, consequently, the price is competitive in comparison with the market offer, which not always can be achieved due to low economies of scale or little production experience.

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<sup>11</sup> J. Penc, *Decyzje w zarządzaniu*, Wyd. Profesjonalnej Szkoły Biznesu, Cracow 1996, p. 192.

The above model of integrated construction company management reflects also expectations concerning the computer support of the indicated main management blocks. An enterprise should be equipped with a system allowing for creation of construction schedules and their updating according to a given situation. The application should be linked to the cost registration system where they are generated, i.e. resulting from the execution of performed tasks, so it would be possible for the managers to know and to be able to analyse the progress of the investment at its every stage, along with all positive and negative alterations in comparison with planned amounts.

## 6. Conclusions

Nowadays construction companies operate in difficult and demanding conditions of competitive market. Surviving on such a market requires being prepared to fight for difficult commissions and balance on the edge of profitability, searching for reserves in one's own organization and reasonable, sustainable management of every construction site. It cannot be achieved in an organization that is not adapted to the market's requirements. Nor can it be achieved without ensuring proper management of construction projects. It requires:

- consideration and restructuring of a company according to guidelines indicated in this article;
- careful and detailed tendering and preparation to execution of gained commission;
- effective monitoring of constructions' execution in order to be able to quickly find out any aberrations and risks.

It would be tremendously helpful to introduce well-thought computer tools supporting the above-mentioned tasks, especially those connected to construction projects in progress. Without a well-functioning computer feedback system it is not possible to save the company from the negative influence of its environment.

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