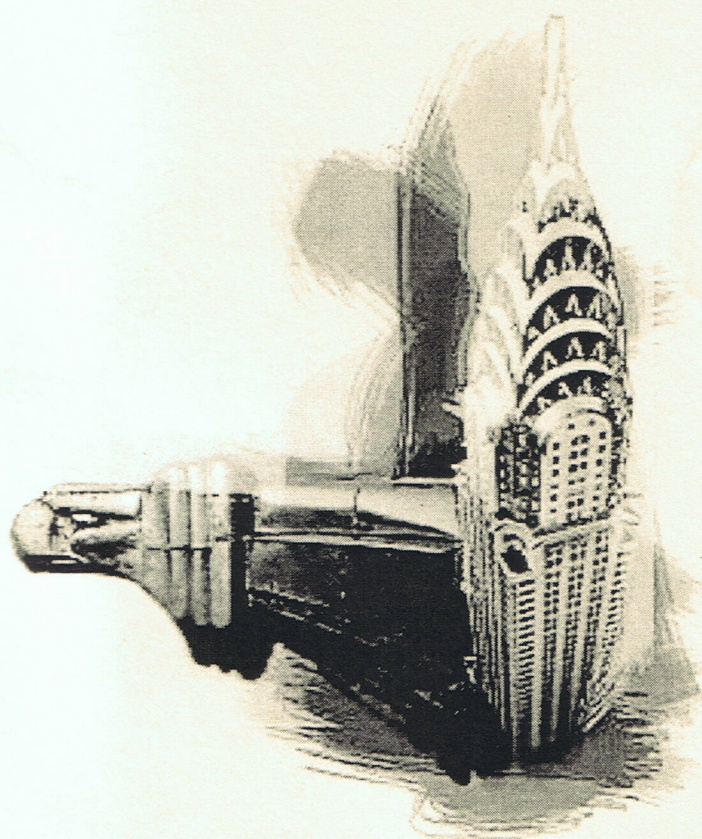


NAPW 2006 IV

North American Productivity Workshop

Book of Abstracts



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Performance Measurement of Service Operations: A Dynamic Efficiency Perspective.

Konstantinos P. Triantis and Kalyan Pasupathy

Operational investment decisions not only impact the current financial state of the enterprise but also their future survivability. Furthermore, these decisions potentially help transition the enterprise to higher performance levels. The body of literature is rich with change management approaches that provide guidance to enterprises seeking change. However, in spite of the guidance available, the activities that take place during transitional periods are often the most disruptive, and contain the furthest reaching performance and cost consequences, of any period of the life-cycle of systems. One of the reasons for this observed behavior is the failure of change management approaches to identify an efficient path of transition, from the old way of doing things, to a new performance paradigm. The enterprise's ability to master transient periods is fundamental to efficiently achieving steady state operations in the long-run, thus reducing transitional losses due to sub-optimal performance.

In the efficiency literature, the impact of operational investment decisions within the enterprise may be captured by changes to activities and processes using a stage-by-stage framework (similar to a chain) (Soteriou and Zenios, 1999) or the network model (Färe and Grosskopf, 2000). Typically, these modeling approaches are static in nature. Other research (Vaneman and Triantis, 2003; 2006) considers a dynamic representation of the activities and processes of the enterprise and provides efficiency computations during the transition period through the introduction of a dynamic structure. This structure requires a prior empirical estimation of the production (transformation) function.

We explore ways to enhance this approach by proposing a framework that replaces the empirical production frontier with an actual structural input-output operational representation of the enterprise. We illustrate the applicability of this approach for service operations. More specifically, the Service-Profit Chain (SPC) framework (Heskett et al., 1994) brings together several operational components, customer perceptions, customer behavioral intentions and customer loyalty to evaluate service operations. The components of the SPC are representations of the actual input-output transformation that occurs within the enterprise's service chain. We include feedback mechanisms in the chain that allow for the optimization of operational attributes during the transition period. This in turn allows for the dynamic evaluation of the long-term impact of operational investments. The optimization of operational investment is accomplished by incorporating a hill-climbing algorithm in a system dynamics model of the SPC. The hill-climbing algorithm evaluates the current operational state of the SPC system and compares it to specific operational performance goals to determine the gap that can potentially lead to additional investment interventions.

In conclusion, this paper explores a methodological approach that combines system dynamics modeling with the measurement of productive efficiency for the purpose of evaluating systems with respect to performance and costs when making operational investment decisions.

Analysis of the Effect of Environmental Conditions on the Performance of Retailing Stores.

Clara Vaz and A. Camanho

The assessment of performance in retailing services has gained considerable attention in recent years. The increased competition motivated the organisations to strive for efficiency in order to cut costs and deliver better customer services. This paper develops a method based on Data Envelopment Analysis (DEA) for the efficiency assessment of retailing stores. The method enables the quantification of inefficiencies taking into account the effect of exogenous factors (i.e., non-discretionary inputs and outputs).

The method developed starts with the identification of the factors that affect the DMUs' performance, including those outside the decision makers' control. The statistical significance of the effect of the exogenous factors on performance is tested using the Kolmogorov-Smirnov test, such that only the relevant factors are considered in the DEA assessment. An enhanced DEA model is run for each store, ensuring that

the definition of the efficient frontier is based exclusively on the discretionary variables, and only comparable stores are allowed as peers, i.e., stores whose area of influence is identical or less favourable than the catchment area of the store under assessment. As a result, the shape of the production possibility set is adjusted for each DMU according to the exogenous conditions where it operates. To avoid the loss of discrimination power of the DEA analysis, the choice of the peers authorized in the assessments is done allowing for trade-offs between the nondiscretionary factors (e.g., a store with more population in the surrounding area than the DMU under assessment may be allowed as peer if its level of competition is also higher). The adjustments required to the standard DEA model imply the definition of a mixed integer DEA formulation.

To disentangle technical inefficiency from the effect of environmental conditions, the results of the DEA model that takes into account the environmental conditions are compared with the results of a standard DEA model including only the discretionary inputs and outputs. This analysis showed that the average efficiency estimates of the stores analysed increases when the exogenous factors are taken into account, with the efficiency values for some stores increasing up to 15%.

Finally, to explore in more detail the impact of each of the non-discretionary factors (population and competition) on the performance of individual stores, a "step by step" approach was used. This approach consists of adding to the DEA model the environmental factors, one at each time (like a stepwise procedure of regression analysis). The results obtained in the successive models are analysed for each DMU to quantify the effect of each exogenous variable on store performance.

The applicability of the approach developed in this paper is illustrated in the context of a real-world efficiency assessment of grocery stores. The assessment adopted an output oriented perspective, consistent with the objective of sales maximization. The managerial implications of the results obtained are explored, comparing the insights gained with the DEA analysis with the results of the approaches for managerial planning and control currently used in the organisation.

Session FB3: 11:00 – 12:30, Rm. 3-50
Regional and Aggregate Studies of Productivity
Session Chair: Valentin Zelenyuk

Economic Efficiency of Ukrainian Regions: How Far Are They Apart?

Pavlo Demchuk

In this paper we investigate efficiency patterns across regions of Ukraine. Contrary to common perception we find no significant difference in distributions and aggregate efficiency between the Agricultural and Industrial regions, neither between the Right Bank (mostly Ukrainian speaking) and the Left Bank (mostly Russian speaking). However, we find that all the regions substantially lag behind the Kyiv city starting from 2001. Using truncated regression analysis with bootstrap we also come to conclusion that inefficiency of regions depends positively on alcohol and tobacco consumption, as well as amount of labor employed in the region. On the other hand, we find strong evidence that amount of capital in the region, and in particular foreign direct investment, is positively associated with its efficiency level.