

Draft of Project Team Quality Model in Traditional Project Management

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Abstract—A paradox is observed in the state of art of the project team quality in project management. All specialists recognize the exceptional importance of the parameter “quality” for the final result of the project. On the one hand, one can easily find definitions of project quality, quality of product of the project, quality of the project management processes, and so on. On the other hand, a huge number of bibliographical sources considers the project team functioning, as a *sine qua non* condition of the project success. The notion “project team quality” is quasi absent in the literature. In the paper an approach is proposed to fill in – partially – this gap, in the form of a proposal of the guidelines, which define the project team quality and should allow to measure it. Consecutively, literature review of the success of the project and success of the project management, project team work, leadership, selection of team’s members and project team dynamics are presented. The main part of the paper consists of guidelines for the quality model of the project team: general assumptions, proposed definition and openness of the model to measure the quality of the team. The paper has a conceptual character. Its objective is to show the possibility to define the project team quality process, which ensures not only the optimal level of the team quality, but it will also allow to undertake valuable managerial decisions during the project life cycle.

Keywords—*project team; quality of project team; model of project team quality; project team quality measure*

I. INTRODUCTION

We are witnesses of an interesting phenomenon in the project management science. All experts recognize the exceptional importance of the parameter “quality” for the final result of the project. On the one hand, one finds numerous definitions of project quality, quality of product of the project, or quality of the project management processes quality. On the other hand, a really huge number of bibliographical sources considers – the human factor – project team functioning especially, as a *sine qua non* condition of the project success. The favourite subjects are: leadership, team work, relations, cooperation, psychological abilities of the team members, and so on. The term „quality” with reference to the project team appears extremely seldom. In the literature of the subject, in relation to the team, the concept of the quality appears only as “relationship quality among team members” or “teamwork quality”. This phenomenon is incomprehensible in juxtaposition with the statements above. In the paper an

attempt has been made to fill in this gap – at least partially – in the form of a model, which defines the project team quality and allows to measure this quality. Consecutively, literature review of the success of project and success of project management, project team work, selection of team’s members and project team dynamics are presented. In the central section 4., Guidelines for the Quality Model of the Project Team are presented: general assumptions, definitions and possibility to measure the quality of team. The proposal is based on Myers-Briggs method and Belbin test. The paper has a conceptual character. Its objective is to show the possibility to define the project team quality model, which ensures not only the optimal level of the team quality, but it also undertakes valuable managerial decisions during the project life cycle.

II. SUCCESS OF PROJECT AND SUCCESS OF PROJECT MANAGEMENT

The project is considered as a sequence of unique, complex and interconnected tasks, with common goal, dedicated to achieve it in a definite date, within limited budget, compatible with planed requirements [1]. In some definitions, quality requirements conditions are added. The triple constraint (project management triangle, iron triangle) is commonly recognized as a main element of the definition of the project success. Until The 80. of the 20th century, the evaluation of a project result via the iron triangle was considered as complete and unique.

A change of any parameter disturbs the balance of the project. A return to the previous state of balance is possible only after the change of one other parameter at least. The iron triangle (Fig. 1) shows the dependencies between the three main parameters of the project: time, cost and scope, and their impact on the final result – quality of the project.

The quality concerns the product of the project as well as the process of the project management. According to the Standish Group investigations, the project’s success means: on Time, on Budget with a Satisfactory Result [2]. This definition is focused more on the project’s product user and the customer. It allows the development of the project’s aim. Jim Highsmith considers the trio: customer’s satisfaction, contractor’s satisfaction and project team’s satisfaction [3] as success. Definition of project’s success is still evaluating. Organisation of project’s work starts with the team forming. Its members should not only have the competences necessary for their tasks,

Selected methods supporting project management, taking into account various groups of project stakeholders and using type 2 fuzzy numbers” – Project No NCN 02NO/0024/18 – The National Science Centre, Poland

but also be equipped with specific psychological predispositions and features to work as a team.

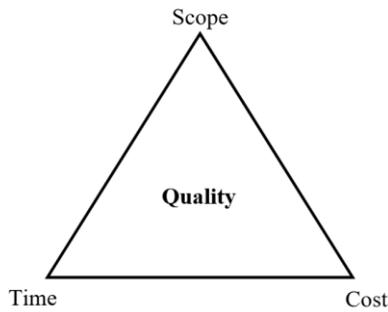


Fig. 1. The iron triangle of the project. source authors.

In bibliography, the notions of project's success and project's management success are confused relatively often. The success of the project management is a notion narrower than the project's one. The essence of the project management success are integration of requirements, necessary actions and results leading to the project's goal and the result qualified as a success [4]. The tasks of projects management are done to achieve the success of the project. Nevertheless, in spite of the project's defeat, the project management could be successful. IPMA defines a success of project management as appreciation of project management results by adequate stakeholders [4]. Following P. Drucker, one can directly manage something if it is measurable in terms of: time, cost, scope, quality, risk or tasks integration. Measurement of management of people or communication is more difficult, and requires a system of convenient measures.

Quasi unanimously, people are considered as the main factor of the project management success. Knowledge, skills, experience and individual features decide on the choice of the appropriate project management and – indirectly – on the final result of the project.

To be successful, project management needs an organised team, the members of which are able to cooperate. A competent project team as a factor of project management success appears in 90% of successful projects, and the fact of establishment of such team – in 88% of such realisations [5, 6].

III. PROJECT TEAM

A. Team Work

Team work contains all managerial and leadership actions, related to team forming, its functioning and dynamics of the group [7]. A team is a group of persons, working commonly on the defined objectives achievement [7]. In the literature one can meet different definitions of a project team, and different features of it. For example, Darnall [8] recognizes the crucial feature of the team members participation in the integration team as a part of the people job. "The way we function, how we communicate, and the tone we set in dealing with each other will set the tone for the entire project" [8]. Another approach is presented by Ortsman [9]. The author starts with a

global task, which could be goal, product or service. The team should be mostly oriented on such a work organisation which ensures the optimal way to do the global task. All of the project team features are characterized by common, basic conditions, which should be fulfilled by each of them [10].

Summarising the features above, a project team is an organisational unit, constituted for a common realisation of the goal, supervised by a project manager (PM).

B. Selection of the Project Team Members

Complexity of the cotemporary world, growing permanently, makes it nearly impossible to find persons with sufficient level of knowledge and skills to solve all problems related to projects. In such a situation, decisions in projects are results of the work of multifunctional teams and their collective knowledge. The role of the project manager consists in creating the environment which allows and facilitates people in project team to reach an agreement about the tasks which allows people in project team to reach an agreement about the undertaking tasks, and facilitates this process [10]. Such a situation imposes on team members some features they should be equipped with, in order to be able to accomplish their tasks.

Commonly known and used questionnaire, recommended to select team project's members is MBTI (Myers-Briggs Type Indicator) [11]. The questionnaire was developed on the grounds of K. G. Jung psychological types conception, by K. Myers and I. Briggs-Myers, and soundly experimented [12]. This method is used to define the psychological type of the person examined. There are four dimensions of human behaviour, every represented by a couple of opposed elements: extravert-introvert, sensing-intuitive, thinking-feeling and judging-perceiving. Such decomposition leads to defining sixteen basic psychological types of human. Generally, every human has all the elements of the four couples, but each of them in different proportions. Their concrete connection defines the human profile of personality. The combination of personalities, adapted to tasks and objectives of the project is an essential factor of the success of project management and project itself. MBTI is applied for the personnel recruitment, diagnosis of the psychological sources of conflicts and improvement of interpersonal relations in the project team [12].

Project team members play different roles in it. The most known approach is Meredith Belbin's one, which distinguishes nine team roles [13]:

- Leader. Equilibrated, dominant, extrovert, defines objectives, undertakes decisions.
- Practical organiser. Performs tasks, changes concepts and plans into practical actions. Equilibrated and self-disciplined, follows plans.
- Locomotive. Dynamic and ambitious, takes up challenges, courageous, mobilizes team, extrovert.
- Plant (strategist, visionary). Generates ideas taking into account the main problems. Dominant, intelligent, introvert.

- External Coordinator. Explores the project's environment, enters into communication with external world, equilibrated, dominant, extravert, negotiator.
- Judge-Evaluator. Analyses problems, evaluates conceptions and suggestions, objective, equilibrated, intelligent, introvert.
- Team-worker. Supports other people, prevents conflicts, enhances co-operation, equilibrated, extravert, loyal, empathic.
- Completer Finisher. Oriented on the final result, on the task performance, restless, fraught, introvert, self-disciplined.
- Specialist. Person with knowledge and skills not known by any other team member, self-directed [13].

Of course, every person has features corresponding to each of the roles above, but in various proportions. Belbin's method recommends the equal distribution of the roles among the team members. However, not all of them are always required at the same time in consecutive phases of the project lifetime. Belbin's team roles can be assigned to persons as a result of special Test Belbin [14].

C. Project Team Dynamics

The team building is a sophisticated process, with several phases. For each of them, one distinguishes characteristic behaviour of the team members and the appropriate reactions of the project manager on them. The general model of team building and development was proposed by Hersey and Blanchard [15]. The lifecycle of the project team is composed from of five phases, in the frame of which one can see the dynamics of this process:

Stage 1 – Forming. Behaviours: attempt to define tasks and methods of their realisation, need of information, concentration on relations – not on roles, chaos.

Stage 2 – Storming. Behaviours: enactment a natural hierarchy, transfer of responsibility, strong rivalry.

Stage 3 – Norming. Behaviours: development of principles and their common acceptance, crystallisation of the roles in hierarchical power, concentration on the objectives, cooperation and coordination.

Stage 4 – Performing. Behaviours: cooperation.

Stage 5 – Dissolution of the team. Behaviours: formal dissolution, return to the routine duties/transit to other project, celebrating.

IV. GUIDELINES OF THE PROJECT TEAM QUALITY MODEL

The guidelines are presented in two subsections below: general establishments with definitions of the project team quality and draft of measurement of the quality of project team with some indications on the impact of the quality of project team on team management quality.

A. Fundamentals of the Model Development

The standards of project management have some references to quality management systems, but much less attention is given to this issue than to the processes in the project life cycle. The reason is mostly the uniqueness of project management [16, 17]. Quality is of the exceptional importance for the final result of the project as well as for its success. Quality appears, for example, in issues such as teamwork quality and relationship quality among team members in publications from the area of the project team [18, 19]. From the very beginning, the quality management gurus emphasized the importance of the human factor as a quality dimension [20-23]. Quality is defined as "the degree to which a set of inherent characteristics of an object fulfils requirements" in ISO 9000:2015 standard [24]. Frequently, the definitions of quality used in project management literature are also based on this definition. Project management uses the philosophy of Total Quality Management (TQM), which can be defined as the application of tools and techniques to understand, manage and meet customer expectations [8]. The special characteristics of projects require special tools and techniques or applications of those tools adapted to projects. A project must be client-focused, goal-directed, and people-oriented to be able to successfully implement TQM in project management.

There are many differences between quality in project management and quality in manufacturing. According to Darnall, they are related to customer, time (improvement process and team building), focus, measurement, roles and responsibilities [8]. Projects, in most cases, have one customer that reflects one need. It is a more narrowed definition of customer. The techniques and processes the project manager uses to understand the requirements of the project's customer are very different from those used by the marketing department of a manufacturing plant. Projects are often onetime endeavors with a defined beginning and end. The project team does not have the structure and organization of a plant and this is why it needs to develop a way to focus on the project. It is very important to clearly define what the project team wants to achieve and who is responsible for the various parts. Important is also tracking the goals progress so the project manager could know whether the project team is making progress. The model is based on the following assumptions:

- A. The model does not take into account technical competences of the project team members.
- B. The model considers currently recognized psychological aspects of the project team quality only.
- C. Project quality level depends on growing of the project management quality level.
- D. Project management quality level depends on growing of the project team quality level as well as on the quality level of relations project manager-team.
- E. Project team quality level, as well as the quality level of relations project manager-team, depends on growing of quality level of the members psychological profiles, set down using MBTI and Belbin methods.

F. Quality parameters are measured classically (in percent, e.g.). Nevertheless, it is also possible and useful to introduce the measurement using the fuzzy numbers apparatus.

If something cannot be defined, it cannot be measured, and if it cannot be measured, it cannot be controlled and improved. Using the abovementioned definition of quality contained in the ISO 9000:2015 standard [24], the quality of project team can be defined as “the degree to which a set of inherent characteristics of the project team fulfils requirements”. Requirements mean the need or expectation which has been established. The requirements often apply to customers, but they may be the requirements of the organization itself. In this paper, requirements for the project team are primarily the responsibilities of the project manager. PM is responsible for the level of project management quality, which is affected by the level of quality of the project team and the level of quality of relations between the project manager and the team. The requirements for the project team are also defined in terms of cooperation with a psychologist and PR expert. With PM, they decide about the optimal proportions of roles at each stage of the project.

The authors propose guidelines for the quality model of the project team, which includes its definition and a draft of its measurement method. The possibility to define and measure the quality of project team both ensures the optimal level of the team quality and allows to make accurate managerial decisions throughout the project life cycle.

According to the authors of this paper, “the quality of project team” is the degree of adaptation of the quality level of psychological profiles of the members of the project team to the requirements of particular phases of the project and requirements of PM, taking into account the nature of the project. This is a refinement of the definition of quality taken from the ISO 9000 standards.

B. Measurement of the Quality of Project Team

Because of a limited space, let us give an idea of the quality of project team measurement only. The model concerns psychological aspects of project team. The quality of project team measurement is proposed as a process, described below as the sequence of three steps.

1st Step. Let us use MBTI first as the tool of a preliminary selection. Out of all the employees, the group is selected, according to the following criteria: all sixteen types of MBTI are represented, if possible in the same proportions, each of them represented by the people with his highest score of his leading feature (in percent), of the MBTI test. The number and competences of this group must be sufficient to do the whole project work. Such group will be called a Reference Resource Group (RRG), ensuring the best quality of the project team, taking into account existing people availability. Let us denote such an ideal level of the group quality as RQPT (Reference Quality of Project Team). Let $BPIQ_i$ denote the Best Personal Individual Qualities levels ($i=1,2, \dots,16$) for all sixteen psychological types. Then let us define the RQPT level by (1).

$$RQPT = \frac{1}{16} \sum_{i=1}^{16} BPIQ_i \tag{1}$$

2nd Step. There are three main applications of MBTI in development of the project team [7]. It is used for the personnel recruitment, diagnosis of the psychological sources of conflicts and improvement of interpersonal relations PM - project team.

Project personnel recruitment. Every project is more or less specific; there are many different types of projects. Moreover, in classical project management approach, the project is divided into five stages [25]: 1. initialisation, 2. planning, 3. execution, 4. control and 5. closing. Each of these stages has its specificity and requires people with different psychological MBTI. So, for each stage, a specific recruitment should be done, taking into account stage’s specificity and specificity of the project itself. Such recruitment should be done by Project Manager, Psychologist and PR expert, and the candidates should be grounded in RRG. For a stage k ($k=1,2,3,4,5$), such team should be comprised of the people owning psychological types in proportions defined by PM, Psychologist and PR specialist. Let ST_k be a specific team for a project’s stage k ($k=1,2,3,4,5$). Its reference quality – $RQST_k$ – is given by (2).

$$RQST_k = \frac{1}{n} \sum_{i=1}^n BPIQ_i \tag{2}$$

where $BPIQ_i$ is the Best Personal Individual Quality of the person i , and n is the number of members of the specific team for the given stage.

Diagnosis of the psychological sources of conflicts. MBTI method is useful to diagnose reasons of conflicts, inevitable during the life cycle of the project. There can be many different sources of such conflicts and different people involved in them – e.g. PM, his superiors, his workers, customers. The more psychological nature the conflict has, the more effective it is to use the MTBI method in preventing and, frequently, in solving the conflict. Such prevention and solution of conflicts should be done using $RQST_k$, by PM, Psychologist and PR specialist.

Improvement of interpersonal relations PM-project team. The PM duties and scope of activities are different than those of the project team members. Usually, the tasks of the project team members are much more precisely defined than those of PM. That is why, frequently the psychological type of PM and his team members are essentially different. Project manager must know his own type and the types of his people, and he should absolutely be conscious of their differences. It allows him to understand better the differences, propose to the team and undertake common actions, which contributes to partial compensation of these divergences.

3rd Step. This is the final step of the project team members selection. It relays on Belbin method, presented in s. III.B. The nine Belbin team roles can be assigned to persons as a result of special Test Belbin [14]. Belbin method recommends the equal distribution of the roles among the team members. However, not all are always required at the same time, e.g. in consecutive phases of the project team lifetime. The decision about the optimal proportions of the roles in respective stages of the project is undertaken by PM, Psychologist and PR expert. Below, some examples of dominant roles in respective stages are given:

- Initialisation – leader, locomotive, plant, judge-evaluator;
- Planning – leader, locomotive, judge-evaluator, completer finisher;
- Execution – leader, external coordinator, completer finisher, specialist;
- Control – leader, judge-evaluator, specialist;
- Closing – leader, completer finisher.

These roles are attributed to the members of a specific team (STk) for a project stage k (k=1,2,3,4,5) by PM, Psychologist and PR specialist. Such team – Tk is optimal, and its quality level is a reference – RQTk. All three specialists discuss the style and manner of management of the team Tk when the distribution of roles is not optimal. The parameters defining respective roles are in fact a mix of various psychological features/predispositions, and it is impossible to attribute to each of them an exact value. The solution is offered by fuzzy numbers apparatus [26]. The parameters defining respective roles are represented by fuzzy numbers. Each experts estimates independently t-level of such a fuzzy number and his level of caution of such an estimation. The authors proposal is to organise a consensus meeting of three experts. The consensus meeting consists in substantial argumentation, using facts only [9]. It creates an opportunity to explain the nature of differences between estimations of the values of the fuzzy number discussed, representing given Belbin role, and select the optimal one. The analysis of fuzzy numbers application to measure the quality of the project team has been recently done by authors and will be aim of the nearest publication.

The impact of the quality of project team on team management consists in recognising the delicate matter of psychological features of the team matters first. Next, PM accompanied by Psychologist and PR expert, in the case of decreasing of quality level, should be open and creative to try to raise this level.

V. SUMMARY, CONCLUSIONS

Quality is a very large notion, affecting many objects – products, services, processes and other forms of human activities. In technical area, the definition and the measurement of quality are evident and easy to formulate. In social and management sciences, the challenge is much more sophisticated, because of the higher level of differentiation/variation of social systems in comparison with the technical ones [9]. Project team is a social group of affiliation, with its complicated structure, processes, and interpersonal relations. The significant role of such team in the project success or failure has inspired the authors to develop an idea of project team quality. This development has been presented in three sections (key section – Guidelines of the Quality of the Project Team). The process is based exclusively on psychological parameters of MBTI for the preliminary selection of the project team members, and Belbin method for the final selection of them. For the final selection of the project team members, the fuzzy approach of Belbin parameters and quality measurement have been announced.

This paper, in line with the authors' knowledge, is the first attempt to the quality of project team. The authors are conscious of its shortages. Let's note that the measurement question has been only sketched because of the lack of space. Another, large paper, will appear soon.

Further research should also be done Theoretical, focused on the enrichment of a set of quality psychological parameters by the new ones, analysis of the quality using special cases of fuzzy numbers (triangular, trapezoidal), and introducing also fuzzy numbers of type 2 or higher. Practical – research to test and improvement of the proposed model.

And, finally, the similar study could be done on project team quality in projects, managed according to not classical, but agile methodologies, Scrum [27] particularly.

Nowadays, quality is omnipresent in all areas of human activities. So, in "projects age", quality of project team is entirely worthy the researchers' and practitioners' interest.

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