

1 - MCDA for Health Technology Assessment: Trends and Challenges

Yorgos Goletsis, Garoufalia Naka, Kostas Athanasakis, Michalis Doumpos

Priority setting in healthcare's financing is a multidimensional problem as there are conflicts among different stakeholders' groups (patients, scientific specialists, healthcare providers, manufacturers, insurers). Allocating the limited resources and funding to (new) medical technology requires an evaluation of the multiple types of value medical technology (i.e. tools, tests, devices, drugs, vaccines, processes, etc.) can occur, which extend the traditional economic evaluation which is often limited to the evaluation of costs and a single health related outcome (such as QALYs, DALYs, etc.).

Multicriteria Decision Analysis (MCDA) can expand the current more or less standard assessment process by introducing multiple (and often conflicting criteria), the preferences of multiple stakeholders, including the society.

For this reason, in our paper we are reviewing the relevant literature and through a detailed review and bibliometric analysis of 226 papers we identify the theoretical foundations and trends in the relevant literature. Despite the relevant progress over the last years, MCDA for Health Technology Assessment needs to address several challenges before being widespread. Such challenges could be conceptual, methodological or organizational. Overcoming these challenges can help embedding the multicriteria concepts and methods in healthcare technology evaluations and decision making.

2 - Comparison of HB Shrinkable Estimators and DCE Simulators for Demand for Care

Christine C Huttin

OBJECTIVES: this communication aims to discuss how and in which context a random price generator for health care markets can be useful in comparison with other approaches for economic modeling and pricing of medical products and services **METHODS:** a comparison of the different approaches used will be discussed with their statistical limitations: nested logit models, cumulative logit models, latent model of choices, shrinkable estimators with Hierarchical Bayesian approach, combination of robust pricing optimization with multinomial logit choice models, and choice models with random price generators and current model application of the BLP model on NGS sequencing. **RESULTS:** random generators proved to be useful but do not fit any kind of structural conditions to adjust supply and demand of health re markets in more or less regulated health and economic systems. an approach by sets of alternatives and choice models allow to adjust for heterogeneity of demand but lack of price data in some markets make it useful to rely on shrinkable estimators with HB approaches. In duopoly cases, the use of BLP is currently tested and may help for investigation of antitrust policies. **CONCLUSIONS:** the complexity of health care markets lead to consider various combinations of models and even participatory modeling to reach growing consensus with various layers of decision makers both on the payer side and the economic actors switching to data driven models for both drug and vaccines.

3 - Integrating Multi-Criteria Decision-Making (MCDM) in Traditional Chinese Medicine (TCM) Diagnosis: A Case Study on Post COVID-19 Syndromes

Mei-Chen Lo, Fang-Pey Chen, Yen-Ying Kung

This research delves into the synergistic application of Multi-Criteria Decision-Making (MCDM) methodologies in Traditional Chinese Medicine (TCM) diagnosis, with a specific focus on Post COVID-19 Syndrome. The global aftermath of the pandemic has heightened the demand for nuanced diagnostic approaches, and this study aims to bridge the gap between traditional diagnostic principles and modern decision-making tools. Through a detailed exploration of MCDM techniques such as Analytical Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), the research integrates these methodologies into the TCM diagnostic framework. The case study on Post COVID-19 Syndrome serves as a

practical application, examining how MCDM enhances diagnostic precision and effectiveness. The findings not only contribute to the evolution of TCM practices but also hold implications for a more integrated and responsive healthcare approach in the post-pandemic era.

■ WC-48

Wednesday, 12:30-14:00 - Room: 60 (building: 324)

DEA methodological developments I

Stream: Data Envelopment Analysis and its Application

Invited session

Chair: Mehdi Toloo

1 - Complete Ranking and Benchmarking Methods for Improved Efficiency Assessment in Neutrosophic Environments

Deena Sunil, Kshitish Kumar Mohanta, Vishal Chaubey, Poornima Hulipalled

The measurement of the relative efficiency of the Decision-Making Units (DMUs) in a fuzzy environment is conducted through the employment of the fuzzy data envelopment analysis (FDEA). In FDEA, one of the primary concerns is to identify the benchmarking for inefficient DMUs, in order to enhance the efficiency of these particular units. Additionally, the complete ranking of the DMUs is also an important aspect to consider within the realm of FDEA. To address these issues, this article proposes the utilization of a reference set and complete ranking technique for the DMUs in a neutrosophic environment, which is an extension of the fuzzy environment that effectively represents uncertainty. In order to evaluate the relative efficiency of the DMUs, the Neutrosophic DEA model is solved using the possibility mean approach. Furthermore, a reference set based on the possibility mean function is suggested to identify peers for the inefficient DMUs. Moreover, the Neutrosophic super efficiency model, is employed to assess the relative super efficiency score of the DMUs. This super efficiency score is then utilized to achieve a complete ranking of the DMUs. To demonstrate the effectiveness and applicability of the proposed approach, a numerical example is considered.

2 - Adding counterfactual interpretation to DEA

Gordana Savic, Ognjen Nikolić, Sandro Radovanović

This paper investigates the integration of the Synthetic Control Method (SCM), a proven method to analyze an impact of policy interventions, and Data Envelopment Analysis (DEA), a well-known mathematical technique for measuring relative efficiency of decision-making units with multiple inputs and multiple outputs, to evaluate the effect of policy interventions on the efficiency of decision-making unit. Specifically, this paper applies these methodologies to assess the efficiency of Serbian banks over a given period, focusing on the influence of a merger between two principal banks on their operational performance, and answering a counterfactual question whether efficiency of a bank would be the same if a merger did not happen. The study demonstrates that SCM can be an effective tool for analyzing the repercussions of policy measures on decision-making unit efficiency. In other words, we suggest combining these two methods in the future, in order to conclude whether an intervention really has an impact on efficiency.

3 - Embracing fairness within a cross-efficiency hierarchical network DEA system

Marios Kremantzis, Siwei Xiao, Leonidas Sotirios Kyrgiakos, George Vlontzos

Several scholars have utilized hierarchical network Data Envelopment Analysis modeling techniques to assess the performance of complex structures. However, there has been limited consideration given to the integration of a peer-appraisal setting within a self-evaluation hierarchical context. This aims to enhance discriminatory power and mitigate the issue of unrealistic weighting scheme. To this end, our study