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# Quality Management in Public Sector Organizations: Evidence from Six EU Countries

**Abstract:** Although there is considerable evidence for the hypothesis that an efficient use of management techniques is the key to a good public service delivery, a lot of studies come to the conclusion that there is only partial, reluctant implementation or even a general lack of the use of such techniques by public managers. This paper empirically examines the determinants for the use of quality management techniques in public sector organizations from six EU countries. It turns out that especially more organizational autonomy and result control appear to be of importance while, surprisingly, the combination of these variables leads to negative results. Moreover country factors matter; country clusters based on administrative tradition can clearly be distinguished in the regression analysis.

**Keywords:** quality management techniques, managerial autonomy, fractional response model

## 1. Introduction

Over the last few decades, public sector organizations are faced with unprecedented challenges. Budgetary pressures and a growing demand for financial accountability, combined with changing public expectations of public sector services require new approaches and solutions. Public sector organizations are therefore seeking to adopt new processes, techniques and technologies to increase process efficiency, reduce costs, improve the quality and encourage greater accountability. Private sector organizations have achieved proven success in increasing quality and driving down costs by increasing efficiency and processing capacity by implementing best practices in various management techniques. Today, public sector organizations are under pressure to deliver the same successes. In line with private sector experiences, considerable evidence can also be found in public sector literature for the hypothesis that an efficient use of management techniques is the key to a good public service delivery: ‘management does indeed matter’ (e.g. Boyne, 2004; Stringham, 2004; O’Toole & Meier, 2003; Ingraham et al., 2003; Poister & Harris, 2002; Berman & West, 1995 ; Kravchuk & Leighton, 1993).

As there are numerous management techniques referred to in the literature, some authors tried to divide these management techniques into separate categories. Flynn (2007) organized the wide range of management techniques into four categories: (1) financial management techniques (e.g. development of a cost calculation system, internal allocation of resources to organizational units on the basis of results); (2) performance management techniques (e.g. long range planning, the development of an internal reporting and evaluation system); (3) human resource management techniques (e.g. the development of a result driven HRM, the possibility for extended internal personnel management autonomy for lower organizational units); and (4) quality management techniques (e.g. quality management techniques, quality standards). This paper focuses on this last group of management techniques, namely quality management techniques.

Quality is however a very broad concept which has evolved significantly throughout modern history (e.g. Bovaird & Löffler, 2003; Löffler, 2002; Reeves & Bednar, 1994). In the beginning, ‘quality’ was mainly defined as the conformance to previously established specifications (e.g. Gilmore, 1974; Juran, 1974; Levitt, 1972) or to requirements of the customers (Crosby, 1979). Subsequently, the emphasis was put on achieving maximum customer satisfaction (Grönroos, 1984). After that, the focus was not any more on the final results (conformance to standards, attaining maximum customer satisfaction), but rather on

the processes that are the key to a good service delivery. Deming (1986), for instance, defined 'quality' as the continuous improvement of service delivery based upon reduction of variance in the desired output. A high quality service delivery implicates the permanent refinement of all organizational processes. The meaning of the concept of 'quality management' simultaneously evolved with the definition of 'quality': from taking actions to fulfill either previously established specifications or customers' expectations to taking actions with the aim of embedding awareness of quality in all organizational processes. Currently, we are in the phase of 'Total Quality Management (TQM)', the management approach in which the permanent improvement of the quality of products and services through ongoing refinements within the entire organization is the central point. Quality management is seen as the sustained effort for a high quality service delivery. At present, there is a wide variety of techniques organizations can choose from to assess the quality of their service delivery. By means of these techniques, the organization can be analysed/evaluated on several characteristics (e.g. leadership style, partnerships, strategy and planning). Based upon this analysis, action plans might then be generated to ameliorate the organizational aspects on which the organization did not score well and by this, end in a better service delivery.

The goal of this paper does not exist in studying the effect of using quality management techniques on performance but rather examines why organizations use quality management techniques. More precisely, using cross-country data this article empirically explores the factors that affect the use of these techniques in public sector organizations.

We examine the use of quality management techniques for a specific type of public sector organization, which we call the state agency. Agencies are variously described internationally as non- departmental public bodies, hybrids, quangos, fringe bodies, non- majoritarian institutions, quasi- autonomous public organizations, and distributed public governance (see e.g. Wettenhall, 2005; Christensen and Laegreid, 2006; Roness, 2007). How an agency is defined and what it does varies considerably across national and organizational cultures, legal systems and political systems (Smullen, 2004). Following Pollitt et al. (2004) and Talbot (2004) we focus on those public agencies with following features: 1) they are public law bodies, 2) they are structurally disaggregated from other organizations or from units within core ministries, 3) they have some capacity for autonomous decision making with regard to management policy, 4) they are formally under at least some control of ministers and ministries, 5) they have some expectation of continuity over time, and 6) they have some resources on their own. Companies and corporations with a commercial focus which have to closely observe the laws regulating private companies or which are registered under company

law as a company and governmental foundations, trusts and charities are excluded from our understanding of agencies. The organizations in our sample range from departmental agencies without their own legal identity, to public law agencies and private law agencies, which do have their own legal identity. These agencies differ to the extent they have been granted managerial autonomy.

The remainder of this article is organized as follows: The next section describes the data, while the theoretical model is developed in the third and fourth sections, in which some descriptives as well as results from previous literature are discussed. The empirical findings are discussed in the fifth section, which is followed by some concluding remarks.

## 2. Data

Data used for the analysis have been provided by the “Comparative Public Organization Data Base for Research and Analysis” or COBRA-network. The COBRA network aims to encourage and enable comparative research into public sector organizations (for more information see; <http://soc.kuleuven.be/io/cost/index.htm>). It developed a common questionnaire in order to survey senior managers of public sector organizations. The top level management (Chief Executive Officers (CEOs) of these organizations was asked to fill in a web-based questionnaire containing several types of questions (e.g. on the use of management techniques and managerial autonomy). The data were treated anonymously. The countries included in the subsequent analysis are: Belgium, Italy, Portugal, Germany, The Netherlands and Austria. The overall response rate for the Belgian survey was 55%, for Italy 70%, for Portugal 45%, for The Netherlands 38%, for Germany 60% and for Austria 39%. Missing data on the outcome, explanatory, and/or control variables, leaves us with a sample size of 298 state agencies (29 Belgium agencies, 30 Italian, 73 Portuguese, 58 Dutch, 46 German and 62 Austrian agencies). These organizations proved to be representative for the total populations in each state, with a broad distribution across type of agency, primary tasks, ministries and policy fields.<sup>1</sup> The included countries represent two distinct administrative traditions (e.g. Painter and Peters, 2010); Belgium, Italy and Portugal have a Napoleonic administrative tradition while Germany, Austria and The Netherlands have a Continental tradition.<sup>2</sup>

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<sup>1</sup> The representativeness of the data was tested using Chi-square goodness of fit tests. The number of agencies per type in the sample was compared with the number of agencies per type in the population.

<sup>2</sup> Administrative tradition may be defined as ‘an historically based set of values, structures and relationships with other institutions that defines the nature of appropriate public administration with society’ (Peters 2008: 118). According to Yesilkagit (2010), administrative traditions both refer to formal governance structures which encode the past as well as inherited set of ideas and beliefs. In both meanings

The employment of self-report measures has however been debated intensively in literature (e.g. Moyser, Wagstaffe 1987; Enticott et al. 2008; Walker and Enticott 2004) since this can lead to common method bias. Although such bias can distort results, there still exists many misconceptions about common method bias in self report measures. Conway and Lance (2010) discuss these misconceptions at length in their paper “What reviewers should expect from authors regarding common method bias in organizational research”. They stress that relationships between self-reported variables are not necessarily and routinely upwardly biased. Moreover, other reports are not superior to self-reports, for some topics (e.g. Shalley et al. (2009) employee creative performance) the advantages of using self-reported measures outweigh the disadvantages. Since our goal exists in examining the use of specific management techniques while taking several organizational factors into account (e.g. budget), a clear argument as to why self-reports are appropriate exists. As discussed by Enitcott (2004, pg. 320) the top level management of an organization has the best vantage point for viewing the entire organizational system and is thus best suited to answer questions on the organization as a whole. Second, according to Aberbach et al. (1981) such a ‘position-based’ definition of CEO’s is the most efficient approach when doing comparative research where organizational differences are huge across administrative systems. This is definitely the case since we are examining organizational behavior across 6 countries. Moreover and also in line with Conway and Lance (2010) proactive measures have been taken in order to minimize threats of common method bias. As such, data on the number of staff, income source and budget came from the same survey, but have been verified by the involved country teams by examining official sources. In short we believe, although the COBRA data are based on self-report measures, the data to be an appropriate way to analyze the use of quality management techniques.

### **3. Measuring the use of quality management techniques**

As there is a whole range of management techniques organizations might use to work on the quality of their service delivery, only a selected number of quality management techniques was included in the survey. More precisely, top managers were asked for the extent to which they used two well-known quality management techniques in the public sector, namely the use of quality standards and quality management systems. For each of those two management

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these traditions define what is appropriate in public administration for a country and thereby constrain the available options for administrative policies, creating path dependency mechanisms (Yesilkagit 2010; Pollitt 2012). Administrative traditions create legacy effects on contemporary patterns of public administration, in particular in the face of pressure for change (Painter and Peters 2010: 13).

techniques, respondents had to indicate to what extent these techniques are used within their organization, with 0= not being used; 1= being use to some extent; and 2= being used to a large extent. An explanatory factor analysis (using a polychoric correlation matrix, in order to account for the categorical nature of the dependents) has been carried out in order to verify the fact that both management techniques load on the same factor. Since they do, an index is created based on the two management techniques, which has been rescaled to the interval (0,1). This index serves as the dependent variable in our analyses.<sup>3</sup>

#### **4. Determinants of using quality management techniques**

This section introduces and describes the variables used in this study and the main rationale underlying their adoption. We first introduce the specific drivers for using quality management techniques, based on literature on the use of performance management techniques in general, and then depict some descriptive statistics useful in the characterization of our samples. We distinguish between internal (organization-level) factors on the one hand and external, environmental factors on the other. In Figure 1, this set-up is visually presented. However, a comprehensive discussion of all possible determinants of using quality management techniques lies beyond the scope of this paper. Instead, we will focus on variables that will be incorporated in the subsequent empirical analysis.

Please include Figure 1 here

##### ***Internal Factors***

###### *Size*

Public sector organizations differ widely in size. Because larger organizations have a higher likelihood of having more hierarchical levels within the organization (e.g. Kimberly 1976; Child 1973; Blau 1970), they are more likely to be confronted with problems of information asymmetry and goal incongruence (Eisenhardt 1989). In order to overcome these issues, more structured management techniques, such as quality management techniques, will more likely be applied in large organizations.

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<sup>3</sup> Cronbach's alpha for the index equals 0.73.

Empirical evidence of the effect of organizational size on structured management techniques tends to be positive, but that is not in all studies the case (positive: Bordeaux and Chikoto 2008; Laegreid et al. 2006; Moynihan and Ingraham 2004; Poister and Streib 1999 versus Askim 2009 – negative or no effect, Verhoest et al. 2010).

We include a categorical variable (Size) which is measured in FTE. Small size refers to agencies with less than 65 employees, medium size refers to agencies with a maximum of 335 and a minimum of 65 employees while a large agency needs to have more than 335 employees.<sup>4</sup> The lowest category is used as a benchmark.

### *Organizational age*

Organizational age can be regarded as a proxy of organizational culture and institutional norms. As such age of the organization is important, as older agencies will have a more enshrined culture, values and norms, which makes it harder to introduce and effectively use instruments which are at odds with the present, strongly institutionalized culture (Laegreid et al. 2006; Quinn and Rohrbaugh 1981). Empirical research on the effect of organizational age on the use of management techniques has however led to ambiguous results. While some research pointed at positive influences of age (Askim 2009), other research come to other conclusions, being a negative effect (Laegreid et al; 2006) or no independent effect (Verhoest et al; 2010 for agencies compared before 1990 with those created later in case of multivariate regressions, although in bivariate relations a positive correlation was found).

We include a categorical variable (Age) measured in years since creation with current legal status (survey year minus year of set-up). Agencies are designated as young when they exist no longer than 10 years. Medium age refers to agencies which exist for a maximum of 25 and a minimum of 11 years. Old agencies needs to have existed more than 25 years.<sup>5</sup> The lowest category is used as a benchmark.

### *Measurability of primary task*

Task characteristics and the related technical environment affect organizational practice, and hence the use of quality management techniques. Tasks can differ according to their

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<sup>4</sup> Size is available as a continuous variable in the data but is however heavily skewed. We have tried several transformations (e.g. log transformation), yet these only improved the situation slightly. As such we decided to construct a categorical variable based on the distribution of the data.

<sup>5</sup> Age is available as a continuous variable in the data but is however heavily skewed. We have tried several transformations (e.g. log transformation), yet these only improved the situation slightly. As such we decided to construct a categorical variable based on the distribution of the data.

measurability (Wilson 1989; Van Dooren 2005), their policy/political environment (Bourdeaux and Chikoto 2008; Dull 2009) as well as their salience (Pollitt et al. 2004). Within broader performance related literature, the extent of availability, and thus measurability, of performance information has been found to be positively associated with performance management (Bourdeaux and Chikoto 2008; de Lancer Julnes and Holzer 2001; Moynihan and Ingraham 2004; Ammons and Rivenbark 2008; Moynihan and Landuyt 2009). Quality management techniques can thus be expected to be used more in organizations with more measurable tasks and tasks which face pressures stemming from market forces or political salience.

A dummy (primtask) is included in order to examine the effects of primary task. This dummy is set to one when the primary task is tangible in kind (general public services and business and industrial services) and to zero otherwise (in case of policy development, regulation and exercising public authority as primary task).

#### *Legal distance*

Agencies which are structurally disaggregated from government and which have their own legal identity, are more susceptible for demands of their customers and stakeholder and more visible for media and society, increasing the need for legitimacy. Such organisations need to secure their existence by building strong linkages with and support from these external actors. Hence pressures to adopt and use modern management techniques which helps them to deliver services of a high quality and in an efficient way, are comparatively strong. Units directly under ministerial responsibilities are more politicized and less in direct contact with citizens, which is typically seen as hampering managerial instruments (Reichard 2004; Bogumil and Ebinger 2008; Bouckaert and van Dooren 2003; Bach and Jann 2010).

Distance from government (Type) is coded one if the agency has its own legal identity, separate from the state, vested in public law or private law, and is set to zero otherwise.

#### *Income Source*

Public sector organizations can get their financial resources predominantly from the government budget, or predominantly from self-generated income, through the sale of services or by receiving retributions or fees for the delivery of these services. In case of the latter, public sector organizations will want to maximize this self-generated income. For such an organization it is extremely important to monitor the quantity and quality of services

produced and delivered, and the efficiency of their operation, as these elements will immediately impact upon their financial viability. Moreover, for such organizations it is crucial to convince users from the quality of their services, hence making quality management even more crucial. Such organizations need to be able to react swiftly upon declining demand for their services, or deteriorating reputation or user satisfaction. External pressure from markets and citizens is seen as driver for managerial reform activities (Bogumil and Ebinger 2008) and performance management instruments (Moynihan and Ingraham 2004). These elements make it very important for senior management to use performance management techniques internally within the public agencies to monitor and steer performance.

Therefore, a dummy (incsour) concerning income source is added. This variable reflects the main source of income of the organization. It indicates whether or not the organization is predominantly self-financing or financially dependent from the government instead. This dummy equals 1 if the income source is predominantly or fully nongovernmental, and zero otherwise (i.e. predominantly governmental-funded).

### *Budget*

A large budget might refer to an enhanced capacity of the organization to implement quality management techniques. Previous research often pointed to insufficient resources as an explanation for implementation failure, i.e. having performance information without using it (Van Dooren, 2005). Empirically, financial resources have been shown to have mixed effects on the use of performance management techniques. Several studies find positive effects referring to the provision of adequate resources (De Lancer Julnes and Holzer 2001, Grizzle and Pettijohn 2002; Askim, Johnsen, and Christophersen 2008; Moynihan and Landuyt 2009). However, Van Dooren (2005) finds no significant relation between financial resources and the degree of performance measurement adoption and implementation. Likewise, in their study of 226 agencies from three countries, Verhoest et al. (2010) did not find any independent effect of a larger budget on the use of performance management techniques in the multivariate regression analysis, although in the bivariate analyses, correlations showed to be positive.

The variable budget (budget) is included as a variable with 3 categories.<sup>6</sup> The lowest category is used as a benchmark.

### *External Factors*

Senior managers of public agencies are involved in an external principal-agent relation between them as agent and their portfolio minister and parent department as principals, which want the agencies to implement specific policies in a well-performing way. To date however, only very limited attention has been paid to the link between this relationship and the internal use of management techniques. Consequently external factors such as managerial autonomy and result control will be included in the subsequent analyses.

### *Managerial Autonomy*

A critical element in this principal-agent relation is that the agent gets sufficient autonomy in order to be able to implement the principals' demands in an efficient, flexible and specialised way. Generally one could say that the more autonomous the organization, the more senior managers can be considered as residual claimants of their organization. This makes it more important for senior managers to have their organization performing well. Therefore, it is useful (and rational) for the senior managers to limit information asymmetry and goal conflicts within the organization. By using management techniques (monitoring, bonding, incentives) internally, senior managers can stay informed of the activities in lower organizational units and assess the results (control those units). Also, they can gain the trust of the oversight government by providing them with guarantees as well as clear information, which makes monitoring of their organization by the oversight authorities possible.

We focus here on managerial autonomy, which refers to making decisions about the choice and use of financial, personnel and other resources at the strategic or operational level (Verhoest et al., 2004). In line with several researchers (Moyniham and Pandey 2010; Moyniham 2005; Laegreid et al. 2006), we will expect managerial autonomy also to lead to a higher use of quality management techniques.

Two types of managerial autonomy are taken into account; personnel management autonomy (PA) and financial management autonomy (FA). Personnel management autonomy relates to the autonomy of an agency to take decisions concerning policies regarding salary

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<sup>6</sup> Budget size is available as a continuous variable in the data but is however heavily skewed. We have tried several transformations (e.g. log transformation), yet these only improved the situation slightly. As such we decided to construct a categorical variable based on the distribution of the data.

level, rules and procedures regarding promotion, and evaluation of staff, in general (so beyond individual decisions) without interference from ministries (see appendix, Table 4, for the precise wording of these questions). For each of the three items, organizations can either have no autonomy (score 0) or full autonomy (score 1). A dummy score is calculated, based on the aggregation of the three items; whereby score 1 indicates full autonomy on all three items.

Financial managerial autonomy is measured in a similar way. An index is constructed, based on the aggregation of the scores on three items: the extent to which the organization is able to shift personnel and running cost budgets, to set tariffs for services and products, and to shift personnel- running cost and investment budgets (cf. table 4 in the appendix). However unlike the indicators for personnel management autonomy, organizations can either have no autonomy (score 0), needing prior approval from parent ministries (score 1) or without prior approval from above (score 2). Each variable is recoded to a dummy (dummies are set to zero if score equals 0 or 1 and set to one otherwise) and then aggregated. After which this sum is again transformed to a dummy; whereby score 1 indicates full autonomy on all three items.

#### *Result Control by portfolio minister*

Recent studies have demonstrated (Laegreid, Roness, & Rubecksen, 2008; Christensen & Laegreid, 2007) that an increase of managerial autonomy has been accompanied with an expansion of regulation and control: public sector organizations received more autonomy from the oversight authorities, but at the same time they were also controlled more from, on the one hand, the traditional ex ante authorities and from newer ex post audits and assessment measures on the other hand. In many countries this result control system manifest itself in the form of a result-oriented contract-like agreement between the minister and the public agency, which clearly stipulates the expected results, as well as the way agencies need to report, and what sanctions are applied when objectives are not met. The price a public agency has to pay for its increased managerial autonomy is to accept such a result control system, in order to ensure the minister and parent departments that the agency uses its discretion to pursue the achievement of the objectives of its principal (Christensen et al., 2004).

It is important to stress that external result control is an external factor, while using quality management techniques is an organization-internal process. The use of quality management techniques can however help in fulfilling the external requirements. The internal use of quality management techniques can be induced by the external result control by actors outside

the organization as a way to carry out central regulation or control of activities within agencies towards a desirable standard or goal (Laegreid et al. 2007). However, the use of quality management techniques can also be an intentional choice by the organization itself. Following normative isomorphism, agencies may pick and choose based on enhancing their legitimacy in their environment (Laegreid et al. 2007). Moreover a neo- institutional explanation is also possible, the use of management practices can also exist because of technical reasons, to promote better performance, but only for those organizations where the management practice is more likely to promote improved performance (Laegreid et al. 2007). In the paper we regard the use of quality management techniques as a willful choice from agencies.

Although scarcely studied, the independent influence of external result control of agencies by their minister and parent department is considered to have a positive influence on the use of structured management techniques within agencies (see Verhoest et al; 2010).

The measurement of result control is based on (i) the accountability of the agency CEO for agency performance (results) to the government and (ii) the extent to which the organization faces sanctions or rewards for its performance. Again a dummy variable is constructed which measures the extent to which the organization is subject to a high level of result control by government or not. A high level of result control in this case equals a ‘hard’ form of performance contracting, in which under- or over-performance leads to not only the accountability of the agency CEO, but also to sanctions or rewards (see Verhoest 2005; 2010). A score ‘0’ refers to no result control or ‘soft’ result control (meaning CEO is accountable for the results, but without sanctions or rewards being given).

## **5. Empirical findings**

Overall, we use 298 observations in the following regression analyses. Descriptive statistics of the variables used are given in Table 1. Of course, there is a relationship between the degree of (both personnel and financial) management autonomy and the legal type of agency. Organizations further away from the parent ministry typically enjoy more managerial autonomy. Nonetheless, the degree of de facto managerial autonomy can differ substantially from the degree of formal autonomy (Maggetti, 2007), hence making it interesting to include both types of autonomy. The highest variance inflation factor equals 2.42, meaning that there is no multicollinearity in the sense that it is causing technical problems in the estimations.

Please include Table 1 here

Since, according to principal agent theory, more managerial autonomy may enhance performance by public sector organizations only under the condition of result control, an interaction term is each time included in the regression analyses between both variables. The argument for doing so refers to ‘letting public managers manage’ but simultaneously ‘making public managers manage’. In other words, the agency does have to receive sufficient autonomy in order to be able to implement the principals’ demands in an efficient, flexible and specialized way. Having autonomy or decision making competences in managerial affairs may be a facilitator, enabler or inducement of using management techniques (Laegreid et al. 2008; Christensen et al. 2007). Managerial autonomy combined with result control provides public managers with both the possibility and the incentive to introduce quality management techniques.

Some agencies however did not use quality management techniques, i.e. some observations are left censored. This restriction is taken into account by employing Tobit models (cf. e.g. Greene, 1997; or Gourieroux, 2000). Let the latent variable  $y_i^*$  of our econometric model be  $N(\mu, \sigma^2)$  and

$$y_i^* = x_i' \beta + \varepsilon_i, \quad (1)$$

Where  $\beta$  is the parameter vector to be estimated,  $x_i$  the vector of explanatory variables and  $\varepsilon_i$  the error term. The observed use of quality management techniques is

$$y_i = \begin{cases} 0 & \text{if } y_i^* \leq 0, \\ y_i^* & \text{if } y_i^* > 0. \end{cases} \quad (2)$$

First, a homoscedastic Tobit model is estimated. If heteroskedasticity occurs, the homoscedastic model will lead to inconsistent estimates for both the standard errors and the coefficients. Consequently, we compute, based on the homoscedastic model, Lagrange multiplier (LM) tests on heteroscedasticity (see Greene, 1997, p. 969). The results of the LM statistics stress the need for a Tobit model with multiplicative heteroscedasticity (see Greene, 1997, p. 967). We include the country dummies in the heteroscedasticity term. The results of both the homoscedastic and the heteroscedastic model are given in table 2. Since the LM test rejects the hypothesis of homoscedasticity, we only discuss the heteroscedastic model.

Please Include Table 2 here

The results show that both high result control as well as high personnel management autonomy lead to an increased use of quality management techniques. Surprisingly however, the interaction term between both variables is significant but negative. The negative coefficient of the interaction term indicates that the effect of high personnel management autonomy on the use of quality management techniques decreases when it is combined with high result control (alternatively, one could say that the effect of high result control on the use of quality management techniques decreases when it is combined with high personnel management autonomy). The other results are interesting as well: larger organizations (in terms of number of employees and budget) are more likely to use quality management techniques compared to smaller organizations. Furthermore, country differences appear to be of importance. Yet when examining the country dummies more elaborately, we notice no significant difference between Belgium, Italy and the reference group (Portugal). Significant differences can however be observed between the remaining (continental) countries (Austria, Germany and the Netherlands) and the reference category. This result is most likely a reflection of the different administrative traditions in both country groups (Latin vs. Continental countries). However, within the Continental country cluster internal differences can be observed, leading to the observation that his cluster is more heteroskedastic than the Latin one.

One can however worry about the use of a Tobit model because it is a special case of a selection model (often called generalized Tobit model), in which one usually models two decisions. First, top level management has to decide whether to use quality management techniques or not. Besides this propensity to use such techniques, top level management has to determine to which degree to use it by a second decision. The Tobit model incorporates both decisions by assuming that the explanatory variables driving both decisions enter the two equations with the same magnitude. By using a Tobit model, the assumption is that there is an underlying structural model for the unobserved variable  $y^*$ . Yet we only observe  $y > 0$  if the propensity to use quality management techniques is also larger than zero. If the propensity is below zero, we only observe  $y = 0$ . As discussed by Czarnitzki & Kraft (2004), this approach may seem a little artificial. Therefor and in line with Czarnitzki & Kraft (2004), we also estimate a fractional response model, which treats the dependent variable as a share which is bound between zero and one. Following the methodology described in Papke and Wooldridge (1996), we assume that

$$E(y_i | x_i') = G(x_i' \beta), \quad (3)$$

Where  $G$  is a function satisfying  $0 < G(x_i'\beta) < 1$ , ensuring that all predicted values of  $y$  lie between zero and one. As  $G$  we choose the cumulative density function of the standard normal distribution:  $\Phi(x_i'\beta)$ . The estimation procedure is a particular quasi-likelihood method (QMLE). According to Papke and Wooldridge (1996), the QMLE is consistent and  $\sqrt{N}$ -asymptotically normal regardless of the distribution of  $y_i$  conditional on  $x_i$ . In Table III the results of the QMLE estimation are presented. As suggested by Papke and Wooldridge (1996, pp. 622-623), the standard errors are computed robust to obtain the “true” asymptotic variance. A general functional form diagnostic to check for possible unobserved heterogeneity in the model. The test examines whether quadratic and cubic terms of  $x_i'\beta$  cause a rejection of our model specification as given in equation (3). We compute the robust LM statistic which is distributed chi-squared with two degrees of freedom. The value of the LM statistic in our case is 2.4 (p-value=0.3) which means that our specification as presented in Table 3 passes the test and, thus, does not need to be rejected.

Please Include Table 3 here

The results are similar to those of the Tobit models: positive effects can be observed for both personnel management autonomy and result control while the interaction between both terms is again significant but negative. Moreover, country differences appear again to be of importance. Once more, there appears to be no difference between Italy, Belgium and the reference category while significant differences can be observed for Germany, Austria, the Netherlands and Portugal. This result again stresses the importance of similar administrative traditions. However, the QMLE results also indicate, contrary to the tobit model, that size, both in terms of employment and budget, appear not be of importance.

## **6. Conclusion & discussion**

We present the results of an empirical study on the use of quality management techniques by public sector organizations. Our dependent variable consists of an index based on the use of two quality management techniques, namely the use of quality standards and quality management systems. Both Tobit regressions and a quasi-maximum likelihood estimator for models of a fractional response variable point to the same conclusion: It turns out, that managerial autonomy and external result control leads public sector organizations to use quality management techniques.

This is important empirical evidence concerning the effects of managerial autonomy and external result control on the behavior of public sector organizations. While the impact of these factors has been discussed in other connections, it has been neglected with respect to quality management techniques. Managers of autonomous organizations use quality management techniques to limit problems of information asymmetry and goal conflicts within their organization. The more autonomous the organization, the more the managers can be considered as residual claimants of their organization. This makes it more important for them to have their organization performing well. Therefore, it is useful to avoid difficulties in the 'principal-agent relationship' by using governance mechanisms such as quality management techniques. Moreover, because of a change from control on inputs to control on results ('ex post') managers might also use quality management techniques in order to provide the oversight authorities with clear information which makes monitoring of the organization by those oversight authorities possible.

Surprisingly however, the interaction between managerial autonomy and result control is negative. A too strong ex-post result control thus appears to eliminate the positive effects of strong managerial autonomy. A possible explanation could be that, in such cases, senior managers will be considered less of a residual claimant of their organization compared to organizations with equal levels of managerial autonomy but lower levels of ex post result control. This is especially likely since high result control refers to the implementation of sanctions.

The regressions however disagree on the effect of size on the extent to which quality management techniques. Consequently we argue that the use of quality management techniques does not depend on the size of the organization. Quality standards and quality management systems are not used to a different extent in small versus large organizations because of either a difference in the number of hierarchical levels and by this possible problems of information asymmetry and goal incongruence.

Finally, the empirical results show that country matters. Based on differences in significances of the country dummies, country clusters based on administrative tradition could clearly be distinguished. No differences could be observed for countries from the Latin cluster, while the countries from the Continental cluster all reacted significantly different from the countries in the Latin group. The continental cluster however proved to be more heteroskedastic than the latin country cluster. This finding indicates that not only differences between country cluster matter but also within country clusters. This is not surprising since country specific factors which go beyond administrative traditions and societal cultures are

expected to affect organizational behavior (e.g. Christensen and Laegreid, 2001; Verhoest et al., 2010).

In this study, there is an important limitation that has to be acknowledged and addressed. This limitation concerns the quantitative method we have used. The multivariate regression analyses we performed enable us to show significant/non-significant relationships between variables, however, by these analyses we are unable to highlight the explanatory mechanism behind these relationships. The underlying process might be peer-pressure, isomorphism, rational intention or another process causing an effect. In order to fully explain the effects of certain variables on the use of quality management techniques, future in-depth case study will be necessary.

To end, some practical approaches might emerge from this study. Based upon our results, the argumentation that organizations with increased levels of managerial autonomy and result control will automatically provide better services by e.g. the use of quality management techniques apparently has to be refined. Within the context of the continuous attempts being made to improve public sector organizations' performance, this finding is particularly interesting: having a view on the cases in which the enlargement of an organization's managerial autonomy really leads to a higher use of quality management techniques can be considered as a critical step in the striving for a more efficient public service delivery.

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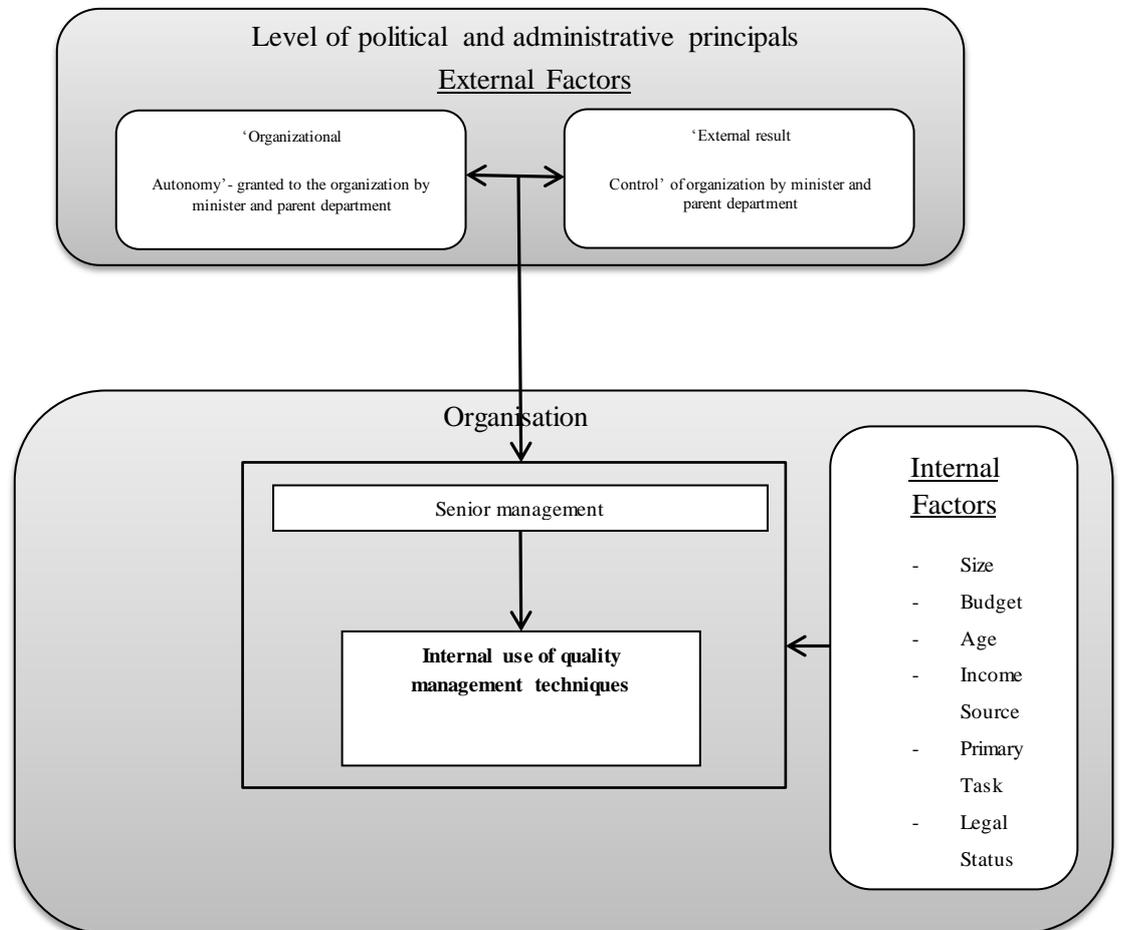
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## 8. Tables and Figures

**Figure 1 Determinants of using quality management techniques**



**Table 1: Descriptive Statistics (298 observations)**

Variable	Description	Mean	Std	Min	Max
Use of quality management techniques	Interval	0,548	0,306	0	1
High Personnel Management Autonomy	Dummy	0,433	0,496	0	1
High Financial Management Autonomy	Dummy	0,174	0,380	0	1
High Result Control	Dummy	0,372	0,484	0	1
Type	Dummy	0,594	0,492	0	1
Primary Task	Dummy	0,607	0,489	0	1
Income Source	Dummy	0,242	0,429	0	1
Age	Categorical	0,852	0,856	0	2
Budget	Categorical	1,245	0,867	0	2
Size	Categorical	1,087	0,832	0	2
Belgium	Dummy	0,097	0,297	0	1
Italy	Dummy	0,101	0,301	0	1
The Netherlands	Dummy	0,195	0,397	0	1
Austria	Dummy	0,154	0,362	0	1
Germany	Dummy	0,208	0,407	0	1
Portugal	Dummy	0,245	0,431	0	1

**Table 2: Tobit regression results (298 observations)**

Exogeneous variables	Dependent variable: Use of quality management techniques			
	Homoskedastic Tobit		Heteroskedastic Tobit	
	Coefficient	<i>t</i> -value	Coefficient	<i>t</i> -value
High Personnel Management Autonomy	0,123**	2,15	0,094*	1,7
High Result Control	0,172***	3,08	0,149***	2,96
High Financial Management Autonomy	-0,041	-0,64	-0,011	-0,17
Interaction between Personnel Management Autonom	-0,210***	-2,64	-0,16**	-2,11
Interaction between Financial Management Autonom	-0,084	-0,76	-0,072	-0,66
Type	-0,032	-0,56	-0,035	-0,68
Primary Task	0,005	0,11	0,037	1
Income Source	0,054	1,27	0,056	1,25
<b>Age dummies</b>				
Medium	-0,011	-0,24	-0,002	-0,04
High	0,005	0,13	0,022	0,5
<b>Size dummies</b>				
Medium	0,091*	1,67	0,089*	1,73
Large	0,115**	2,16	0,139***	2,76
<b>Budget dummies</b>				
Medium	0,029	0,48	0,068	1,08
Large	0,118**	2	0,15**	2,49
<b>Country dummies</b>				
Belgium	0,056	0,64	0,046	0,52
Italy	-0,016	-0,21	-0,035	-0,39
The Netherlands	0,2***	2,61	0,198**	2,57
Austria	0,196***	2,79	0,196***	2,84
Germany	-0,125*	-1,74	-0,135**	-2,25
Constant term	0,219**	2,29	0,173*	1,89
Log Likelihood	-95,1177		-83,6074	
LR test on joint significance of country dummies	$\chi^2(5)=32,20***$		$\chi^2(5)=56,75***$	
LR test on joint significance of age dummies	$\chi^2(2)=0,11$		$\chi^2(2)=0,31$	
LR test on joint significance of size dummies	$\chi^2(2)=4,96*$		$\chi^2(2)=7,64*$	
LR test on joint significance of budget dummies	$\chi^2(2)=4,46$		$\chi^2(2)=6,59**$	

**Table 3: QMLE results of the model for a fractional response variable (298 observations)**

Exogeneous variables	Dependent variable: Use of quality management techniques	
	Coefficient	t-value
High Personnel Management Autonomy	0,443*	1,96
High Result Control	0,675***	3,2
High Financial Management Autonomy	-0,188	-0,66
Interaction between Personnel Management Autonomy & Result Control	-0,817***	-2,7
Interaction between Financial Management Autonomy and Result Control	-0,313	-0,7
Type	-0,071	-0,31
Primary Task	0,022	0,14
Income Source	0,247	1,33
<b>Age dummies</b>		
Medium	-0,006	-0,03
High	0,039	0,21
<b>Size dummies</b>		
Medium	0,369*	1,79
Large	0,426*	1,91
<b>Budget dummies</b>		
Medium	0,095	0,37
Large	0,437*	1,71
<b>Country dummies</b>		
Belgium	0,223	0,65
Italy	-0,037	-0,12
The Netherlands	0,812**	2,52
Austria	0,803***	2,67
Germany	-0,440*	-1,87
Constant term	-1,09***	-2,97
Quasi Log Likelihood		-148,496
LR test on joint significance of country dummies		$\chi^2(5)=28,71***$
LR test on joint significance of age dummies		$\chi^2(2)=0,06$
LR test on joint significance of size dummies		$\chi^2(2)=4,39$
LR test on joint significance of budget dummies		$\chi^2(2)=3,42$

## 9. Appendix

**Table 4 Precise wording of the questions on managerial autonomy**

Strategic personnel management autonomy	<p>Provided that the organization has own staff, can the organization without interference from above (without ministerial or departmental influence) set the general policy for the organization conditions for promotions?</p> <p>Provided that the organization has own staff, can the organization without interference from above (without ministerial or departmental influence) set general policy for the level of salaries?</p> <p>Provided that the organization has own staff, can the organization without interference from above (without ministerial or departmental influence) set general policy for the way of evaluating personnel?</p>
Strategic financial management autonomy	<p>Can your organization itself shift between the budgets for personnel - running costs without approval from above (ministerial or departmental approval)?</p> <p>Can your organization itself set tariffs for services or products without approval from above (ministerial or departmental approval)?</p> <p>Can your organization itself shift between the budgets for personnel or running costs on the one hand and investments on the other hand without approval from above (ministerial or departmental approval)?</p>