

ASSIGNMENT OF LECTURER TO COURSES BASED ON OPTIMAL COMPETENCY SCORES USING MODIFIED HUNGARIAN METHOD (MHM) AND OPTIMIZATION MODEL

(Penetapan Pensyarah kepada Kursus Berdasarkan Markah Kompetensi Optimum Menggunakan Kaedah Hungarian yang Diubahsuai (MHM) dan Model Pengoptimuman)

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ABSTRACT

Effective assignment of lecturers to courses is a critical task in Higher Education Institutions in ensuring optimal utilization of faculty expertise and resources. Past related studies mostly used the Hungarian assignment method while the use of Modified Hungarian Method (MHM) optimization model is still lacking. Furthermore, competency-based lecturers to courses assignment involving knowledge, skills and teaching motivation has never been implemented. This paper presents a mathematical programming approach through an enhanced formulation of the MHM model. The competency-based MHM (C-MHM) model considers the competency scores of lecturers for courses involved in which the model's objective function is to maximize the total competency scores obtained from the lecturer-to-course assignments. Data on competency scores of lecturers across all undergraduate courses were collected from Mathematics lecturers in UiTM Shah Alam through online survey. The C-MHM model with competency scores as input data was solved using MATLAB intlinprog to generate an optimal teaching assignment plan where lecturers have been assigned to teach a maximum of three courses. The optimal solutions of this competency-based C-MHM model indicates which courses are the best to assigned to a particular lecturer based on competency levels measured using three factors namely knowledge, skills and teaching motivation. Analysis of these results reflect the proficiency and suitability of each lecturer for the assigned courses. The key contribution of the approach in our study is the adaptation of the MHM optimization model to incorporate the lecturers' competency levels and other multidimensional inputs efficiently. The model aims to improve teaching quality, reduce mismatches, and enhance overall academic performance.

Keywords: lecturers-to-courses assignment; competency; Modified Hungarian Method; mathematical programming model; higher education institutions

ABSTRAK

Penetapan pensyarah kepada kursus secara berkesan adalah tugas yang kritikal di Institusi Pengajian Tinggi dalam memastikan penggunaan kepakaran dan sumber fakulti yang optimum. Kajian yang berkaitan sebelum ini kebanyakannya menggunakan kaedah penetapan Hungarian (HM) manakala penggunaan model pengoptimuman kaedah Hungarian yang diubahsuai (MHM) masih kurang. Tambahan pula, penetapan pensyarah kepada kursus berasaskan kompetensi yang melibatkan pengetahuan, kemahiran dan motivasi pengajaran belum pernah dilaksanakan. Kertas kerja ini membentangkan pendekatan pengaturcaraan matematik melalui formulasi model MHM yang dipertingkatkan. Model MHM berasaskan kompetensi (C-MHM) mengambilkira skor kompetensi pensyarah bagi kursus-kursus yang terlibat yang fungsi objektif model adalah untuk memaksimumkan jumlah skor kompetensi yang diperolehi penetapan pensyarah-ke-kursus. Data skor kompetensi pensyarah merentasi semua kursus sarjana muda telah dikumpul daripada pensyarah Matematik di UiTM Shah Alam melalui kaji selidik atas talian. Model C-MHM dengan skor kompetensi sebagai data input telah diselesaikan menggunakan MATLAB intlinprog untuk menjana pelan penetapan pengajaran yang optimum

di mana pensyarah diberikan maksimum sebanyak tiga kursus. Penyelesaian optimum model C-MHM berasaskan kompetensi ini menunjukkan kursus-kursus mana yang terbaik untuk diberikan kepada pensyarah tertentu berdasarkan tahap kompetensi yang diukur menggunakan tiga faktor iaitu pengetahuan, kemahiran dan motivasi pengajaran. Analisis keputusan ini mencerminkan kecekapan dan kesesuaian setiap pensyarah untuk kursus-kursus yang ditetapkan. Sumbangan utama pendekatan dalam kajian kami ialah pengadaptasian model pengoptimuman MHM untuk menggabungkan tahap kompetensi para pensyarah dan input pelbagai dimensi dengan cekap. Model ini bertujuan untuk meningkatkan kualiti pengajaran, mengurangkan ketidaksepadanan, dan meningkatkan prestasi akademik secara keseluruhan.

Kata kunci: penetapan pensyarah-ke-kursus; kecekapan; kaedah Hungarian yang diubahsuai; model pengaturcaraan matematik; institusi pengajian tinggi

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