



Fig. 1. Finding a balance between resource capacity and project demands under disruption scenarios [author's own diagram]

The project addresses the issue of balancing between the requirements imposed by the tasks to be performed, on the one hand, and its resource capacity, e.g. the competences of its personnel, on the other. The individual competences of individual employees compose a competence structure of the entire team, determining the possibilities of implementing the group of tasks it undertakes. The models of competence structures presented in the available subject literature allow to formulate typical questions related to the assessment of staff potential and costs related to the allocation of employees, for example:

- Does a given team of employees with specific competences, guarantee the realization of tasks satisfying the assumed constraints? If it does, what are the costs connected with realization of given assignment plan?

The nature of these types of questions emphasizes the need to **analyse the considered competence structures**, e.g. the analysis of the possibility of meeting the assumed expectations. An alternative group of issues, rarely addressed in publications, inspires questions emphasizing the need to **synthesise competence structures**, e.g. strengthening the potential of the staff. Examples of this group of questions, dedicated to searching for structures that guarantee the fulfilment of expectations, i.a.:

- Will the planned training of employees guarantee a personnel assignment satisfying the assumed constraints? If so, which employees and in the scope of which competences should be trained?
- What are the necessary costs and time associated with the appropriate training?

It is worth noting that this type of questions become crucial in the context of robust planning of resource allocation, i.e. planning to minimize the impact of potential (with unknown time of occurrence) unwanted disruptions occurring during the realization of assigned tasks. An example of this type of events are employee absences which results the personnel allocation plan modifying (i.a. their task reallocation).

In some competence structures cases, it is impossible to make an acceptable modification of assignment plan. The reason for this may be the lack of sufficient competences of available staff, as well as limitations of an administrative and legislative nature (e.g. related to exceeding the limits of employees' working hours). Anticipating this type of events, robust competence structures to the assumed set of distractions are needed. Consequence of questions arising in this context, such as:

- What is the robustness level of given competence structure to assumed type of distraction?
- What competence structure guarantees the desired robustness level to assumed type of distraction?

there is another question about sufficient conditions, whose fulfilment guarantees the existence of the answers sought. In the context of the considered problem of competency structures planning enabling determination of robust task assignment (e.g. robust to employee absenteeism), an NP-difficult problem, the search for such conditions becomes particularly important – it determines the purposefulness of work- and time-consuming searches.

The results of preliminary research implementing the paradigm of declarative modelling, based on the environments of mathematical programming/constraint programming, confirm its right choice as a tool for modelling decision support systems, in particular in the scope of the robust competence structures varianting.

The aim of the research is to develop and empirically verify the method of synthesizing competence structures robust to a selected set of disruptions. . Because the calculations are time-consuming, and still may not guarantee that a solution will be found, an additional objective of the projected investigations is to look for so-called sufficient conditions, the fulfilment of which guarantee the existence of admissible solutions. Determination of such conditions will allow to avoid the time-consuming and laborious search for solutions that guarantee robustness of the planned competence structures to the given types of disruptions.

The expected results of the project will constitute an original contribution to the development of management and quality studies in the area of the theories of robust personnel assignment planning, competences management, human resources development planning, personnel controlling etc. In other words, they will transfer into their practical use in the form of rational varianting (re-scheduling) changes of assignment caused by specific disruptions.