SIZE AND STRUCTURE IN THE PURCHASING FUNCTION: EVIDENCE FROM GERMAN MUNICIPALITIES

Christoph H. Glock and Michael G. Broens*

ABSTRACT. This paper analyzes how German municipalities organize their purchasing activities. It aims to identify patterns in the structure of the purchasing function and to study how the size of the municipality influences the design of its purchasing organization. Therefore, an analytical framework based on contingency and organization theory is developed and results of an empirical study are presented. The results indicate that German municipalities use a medium level of centralization and specialization in organizing their purchasing activities, but that the purchasing process is highly formalized and represented on high hierarchical levels in many cases. As to the relationship between the size of a municipality and the structure of its purchasing function, the study indicates that size, measured by the number of inhabitants, the number of employees and purchasing volume influences the structural variables in various ways.

INTRODUCTION

To enable municipalities to provide high quality services to citizens and to use public funds efficiently and transparently, an adequate purchasing organization is necessary. Purchasing’s contribution to the functioning of a municipality is apparent: supplying a municipality with the best products and services available enables the municipality to offer services in a state-of-the-art manner, while

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using budgets economically may make additional funds available which can be used to further increase the quality of service delivery.

Despite the importance of purchasing for providing high quality services, organization of purchasing in municipalities has scarcely been analyzed in the past. To close this gap, this paper reports the results of an empirical investigation of purchasing organization of German municipalities. The purpose of this research is twofold: First, it aims to identify patterns in the structure of the purchasing function of municipalities, and secondly it intends to study how the size of the municipality influences the structure of its purchasing organization. Both aspects contribute to the understanding of the structuring of public organizations. Relating the size of a municipality to the structure of its purchasing function may have important implications for practitioners. If it is possible to identify a connection between size and structure, purchasing managers who are interested in restructuring the organization of purchasing may evaluate alternative organizational designs with reference to this connection. Further, such a study contributes to the literature on the size and structure of bureaucracies with its long history starting with Weber (1947), which has thus far not focused on public purchasing organizations. Due to similar environmental conditions, the results of the study may also be transferred to other sectors that are subject to public procurement law (at least in Germany) as well. Therefore, it may be assumed that the results of this study are interesting for a large number of researchers and practitioners in the area of public purchasing.

The paper is organized as follows: the next section gives an overview of previous research to position this study in the existing literature. The following sections derive the analytical framework for this research and present the results of an empirical study conducted in late 2009 and early 2010. The last section presents the conclusions of the study.

LITERATURE REVIEW

The organization of purchasing has been a subject of academic research for years (see Glock and Hochrein [2011] for a review of related literature). One stream of research in this area focused on the structuring of the purchasing function in private companies and analyzed various characteristics of purchasing organizations, such as
the degree of centralization, reporting relationships, or the education and functional experience of the chief purchasing officer (Fearon, 1988; Giunipero & Monczka, 1997; Johnson, Lenders & Fearon, 1998; Johnson & Leenders, 2001; Johnson, Klassen, Lenders & Fearon, 2002; Johnson & Leenders, 2004; Trent, 2004). A second research stream explicitly focused on the organization of purchasing in public institutions and considered the particularities of the public purchasing process. De Boer and Telgen (1998), for instance, studied the purchasing organization of municipalities in the Netherlands and found that purchasing was centralized in the majority of institutions participating in the survey. However, only 15% of the participants had a formal purchasing department, and further a professional approach towards purchasing was missing in many cases. McCue and Pitzer (2000) studied the degree to which purchasing was centralized in cities and counties in the US and found that the majority of institutions used a hybrid purchasing organization, i.e. an organization that combines centralized and decentralized structural elements. Further, the authors showed that no distinct tendency towards centralization or decentralization could be identified, which indicates that purchasing organizations have to be adapted to changing conditions and requirements over time and that a single optimal organization which leads to an efficient purchasing process in every context does not exist. A similar study was conducted by Gianakis and Wang (2000), who analyzed the degree of decentralization and its determinants in the purchasing activities of cities in the US. The results indicated that hybrid purchasing organizations are dominant in most municipalities and that a variety of factors influence the degree of decentralization in a municipality, such as its financial condition, the use of performance measurement systems or the organizational culture. Further empirical data can be found in two studies conducted by the Center for Advanced Purchasing Studies (CAPS Research, 1999, 2001), that focused on the degree of centralization of the procurement function, the design of reporting structures, and the use of electronic tools in the procurement process. Laios and Xideas (1994b) studied state-controlled enterprises in Greece and analyzed the influence of the degree of state control and the product type on the organization of purchasing along four phases of the purchasing process. A comparison of purchasing organizations of public and private institutions can be found in Laios and Xideas (1994a) and Johnson,
Leenders and McCue (2003). Laios and Xideas (1994a) showed in an empirical study that purchasing is more formalized in public institutions than in private companies, but that no distinct tendency towards centralization in purchasing could be identified. In contrast, Johnson, Leenders and McCue (2003) found that public institutions used a higher degree of centralization in their purchasing activities.

Bakker, Walker, Schotanus and Harland (2008) provided a study of collaborative procurement initiatives in public hospitals and municipalities and introduced a framework of different organizational forms and insights into when to use which form. A typology of alternative forms of collaborative purchasing can be found in Schotanus and Telgen (2007). The use of e-procurement tools as a means to automatize the public purchasing process was finally discussed in MacManus (2002), Moon (2005), Henriksen and Mahnke (2005) and Wirtz, Lütje and Schierz (2010). A study that analyzed the impact of organizational size on the prevalence of green procurement initiatives in Norwegian municipalities was conducted by Michelsen and De Boer (2009).

In addition to the papers mentioned above, works on the organization of the industrial buying center are also relevant for this paper. In this context, a variety of studies utilized ideas from contingency theory to identify contextual factors that influence the structure of the buying center. Spekman and Stern (1979), for example, studied the relation between environmental uncertainty and the organization of the buying center and found that an increasing uncertainty results in an increase in the division of labor and a higher degree of participation, i.e. a higher extent to which the members of the buying group are involved in purchasing-related decisions. A correlation between environmental uncertainty and the degree of centralization and formalization of the buying center could not be observed. A similar study was conducted by McCabe (1987) who also analyzed the relation between environmental uncertainty and the organization of the buying center. In contrast to Spekman and Stern (1979), McCabe (1987) found that an increasing uncertainty leads to a higher degree of centralization and a lower degree of participation. The difference between both studies may be due to the different constructs used to measure the dependent and independent variables. Naumann and Kim (1986) studied the impact of technological characteristics of a company’s products on the degree
SIZE AND STRUCTURE IN THE PURCHASING FUNCTION

of centralization and formalization of the buying center and showed
that both structural variables increase as a firm’s technology
becomes more non-routine. Other contextual factors that have been
studied as determinants of the buying center structure are the
complexity of the required products (Kotteaku, Laios & Moschuris,
1995), product type (Xideas & Moschuris, 1998), the degree to which
purchases are repeated (McWilliams, Naumann & Scott, 1992), or
the structure of the organization as a whole (Wood, 2005). A meta-
analysis which studies the relation between the purchasing situation
and the structure of the buying center can be found in a paper of
Lewin and Donthu (2005). The authors showed that certain relations
between contextual variables and the structure of the buying center
may be found in a broad range of studies, while the impact of other
contextual variables could not be clearly identified.

A closer examination of the works mentioned above illustrates
that only a small number of papers focused on the purchasing
organization of municipalities, and that only a few papers have been
adequately theoretically substantiated (see Table 1 for an overview).
In a recent review of works that studied the organization of
purchasing, Glock and Hochrein (2011) found that only 23 of 85
reviewed articles considered public institutions in their analysis, and
that only a single one of these 23 articles made reference to an
established theory (Bakker, Walker, Schotanus & Harland, 2008). For
example, the works of McCue and Pitzer (2000), Johnson et al.
(2003) and CAPS Research (1999, 2001) are purely descriptive,
while the paper of Gianakis and Wang (2000) lacks a proper
theoretical foundation and Laios and Xideas (1994a, b) consider only
one or two contextual variables in their studies. This is insufficient
inasmuch as public institutions often spend high sums on acquiring
products and services, which is why a proper organization of the
institution’s purchasing function may contribute to an economic use
of budgets. In Germany, for example, the public sector is assumed to
account for approximately 17 % of the German GDP (Scientific
Advisory Council at the Federal Ministry of Economics and
Technology, 2007), which illustrates the impact a reduction in public
spending may have on an economy. To provide both researchers and
practitioners with a more detailed description of purchasing
organizations in public institutions and to study environmental factors
that may influence the structure of purchasing, this paper provides an empirical examination of the purchasing organization of German municipalities.

**ANALYTICAL FRAMEWORK**

**Public Procurement in Germany**

Just as other public institutions in Germany, municipalities have to consider public procurement laws when awarding procurement contracts to a third party. Thereby, regulations on the national level have to be considered as well as rules passed by the European Commission (EC). The latter are important in case the value of a public contract exceeds certain threshold values (Commission Regulation (EC) No 1251/2011).

The definition of procurement procedures and detailed contracting rules is delineated within several public procurement

<table>
<thead>
<tr>
<th>Paper</th>
<th>Theory</th>
<th>structural variables used</th>
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<tbody>
<tr>
<td>Bakker et al. (2008)</td>
<td>Contingency Theory</td>
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<td>descriptive</td>
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<td>Schotanus/Telgen (2007)</td>
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regulations, whose validity depends on the object of agreement, i.e. deliveries and other services (VOL), construction and building (VOB), and freelance services (VOF). For example, the VOL contains a hierarchy of different procurement procedures both on the national level and the level of the European Community which have to be employed in case the volume of a public contract exceeds the threshold values. Although national and EC laws use different terms to describe public procurement procedures, both are widely comparable (Schindler, 2008). While the procedures connected with public tendering (national law) or the open procedure (EC law) and restricted tendering (national law) or the restricted procedure (EC law) are regulated in detail, regulations are less rigid in case a direct agreement (national law) or a Negotiated Procedure (EU law) is employed. Public institutions are only allowed to use this procedure in exceptional cases, for example if the product or service in question can only be provided by a limited number of companies due to its particular characteristics (Section 3 and section 3 EG VOL/A).

Dimensions of Organizational Structure

The structure of an organization defines responsibilities and authorities and determines how tasks are allocated to the members of an organization and which resources are available for reaching organizational goals (Jones, 1998; Simon, 1997; Robbins, 1990). As was shown in the preceding section, many empirical studies analyzed the degree of centralization in purchasing, the use of sourcing teams, or the position of the purchasing department in the hierarchy of the organization. Table 1 illustrates which structural variables were used in works that studied the organization of public purchasing, and the reader is referred to the review of Glock and Hochrein (2011) for an overview of the use of other structural variables. The variables mentioned above are important design parameters in defining the structure of an organization, but are not sufficient to completely describe the structural setup since other design variables exist which influence the structure of an organization and which help to describe organizations in greater detail.

Robbins (1990), for example, differentiated between the structural dimensions complexity, formalization and centralization, which he interpreted as basic components of an organization’s structure. Complexity, in this context, describes the degree of
differentiation within the organization and includes the degree of specialization, the number of levels in the organization’s hierarchy, and the extent to which an organization is dispersed geographically. Formalization, in contrast, measures the degree to which an organization relies on rules and procedures to direct the behavior of its members, whereas centralization refers to the locus of decision-making authority within the organization.

An alternative description of design parameters was proposed by Mintzberg (1979), who divided structural variables into four groups: design of positions, design of superstructure, design of lateral linkages, and design of decision-making system. In the first category, he summarized variables that relate to the design of positions, whereas in the second category he included parameters that determine the structure of the organization as a whole. The third category was comprised of design variables that shape the planning and control systems of the organization, while the fourth category was a summary of variables that influence the locus of decision-making authority within the organization.

A third typology of structural variables is due to Pugh, Hickson, Hinings, and Turner (1963, 1968). The authors defined five basic dimensions of organizational structure: specialization, standardization, formalization, centralization, and configuration. Specialization measures how tasks are allocated to the members of the organization, whereas standardization describes the degree to which tasks and processes are specified in rules and definitions. Configuration, in contrast, refers to the design of the authority structure of the organization, whereas formalization and centralization relate to the use of procedures and rules and the degree to which authority is located in a single organizational unit, as explained above. Alternative typologies can be found in Daft (1992), Price (1972) or Weber (1947), for example.

In the following, we define four structural variables which constitute the analytical framework of this study. The first two variables, centralization and formalization, are the structural variables that have most frequently been used in prior studies (see Spekman & Stern, 1979; Johnston & Bonoma, 1981; Naumann & Kim, 1986; Laios & Xideas, 1994b; Kotteaku, Laios & Moschuris, 1995; Xideas & Moschuris, 1998; Lau, Goh & Puah, 1999; Lewin & Donthu, 2005; Wood, 2005; see also Glock & Hochrein, 2011) and
can be assumed to be important design elements of the municipal purchasing function. Centralization, in this context, can be used as a measure to reduce complexity in large organizations, whereas formalization may help to control the purchasing process which is especially sophisticated in public institutions due to the vast amount of regulations that need to be considered. The third variable, specialization (see Spekman & Stern, 1979; Laios & Xideas, 1994b; Kotteaku, Laios & Moschuris, 1995; Xideas & Moschuris, 1998; Lau, Goh & Phua, 1999), is included in our study since the broad variety of products and services (from office supplies to protective clothing to vehicles for winter services) that are needed in municipalities, as well as the regulations of public procurement law, might necessitate dividing labor among the employees in such a way that each employee develops areas of expertise within the field of public purchasing. The fourth variable measures the hierarchical position of the purchasing function in the overall hierarchy of the organization, which helps to assess the importance that is ascribed to purchasing in the organization. The four structural variables used in our study have frequently been employed in prior studies and could be interpreted as a “standard measure” of organizational design. Additional structural variables were not included in the survey to keep the length of the questionnaire short and to assure that the length of the questionnaire did not negatively impact the response rate. Each structural variable is discussed briefly in the following sections.

Centralization

A closer look at the literature reveals that two different definitions are frequently used to measure the degree of centralization. The first definition refers to the concentration of decision-making authority and measures the extent to which authority is aggregated in a single organizational unit (Pugh et al., 1963; Price, 1972; Dröge & Germain, 1989; Chow, Heaver & Henriksson, 1995; McCue & Pitzer, 2000). The position of the organizational unit(s) in the overall hierarchy of the organization is irrelevant in this context, wherefore highly centralized units may also be found on lower hierarchical levels. The second definition refers to the position of decision-making authority within the hierarchy of the organization, wherefore only those organizations are considered to be centralized which concentrate authority on high hierarchical levels (Hickson, Pugh & Pheysey, 1969;
One of the aims of this study is to analyze whether decision-making authority for purchasing-related tasks is concentrated in a single organizational unit (i.e. a central purchasing department) or dispersed within the organization. Therefore, this study assumes that a centralized purchasing department may exist on relatively low hierarchical levels and consequently refers to the first definition introduced above. The hierarchical position of the purchasing department is considered in a separate design variable.

**Specialization**

Specialization refers to the division of labor in the organization. Several authors differentiated between two forms of specialization and proposed that tasks may either be grouped by roles or by activities (see e.g. Dröge & Germain, 1989; Robbins, 1990; Simon, 1997). The first case, which we denote as functional specialization, results in a functional segmentation of the organization and establishes a division of jobs into simple and repetitive tasks which may be efficiently performed (Robbins, 1990; Daft, 1992). The second case may be denoted as object-oriented specialization, which helps to reduce interface problems as employees are responsible for different tasks that are logically interconnected. Consequently, functional specialization is beneficial in case only few interdependencies arise between different tasks and high efficiency improvements are expected in specializing on a small set of activities, whereas an object-oriented specialization is beneficial in the opposite case (Galbraith, 1971; Daft, 1992).

If we consider the purchasing function of a municipality, the purchasing organization would be functionally specialized if the employees of the purchasing department concentrated on separate activities of the purchasing process. Thus, in case of a high degree of functional specialization, each employee would be responsible for a separate step of the purchasing process, such as the formulation of tender documents, the evaluation of bids etc. In contrast, the purchasing organization would be specialized on an object-oriented basis in case the employees of the purchasing department specialized on the required objects, such as IT-products, cleaning services etc., and were responsible for all steps of the purchasing
process that are necessary to purchase the object in question. A practical example of an object-oriented purchasing organization is one which uses category management, which is discussed in Nellore and Motwani (1999) and Englyst, Jorgensen, Johansen and Mikkelsen (2008), for example.

**Formalization**

Formalization describes the degree to which an organization relies on rules and procedures to direct the behavior of its members (Hickson, 1966; Hall, Haas & Johnsen, 1967; Pugh et al., 1968; Child & Mansfield, 1972; Price, 1972; Dröge & Germain, 1989; Robbins, 1990; Chow, Heaver & Henriksson, 1995). Thus, if an organization is highly formalized, the job incumbent has a minimum amount of discretion about how the different tasks may be completed. Formalization may be achieved by defining roles and authority relations or by establishing rules that regulate decision processes, the communication of employees, or the processing of information in the organization (Hall, Haas & Johnson, 1967; Hall, 1991). Organizations formalize the behavior of its members to reduce its variability and to predict and control it (Mintzberg, 1971; Pheysey, Payne & Pugh, 1971; Hall, 1991). In addition, formalization contributes to the standardization of work by establishing rules and regulations that ensure that tasks are fulfilled alike by all members of the organization (Hall, 1967; Mintzberg, 1971; Robbins, 1990). In general, formalization may be achieved by using written norms or by conveying rules in a non-written, but nevertheless explicit, form (Price, 1972; Hall, 1991).

**Hierarchical Position**

The hierarchical position of an organizational unit is shaped by the reporting structure of the organization, which defines the reporting relationships between organizational entities. This structural variable is closely related to the structural dimension configuration defined by Pugh et al. (1963, 1968), which measures the shape of the authority structure. The difference between our variable and configuration is that Pugh et al. (1963, 1968) consider the hierarchical structure of the organization as a whole and consequently measure aspects such as vertical and lateral span of control, criteria for segmentation, and numbers of positions, whereas
our variable solely refers to the position of the purchasing department in the hierarchy of the organization. We decided to use the hierarchical position of the purchasing department as a structural variable since the position of an organizational unit helps to assess the status this unit enjoys in the organization and the degree to which an organizational unit may influence decisions on the strategic and tactical level (Bloom & Nardone, 1984; Fearon, 1988; Monczka, Trent & Handfield, 2005). Configuration, in turn, measures characteristics which are not necessary for the purpose of our study.

Size as a Contextual Variable

Contingency theory assumes that the structure of an organization is shaped by the characteristics of its environment (Ford & Slocum, 1977). As a consequence, an important task of organization theory is to identify contextual variables and explain how these variables influence the structure of organizations. In the last decades, a variety of different contextual variables has been analyzed in the context of organization theory, such as origin and history, ownership and control, size, technology, location, and resources (see e.g. Pugh et al., 1963; Hickson et al., 1969; Inkson, Pugh & Hickson, 1970; Child & Mansfield, 1972). A closer look at the literature reveals that conflicting views of the relation between a variety of contextual variables and the structure of the purchasing function exists. For example, Lewin and Donthu (2005) showed in a meta-analysis that the relationships between the purchase situation and several dimensions of buying center structure found in the literature were statistically not significant. The authors concluded that the specific characteristics of the studies could have been responsible for variations in the results. Further, McCabe (1987) showed that different perceptions of the relationship between task uncertainty and the structure of the buying center exist, wherefore he introduced the concepts of “perceived uncertainty” and “objective product characteristics” to partially explain the contradictory results.

This study analyzes how the size of a municipality influences the structure of its purchasing function. The size of an organization has frequently been used as a contextual variable in the past and has often been operationalized as the number of members of an organization (Hall, Haas & Johnson, 1967; Kimberly, 1976; Miletie, Gillespie & Haas, 1977; Robbins, 1990), the organization’s capacity,
net assets, or sales volume (Pugh et al., 1963; Kimberly, 1976; Gupta, 1980). The primary reason why the size of an organization has frequently been chosen as a contextual variable is that an increase in the number of organizational members entails an increase in potential communication channels in the organization (Caplow, 1957; Kimberly, 1976), which impedes planning and controlling activities. As a result, we may assume that the organization reacts by adjusting its structure to generate mechanisms which help to enforce directives. In the context of public purchasing, we may assume that as a municipality gains in size, a different purchasing organization becomes necessary to counter complexity-related problems.

Interdependencies between the Variables

While interpreting structural and contextual variables, one must consider that correlations may occur within the categories. The theory of bureaucracy, for example, assumes that formalization, specialization, and centralization are highly correlated and that an increase in these variables induces a low level of organizational flexibility (Weber, 1947; Pugh et al., 1963). Other researchers have also found correlations between structural variables, but have often arrived at results that differ from those derived by Weber (see for example Child, 1972; Reimann, 1973, 1974).

EMPIRICAL INVESTIGATION

Design of the study

This study aims to analyze how German municipalities organize their purchasing function and to examine the impact of size on the purchasing organization. For this purpose, 699 German municipalities were contacted in a mail survey in late 2009 and early 2010. The sample consisted of all German municipalities with at least 20,000 inhabitants. Explicitly excluded from the sample to avoid biases were small cities and towns which rarely award public contracts. The number of inhabitants was used as an exclusion criterion since the necessary data is readily available from the German Federal Statistical Office. An analysis of the respondents’ data indicated that the number of inhabitants, the purchasing volume, the number of employees, and the number of employees performing purchasing-related tasks are correlated, wherefore the
number of inhabitants is an appropriate selection criterion. Since construction contracts are regularly awarded by special construction departments of the municipality, and not by the purchasing department, construction contracts are explicitly excluded from the analysis in the following.

To raise the necessary data, a key informant at each of the municipalities was contacted. Thereby, only those employees were selected as key informants that were regularly performing purchasing-related tasks and that had been responsible for purchasing products and services for at least one year at the respective municipality. At those municipalities where the position of a chief purchasing officer could be identified, the CPO was selected as key informant. Of the 699 questionnaires sent to the municipalities, 172 usable surveys were returned, yielding a response rate of 24.6%. Table 2 gives an overview of the size of the cities participating in the survey as measured by the population. As can be seen, the size distribution of the respondents approximately equals the size distribution of the sample. To complement the questionnaire, we used objective data of the German Association of Cities to collect data about the number of inhabitants of the respective municipalities.

### TABLE 2

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<th>Population Group</th>
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<tr>
<td></td>
<td>Number of Cities</td>
<td>%</td>
</tr>
<tr>
<td>20,000 – 50,000</td>
<td>510</td>
<td>73.0</td>
</tr>
<tr>
<td>50,000 – 100,000</td>
<td>107</td>
<td>15.3</td>
</tr>
<tr>
<td>100,000 – 200,000</td>
<td>43</td>
<td>6.2</td>
</tr>
<tr>
<td>200,000 – 400,000</td>
<td>24</td>
<td>3.4</td>
</tr>
<tr>
<td>&gt; 400,000</td>
<td>15</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>699</td>
<td>100</td>
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To avoid biases in the formulation of the questionnaire, a first version of the survey was sent to a group of experts in the area of public purchasing, who were asked to examine the questionnaire and
whose feedback was used to slightly modify the formulation of the questions before the survey was conducted. Further, to avoid nonresponse bias, we conducted a series of t-tests to compare the first-wave and the second-wave respondents in terms of structural and contextual variables (see Armstrong & Overton, 1977). None of the t-tests of the means revealed any significant difference between these two groups of respondents, indicating insignificant non-response bias.

**Operationalization of the Variables**

In the following, we show how the structural variables and the variable “size” described above have been operationalized in this study.

**Centralization**

As pointed out above, centralization describes the degree to which purchasing authority is concentrated in a single organizational unit. To operationalize this construct, we adopted the measures used by Gianakis and Wang (2000) and the Center for Advanced Purchasing Studies (CAPS Research, 1999, 2001) to formulate four items. The corresponding questions were formulated as follows: In our city,...

1. ...all departments are involved in the purchasing process.
2. ...all departments have budgets to independently purchase low-value products and services.
3. ...all departments are authorized to independently award contracts whose value does not exceed the threshold values in a simplified process.
4. ...each department is responsible for purchasing its own requirements.

The participants of the study were asked to evaluate these four items on a 5-point Likert-scale with 5 being “strongly agree”, 4 being “agree,” 3 being “neutral,” 2 being “disagree,” and 1 being “strongly disagree.” The first item measures whether all departments of the municipality influence the purchasing process without referring to formal responsibilities. “Involvement,” in this context, was defined as playing an active role in the purchasing process, e.g. by being responsible for defining product specifications, formulating tender
documents or evaluating bids. Indirect influence, such as expressing opinions, was explicitly excluded from the analysis. The focus was consequently on “authority,” and not on “influence” (cf. Simon, 1997, for a distinction). The second item refers to a small order system which enables organizational units to purchase products and services of small value without involving the purchasing department, whereas item three refers to the process of a direct agreement defined by public procurement law (see above). Thereby, the threshold values defined by public procurement law may be higher than internal small order limits. The last item measures the extent to which formal authorities for performing purchasing-related tasks are concentrated in the different departments of the municipality. The four items were consolidated in an index to describe the degree of centralization, and the Cronbach alpha was used to measure the internal consistency of this index. The result for all four items was 0.676; therefore we decided to remove the first item from the index, which led to an increase in alpha to 0.769.

Specialization

The structural variable specialization refers to the division of labor within the organization and may either be oriented on the functions that need to be performed or on the objects that are purchased. Again, we used four test items and asked the participants of the study to evaluate these items on a 5-point Likert-scale: In our municipality,...

1. ...we have a specialist for each step of a tendering procedure.
2. ...several employees work together on a tendering procedure.
3. ...the tasks that arise in the course of a tendering procedure are assigned to the employees based on the object that is purchased, and not on the process steps of the tendering procedure.
4. ...the tasks that arise in the course of a tendering procedure are always handled by the same employees.

The first item measures whether specialists exist for each step of a tendering procedure. This item does not directly refer to the division of labor, as the specialist may also be responsible for other tasks and function as a reference person in case problems arise. However, the existence of specialists is a necessary condition for specialization. The second item measures the extent to which tasks that arise in the
course of a tendering procedure are assigned to more than one employee, whereas the third item directly refers to the way labor is divided in the organization. The last item measures whether the same employees are always responsible for the tasks that arise in the course of a tendering procedure, or whether responsibilities vary over time.

An index was created from the four items, and the Cronbach alpha was calculated to ensure internal consistency of the index. The result for all four items was 0.400, wherefore we decided to remove the fourth item from the index, which led to an increase in alpha to 0.654.

**Formalization**

Formalization distinguishes how much the organization relies on rules and procedures to direct the behavior of its members. According to Mintzberg (1979), behavior may be formalized by job, by work flow, or by rules which are valid for all jobs, work flows, and members of the organization. In addition, formalization may be reached by establishing control mechanisms (Hage & Aiken, 1967; Price, 1972) since rules and procedures only have a formalizing effect if they are obeyed by the members of the organization.

The structural variable formalization was again operationalized with the help of four test items, whereby the first item refers to formalization by work flow, the second to formalization by job, the third to formalization by rules, and the fourth to formalization by control (An overview of alternative ways to operationalize formalization can be found in Pennings [1973]): In our municipality,...

1. ...we have detailed instructions regulating how a tendering procedure has to be performed.
2. ...each employee has a formal job description regulating how his or her work has to be done.
3. ...we have general rules and principles that are valid for all employees and jobs.
4. ...employees are regularly supervised in conforming to rules and procedures.

The participants were again asked to evaluate the items on a 5-point Likert-scale, and the Cronbach alpha was used to measure the internal consistency of the resulting index. The result (alpha = 0.732)
shows that these items are a reliable measure of the concept of formalization.

**Hierarchical Position**

Finally, the participants of the study were asked to indicate the function to which the purchasing department directly reports. With reference to two studies of the Center for Advanced Purchasing Studies (CAPS Research, 1999, 2001), the participants were given the following alternatives from which to choose: major/executive board, central services, technical services, IT, finance, and others. Note that the hierarchical position of the purchasing department does not directly become apparent from all alternatives, as the IT department may directly report to the executive board or be a subordinate of central services, which in turn reports to the executive board. However, the measure may be used to identify patterns in the hierarchical position of the purchasing department and is helpful in assessing reporting structures in the respective municipalities. Further, we may assume that a department reporting to the major/executive board or central services is located on a higher hierarchical level than a function reporting to the other departments.

**Size of the Organization**

The contextual variable size was operationalized by measuring four items which were supposed to be correlated: The total number of employees of the municipality, the number of employees that are involved in the purchasing process, the number of inhabitants and the purchasing volume. We assumed that a high number of employees in an organization may lead to a centralized structure which may affect the internal structure of the departments of the organization as well (Wood, 2005), while the size of a department itself may also be correlated with its degree of centralization. Therefore, the participants were asked to indicate the approximate number of employees of the municipality and the approximate number of employees that are involved in the purchasing process.

Further, we measured the number of inhabitants since we assumed that an increasing population may make more economic resources available (Poister & Streib, 1989; Daley, 1993). An increasing budget, in turn, may lead to a higher volume of public purchases and a higher willingness to professionally organize the
Further, an increase in the number of inhabitants induces a wider array of services that needs to be performed (Daley, 1993), such as running theatres or secondary schools, which may result in a higher number of public purchases. In contrast, small municipalities often delegate various sovereign functions to their respective administrative district (see German Association of Cities, 2008) and are thus not responsible for purchasing products and services associated with performing these functions. It is obvious that this may impact the structure of the purchasing function as well. To raise the number of inhabitants of a municipality, we used objective data from the Statistical Yearbook of German Municipalities, published by the German Association of Cities (2008). The year 2007 was chosen as the reference year, since more recent data was not available at the time of the study.

Finally, we measured the purchasing volume, i.e. the amount of money spent on public purchases. We assumed that with an increasing purchasing volume, the amount of purchasing-related activities that need to be performed increases, which may result in scale effects in case the division of labor is appropriately organized. Further, with a higher purchasing volume, benefits that result from consolidating requirements increase as well (Monczka, Trent & Handfield, 2005), which may impact the structure of the purchasing function, too (see also Crow & Lindquist, 1985). The purchasing volume of a municipality was measured by asking the participants to assess the average annual volume of public contracts their municipality awarded in the years 2003-2008.

As to correlations between the four measures, our analysis showed that all four measures are positively correlated, with correlation coefficients ranging from 0.548 to 0.843 at a significance level of $p = 0.000$.

**Results**

The frequency distribution of different degrees of centralization of the responding municipalities is illustrated in Figure 1 (note that a small value on the centralization index refers to a centralized organization). As can be seen, most municipalities use a hybrid purchasing organization which combines decentralized and centralized structural elements, and highly centralized or highly
decentralized purchasing organizations were only found in a few cases. Only nine municipalities evaluated each item of the centralization index with 1, whereas 18 municipalities selected the maximum value for each item. Of the respondents, 69.77% reached values between 6 and 12 (with a mean scale value of 9) on the centralization index, which illustrates the importance of hybrid purchasing organizations.

In a second step, we analyzed the relation between the measures of size identified above and the degree of centralization and calculated Spearman’s rank correlation coefficient for this purpose. The results are presented in Table 3. As can be seen, a statistically relevant correlation (with \( p < 0.05 \)) between three of the four measures of size and the degree of centralization could be identified. This may be interpreted as follows: An increasing number of employees in an organization entails a greater diversity of requirements, which is difficult to consolidate in a central purchasing department. In such a case, it might be beneficial to directly involve the different departments of the municipality in the purchasing process or to place purchasing managers in the respective departments, which results in a greater degree of decentralization. Similarly, as the number of employees that perform purchasing-
TABLE 3

Spearman’s Rank Correlation Coefficient for the Degree of Centralization

<table>
<thead>
<tr>
<th></th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants</td>
<td>0.147</td>
<td>1.863</td>
<td>0.064</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.186</td>
<td>2.368</td>
<td>0.019</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.373</td>
<td>5.031</td>
<td>0.000</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.326</td>
<td>3.838</td>
<td>0.000</td>
</tr>
</tbody>
</table>

related tasks increases, coordinating the purchasing process in a central unit becomes more and more difficult due to an increase in the number of potential communication channels, both inside the central unit and between the central unit and the different departments of the municipality. Allocating responsibilities for purchasing products and services closer to the requiring units seems to be a suitable measure to reduce complexity in this case. The positive correlation between the purchasing volume and the degree of decentralization may be explained by the fact that in case the total purchasing volume of a municipality is high, efficiency effects that result from consolidating requirements may already be achieved at the department level. In such a case, it might not be necessary to pool requirements at the organization level, which leads to greater decentralization. A statistically relevant correlation between the number of inhabitants of a municipality and the degree of decentralization could not be observed.

Figure 2 illustrates that the purchasing organizations of the responding municipalities possess a medium degree of specialization in the majority of cases, with 79.89% of the respondents reaching values between 6 and 12 (with a mean scale value of 9) on the specialization index (note that a high value on the specialization index refers to a specialized organization). In contrast to centralization, the mean of the responses (7.90) is lower than the mean scale value (9), which indicates that the municipalities in the sample prefer a somewhat lower degree of specialization in organizing their purchasing activities. The fact that a very high degree of specialization was only barely found may be traced back to the portfolio of complex products and services that are only irregularly
required by municipalities, such as software, fire appliance or vehicles for winter services, which renders comprehensive specialization difficult (see also Laios & Xideas, 1994a). A separate analysis of item 3 (Mean: 2.43, SD: 1.17) indicates that German municipalities tend to specialize on the objects that are purchased, instead of specializing on separate process steps of the tendering procedure. Obviously, the characteristics of the products and services purchased by municipalities and the regulations of public procurement law, which determine that products and services have to be described in detail and brand-neutral in tender documents, necessitates a comprehensive understanding of the particularities of the products and services in question.

Table 4 shows that a statistically significant, although small, correlation between three of the four measures for size defined above and the degree of specialization could be found. Since the specialization index led to a value for the Cronbach alpha below 0.7, we further analyzed the influence of the measures of size on the four items introduced above to see whether any additional information
TABLE 4
Spearman’s Rank Correlation Coefficient for the Degree of Specialization

<table>
<thead>
<tr>
<th></th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants</td>
<td>0.160</td>
<td>2.032</td>
<td>0.044</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.142</td>
<td>1.796</td>
<td>0.074</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.160</td>
<td>2.033</td>
<td>0.044</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.260</td>
<td>2.997</td>
<td>0.003</td>
</tr>
</tbody>
</table>

could be obtained from the data. The analysis showed that a statistically relevant correlation between three of the four measures for size and the first item as well as between the purchasing volume and the third item could be identified, while the other correlations were all not significant (see Table 5). We may thus assume that an increasing purchasing volume or an increasing workforce leads to a higher degree of division of labor, where employees are more and more responsible for a small set of repetitive tasks. The reason for this tendency might also be an effort to deal with complexity in the organization, since it is easier for employees to keep an overview of a limited set of activities than to be responsible for processes that affect a huge number of organizational units.

TABLE 5
Spearman’s Rank Correlation Coefficient for The Different Items of the Specialization Index

<table>
<thead>
<tr>
<th></th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of inhabitants</td>
<td>0.121</td>
<td>1.533</td>
<td>0.127</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.160</td>
<td>2.033</td>
<td>0.044</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.189</td>
<td>2.414</td>
<td>0.017</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.274</td>
<td>3.175</td>
<td>0.002</td>
</tr>
<tr>
<td>Item 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of inhabitants</td>
<td>0.114</td>
<td>1.432</td>
<td>0.154</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.124</td>
<td>1.565</td>
<td>0.120</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.130</td>
<td>1.645</td>
<td>0.102</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.134</td>
<td>1.506</td>
<td>0.135</td>
</tr>
</tbody>
</table>
The results of our study for the degree of formalization are shown in Figure 3 and Table 6. As can be seen, the purchasing organization of German municipalities is highly formalized in most cases: whereas only 12.79% of the participants reached values between 4 and 11 on the formalization index, 77.3% arrived at values between 13 and 20.

**FIGURE 3**
Frequency Distribution of Different Degrees of Formalization

<table>
<thead>
<tr>
<th>Item 3</th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants</td>
<td>0.137</td>
<td>1.729</td>
<td>0.086</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.081</td>
<td>1.013</td>
<td>0.313</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.089</td>
<td>1.116</td>
<td>0.266</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.209</td>
<td>2.374</td>
<td>0.019</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item 4</th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants</td>
<td>0.007</td>
<td>0.083</td>
<td>0.934</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>-0.011</td>
<td>-0.144</td>
<td>0.886</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>-0.110</td>
<td>-1.392</td>
<td>0.166</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>-0.011</td>
<td>-0.117</td>
<td>0.907</td>
</tr>
</tbody>
</table>
Reasons why municipalities tend to formalize their purchasing activities may be traced back to the regulations of public procurement law and the efforts of many municipal governments to use public funds transparently, which may lead to additional internal rules and process descriptions (Laios & Xideas, 1994b).

Table 6 illustrates that a statistically relevant correlation between the degree of formalization and all four measures of size introduced above could be identified. On the one hand, this could be a result of the regulations of public procurement law, which specify that formalized procedures have to be applied in case the value of a public contract exceeds certain threshold values, leading to a higher degree of formalization as the purchasing volume increases. On the other hand, the efforts of many municipal governments to use public funds transparently lead to additional regulations with an increasing purchasing volume, which further impacts the degree of formalization. In addition, an increase in the workforce of the organization may entail a higher degree of formalization. Potential reasons could be the result of an effort to control complexity, which has been shown to be positively correlated with size. In such a case, implementing formal guidelines and procedures and controlling the employees of the organization may help to implement standards, which reduce complexity and contribute to increasing the efficiency of the organization (Child, Diederichs, Sanders & Wisniowski, 1991).

| S

| Table 6 |

| Spearman's Rank Correlation Coefficient for the Degree of Formalization |
|---------------------------------|--------------|-------|
| Number of inhabitants           | 0.283        | 3.696 | 0.000 |
| Employees of the municipality    | 0.197        | 2.522 | 0.013 |
| Employees involved in purchasing| 0.253        | 3.281 | 0.001 |
| Purchasing volume               | 0.273        | 3.160 | 0.002 |
Figure 4 indicates that the purchasing departments of German municipalities often report to the major/executive board or to the central services department. Thirty-five respondents indicated that a central purchasing department did not exist and that the responsibility for purchasing products and services was allocated among at least two departments, whereas participants that selected the option “others” indicated that the purchasing department reports to the legal, construction, or real estate department. The fact that 63.37% of the respondents indicated that the respective purchasing department either reports to central services, which is often a direct subordinate of the executive board, or directly to the major or executive board indicates that purchasing is considered highly important in these municipalities (cf. Bloom & Nardone, 1984; Fearon, 1988). One reason why the purchasing function enjoys a high status in many towns and cities may be the restrictive regulations of public procurement law, which contain diverse liability regulations.
that become effective in case a municipality violates applicable law in awarding a public contract. To avoid failures in the public procurement process and to protect the municipality from compensation claims, the municipal government may decide to locate the purchasing function on a high hierarchical level, which simplifies both reporting and control.

Table 7 illustrates that a statistically relevant correlation between all four measures of size defined above and the hierarchical position of the purchasing department could be found. We may thus assume that an increase in the respective contextual variables leads to a lower hierarchical position of the purchasing department by tendency. This might again be an effort to deal with complexity in the organization, since an increase in the size of a municipality leads to a larger set of activities that have to be performed at high hierarchical positions. In this case, it might be necessary to move certain functions down the hierarchy to relieve the executive board.

Table 7

<table>
<thead>
<tr>
<th>Measure</th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of inhabitants</td>
<td>0.192</td>
<td>2.457</td>
<td>0.015</td>
</tr>
<tr>
<td>Employees of the municipality</td>
<td>0.246</td>
<td>3.177</td>
<td>0.002</td>
</tr>
<tr>
<td>Employees involved in purchasing</td>
<td>0.205</td>
<td>2.618</td>
<td>0.010</td>
</tr>
<tr>
<td>Purchasing volume</td>
<td>0.233</td>
<td>2.672</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Table 8 presents the correlation coefficients between the three indices developed above and the hierarchical position of the purchasing department. As can be seen, a positive correlation between centralization and the hierarchical position could be identified, indicating that a higher value on the centralization index (i.e. a higher degree of decentralization) leads by tendency to a lower position of the purchasing department in the overall hierarchy of the organization and vice versa. This is an obvious result, since consolidating reports on lower hierarchical levels before forwarding them to the executive board of the municipality proves to be efficient in case the purchasing function is decentralized.
TABLE 8
Spearman’s Rank Correlation Coefficient for Indices Developed above
And the Hierarchical Position

<table>
<thead>
<tr>
<th></th>
<th>Spearman R</th>
<th>t (N-2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralization</td>
<td>0.257</td>
<td>3.326</td>
<td>0.001</td>
</tr>
<tr>
<td>Specialization</td>
<td>0.146</td>
<td>1.846</td>
<td>0.067</td>
</tr>
<tr>
<td>Formalization</td>
<td>0.125</td>
<td>1.575</td>
<td>0.117</td>
</tr>
</tbody>
</table>

In a last step, we tested the structural variables centralization, specialization, and formalization for correlations and found a statistically relevant correlation only between the degree of formalization and the degree of specialization (R = 0.371, t(N–2) = 5.004, and p = 0.000). We may thus conclude that as the purchasing organization becomes more specialized, rules and procedure descriptions are implemented to coordinate processes that are now shaped by a high degree of division of labor, and/or that an increasing degree of formalization demands a higher degree of specialization to make it possible for employees to work with the rules and processes that are necessary for performing their tasks. A correlation between the degree of centralization and any of the two other structural variables could not be found. Therefore, we could not confirm the interdependencies between centralization, specialization, and formalization propagated by Weber (1947).

CONCLUSIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The purpose of this study was to analyze the organization of the purchasing function at German municipalities. The results of our study may be summarized as follows:

First, German municipalities predominantly use hybrid purchasing organizations, i.e. purchasing organizations which combine centralized and decentralized structural elements. It was shown that large municipalities use a higher degree of decentralization, which could be an effort to control complexity. These findings are in line with the predictions of Blau (1970), who hypothesized that an increase in the size of an organization leads to a higher degree of departmentalization, and the results of Gronhaug (1975), Crow and Lindquist (1985), Dawes, Dowling and Patterson (1992) and Wood
The major problems associated with a high level of decentralization clearly are disadvantages in the consolidation of requirements, which may lead to higher prices for required products and services. Thus, we suggest that especially in large municipalities, implementing measures that reduce complexity in the purchasing process would enable the municipality to select a higher degree of centralization for its purchasing process and to benefit from consolidated requirements. One measure to reduce complexity includes the implementation of modern IT- and e-procurement systems, for example.

Secondly, German municipalities use a medium degree of specialization in organizing their purchasing function, and an object-oriented specialization is dominant. It was shown that with an increasing size of the organization, the division of labor increases, leading to a higher degree of specialization. A high degree of specialization was found only in exceptional cases, which suggests that due to the complex portfolio of different products and services, purchasing agents can specialize on processes or objects only to a certain degree. Since a high degree of specialization in purchasing can lead to efficiency gains in the processing of purchases, municipalities could try to increase the degree of specialization, for example by outsourcing the purchase of products that are only infrequently needed or by establishing purchasing consortia for sporadic requirements (e.g. Steinhauer, 1976). The latter enables the municipality to pool requirements with other institutions, which enables the consortium to employ specialists for the required products and services, and which may also lead to lower prices.

Thirdly, purchasing organizations of German municipalities are highly formalized, and it was shown that the size of the organization is positively correlated with the degree of formalization. This may be the result of the regulations of public procurement law or the efforts of the municipalities to use budgets transparently, which may lead to additional regulations and process descriptions. Since a highly formalized organization may result in slow decision processes, our results suggest that especially large municipalities should try to implement measures that reduce formalization in purchasing. It is clear that a certain level of formalization is due to the regulations of public procurement law, which is not under control of the municipality. However, our study showed that many municipalities...
have implemented additional regulations in the purchasing process, which complicates a decision process that is already highly formalized. Since the purpose of formalization is to control the behavior of the organization’s employees, municipalities should consider whether the behavior of their employees could be controlled without implementing additional rules and regulations. One option is the use of incentive systems, which could help align the personal objectives of the employees with the goals of the institution and which would render the use of additional rules and regulations unnecessary.

Fourthly, purchasing at German municipalities is located on relatively high hierarchical levels, which illustrates the importance purchasing enjoys in the respective municipalities. It was shown that an increase in the size of the organization leads to purchasing being located at lower hierarchical levels, which could be an effort to control complexity in the organization. A comparison of our results with those obtained by De Boer and Telgen (1998) indicates that the importance purchasing enjoys in municipalities has increased over the last decade. However, our results also suggest that purchasing is still underrepresented on high hierarchical levels of large municipalities, which implies that the attention of decision makers in municipalities needs to be raised for the advantages that a professionally organized purchasing function may have on the financial situation of the institution and on the quality of the services it provides.

Our study also has limitations. First, our analysis was restricted to organizational size as the only contextual variable. It is clear that other contextual factors might be relevant for the design of purchasing organizations as well, such as the political culture of the municipality or the experience and education of the chief purchasing officer (see for example Gianakis & Wang, 2000). This suggestion is supported by the relatively low correlation coefficients that were found in the analysis. Especially the political culture of a municipality might be an interesting contextual variable, since decisions in municipal governments are not always based on economic considerations. Consequently, subsequent studies could concentrate on unveiling further relationships between environmental factors and the purchasing organization of municipalities. In addition, researchers could concentrate on studying changes in the organization of the purchasing function at municipalities and study if, how, and why the
structure of purchasing organizations is changed over time. Since prior research has shown that organizations tend to shift from centralized to decentralized arrangements and back (see e.g. Johnson & Leenders, 2006), research on this aspect seems to be promising. Finally, the study of additional structural variables could lead to additional insights as to how the environment of a municipality influences the structure of its purchasing function.

Another limitation of our study clearly is the focus on German municipalities, which could impede generalizing its findings, especially towards countries with different public procurement regulations. However, we note that other organizations are subject to public procurement law as well, such as universities, public companies or federal state authorities, wherefore we may assume that these organizations operate under similar environments as municipalities. The results of our study may thus be of interest for researchers and practitioners studying other members of the public sector as well. Finally, since the member states of the European Community have a common public procurement law, the results of our study might also be transferred to public organizations in other nations, at least within the European Community. However, we suggest that future research could try to identify differences in the environments of different public sector organizations and study how these differences influence the structure of the purchasing function.

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REFERENCES


