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## **Exploring management control system typologies: An organisation level view**

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## **Abstract**

**Purpose** - Management controls are the processes and mechanisms managers use to influence the behaviour of individuals and groups towards the organisation's objectives and goals. Discrete management controls and management control system (MCS) frameworks have been extensively researched, but there is little research on organisation level MCS types. This study seeks to identify organisation level MCS types.

**Design/methodology/approach** - This study draws on the MCS type literature, the competing values framework, and the upper echelons theory to form organisation effectiveness and top management team constructs to characterise firms. Cluster analysis was used to group a sample of 318 firm-years into MCS types.

**Findings** - The study reports a theory-based measurement construct that is initially validated with new empirical data. We found from the empirical data four different categories of firms based on the general type of their MCSs labelled clan, adhocracy, market, and hierarchy.

**Originality/value** - This study makes two contributions to the MCS literature. Firstly, it presents a theory-based measurement construct to identify organisational and top management attributes that can be used to classify organisations overall MCS types. Secondly, it demonstrates how information from annual reports and other publicly available data sources can be used to identify the overall MCS types of organisations.

Classification Research paper

Keywords: Management control systems, typology, accounting data, cluster analysis

## **Exploring management control system typologies: An organisation level view**

### **1 Introduction**

Management control systems (MCS) are at the heart of our understanding of how management strives to achieve the objectives and goals of the organisation and explaining why organisations behave the way they do. Management controls are the processes and mechanisms managers use to influence the behaviour of individuals and groups towards predetermined objectives and goals (Flamholtz et al., 1985). These processes can include personal supervision, performance measurement, and reward systems. The control processes and mechanisms are not used separately. Instead, they are combined and used together as a MCS and various frameworks have been proposed to categorise and systematise these different combinations of management controls in place (e.g. Ferreira and Otley, 2009; Malmi and Brown, 2008; Simons, 1995).

MCS frameworks seek to specify and study the individual elements forming a MCS (Strauß and Zecher, 2013). MCSs have been understood as a collection of management control practices addressing diverse control and management problems. This view maintains that there is a collection of individual control practices and systems forming an MCS. In their MCS framework Malmi and Brown (2008) introduced the notion that the practices and systems in use form a package. Ferreira and Otley (2009) extended the understanding of MCSs by introducing an MCS framework, where the management control practices form a system of interrelated controls. These views of MCSs have formed separate literature streams and Grabner and Moers (2013) offered to clarify the distinctions and definitions of the package and system views.

Based on these frameworks, much of the MCS research has focused on the internal structure and interdependencies of the individual control practices within the MCS (Bedford and Malmi, 2015; Chenhall and Moers, 2015; Davila et al., 2015). How the organisation has addressed the fundamental task of organising, i.e. coordinating the activities of the organisation members with interdependent activities, using formal control systems, and social controls throughout the organisation is a fundamental property of the organisation (Chatman and O'Reilly, 2016).

Taking a broader view of the organisation and how it addresses control as a whole, and not at the level of individual control practices or mechanisms, enables the overall characterisation and categorisation of a whole MCSs (Speklé, 2001). These MCS archetypes are specific and distinct

configurations of the control practices and systems in place and represent separate groups of differing control types (Speklé, 2001). Although typologies of management control and MCS types have been proposed (Ouchi, 1979; Speklé, 2001; Whitley, 1999), there is little empirical research on firm or organisation level MCS types in the extant literature on management control (Auzair, 2015; King and Clarkson, 2019).

Knowledge about organisational overall MCS types is important in understanding how organisations influence behaviour and strive towards their objectives. This study draws on the MCS type literature (Ouchi, 1979; Speklé, 2001; Whitley, 1999) to identify four organisation level MCS types. The competing values framework (CVF) (Quinn and Rohrbaugh, 1983) identifies four different organisation types each with differentiated and characteristic organisational effectiveness measures. These organisation types can be aligned with the identified MCS types. According to the upper echelons theory (Hambrick and Mason, 1984) the demographic properties of top management teams (TMT) can be used as proxies for their cognitive settings making it possible to predict firms' strategic actions from their executives' backgrounds. The CVF and the upper echelons theory are used to form organisation effectiveness and TMT constructs to characterise firms and identify the organisation level MCS types. To advance the understanding on MCS types, these constructs are used with cluster analysis to group a sample of 318 firm-years into four MCS types with distinct characteristics. It also addresses the call for theoretical insights and empirical findings on the influence of top management on designing, perceiving, and using MCSs (Schaeffer and Dossi, 2014) and a typology of MCS design (King and Clarkson, 2019; Otley, 2016).

The study makes two contributions to the current MCS literature. Firstly, it identifies organisational and top management attributes that can be used to classify organisations MCS types. Secondly, as a methodological contribution, it demonstrates the use of a theory-based model to empirically study overall MCS types of organisations using publicly available accounting and TMT data.

The rest of the study is structured as follows. The following section reviews the extant literature on MCS types, CVF organisation types, and defines the used constructs. The third section

describes the used data and measures, followed by the methods, results, and findings. The last section discusses the findings, implications, and limitations of the study.

## 2 Literature review

### 2.1 MCS types

In their review Strauß and Zecher (2013) identified several MCS typologies in the extant literature that were based on either a cybernetic approach, transaction cost economics (TCE), or comparative sociology approach. The TCE and comparative sociology-based typologies are more suited for typing whole MCSs, while the cybernetic based MCSs differentiate control mechanisms and processes (Strauß and Zecher, 2013). Table I summarises the main features of the TCE and comparative sociology approach based MCS typologies.

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Based on the TCE approach Ouchi (1979) divides MCSs into evaluation and control systems using market, bureaucracy, and clan mechanisms. The typology of Lebas and Weigenstein (1986) is essentially the same division into three types with slightly differing names: market, rules, and culture approaches. In both typologies, external market mechanisms e.g. prices are used to control behaviour in the market type control. The bureaucracy and rules types use externally imposed rules and output controls to control behaviour. The third MCS types clan and culture use rituals, internalised beliefs, and values to influence behaviour.

Using the comparative sociology approach, Whitley (1999) introduced four different control systems in his typology. The output-based control systems are comparable with the market types of Ouchi (1979) or Lebas and Weigenstein (1986). In a comparable manner, bureaucratic control systems are like bureaucracy and rules, and patriarchal control systems resemble clan and culture types. Whitley (1999) introduces a fourth type delegated control systems in his typology, where control is exerted by autonomous groups or units in the organisation.

Speklé (2001) again applies the TCE approach and proposes five control types in his typology. Four control types are like the types presented in the prior typologies. Market and machine controls resemble the market and bureaucracy types in the earlier typologies. Speklé's (2001) boundary control uses interdicts and sets boundaries to limit unaccepted behaviour and is similar to clan, culture, or patriarchal controls. Exploratory control is based on interaction and the emergence of insights to achieve cooperation and resembles Whitley's (1999) delegated control systems. The fifth type, arm's length control, combines elements of the competitive market and administrative machine controls. Arm's length control does not correspond to any specific control type in the earlier typologies.

## 2.2 *The competing values framework*

The competing values framework proposed by Quinn and Rohrbaugh (1983) has been widely used in analysing organisations (Hartnell et al., 2011). The spatial framework consists of three value dimensions (control-flexibility, internal-external, and means-ends) that underlie conceptualisations of organisational effectiveness, see Figure 1. The first dimension reflects organisational structure with values of control and stability to flexibility and individuality. The second dimension differentiates organisational focus from an internal view on the well-being and development of the people in the organisation to an external view on the organisation itself. The four quadrants formed by these two main dimensions represent the four types of organisations that form the CVF: clan, adhocracy, market, and hierarchy. The third dimension distinguishes emphasis on means or important processes from the ends or results within each quadrant. The CVF provides a tool to define the organisational effectiveness measures in terms of associated values and linking appropriate management controls to each type of organisation in the four quadrants (Cooper and Quinn, 1993).

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Fig. 1 about here

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The clan or the human relations model in the CVF is internally oriented and is characterised by a flexible organisation structure. Clan organisations are process oriented and ideally, leadership is very caring and empathetic showing concern and support (O'Neill and Quinn, 1993).

Participation and empowerment are used as means to bring about human resource development and employee commitment as ends (Hartnell et al., 2011).

The adhocracy or the open systems model is also characterised by a flexible organisation structure but is externally oriented focusing on the organisation itself. Their organisation structures are described as organic, flat, or loosely coupled systems (O'Neill and Quinn, 1993). Using flexibility, agility, and creativity as means adhocracies are expected to turn out innovation, growth, and resource acquisition as ends (Hartnell et al., 2011; Quinn and Rohrbaugh, 1983).

The market or rational goal model is similarly externally oriented but exerts control with its rigid control structures and mechanism (Hartnell et al., 2011). Market organisations focus on initiating action and achievement when attempting to fulfil their stakeholders' expectations. Using planning and goal setting as means, market organisations are expected to result in productivity and efficiency as ends (Quinn and Rohrbaugh, 1983).

The hierarchy or internal process model combines rigid control structures and mechanisms with internal focus. Their organisation structures are often hierarchies combined with conservative or cautious style leadership (O'Neill and Quinn, 1993). Hierarchies expect to achieve control, stability, and predictability as ends using communication and information management as means (Quinn and Rohrbaugh, 1983).

### *2.3 Four types of control and top management properties*

Four contrasting organisation models emerge from the CVF. Quinn and Rohrbaugh (1983) found these four types to be congruent with earlier typings in the organisational literature. Furthermore, the MCS types in Table I can also be merged with the CVF. The clan, market, and hierarchy organisation types in the CVF have direct counterparts in the MCS types (Büschgens et al., 2013; Yu and Wu, 2009). The human relations approach of the clan model corresponds with the clan, culture, patriarchal, and boundary control types, see Table I. Similarly, the rational goal-oriented approach of the market model matches the market and output-based control types and the hierarchy corresponds with the bureaucracy, rules, and machine control types. The open systems adhocracy juxtaposes with the delegated and exploratory control types of Whitley (1999) and Speklé (2001) with emerging insights and autonomy central in accomplishing control.



Quinn and Rohrbaugh (1983) used organisation effectiveness measures applied in organisation analysis to differentiate the four organisation types. In their typology, each quadrant or organisation type has distinctive organisation effectiveness criteria or measures that separate them from each other. The CVF literature that followed has listed an array of organisation properties and measures characteristic for each organisation type (e.g. Hartnell et al., 2011; O'Neill and Quinn, 1993; Zammuto and O'Connor, 1992). Since each organisation type has distinctive and identifiable effectiveness criteria and measures, the organisation and control types can be differentiated and identified from these measures.

According to the upper echelons theory (Hambrick and Mason, 1984) the actions and performance of organisations can be understood through the properties of their most powerful actors, the top management team. The top executives form personal interpretations of the challenges they face based on their personal experiences, values, and personalities, and act according to these interpretations (Hambrick, 2007). The upper echelons theory also holds the view that demographic properties of the TMTs can be used as proxies for their cognitive settings making it possible to predict strategic actions from the executives' functional backgrounds, business or firm tenure, educational background, and other affiliations (Hambrick, 2007). Thus, the top managements demographic properties reflect the organisation and control type as top management has been found to influence organisation culture and values (Bhimani, 2003; Hu et al., 2012), use the organisation culture and values as a control system (Chatman and O'Reilly, 2016; Marginson, 2009), or align their control system with the prevalent organisation culture (Heinicke et al., 2016).

In conclusion, the management control literature has identified MCS types that are linked to the organisation types in the CVF. The top management influences the organisation type and the management controls used within the organisation. Ensuing from the upper echelons theory, the top management demographic properties reflect the organisation's culture type and management controls used to influence behaviour and strive towards their objectives. According to the CVF, each organisation and control type promotes and uses distinctive effectiveness criteria or measures to assess organisation performance. A set of organisation and TMT constructs can be identified to differentiate and categorise the organisation and MCS types. Although an unlimited number of constructs could be chosen, a limited number of uncorrelated constructs allow valid

patterns to emerge from a configuration analysis (Bedford and Malmi, 2015). The constructs included in the empirical analysis are drawn from the extant CVF literature and represent organisation properties and measures characteristic to the different CVF models. The fourteen organisation and TMT constructs used in the clustering analysis and validation are discussed next and summarised in Table II.

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TMT size and firm size were chosen as organisational constructs for the clustering. While increasing TMT size has been found to improve firm performance (Certo et al., 2006) due to increased ability to process information, Haleblian and Finkelstein (1993) note increasing TMT size creates communication and coordination problems. In this light, adhocracy control seeking agility should display small TMTs able to make swift decisions. While adhocracy control values agility, hierarchy control emphasizes stability with larger TMTs (Cameron and Lavine, 2006; Quinn and Rohrbaugh, 1983). Firm size measured as number of employees has been shown to separate small firms with capability to change and adapt (Abebe, 2010) from larger more rigid and bureaucratic firms (Baliga and Jaeger, 1984).

The upper echelons theory maintains that the functional backgrounds of TMTs influence their decisions and actions, and classifies them into three categories: output, throughput, and peripheral functional backgrounds (Hambrick and Mason, 1984). Output functions include marketing, sales, and R&D (Abebe, 2010). TMTs with output functional backgrounds emphasise growth and search for new opportunities and markets (Hambrick and Mason, 1984). Adhocracy and market control should display a higher share of output functional backgrounds since the CVF associates growth with adhocracies, while search for new opportunities and markets are linked with market organisations (Hartnell et al., 2011; Zammuto and O'Connor, 1992). TMTs with throughput functional backgrounds seek to improve the efficiency of the transformation process and include production, process engineering, and accounting (Abebe, 2010; Hambrick and Mason, 1984). According to the CVF, process oriented leadership is linked with clan control, while improvement-oriented leadership is a feature of adhocracy control (O'Neill and Quinn,

1993; Wang et al., 2015). Therefore, throughput functional backgrounds should be more common with these control types.

TMT members with peripheral functional backgrounds, e.g. law, finance, personnel, and administrative backgrounds, are not directly involved with the organisations core activities (Hambrick and Mason, 1984). Clan control in the CVF values teamwork, participation, and human resource development, which should lead to higher share of peripheral functional backgrounds in the TMT (Hartnell et al., 2011). Peripheral functional backgrounds are also beneficial in formal planning, maintaining structures, and coordination typical of hierarchy control and goal oriented market control (Hambrick and Mason, 1984; O'Neill and Quinn, 1993). Koch et al. (2017) noted that there is a large share of top executives, that have general management backgrounds instead of functional ones. TMT members with general management backgrounds have moved away from specific functions and possess generic governance expertise (Biemann and Wolf, 2009; Koch et al., 2017). General management backgrounds are common in long tenured top management of large corporations as managers perform more general management duties than special tasks (Koch et al., 2017). Governance and management expertise benefit organisations emphasising control making general management backgrounds more pronounced within hierarchy and market control.

The upper echelons theory assertion that TMT age, organisation tenure, and team tenure are related to performance has received substantial support (Bell et al., 2011; Hambrick, 2007). TMT age has been shown to be associated with firm strategic change (Wiersema and Bantel, 1992). Younger TMTs were more receptive to change and willing to take risks while older TMTs became less flexible and avoided risky decisions. Correspondingly, adhocracies in the CVF are agile and risk taking while hierarchies value caution and stability (Hartnell et al., 2011; Zammuto and O'Connor, 1992). Hence, adhocracy control should exhibit younger TMTs and hierarchy control older TMTs. In a similar manner, long tenured TMTs have been found to resist change and maintain organisational status quo (Boeker, 1997). Long tenures should be common with hierarchy control seeking to maintain existing structures (O'Neill and Quinn, 1993). Baliga and Jaeger (1984) noted that long organisational tenure is needed for clan control. Long tenure can also have a negative effect on the agility of adhocracy control and environmental scanning of market control (Abebe, 2010; Hartnell et al., 2011). Thus, the TMTs of clan and hierarchy

organisations have longer tenures than TMTs of adhocracies and market organisations. TMTs have been observed to integrate their behaviour as team tenure increases (Hambrick, 2007). Congruent behaviour due to long team tenure is valued by clan control where teamwork, personnel development, and empowerment are emphasised (Hartnell et al., 2011). In turn, market control could show short team tenure as it focuses on achievement and short-term results (Hartnell et al., 2011) and control relies on agreed outputs (Ouchi, 1979).

To assess predictive validity, additional variables not included in the cluster solution are chosen and tested for differences (Hair et al., 2015). Profit margin reflects the firm's efficiency and management's capability to control the costs to generate sales (Fairfield and Yohn, 2001). Effectiveness is associated with hierarchy control (Cameron and Lavine, 2006; Hartnell et al., 2011). In contrast, asset turnover represents productivity and the effective use of the firm's assets (Fairfield and Yohn, 2001). In the CVF, market control is expected to show high productivity (Cooper and Quinn, 1993; Quinn and Rohrbaugh, 1983).

The MCS types also differ on organisational measures like growth and innovation. Adhocracy control strives to grow and acquire resources (O'Neill and Quinn, 1993; Quinn and Rohrbaugh, 1983), while clan control intensifies during organisational decline and when losing resources (Harrison and Carroll, 1991). Organisational growth and decline can be measured as changes in personnel (Hartnell et al., 2011). Adhocracy control stresses innovation, while market organisations focus on increasing market share. Both emphasize innovation effectiveness measures compared to clan and hierarchy control (Cameron and Lavine, 2006; Zammuto and O'Connor, 1992). R&D intensity or R&D expenditure of sales is widely used as a measure of corporate innovativeness (Baysinger and Hoskisson, 1989; Hambrick and Macmillan, 1985).

Clan control emphasizes nonspecialised career paths and teamwork benefiting from high diversity (Baliga and Jaeger, 1984; Hartnell et al., 2011). TMT diversity brings different types of knowledge and a wider range of perspectives valued by market control (Certo et al., 2006). According to Cameron and Lavine (2006) hierarchies value consistency and uniformity expressed as low diversity. Educational background diversity proxies the TMT diversity.

This section attempted to provide a brief summary of the literature relating to CVF organisation models and MCS types. The evidence reviewed here suggests that organisation level MCS types

can be identified and they correspond to the four organisation types identified in the CVF. By means of the CVF organisational effectiveness criteria and top management characteristics, MCS types can be identified and characterised from sample organisations.

### **3 Research methodology**

#### *3.1 Data*

The sample was collected from firms listed in the NASDAQ OMX Helsinki stock exchange during 2008-2011. The Finnish Corporate Governance Code applied by the stock exchange requires operative management is separate from the board of directors and firms disclose organisation of the management. If the company has a management team, its composition and duties as well as the areas of responsibility of its members shall be disclosed. This sample was chosen as Finnish companies readily publish information on their TMTs and the very interesting time period included both economic downturn and recovery.

The sample included firms in basic materials, consumer goods, consumer services, industrials, technology, and telecommunications industries. The single firm in the telecommunication industry resembles the consumer goods and services firms warranting its inclusion in the sample. Financials were excluded as their assets and liabilities differ considerably from the sample. Health care and utilities are regulated industries and thus were left out. The oil & gas industries consisted of one state owned firm which was excluded not to risk generalisability of the results. One firm was deemed an outlier based on Euclidian distance (Hair et al., 2015) and six firms were excluded due to missing data leaving 83 firms with 318 firm-years of data in the sample. Demographic data for the sample is presented in Table III.

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The accounting data used in this study was collected from the Voitto+ company information database published by Asiakastieto Group. The used data was published in November 2012. The top management team was defined as the group of top executives the firms declare as their top management team in their annual reports. This corresponds with Senior and Swailes (2004)

definition of a real team where the group see themselves as a team and is also seen by outsiders as a team. This definition is also applicable to different size organisations as the firms define the size and composition of the TMT needed to manage the organisation. Reliable and up to date information on the TMTs is readily available in the firms' published and audited annual reports and stock exchange releases. This information was supplemented with information from firm internet pages and TMT member LinkedIn profiles.

### *3.2 Measures*

TMT size was the number of persons in the team. Firm size was measured as the mean number of employees during a fiscal year.

The functional background variables were calculated as the share of managers with the corresponding background in the top management team. Consistent with prior studies (Abebe, 2010; Hambrick and Mason, 1984), top management team functional backgrounds were categorised as throughput, output, and peripheral functions. Throughput functions seek to improve the efficiency of the transformation process and include production, process engineering, and accounting. Output functions include marketing, sales, and R&D. They emphasise growth and search for new opportunities and markets. Peripheral functions (e.g. law, personnel, finance) are not directly involved with the firm's core activities. A fourth category, general management, was added as not all managers have specific functional backgrounds, but instead have broader general management backgrounds e.g. division heads (Biemann and Wolf, 2009).

TMT age, firm tenure, and team tenure were measured as simple averages of team member age and tenures for each fiscal year.

Firm profitability expressed as return on assets (ROA) was separated into profit margin (PM) and asset turnover (ATO) (Fairfield and Yohn, 2001). Profit margin was calculated as profit (net profit before taxes and finance costs) in relation to total sales. Asset turnover was calculated as total sales divided by average assets, where average assets were the mean of the balance sheet totals for the current and the previous year.

Organisation growth was represented by increases in number of employees (Hartnell et al., 2011). Accounting based data was used to calculate growth of the organisation as the annual change in average number of personnel.

R&D intensity of the organisations was measured as the annual R&D expenditure divided by total sales (Baysinger and Hoskisson, 1989; Hambrick and Macmillan, 1985). Although one of the most commonly used measures of R&D intensity, it may be affected by firm size or industry (Baysinger and Hoskisson, 1989). Hambrick and Macmillan (1985) also point out the time dimensional problems with R&D intensity as the results of R&D expenditures are seen in later time periods. Despite this, no lags were used for parsimony.

Top management team educational background diversity was conceptualised as variety, and Blau's index of heterogeneity was used as measure (Harrison and Klein, 2007). Due to variation in top management team size, a bias corrected formula of Blau's index was used (Biemann and Kearney, 2010). The index gives values from 0 to 1 with increasing diversity. Analogous with prior studies the educational backgrounds of the TMT members were grouped into five categories used by Wiersema and Bantel (1992): arts, sciences, engineering, business and economics, and law. When more than one field of education was reported, the first one was taken to be the dominating field. Also "not indicated" was added as a sixth group. Some individuals did not report their education, and this was taken as a distinguishing factor from the rest of the group.

#### **4 Findings**

Descriptive statistics for the sample are shown in Table IV. The sample consisted of 318 firm-years in six industries. The correlation matrix in Table IV shows plausible associations between the variables. While there is some correlation between the functional background measures and the temporal measures, the highest correlation is -0.63 between output functional and general management backgrounds. The pairwise correlations are well below the generally accepted limit of 0.70 suggesting no concerns with multicollinearity (Hair et al., 2015).

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A combination of hierarchical and non-hierarchical clustering methods was employed to investigate organisation level MCS types. Cluster analysis was chosen, as it is commonly used to group objects into homogenous clusters, which differ from objects in the other clusters (Hair et al., 2015). Hierarchical cluster analysis using squared Euclidian distance as similarity measure and Ward's method as clustering algorithm was first used to generate a full set of cluster solutions. The variables were standardised using Z-scores to avoid variables with large ranges getting more weight in defining the cluster solution and dominating the result (Ketchen and Shook, 1996). The number of clusters was determined using increase in heterogeneity measured by the agglomeration coefficient (Hair et al., 2015). Heterogeneity increased significantly when reducing the number of clusters from four to three indicating the clustering should be stopped at four clusters.

The four-cluster solution from the hierarchical cluster analysis was further optimised using non-hierarchical K-means clustering, which allows the reassignment of observation into other clusters while minimising heterogeneity (Hair et al., 2015). Software generated seed points were used to produce a four-cluster solution with 74, 85, 113, and 46 cases in the clusters. Table V shows the results of the analysis, the analysis of variance (ANOVA), and the post hoc multiple comparison procedure used to compare the means. Levene's test confirmed that some variances are not equal and cluster sizes differ, making the Welch F-statistic and the Games-Howell post hoc test appropriate choices (Howell, 2008). The robustness and validity of the cluster solution was tested using different seed points for the K-means clustering. This resulted in 95.9% of the cases being grouped in the correct cluster. A cluster solution is considered very stable when less than 10% of the cases are assigned incorrectly (Hair et al., 2015).

The cluster solution was further validated by inspecting how each firm classified during the four-year period. Sixty-five firms were grouped in the same cluster for the whole period, while 29 shifted to another cluster. The annual reports of the 29 firms were analysed for reasons for the shift. Most of these shifts (15) were from clan, adhocracy, or hierarchy clusters to the market



cluster. All these firms reported adopting more customer or market-oriented operations or strategies. Five firms moved from adhocracy or market clusters to the clan cluster. These firms displayed very stable operations with the organisation and same TMT growing older. Four firms shifted to the adhocracy cluster from clan or market clusters while reporting major downsizing or divesting large parts of their business. Overall, 78 firms grouped in the same cluster or had plausible reason for a cluster shift and only five firms with shifts could not be explained. These results support the cluster solution.

The four clusters are interpreted in the next sections based on the differences in the clustering variables (Table V), validation variables (Table VI), and comparisons to prior theoretical typologies. These descriptions provide an understanding of the type of control used within each cluster and allow labelling it accordingly. Furthermore, the validation variables show differences between the clusters indicating the predictive validity of the cluster solution.

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#### *4.1 Cluster 1: Clan control*

Cluster 1 consists of 74 cases (23% of the total sample). TMT and organisation size are close to the sample mean and do not differentiate this cluster. The backgrounds of the TMT differ from the other clusters significantly. All the backgrounds are evenly represented in the TMT of this cluster and it also has the highest share of managers with peripheral functional backgrounds. This suggests a propensity towards human resource development, participation, and teamwork valued by organisations with an inclination towards clan control (Hartnell et al., 2011). Cluster 1 also exhibits a long firm tenure of the TMT and the longest team tenure (twice the team tenure of the other clusters). Baliga and Jaeger (1984) have noted the need for long tenures and consensual decision-making to induce clan control.

Firms in cluster 1 exhibit slightly better than average profitability, but low asset turnover. Clan control can be effective in organisations where output or behaviour cannot be accurately measured and controlled, instead ritualised ceremonial forms of control are utilised (Ouchi,

1979). In such organisations, individuals are reminded of organisational and personal goals although their achievement is not always measurable. This may lead to low efficiency measured as asset turnover, when individuals are empowered to accomplish their tasks in various ways. Low organisational growth (measured as growth in personnel) in cluster 1 also suggests clan control as cultural controls have been shown to intensify during organisational decline (Harrison and Carroll, 1991).

#### *4.2 Cluster 2: Adhocracy control*

Cluster 2 groups 85 cases (27% of the total sample). Firms in cluster 2 can be characterised as agile. Small organisations with a small TMT suggest flat and adaptive organisation structures that are flexible and adaptive to changes in the environment (Villalba, 2006). Background properties of the TMT in this cluster also suggest growth and agility as characteristics for these organisations suggestive of adhocracy control. Cluster 2 has the highest share of top managers with output and throughput functional backgrounds. Output functional backgrounds have been linked with increased environmental scanning by the TMT in search for growth opportunities (Cho, 2006), while throughput functional backgrounds have been shown to have a positive effect on firm performance and innovation (Wang et al., 2015). Interestingly, cluster 2 TMTs have almost no members with peripheral functional backgrounds. These managers are not involved with the firm's core activities and might not improve adaptability, creativity, and agility these organisations value (Hartnell et al., 2011). Cluster 2 TMTs are the youngest and shortest tenured supporting a view of agility and innovation as increasing age has been linked with risk avoidance (Wiersema and Bantel, 1992) and increasing tenure with less flexibility and environmental scanning (Abebe, 2010; Hartnell et al., 2011).

Growth, innovation, research, and development characterise the firms in cluster 2. These organisations are highly innovative reflected in their high innovation intensity and show high growth in personnel. Adhocracies have been characterised as seeking growth through innovation and research (Quinn and Rohrbaugh, 1983). Also, adhocracies do not only seek growth per se, they also strive to acquire resources suggested by the growth in personnel, a highly valued resource (O'Neill and Quinn, 1993).

### *4.3 Cluster 3: Market control*

The largest cluster 3 holds 113 cases (36% of the total sample). Firms in cluster 3 have the second largest TMT, but second smallest organisation. The TMT is characterised by a large share of managers with general management backgrounds. This suggests these firms rely on governance competencies the managers have picked up during their careers (Biemann and Wolf, 2009). Compared to the other clusters, the firm and team tenures are short indicating a TMT with more willingness to change or initiate new strategies (Wiersema and Bantel, 1992). These attributes are valued by firms exerting market control and displaying directive and goal-oriented leadership (Hartnell et al., 2011; Zammuto and O'Connor, 1992). Firms in cluster 3 also display a higher share of top management with output functional backgrounds than cluster 4. Marketing, sales, and R&D are important functions for market control, which stress customer focus and competitor information as effectiveness measures (Hartnell et al., 2011).

### *4.4 Cluster 4: Hierarchy control*

Cluster 4 groups 46 cases (15% of the total sample). Firms in cluster 4 are large and their TMTs are larger than in the other clusters. Organisations tend to become more bureaucratic and hierarchical as their size increases suggesting the use of hierarchy controls within these firms (Baliga and Jaeger, 1984; Mintzberg, 1996). The top management of cluster 4 has predominantly a general management background and long firm tenure suggesting these firms value stability and control demonstrated by long tenured managers having ascended the organisation in general management positions and gaining experience needed to control large organisations (Biemann and Wolf, 2009). The emphasis on internal control and coordination could also be seen in the presence of peripheral functional background expertise and the absence of outward scanning managers with output functional backgrounds.

Cluster 4 is also characterised by high a profit margin suggesting the effective use of the firm's assets (Fairfield and Yohn, 2001). Hierarchies in the CVF favour efficiency, control, and stability effectiveness criteria (Cameron and Lavine, 2006; Quinn and Rohrbaugh, 1983).

## 5 Concluding discussion

The overall MCS type in organisations is a key element in understanding why organisations behave the way they do. The overall MCS type implies what forms of management controls are used to influence the behaviour of individuals and groups in the direction of the organisation's objectives and goals. The top management influences the organisation type and the management controls used within the organisation, which can be identified from distinctive organisation and TMT effectiveness measures. Although the literature proposes several typologies for overall MCSs to be observed at the organizational level, there has been little research on organisation or firm level MCS types. This study contributes to the MCS literature by advancing the understanding of MCS types through exploring and identifying firm level MCS types.

The present study makes several contributions to the MCS literature. It identified four distinct MCS types in the sample firms using publicly available data on top management demographic properties and financial performance. The top management is instrumental in moulding the management accounting and organizational control systems used in their organisation. The upper echelons theory (Hambrick and Mason, 1984) asserts the demographic properties of the TMT can be used as proxies for their cognitive settings making it possible to predict their strategic actions. As a result, TMT demographic properties reflect the overall MCS type of organisations. According to the CVF (Quinn and Rohrbaugh, 1983), the different organisation and control types within the framework emphasize distinctive effectiveness criteria or measures to assess organisation performance. This study used the distinctive organisation and TMT properties to identify the four organisation MCS types. The identified four groups were empirically supported by the applied cluster analysis stopping rule and conceptually supported by interpretation of the clusters based on the CVF and extant MCS typologies (Ouchi, 1979; Quinn and Rohrbaugh, 1983; Speklé, 2001; Whitley, 1999).

In their study on organisation types, Tsui et al. (2006) also determined a four-cluster solution as the optimal and fitting the four CVF organisation types and the clan, market, and bureaucracy MCS types of Ouchi (1979). More recently, Bedford and Malmi (2015) explored configurations of control and how different management controls combine as a package. They identified five combinations of controls and discovered they resemble ideal MCS types found in the extant

literature. Consistent with these survey studies, this research identified four MCS types using publicly available accounting data instead. The four groups in this study showed distinct organisational and managerial properties portraying the types of management controls in place typical for each organisation. These findings extend our understanding of ideal MCS types and the conceptualisation of the overall MCS within the literature on the contingency theory of management accounting and control (Otley, 2016).

The study also identified organisation and top management attributes that could be used in future organisational level studies on overall MCSs. The identified attributes proxied the underlying effectiveness criteria and behaviours of the organisations indicating the MCS types in place. The Clan cluster exhibited empowerment in achieving goals with high profitability and low asset turnover emphasizing the results over the means. The clan MCS type also showed propensity towards teamwork, participation, and human resource development by employing a large TMT with diverse functional backgrounds and long tenures. Bedford and Malmi (2015) found their hybrid control displayed similar properties as participation, delegation, and interaction, while Tsui et al. (2006) found clan organisations to be internally integrative and adaptive. Organisation climate and culture research has found clan or human relations organisations exhibit similar attributes as participation, welfare, training, and effort towards mutual goals (Patterson et al., 2005).

The adhocracy type firms are characterised by agility, growth, and high innovation intensity. Tendency towards agility and innovation also appear in the TMT properties as small young TMTs with a high number of managers with output functional backgrounds and short tenures pointing towards active environmental scanning and urge to change. This finding is supported by earlier research showing that adaptive organisations are aware of their environment and anticipate possible changes therein and are ready to change if needed (Costanza et al., 2016). These organisations have been shown to actively develop capabilities and gather resources to sustain change (Costanza et al., 2016). Similar properties were also identified by Bedford and Malmi (2015) in their devolved control which they noted resembled an adhocracy.

Goal orientation and willingness to change characterise firms in the market cluster. The fairly large TMTs have a high share of managers with general management backgrounds. These firms

rely on competent governance from their top management. At the same time the TMTs also show willingness to change or initiate new strategies suggested by their low age and short tenures. Previous studies have found TMTs with lower age and shorter tenures to initiate strategic change in their organisations more often than older and longer tenured TMTs (Wiersema and Bantel, 1992). Goal oriented market control also characterises Bedford and Malmi's (2015) results control type. Market type organisations have also been found to emphasise external customer orientation (Tsui et al., 2006).

Large size, effective use of assets, and high productivity are characteristic for the hierarchy cluster firms. Efficiency, control, and stability are sustained by top management with general management experience, long firm and team tenures. Organisations structured as hierarchies have been shown to be efficient when performing routine tasks based on authority and expertise concentrated at higher levels of the organisation (Adler, 2001). Bedford and Malmi (2015) identified simple and action control types both stressing hierarchies, centralised authority, and restricted autonomy as their control mechanisms. Tsui et al. (2006) also noted a hierarchy organisation type utilising rules, policies, and formal procedures.

As a methodological contribution this study demonstrated a new possibility for theory-based empirical research on MCSs. A theory-based model was used to build linkages between organisation and TMT demographic properties and overall MCS types of organisations. The empirical study validated the use of publicly available accounting and TMT data of the firms as proxies for overall MCS type. Extant MCS research has used survey questionnaires as their predominant method (Otley, 2016). Although adequate attention has been given to the development and testing of the survey instrument, the data can still be biased and contain noise (Bedford et al., 2016). This study used publicly available audited data and did not rely on the subjective assessment of managers often used in surveys. The data used in this study is more objective than the data from surveys but bears some limitations as well. Survey and case study methodologies are still needed in making detailed or rich observations of the MSCs, but this study sets forth a new construct to measure organizational level MCSs.

Although the results provide new information on organisation level MCS types, there are limitations to this study. First, cluster analysis can be criticised as being too effective and always

producing clusters, even though there might not be any logical basis for the result. The cluster solution must be theoretically supported to bear any logical meaning. The selected cluster solution results can be further confirmed by using stopping rules, but cluster analysis lacks the means to test the significance of presented solution. Although the clustering using different seed points suggests the cluster solution is very stable, the result should not be taken as conclusive support for the four MCS types. Further research is needed to verify the number of MCS types and clusters, as there is support for several configurations of MCS types in the extant literature.

While considerable effort was made to get a generalisable sample, the data used may have biases. Although the sample consisted of firms from six industries and multiple MCS types were present in each industry, the data was limited to a single country. Also, the limited size of the sample might affect the cluster solution. Cluster analysis does not set strict requirements for sample size, but each cluster should have a sufficient number of firms to be representative and distinguish small groups from outliers. Since the study used a single country sample, there is a need to empirically explore MCS types in cross-cultural settings and with larger and more recent samples. Despite these limitations, the present study has provided additional evidence with respect to organisation level MCS types and how top management seeks to control their organisations.

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**Table I** Comparison of MCS typologies and the competing value framework (Hartnell et al., 2011; Lebas and Weigenstein, 1986; Ouchi, 1979; Quinn and Rohrbaugh, 1983; Speklé, 2001; Whitley, 1999)

Ouchi	Lebas and Weigenstein	Whitley	Speklé	CVF
TCE approach	TCE approach	Comparative sociology approach	TCE approach	
<i>Market mechanisms</i> Prices and market mechanisms	<i>Market approach</i> External market forces control behaviour	<i>Output-based control systems</i> Reliance on performance measures to control activities	<i>Market control</i> Control based on competition  <i>Arm's length control</i> Quasi-independent control of outcomes	<i>Market</i> Control is achieved with clear objectives and achievement-based rewards
<i>Bureaucracy mechanisms</i> Specified rules of behaviour and process	<i>Rules approach</i> Externally imposed procedures and output controls	<i>Bureaucratic control systems</i> High level of formalisation with written rules and procedures	<i>Machine control</i> Administrative control of behaviour or pre-set goals	<i>Hierarchy</i> Clear roles, formal rules, and regulations exert control
<i>Clan mechanisms</i> Ritualised, ceremonial forms of control	<i>Culture approach</i> Internalised beliefs and values control behaviour	<i>Patriarchal control systems</i> Direct supervision and personal contacts in monitoring and control  <i>Delegated control systems</i> Autonomous groups and units control performance	<i>Boundary control</i> Administrative control using interdictions or unaccepted behaviour  <i>Exploratory control</i> Administrative control through emerging insights that accrue and are spread	<i>Clan</i> Affiliation, reliance, and participation control behaviour  <i>Adhocracy</i> Grasping the importance and impact of the task drives control

**Table II** Summary of the TMT and organisation constructs

Construct	Empirical evidence			
	Clan	Adhocracy	Market	Hierarchy
<i>Clustering constructs</i>				
TMT size		Small <sup>f</sup>		
Firm size		Small <sup>c</sup>		Large <sup>b</sup>
Output functional background		High <sup>i, n</sup>	High <sup>i</sup>	
Throughput functional background	High <sup>k</sup>	High <sup>m</sup>		
Peripheral functional background	High <sup>i</sup>		High <sup>g, k</sup>	High <sup>g, k</sup>
General management background			High <sup>j</sup>	High <sup>j</sup>
TMT age		Low <sup>i, n</sup>		High <sup>i</sup>
Firm tenure	Long <sup>b</sup>	Short <sup>i</sup>	Short <sup>a, i</sup>	Long <sup>k</sup>
Team tenure	Long <sup>i</sup>		Short <sup>i</sup>	
<i>Validation constructs</i>				
Profit margin				High <sup>e, i</sup>
Asset turnover			High <sup>e, 1</sup>	
Personnel growth	Low <sup>k, 1</sup>	High <sup>h</sup>		
R&D expenditure of sales	Low <sup>c</sup>	High <sup>n</sup>	High <sup>c</sup>	Low <sup>n</sup>
Educational background diversity	High <sup>b, i</sup>		High <sup>d</sup>	Low <sup>c</sup>

<sup>a</sup> Abebe, 2010; <sup>b</sup> Baliga and Jaeger, 1984; <sup>c</sup> Cameron and Lavine, 2006; <sup>d</sup> Certo et al., 2006; <sup>e</sup> Cooper and Quinn, 1993; <sup>f</sup> Haleblan and Finkelstein, 1993; <sup>g</sup> Hambrick and Mason, 1984; <sup>h</sup> Harrison and Carroll, 1991; <sup>i</sup> Hartnell et al., 2011; <sup>j</sup> Koch et al., 2017; <sup>k</sup> O'Neill and Quinn, 1993; <sup>1</sup> Quinn and Rohrbaugh, 1983; <sup>m</sup> Wang et al., 2015; <sup>n</sup> Zammuto and O'Connor, 1992

**Table III** Demographic data

	<b>n</b>
Panel A. Industry classification	
Basic Materials	7
Consumer Goods	13
Consumer Services	10
Industrials	37
Technology	15
Telecommunications	1
Total	83
Panel B. Firm size (personnel)	
0 - 250	6
251 - 500	13
501 – 1,000	17
1,001 – 5,000	21
5,001 – 10,000	13
10,001 -	13
Total	83



**Table IV** Descriptive statistics and Pearson correlations (n = 318)

<b>Variable</b>	<b>Mean</b>	<b>SD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1. TMT size, persons	7.39	2.53	1.00								
2. Firm size, persons	5,318	7,613	0.24**	1.00							
3. Output functional background, %	21.41	17.36	0.05	-0.34**	1.00						
4. Throughput functional background, %	25.25	15.52	-0.32**	-0.18**	-0.00	1.00					
5. Peripheral functional background, %	15.95	13.74	0.21**	0.12*	-0.31**	-0.34**	1.00				
6. General management background, %	37.36	20.95	0.05	0.34**	-0.63**	-0.52**	-0.15**	1.00			
7. TMT age, yr	47.49	3.51	0.05	0.33**	-0.24**	-0.14	0.10	0.23**	1.00		
8. Firm tenure, yr	9.17	4.62	0.22**	0.44**	-0.17**	-0.02	0.09	0.10	0.52**	1.00	
9. Team tenure, yr	3.92	2.28	-0.02	-0.03	0.07	0.14*	0.08	-0.21**	0.33**	0.49**	1.00

\* p &lt; .05, \*\* p &lt; .01

**Table V** Results of the K-means clustering

Cluster	1	2	3	4	ANOVA		MCP
	Clan	Adhocracy	Market	Hierarchy	F-Stat <sup>a</sup>	Sig.	Games-Howell <sup>b</sup>
TMT size, persons	7.69	6.04	7.89	8.20	17.13	0.000	1.3.4>2
Firm size, persons	4,160	1,047	3,619	19,246	77.04	0.000	4>1.3>2
Output functional background, %	25.86	33.95	15.04	6.73	52.11	0.000	1.2>3>4
Throughput functional background, %	27.78	38.04	16.64	18.72	45.29	0.000	2>1>3.4
Peripheral functional background, %	22.67	6.37	19.40	14.42	30.20	0.000	1.3*>4*>2
General management background, %	23.69	21.64	48.92	60.13	127.47	0.000	4>3>1.2
TMT age, yr	49.11	45.03	47.13	50.31	35.41	0.000	4*>1*>3>2
Firm tenure, yr	12.90	5.96	7.07	14.28	96.31	0.000	1.4>3>2
Team tenure, yr	6.64	3.25	2.67	3.89	60.66	0.000	1>2.4>3
Cases	74	85	113	46			
%	23	27	36	14			

<sup>a</sup> Welch F-ratio.

<sup>b</sup> Pairs indicated with asterisk (\*) are significant at the .10 level. all others at the .05 or better.

**Table VI** Comparison and validation of clusters

Cluster	1	2	3	4	ANOVA		MCP
	Clan	Adhocracy	Market	Hierarchy	F-Stat <sup>a</sup>	Sig.	Games-Howell <sup>b</sup>
Profit margin, %	8.56	4.73	3.90	6.82	4.08	0.008	1>4>3
Asset turnover	1.12	1.33	1.15	1.28	3.98	0.009	2>1,3
Personnel growth, %	0.67	3.92	3.63	0.34	1.39	0.248	
R&D expenditure of sales, %	1.90	4.55	3.37	1.00	12.42	0.000	2,3>1,4
Education Background diversity	0.69	0.67	0.64	0.60	4.26	0.006	1,2>4

<sup>a</sup> Welch F-ratio.

<sup>b</sup> Significant at the .05 level.

**Fig. 1** Competing values framework (Adapted from Cameron and Lavine, 2006; Quinn and Rohrbaugh, 1983)

