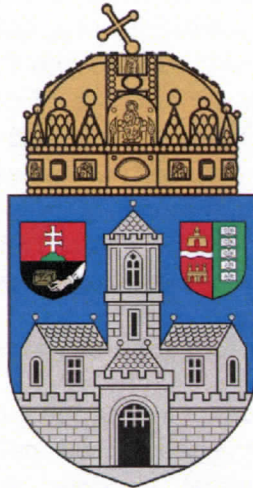


# Obuda University

Doctoral Thesis



*Potential solutions for matching theory problems in university setting*

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The aim of the Thesis was to analyse the alternative ways of solving matching theory problems, to compare these different algorithms and define criteria based on which, these algorithms can be evaluated and compared. These have been done to offer an alternative for standard operating protocols dealing with organisational situations as pre-programmed (programmable) relations. To make the matching algorithms an innate part of the organisations' routine, a specific software has been designed and created that enables the fast and easy use of matching theory algorithms with big groups. I considered it to be important and timely to create a program, which can help those, who lack mathematical and matching theory knowledge – such as CEOs or HR specialists – in creating advantageous pairs.

In the Thesis, various problem situations and their solving algorithms have been inspected to explore the difference between the stable pairs (matching) of matching theory algorithms and optimal solutions created with the help of operations research. This has been done, because the adequacy measure of the two logic is different. A matching is optimal, if the value of the pairs can be defined and the maximum utility matching can be found. On the other hand, when aiming for a stable matching – in the field of matching theory – utility is only important from the individuals' perspective. It creates pairs where an individual can only not get a more beneficial pair when they he/she is already paired up with another partner that was higher on his/her preference list.

During the research, the following questions have been tackled:

- Which are the situations - within university settings, - where pairs have to be created, but decision makers do not apply any matching algorithm consciously, hence creating suboptimal solutions, through a time- and energy-consuming process that does not generate satisfaction in the stakeholders?
- Which algorithm(s) should be used in everyday matching situations?
- Can this (these) algorithm(s) be applied in situations, where the preference of each of the parties is not known?
- Can these algorithms be evaluated besides the feature of stability with another indicator signifying utility, and if yes, how?
- Are the decision makers rational? Do they take advantage of all available opportunities in cases, when the goal is not the creation of a certain matching, but to ensure the participation of all stakeholders in the matching?
- Does the length of the preference list make a difference under the same circumstances?
- Can a software be created for matching situations as mathematical problems that is easily useable and automatically generates the pairs after the input of the involved parties' preferences?
- Does participation in the decision-making effect the satisfaction of those engaged?
- Can matching theory algorithms be advertised and applied more extensively with the help of a software especially made for matching purposes?