ESCOLA SUPERIOR DE CIÊNCIAS EMPRESARIAIS DO
INSTITUTO POLITÉCNICO DE VIANA DO CASTELO

VALENÇA, PORTUGAL
JUNE 28-30, 2017

Instituto Politécnico de Viana do Castelo

Escola Superior de Ciências Empresariais

BOOK OF ABSTRACTS

2017 XVIII CONGRESS APDIO

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Wednesday, June 28, 16:00-16:20

Wednesday, June 28, 16:50-18:30

Wed.1.2, *Wednesday, June 28, 16:50-18:30, Room 2*

DEA and Performance Analysis

Session chair: *Clara Bento Vaz*

1. **The evaluation of the social performance of mining firms**

Renata Oliveira (renata.oliveira@uepa.br) Faculdade de Engenharia da Universidade do Porto, *Renata Oliveira, Andreia Zanella, Ana Camanho*

Keywords: Composite indicators, Luenberger indicator, social performance, mining firms

This study presents a composite indicator to support the evaluation of firms regarding social achievements. In recent years, the social indicators of large corporations are increasingly being used as a measure of their overall performance regarding corporate social responsibility. Reputational issues associated with the firms' impact on society, both in terms of local employment and contribution to regional economic development are critical. This paper proposes a framework for the specification of indicators reflecting social burdens and benefits of mining firms, based on international standards and sectoral guidelines. A composite indicator is obtained using a Directional Distance Function model, allowing the identification of firms with the best practices in the sector regarding social aspects. The evolution of performance over time is assessed using the Luenberger indicator. An illustrative application involving the assessment of 24 large mining firm in the period 2011 to 2012 is discussed. The managerial implications of the results obtained are examined by the end of this work.

2. **Malmquist and Hicks-Moorsteen productivity indexes for clusters performance evaluation**

Rui Cunha Marques (rui.marques@tecnico.ulisboa.pt) CESUR, CERIS, Instituto Superior Técnico, University of Lisbon, *Rui Cunha Marques, Diogo Cunha Ferreira*

Keywords: Cluster analysis; Malmquist index; Hicks-Moorsteen index; Total Factor Productivity; unbalancedeness; uncorrespondencedeness

Measuring the performance of clusters characterized by the unbalancedeness and units with no correspondence in other clusters ("uncorrespondencedeness") has not achieved the desired attention in the literature. Particularly, the operational research has been almost exclusively focused on performance evolution over time, where clusters are generally balanced and the units repeat themselves over these groups. Such analysis has been based on the Malmquist and the Hicks-Moorsteen indexes (MI and HMI), which are solely based on Shephard's radial distance functions and do not account for all inefficiency sources. Making use of the so-called Geometric Distance Functions (GDF) and the GDF-based MI, we propose a generalization of the HMI, based on targets instead of distances to the efficient frontier, allowing the introduction of all inefficiency sources in the productivity model. We propose a Monte-Carlo-based framework to achieve the pseudo-corresponding units for general cluster performance analysis. This framework is a generalization of the conventional performance evolution over time. Wwe show that the HMI can be decomposed into economically meaningful indexes and can be rewritten as the geometric mean of the input and the output-oriented MIs. Given these conclusions and our proposed framework, the employment of the HMI to the general clusters analysis is straightforward.

3. **Análise analítica da eficiência de rega usando modelos determinísticos e estocásticos**

Rui Marques (rui.marques@tecnico.ulisboa.pt) Instituto Superior Técnico, *Helga Pereira, Rui Marques*

Keywords: Eficiência do Uso da Água; Data Envelopment Analysis; Irrigação; Revisão da Literatura

Este trabalho tem como objetivo realizar uma revisão da literatura sobre as metodologias aplicadas para medir a eficiência do uso da água para rega. A avaliação da eficiência das unidades produtivas é muito importante para fins estratégicos (comparação entre unidades produtivas), para planeamento (avaliação da utilização de diferentes combinações de fatores) e para a tomada de decisões (para melhorar o desempenho atual, analisando as diferenças entre a produção atual e a potencial). Encontraram-se mais de trinta estudos que utilizaram métodos determinísticos e estocásticos para determinar a eficiência. Várias metodologias foram utilizadas, embora a técnica mais adotada foi o Data Envelopment Analysis (DEA). Verificou-se que o DEA foi frequentemente utilizado juntamente com análise de regressão para entender melhor a fonte de ineficiência. Dos trinta e dois estudos analisados, 87,5% calcularam a eficiência usando métodos determinísticos. Destes, a metodologia mais utilizada foi a DEA. Esses estudos levaram à conclusão de que, em geral, as explorações são consideravelmente ineficientes em relação ao uso da água, e alguns fatores podem contribuir para sua melhoria, como por exemplo, escolha das culturas adequadas, ter uma maior área de exploração, ter um elevadoo nível de educação, instalar rega localizada, ter acesso a melhores oportunidades de crédito.

4. **Efficiency and Capital Structure in Portuguese SMEs**

António Fernandes (antoniof@ipb.pt) Applied Management Research Unit (UNIAG); Polytechnic Institute of Bragança, *António Fernandes, Clara Bento Vaz, Ana Paula Monte*

Keywords: Data Envelopment Analysis; Technical Efficiency; Capital Structure; SME; Inland of Portugal

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This paper aims to analyse the bi-directional relationship between technical efficiency, as measure of companies' performance, and capital structure, under the agency cost theory as well as the pecking order and trade-off theory to explain the capital structure decisions. The technical efficiency was estimated by the DEA method and corrected by using a suitable bootstrap to obtain statistical inferences. To test the agency cost hypothesis, asymmetric information hypothesis, risk-efficiency hypothesis and franchise value hypothesis (under pecking order and trade off theories framework) two models were performed using some determinants of capital structure such as size, profitability, tangibility, liquidity as control and explanatory variables through a truncated regression with bootstrapping. From an initial sample of 1024 small and medium sized companies from the interior of Portugal, for the period 2006-2009, it was selected a subsample of 210 SMEs from secondary and tertiary sectors. The results suggest that medium sized companies have higher average bias-corrected efficiency than small companies; short-term leverage is positively related to efficiency and the companies in the sample follow pecking-order theory.

5. **Determinants of nursing homes performance: The case of Portuguese Santas Casas da Misericórdia**

André S. Veloso (asveloso@ipb.pt) Polytechnic Institute of Bragança, *André S. Veloso, Clara Bento Vaz, Jorge Alves*

Keywords: Data Envelopment Analysis; Efficiency; Nursing Homes; Third Sector

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petitiveness and Internationalisation - COMPETE 2020 Programme within project "POCI-01-0145-FEDER-006961", and by National Funds through the Portuguese funding agency, FCT - Fundação para a Ciência e a Tecnologia as part of project "UID/EEA/50014/2013".

This study aims to evaluate the economic efficiency of Nursing Homes owned by 96 Santas Casas da Misericórdia (SCM) and the determinants that influenced their efficiency in 2012 and 2013. The SCM are the oldest non-profit entities, which belong to Third Sector in Portugal, provide this social response and receive significant financial contributions annually from the state. The study is developed in two stages. In the first stage, the efficiency scores were calculated through the non-parametric DEA technique. In the second stage, Tobit regression is used to verify the effect of certain organizational variables on efficiency, namely the number of users and existence of Nursing Home chains. The results of the DEA model show that the efficiency average is 81.9%, and only 10 out of 96 Nursing Homes are efficient. Tobit regression shows that the number of users has a positive effect on the efficiency of Nursing Homes, whereas the existence of Nursing Home chains affects their efficiency negatively.

Wed.1.3, *Wednesday, June 28, 16:50-18:30, Room 3*

Production and Inventory Management

Session chair: *Paula Alves*

1. **A spreadsheet based model that estimates the impact of reduced distribution time on inventory investment savings**

Serhat' Saylam (serhat.saylam@metu.edu.tr) Middle East Technical University, *Serhat Saylam*

Keywords: Fill rate; Lead time; Inventory cost; Spreadsheet modeling; VBA, ABC Classification

This study proposes a spreadsheet model that estimates the impact of reduced lead time on inventory investment savings. The study provides users with a means of automatically calculating inventory control parameters such as safety stocks and reorder points, and estimating the savings caused by lead time mean or variability reduction. Then a trade-off analysis can be done to determine whether reducing lead time would override the lead time crashing cost. In the model presented here, the model finds the optimal safety factor of an item based on a fill rate goal using Excel Solver. Then, Excel's VBA automates the process of finding safety factors for other items before and after lead time reduction. To see the functionality of the model and interpret the results, it is applied to different supply support activities of USTRANSCOM.

2. **Solving the backroom design problem**

Maria Pires (maria.pires@fe.up.pt) FEUP and INESC TEC, *Maria Pires, Pedro Amorim*

Keywords: Backroom design, Grocery retail, Strategic Planning

The grocery retail environment is more dynamic than ever and competition keeps intensifying. This requires retailers to adapt and develop innovative approaches to face current challenges. However, fresh thinking concerning backrooms is rare, in both academia and practice. In this presentation, we describe a methodology to design grocery backrooms. The proposed methodology consists in three stages: demand forecasting, backroom sizing and designing the backroom layout. The forecasting model is based on clustering techniques and multinomial logistic regressions. Furthermore, two models were developed for the backroom sizing problem. The first formulation is a bottom-up approach that aims to reduce the backroom life-cycle-costs by determining the optimal storage space and height. The second is a top-down approach based on DEA that determines the efficient level of floor space for each department. Lastly, a mathematical model to solve the backroom layout problem was developed. This problem consists in determining the best location for the departments in the backroom considering their sizes, adjacencies, physical restrictions and location of the corresponding departments in the sales area. The proposed methodology was tested on more than forty convenience stores,