PERFORMANCE MANAGEMENT AND COST-EFFECTIVENESS OF PUBLIC SERVICES:

EMPIRICAL EVIDENCE FROM DUTCH MUNICIPALITIES

Hans de Groot (Innovation and Governance Studies, University of Twente, The Netherlands, h.degroot@utwente.nl)

Bart L. van Hulst (Innovation and Public Sector Efficiency Studies, Delft University of Technology, The Netherlands, b.l.vanhulst@tudelft.nl)

Abstract

The performance of public organizations is one of the key topics in public administration research. Cost-effectiveness as a dimension of performance has hardly been studied in this literature, however. Many governments currently are cutting budgets on an unprecedented scale after the world-wide financial and economic crisis. Reducing budgets and at the same time safeguarding the level of essential public services as much as possible, requires thorough knowledge of cost effectiveness and its determinants. This paper tries to fill this gap. First, by introducing econometric methods to measure cost effectiveness, usually not considered in public administration research. Second, by relating cost effectiveness to variables proxing performance management practices.The model has been empirically estimated using data of around 75 Dutch municipalities on output, client satisfaction, cost and organizational structure in 2008 and 2009. The data relate to the subsector of administrative local services that providespassports, driving licenses and other legal documents. The dataset is created in the context of a recently developed research program on evidence-based public management in Dutch local government.

1. Introduction

The performance of public organizations is one of the key topics in public administration research (for an overview, see Walker and Boyne, 2009). The main focus has been on the process of performance measurement and management and typically challenges the assumptions and outcomes of 'new public management' and related reforms. A smaller part of the research effort addresses the determinants of public performance; however often without calculating the size of impacts on public management. In particular, the dimension of cost effectiveness is usually overlooked. This paper aims at partly filling this gap. Its relevance is not only derived from academic criteria but also from the practitioner's urgent need for results on the cost effectiveness of public programs. Many governments currently are cutting budgets on an unprecedented scale after the world-wide financial and economic crisis. Reducing budgets and safeguarding the level of essential public services as much as possible, requires thorough knowledge of their cost effectiveness.

The methodology of the paper closely follows the evidence-based research agenda put forward by, among others, Meier and O'Toole (2009), advocating empirical large-N research

methods. The paper adds new insight by focusing on measures of cost effectiveness, usually not considered in current research. An empirical illustration is given by studying the efficiency of administrative services of local government and its determinants, using a sample of around 75 Dutch municipalities, employing data on costs, outputs and organizational characteristics in 2008 and 2009. The empirical illustration is of particular interest because it links costs to physical outputs in terms of delivered services. This differs from previous research that proxies physical output by the size of the population (for example, Borger et al (2000) and Kalb (2010). The empirical part also studies the relation between calculated efficiency scores and organizational and managerial characteristics, including proxies of performance management practice.

2. Theoretical considerations

Current approaches to public sector performance in the context of the evidence-based research agenda mentioned before typically try to explain program performance as a function of independent variables that measure product or client characteristics, environmental influences and organizational and managerial variables such as the extent of decentralized decision making, the level of external networking by employees or managers, their intrinsic skills and qualities, available resources etc. Cost-effectiveness or efficiency of the institutions or programs involved is typically not considered. Although resources are often included as a control variable (for example, the level of expenditures per student in educational programs), cost effectiveness is not addressed separately. This is an important omission, as policy makers usually are not interested in effectiveness per se – does the program work – but often in the question: how much effect is a program generating for each dollar spent. Or alternatively: is this program the least costly way of achieving the public objectives, or are their less costly alternatives? A typical question in education could be: is it more effective - in terms of student achievement - to invest in higher quality teachers or in smaller classes? Both measures can be shown to have some effect, but their cost-effectiveness is different. To answer the cost-effectiveness question, a more specific approach is needed. We argue that existing methods from econometrics and operations research can be used to measure and investigate the cost-effectiveness of public programs or institutions (for an overview, see Fried et al, 2008). Methods such as stochastic frontier analysis (SFA) and data envelopment analysis (DEA) determine a virtual frontier of relatively efficient decision making units (compare the solid line in figure 1). The parametric SFA frontier allows for random measurement error in the data as well as systematic deviations from the efficiency frontier arising from intrinsic inefficiencies. The non-parametric DEA frontier is completely determined by the existing data, but does not allow for measurement error. Therefore we prefer the more realistic approach of the parametric SFA frontier, although one has to assume a particular functional form. A widely used functional form is the translog function (Christensen et al, 1973). For our purpose, cost efficiency, i.e. relating total costs and outputs (or outcomes, in which case we speak of cost-effectiveness) is the most relevant efficiency indicator. Pure technical efficiency would only consider the relation

between physical inputs, such as the amount of labor or capital, and outputs. When considering cost-efficiency, the usual assumption is that decision making units also take into account input prices in order to minimize costs. These input prices therefore are part of the frontier estimation exercise, unless prices do not vary substantially for different decision making units, in which case they can be neglected.

Figure 1   Example of an efficiency frontier
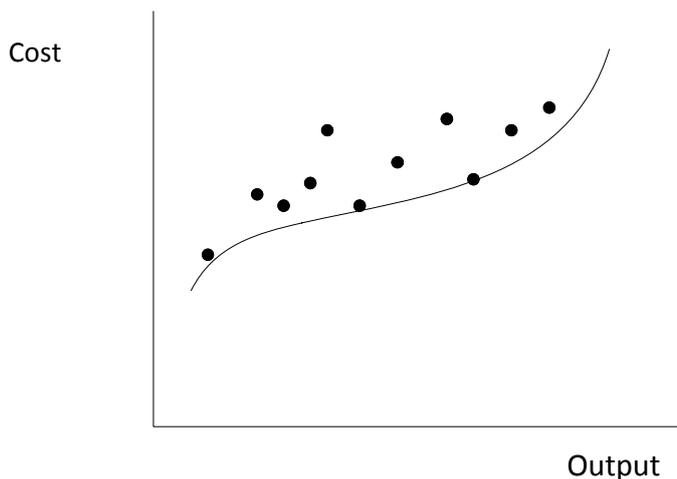
The distance to the efficiency frontier is a measure of the (relative) inefficiency of each decision making unit. In practice, an efficiency score is calculated for each unit from the proportional decrease in all inputs needed to reach the frontier at a given output. Depending on the scope of the analysis and available data, assumptions have to made regarding a possible intertemporal shift of the efficiency frontier, for instance as a result of technological progress. Typically, as a first step, cost-effectiveness or efficiency scores are determined as described, taking into account exogenous factors that also determine efficiency, such as client characteristics. In a second step, efficiency scores can be explained by regressing them on variables that measure management quality or other controllable organizational characteristics. In this stage, different assumptions from organizational or political theories of public sector behavior can be tested.

3. Empirical illustration

Our approach to measuring cost-effectiveness or efficiency in the public sector is empirically demonstrated using data on Dutch municipalities. Their large number, more than 400, and their freedom in choosing internal organizational structure and management instruments, make them well suited to analyze determinants of cost-effectiveness. The dataset is created in the context of a developing research program on evidence-based public management in local government of three Dutch universities. The dataset used for this paper, however, is limited to local administrative public services such as the provision of passports, documents from the registry and small building permits. Data are available on costs, organizational data and outputs, including survey results on citizen satisfaction with administrative municipal

services. The more extensive dataset used here is only available for a subset of around 75 municipalities for 2008 and 2009 (a total of 150 usable observations) and is largely based on an annual benchmark exercise (BMC, 2010). Table 1 gives some descriptive statistics of key variables in thedataset.

Table 1. Descriptive statistics of key variables in 2009 (N=83)

Variable	Minimum	Maximum	Mean
Personnel costs (euro)	177,188	28,193,000	3,708,239
Population size	5,162	710,370	80,518
Passports issued	740	112,443	10,265
Identity cards issued	400	76,205	9,337
Driving licenses issued	258	43,918	5,332
Certificates of death, birth & marriage	125	57,807	4,031
Certificates of residence	348	216,936	9,717
Building permits	22	2,228	316

3.1 Frontier estimation results

We have estimated a translog stochastic cost frontier, employing as the three main output variables (1) the sum of the number of passports, driving licenses and national identity cards, (2) the sum of certificates of death, birth & marriage and (3) small building permits. The last output is considered separately, as the provision of building permits is a relatively costly service. It is worthwhile to consider additional exogenous variables that capture qualitative output characteristics that also affect service costs - and therefore efficiency - given the level of quantitative output. For example, a lower educated or immigrant population could require more time to be serviced and therefore generate higher costs. In this analysis we proxy these factors by the percentage of the population living in urbanized areas. Input price differences have been neglected, given nationally regulated local public sector wages and small regional price variation in the Netherlands. Estimated parameters for the frontier are presented in table 2, while efficiency scores are depicted in figure 2.

From table 2 we can conclude that production of documents and permits are the most important cost drivers for the administrative services examined here. Production of certificates has a small impact on the costs. We also see that the percentage of the population living in urban areas has the expected positive and significant effect. Note that interaction and quadratic terms are in most of the cases not significant. This means that the translog specification is somewhat overdone and a loglinear Cobb Douglas specification might suffice. Sigma and Lambda are indicative parameters of the frontier analysis and are in an acceptable range.

Table 2. Estimation results

Variable	Parameter estimate	T-value
Constant	**-0.95**	**-7.93**
2009	**0.20**	**2.40**
Documents	**0.47**	**2.10**
Certificates	0.08	0.43
Permits	**0.50**	**3.04**
Documents x Documents	-0.01	-0.01
Documents x Certificates	-0.38	-0.74
Documents x Permits	0.42	0.97
Certificates x Certificates	0.36	0.87
Certificates x Permits	-0.11	-0.38
Permits x Permits	-0.17	-0.38
% Urban	**0.29**	**3.03**
% Urban x %Urban	**0.08**	**3.35**
% Urban x Documents	0.07	0.76
% Urban x Certificates	-0.02	-0.45
% Urban x Permits	-0.06	-1.01
SIGMA	**1.16**	**9.49**
LAMBDA	**3.97**	**2.22**

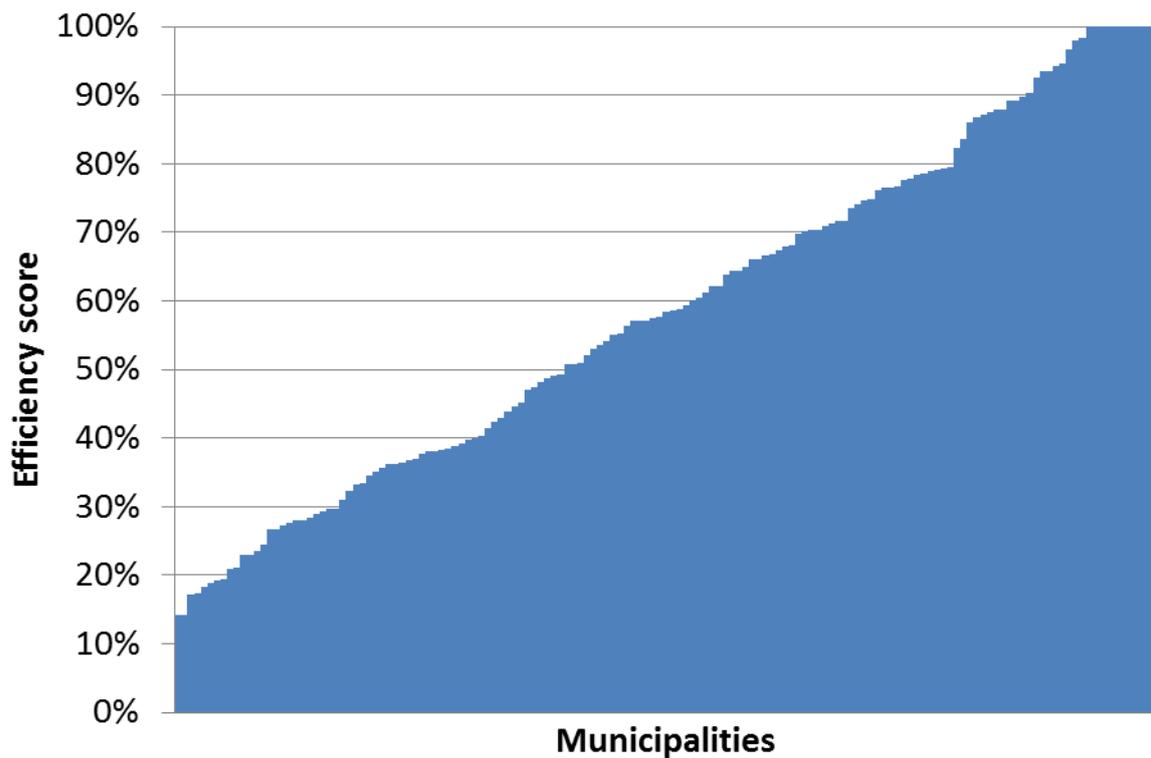**Figure 2. Distribution of efficiency scores (N=150)**

Figure 2 shows the distribution of the efficiency scores, that range from 14% (lowest score) to 100% (fully efficient). About 7 percent of the observations are fully efficient. On average the efficiency scores are 59%, implying that there are possibilities to increase efficiency.

3.2 Explaining efficiency scores

We try to explain differences in efficiency scores by organizational and managerial characteristics of municipalities, in particular the use of performance management practices. Different variables are introduced to proxy these characteristics. The quality of staff is measured by the average pay scale of front office workers. We distinguish three levels of staff quality, implying that 1/6, 2/3 and 1/6 of the municipalities have low, average and high quality staff respectively. The same applies to the level of absenteeism. We also have information on how the services are organized. Three types are distinguished, following recent developments in the provision of local administrative services. Some municipalities offer only traditional services through their central front office. Traditional services are typically limited to passports, identity cards, driving licenses and different certificates. Other municipalities provide extended services through their front office, either with or without integrating their back offices for those services. Extended services include more specialized services such as providing building permits and welfare benefits. We finally have identified subgroups of municipalities, characterised by a more or less performance driven

management style and a more or less performance driven HRM-policies respectively. These subgroups have been identified using survey data on relevant managers, also part of the benchmark exercise.Table 3 shows the relative frequency of the identified subgroups in the sample, based on the four response categories used in the survey for each of two relevant questions.

Table 3 Performance management proxy variables

	Fully applicable	Largely applicable	Partly applicable	Not at all applicable
Management style: the manager sets targets, determines working methods, instructs employees and monitors implementation	13%	48%	31%	8%
HRM-policies: employees have a significant influence on their pay, training and career	3%	39%	53%	5%

In table 4 we present average efficiency scores for the different subgroups of municipalities described before. Statistically signficant differences from the sample mean (p > 0.05) are indicated with an asterisk.

Table 4. Average efficiency scores for different groups of municipalities

Group description	Average efficiency score (* = p > 0.05)
Total average	59%
Small municipalities (< 50,000 inhabitants)	61%
Medium size municipalities (50-100.000 inh)	57%
Large municipalities (> 100,000 inhabitants)	55%
Low quality staff	69%*
Average quality staff	59%
High quality staff	47%*
Low level absenteeism	57%
Medium level absenteeism	55%
High level absenteeism	67%*
Extended services, integrated back offices	47%*
Extended services, separate back offices	64%*
Traditional services	57%
Low client satisfaction scores	52%
Average client satisfaction scores	57%
High client satisfaction scores	68%*
Fully performance driven management style	52%
Largely performance driven management style	55%
Partly performance driven management	65%*

style	
No performance driven management style	62%
Fully performance driven HRM-policy	57%
Largely performance driven HRM-policy	57%
Partly performance driven HRM-policy	61%
No performance driven HRM-policy	61%

Table 4 shows the following differences in efficiency scores when comparing subgroups of municipalities. Population size does not seem to matter. Higher quality of staff, however, leads to lower efficiency levels. Apparently, possible efficiency gains by employing higher quality (= higher paid) staff do not outweigh their higher costs. Note that higher absenteeism is associated with higher efficiency. This is a perverse result: usually higher absenteeism leads to higher costs per output, as absent workers do not provide services and still have to be paid. We have no details on possible insurance contributions that compensate for those costs, but a net gain in efficiency seems unlikely. Municipalities providing extented services using separate backoffices show a more than average efficiency, while the reverse is true for those with integrated back offices. Interestingly, municipalities with high client satisfaction scores also show high efficiency scores. Apparently, there is not necessary a trade off between quality of services and efficiency, as sometimes claimed. Meier and O'Toole (2009) in their public education studies also frequently find positive spillovers from one goal to another due to effective management.

Table 4 also reveals some interesting aspects of performance management practices in relation to efficiency. Although most differences are statistically not significant, we do find that a partly performance driven management style is associated with higher efficiency. This differs from new public management and related approaches that suggest higher efficiency as a result of a fully performance driven management style. Table 4 also shows that performance driven HRM-policies do not show any relation with efficiency. Note, however, that our performance management proxies are not very specific. We cannot exclude that management is targeting other aspects of the services than efficiency, for example client satisfaction.

The efficiency scores determined in the first step of the analysis have been tentatively explained by managerial and organizational characteristics using multiple regression. In this exploratory study, we do not formulate explicit hypotheses on public sector managerial behavior. Instead, we include the potential explanatory variables as described above. Because our dependent variable, the efficiency score, theoretically ranges from 0% to 100%, we transform the dependent variable and then apply aTobit regression (Tobin, 1958). The transformation implies taking the reciprocal of the efficiency scores. Instead of the groups defined in table 4 we use the continuous equivalent of those variables when possible. Estimation results are presented in table 5. Note that as a result of the transformation the

interpretation of parameter estimates in the second stage is as follows: a negative sign implies a positive effect on efficiency scores.

Table 5. Estimation results of the second stage Tobit regression

Variable	Parameter estimate	T-value
Size of municipality	-0,01	-0,19
Quality of staff	**9,63**	**5,11**
Level of absenteeism	**-0,59**	**-2,91**
Extented services with separate back offices as compared with integrated back offices	**-0,64**	**-3,10**
Traditional services as compared with extended services and integrated back offices	**-0,75**	**-2,54**
Client satisfaction	-3,09	-1,02
Largely performance driven management style (as compared with fully performance driven management style)	-0,30	-1,06
Partly performance driven management style (idem)	**-0,79**	**-2,65**
No performance driven management style (idem)	-0,72	-1,83
Largely performance driven HRM-policies (as compared with full performance driven HRM-policies)	-0,24	-0,44
Partly performance driven HRM-policies (idem)	-0,46	-0,85
No performance driven HRM-policies (idem)	-0,05	-0,07
Sigma	**0,99**	**15,88**

Table 5 confirms the results already obtained from analyzing subgroups. Higher quality (= higher paid) staff does not pay off in higher efficiency. The perverse result for absenteeism also shows up here. The effects of organizational structure are again significant: separate back offices turn out to be more efficient than integrated back offices. Client satisfaction no longer has a significant, positive impact on efficiency (although it is close to being significant), but also no negative impact. That still implies that there is no tradeoff between client satisfaction and efficiency of these services. The results for the performance management proxies are comparable with the statistics in table 4: all less than fully performance driven management styles or HRM-policies show higher efficiency, although the difference is only statistically significant in the case of a partly performance driven management style.

Interpretation of the quantitative impact of the variables on efficiency is a bit hard due to the mentioned transformation. However the continuous explanatory variables are standardized, so the differences in magnitude of the parameter estimates give an indication of the impact. For example, a municipality with an average efficiency score and average staff quality is predicted to have a 6% (3.6 percent point) higher efficiency score if the quality of staff is reduced by 1%. Also, a municipality with an average efficiency score is predicted to

have a X% higher efficiency score if it moves from a fully performance driven management style to a partly performance driven management style.

A separate discussion is warranted for possible economies of scale. Does increase of outputs lead to less than proportional costs? We have tested the sum of estimated parameters for the output variables against the hypothesis that the sum is not significantly different from one – that is: no economies of scale. That hypothesis could not be rejected. Note, however, that our cost measure only involves personnel cost. We cannot exclude the possibility that using a broader definition of inputs, including material costs, would lead to a different picture.

4. Summary and conclusion

Public sector performance is one of the key topics in public administration. This paper discusses an often forgotten dimension: cost effectiveness or efficiency. In particular in the aftermath of the financial crisis and worldwide cutbacks on public expenditures, policy makers urgently need more of that type of performance information. We have shown that existing econometric methods can be used to model cost effectiveness. As an empirical example, we studied the (cost) efficiency of administrative services provided by Dutch municipalities. Both quantitative and qualitative output measures have been employed, instead of the usual population proxy. The results show a large variation of efficiency scores, with an average of 60% compared with the most efficient municipalities. A tentative explanation of the efficiency scores by organizational characteristics suggests a number of preliminary conclusions. Interestingly, higher client satisfaction scores do not imply lower efficiency scores, suggesting that there is not necessary a tradeoff between quality and efficiency. Higher quality of staff, however, does not pay off in terms of higher efficiency. Apparently, possible productivity gains are not enough to compensate for higher personnel costs. Finally, the use of fully performance driven management practices does not seem to be associated with higher efficiency, although our proxy variables for those practices are not very specific.

In future research the complete package of Dutch municipal services will be analyzed with respect to its efficiency or cost-effectiveness, as has been done before on a limited scale for other countries (compare Borger et al (2000) for Belgium and Kalb (2010) for Germany), however employing simple output proxies. Additional data on managerial quality and managerial instruments, such as outsourcing service delivery to third parties, networking efforts, etc., will be collected to gain more insight in the determinants of cost-effectiveness of local public services. The analysis of the complete public service package will also be related to political preferences for spending and taxation levels.

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