Chapter 5
Productivity Analysis of Public Services: An Application of Data Mining

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ABSTRACT

Productivity is a key success factor in any organization. In order to improve productivity, it is necessary to understand how various factors affect it. The previous research has mainly focused on productivity analysis at macro level (e.g. nations) or in private companies. Instead, there is a lack of knowledge about productivity drivers in public service organizations. This study aims to scrutinize the role of various operational (micro level) factors in improving public service productivity. In particular, this study focuses on child day care services. First, the drivers of productivity are identified in light of the existing literature and of the results of workshop discussions. Second, the drivers most conducive to high productivity and the specific driver combinations associated with high productivity are defined by applying methods of data mining. The empirical data includes information on 239 day care centers of the City of Helsinki, Finland. According to the data mining results, the factors most conducive to high productivity are the following: proper use of employee resources, efficient utilization of premises, high employee competence, large size of day care centers, and customers with little need for additional support.

INTRODUCTION

Productivity improvement is high on the agenda in many public organizations. It is necessary to improve the productivity of public services in order to satisfy increasing demand with limited resources. Productivity is commonly regarded as an organization's key success factor. On the level of national economy, productivity improvement has been linked to many economic and social phenomena, such as economic growth and high standard of living (Miller, 1984;

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Sink, 1983). Research in various disciplines typically applies different approaches in productivity studies, for instance, national economists are more interested in macro level perspectives, whereas researchers of industrial management and business economics typically examine productivity at micro level (Käpylä et al., 2008).

Productivity is a traditional research topic on which there is a rich body of literature. In a recent Finnish study examining the current status of productivity research, it was concluded that the effects of various factors on productivity are verified too rarely (Käpylä et al., 2008). Productivity effects are often studied at macro level, e.g. national level (e.g. Lambsdorff, 2003; Skans, 2008). In order to improve productivity by managerial means, the drivers of productivity must be identified. These drivers can be utilized for different purposes, such as identifying development targets. Many initiatives of productivity improvement have proven to be inefficient and have met with resistance among employees due to the implementation of harsh decisions (e.g. job cuts) as the only means to improve productivity. However, many different factors may in practice affect productivity. These factors should somehow be connected to micro level organizational operations in order to identify concrete development targets (e.g. improving the division of labor).

The understanding of the role and the significance of various productivity drivers is still in its infancy. This study seeks to establish what role various managerial (micro level) factors play in improving public service productivity. In this study, productivity improvement is examined from the point of view of service provides. The research questions are the following:

- What are the drivers of productivity?
- Which drivers are best related to high productivity?
- Which specific driver combinations are associated with high productivity?

In particular, this study focuses on child day care services. The first question is answered in light of the literature and the results of workshop discussions. The second and third questions are examined by applying data mining methods. Since the specific productivity driver combinations are beforehand unknown, data mining methods will provide a relatively easy way of gaining insight into the relationships between these various drivers. The empirical data includes information on 239 municipal day care centers of the City of Helsinki, Finland.

First, we summarize the relevant literature on the productivity of public services in general. Then follows a discussion of factors contributing to productivity specifically in child day care services. The data and measures used in this study are presented with a brief description of the data analysis methods used. Finally, the results of the empirical examination are reported. In addition, conclusions (including the contribution and limitations of the study and future research suggestions) are presented at the end of this chapter.

ASSUMED DRIVERS OF PRODUCTIVITY

Literature on Productivity of Public Services

Productivity is traditionally defined as the ratio between output (e.g. the quantity of services produced) and input (e.g. the number of employees needed for such production) (Sink, 1983). This definition is interpreted slightly differently in different research disciplines. According to Pritchard (1995), all commonly used productivity definitions can be classified into one of three categories:

- The economist/engineer approach, where productivity is seen as an efficiency measure (outputs/inputs)