

## **The Use of Planning and Control Practices in SMEs and the Relationship with Company Performance**

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July 2002

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The authors wish to thank the participants of the following conferences and workshops for their useful comments and suggestions on earlier versions of this paper: Annual Conference of the European Accounting Association 2000, Munich; RENT Conference 2000, Prague; Workshop on Accounting, KU Leuven 2001.

Type of article: article

Topic: planning, control and performance in SMEs

### **Abstract**

This paper presents the results of empirical research on the use of management accounting systems in small and medium sized enterprises (SMEs) and the relationship with company performance. The results show that the use of planning and control methods differ significantly according to the size and industry of the firm. Successful companies seem to have more formal long-term plans. While the presence as such of a short-term plan does not appear to be significantly related to firm performance, significant differences appeared regarding the kind of information used and gathered in the preparation of these plans. A longitudinal analysis based on cluster analysis shows that the relation between the use of planning and control practices and performance is not exclusively unidirectional but can also be bi-directional. Finally, weak financial performance drives planning and control in SMEs.

## ***Introduction***

Planning practices of small and medium sized enterprises (SMEs) have been the subject of analysis in many empirical studies. The majority of these studies analyse the topic using a contingency based approach. Planning practices have been examined in relation to several firm characteristics. These studies deal with strategic long-term planning, short-term planning practices or a combination of both. Besides analysing planning practices, other studies focus on planning effectiveness by studying the relationship between planning practices and firm performance. Most of these studies assume an a-priori unidirectional causality between planning and performance. In particular, planning is put forward as a factor contributing to business success (Lussier and Pfeiffer 2001). However, empirical evidence with regard to this relationship is conflicting (Boyd 1991; Swenk and Shrader 1993; Lyles et al. 1993; Capon, Farley and Hulbert 1994; Rue and Ibrahim 1998). Compared with planning practices, fewer studies have focused on the use of control practices in SMEs.

The purpose of this paper is to examine the use of management accounting systems (MAS) in SMEs and the relationship with company performance. It extends prior empirical research in the following ways. First, through a survey and several in depth case studies, we investigate not only long and short-term planning practices of SMEs but also management control practices. Second, besides analyzing the relationship of each of these MAS elements individually on firm performance, the combined use of planning and control methods on firm performance is also studied with the technique of cluster analysis. Data on firm performance were obtained from the annual accounts of the companies. This avoids a bias which might be introduced in the study if one relies on self-evaluation by the

respondent of the performance of its company. Further by mailing the survey to two distinct populations with regard to company performance namely successful firms (high return on assets for three consecutive years) and firms in distress (negative return on assets for three consecutive years) we are able to introduce a high level of variability into the item company performance. Also Perry (2001) used two distinct populations (failed and non-failed firms) to study the practices of written business plans. As the matching group in Perry's research consists of non-failed firms with no further specification on the level of performance, we might state that our group of successful firms does not just contain non-failed firms but includes well performing firms. Finally, the relation between MAS practices and firm performance is addressed from a longitudinal perspective as suggested in the literature (Schwenk and Schrader 1993). By considering performance data of several consecutive years, this suggestion is taken into account.

The results of the 124 responding companies show that the use of planning and control methods differ significantly according to the size of the firm and very often also according to the industry. Regarding the relationship between the individual elements of the MAS applied in the company and firm performance, the results indicate that not the presence as such of a long-term or short-term plan was beneficial for firm performance but rather the kind of information  used and gathered in the preparation of these plans. The longitudinal analysis based on a cluster analysis between the use of MAS and firm performance suggests that the relation between the use of planning and control practices and performance is not exclusively unidirectional but can be bidirectional in certain circumstances. The results reveal that company performance as such can be regarded as a moderating variable that determines the use of planning and control methods or MAS.

Within firms in distress the weak financial situation “drives” the use of planning and control systems.

The remainder of this paper is organised as follows. First, the research questions will be formulated. Second, the research methodology is described. Third, the statistical results obtained from the survey data are discussed. Fourth, the results of the cluster analysis combining the survey data with firm performance from a longitudinal perspective are presented. Finally, conclusions are drawn.

### ***Research Questions***

The focus of this study is on the relationship between the use of MAS and the performance of a company. As a result of subdividing the research population according to different size and industry criteria, we are able to test size and industry-effects on the use of MAS as well. Studies examining the relationship between planning practices and the size of a company have yielded unambiguous results. Large companies tend to make more use of planning (Robinson and Pearce 1984; Schrader, Mulford and Blackburn 1989; Risseeuw and Masurel 1994). Similarly, large companies are to be associated with a higher level of planning or management accounting sophistication (Merchant 1985). While numerous studies exist on planning and company size, less empirical studies focus on the use of control methods and company dimension. The following research question relates to this issue:

*RQ<sub>1</sub>: Does the use of MAS differ according to the dimension of the enterprise?*

This research question serves on the one hand as a means of control to corroborate the results of previous studies with respect to the relationship between the use of planning and company size. On the other hand, it extends prior research by analyzing the relationship between the use of control methods and company size more explicitly.

With regard to industry differences, we have divided our population of respondents into industrial firms and commercial firms. It is questioned to what extent the use of planning and control systems differs significantly between industrial firms and commercial firms. The following research question relates to this issue:

*RQ<sub>2</sub>: Are MAS applied differently in commercial firms versus industrial firms?*

For the last three decades the relationship between planning and firm performance has been the subject of numerous empirical studies. While some studies have found significant benefits from planning, others have found no relationship, or even small negative effects. With regard to the relationship between planning and performance, Rue and Ibrahim (1998) distinguish two streams of research. First, studies on the relationship between the planning process and performance. Secondly, studies on the relationship between the presence and the contents of the plan and performance. Our study is to be situated in the second group. Studies on the relationship between the presence of a plan and performance have yielded mixed results. Empirical evidence has been provided on a positive correlation between operational planning and performance (Robinson 1986; Shrader, Mulford and Blackburn 1989). In contrast to operational planning, strategic planning appears to be negatively correlated with performance (Robinson and Pearce 1983;

Robinson 1986). Other studies did not find any significant correlation between planning and performance (Baker, Addams and Davis 1993) or only weak evidence (Boyd 1991). Capon, Farley and Hulbert (1994) argued that “strategic planning can improve performance, but is not a necessary condition”. The results of studies on the degree of formalization of planning and performance also appear to be ambiguous. While some studies do not report a significant correlation (Ackelsberg and Arlow 1985; Cragg and King 1988), other studies did provide evidence of a positive correlation between the degree of formalization and performance (Bracker and Pearson 1986; Robinson and Pearce 1988; Bracker, Keats and Pearson 1988; Lyles et al. 1993; Chaganti and Schneer 1994). It should be noted that in the latter studies the positive correlation is mainly found with growth rates rather than returns. Some studies even found that formalization can be detrimental to profitability (Chaganti and Schneer 1994). As a possible explanation for the mixed results on planning and performance, Rue and Ibrahim (1998) argue that performance may depend more on the content of the plan than on the formality of the planning process. In this context the following research question is put forward:

*RQ<sub>3</sub>: Do successful firms make more use of planning and control methods than non-successful firms?*

Taking into account the appeal in the literature to study the relationship between planning and performance from a longitudinal perspective, company performance data from three consecutive years after the survey have been added to the survey data. This allowed us to

formulate the fourth and last research question on the relationship between the use of MAS and firm performance from a longitudinal perspective:

*RQ<sub>4</sub>: Do firms which make more use of MAS improve their relative performance compared to firms which make less use of MAS?*

## ***Research Design***

### **Survey Contents**

To obtain information on planning and control practices in SMEs a survey was mailed to a large group of SMEs. The survey was also mailed to a group of large enterprises with similar industry and performance characteristics. Subsequently, detailed company case studies were undertaken in order to get information about how the questionnaire was filled out.

The survey started with questions about firm characteristics and firm objectives. With regard to planning, a distinction was made between long-term planning and short-term planning. In particular, questions were included on (a) the presence of different types of plans in the company, (b) the data which are used for the preparation of the plans and (c) the organizational use of the plans. Concerning long-term planning the following different types of long-term plans were listed in the survey: production plan, personnel plan, R&D plan, investment plan and financial plan. With regard to short-term planning the focus was on the type of budgets prepared in the company (for example sales budget, direct labour budget, materials budget) as well as on the type of indicators that are followed up by the company for the purpose of providing input to long-term planning and which kind of data are used for the preparation of budgets (for example historical data, targets or a combination of both). The

survey further included questions on the advantages, disadvantages and the role and the function of the budget in the company. The frequency of changes in planning and control methods was also questioned. Concerning control practices the main aim of the study was to obtain data on the set of financial as well as non-financial performance indicators that were used in the company. In addition, we wanted to investigate whether the control instruments added to the set of management control tools in the 90's (for example benchmarking, scorecards, the use of non-financial performance indicators) have found their way into practice.

Before mailing the survey to the research population, the questionnaire was pre-tested on a sample of five companies. As a result changes in the wording of the questionnaire were made. It took about 30 minutes to fill out the questionnaire. The follow up has been done by a reminder telephone call.

### **Research Population**

In order to choose companies to which the questionnaire would be mailed to, the database of annual published accounts of Belgian companies was used. The survey population was constructed along the following three steps. First, in order to control for the industry variable enterprises from the following industries were chosen: construction, textile, food, metal, wholesale, retail, hotel and restaurants. Second, successful and non-successful companies were selected from the population withheld after the first step. Successful firms were defined as those firms that had obtained a return on assets above 15 percent during three consecutive years (1992,1993,1994). Less successful firms are characterized by a negative return on assets during this period of three years. After these two steps 230 companies with more than 100 employees remain. All these large enterprises received a questionnaire. Large

enterprises have to publish their annual accounts using an extended pre-structured format. SMEs are allowed to publish their annual accounts in abbreviated format, which allows them not to publish their turnover. SMEs are defined as companies that must not have exceeded more than one of the following criteria: annual turnover 4.958.608 EUR, balance sheet total 2.479.304 EUR and average number of employees 50. When two criteria are exceeded or when the number of employees exceeds 100, the company is required to present its annual accounts in the full format and qualifies as a large company. In a third and final step, within the group of enterprises allowed to publish their accounts in abbreviated format, companies of different dimensions were selected. As dimension variable the number of employees employed by a company was chosen. According to the number of employees, three categories of SMEs were created. First of all, a group of very small SMEs (1 - 20 employees), second a group of small SMEs (21 to 50 employees) and third a group of large SMEs (51 to 100 employees). Within that total population, 1400 companies were selected ad random. Two hundred questionnaires were sent to companies in each industry, equally divided over a group of successful firms and a group of non-successful firms. Within each subgroup, companies from the three different dimension groups were chosen. The same criteria were also used for the selection of firms for the company studies, except that the size of the firm was limited to 100 employees.

In total we have obtained 124 usable responses. In order to know whether these results are representative, we have tested for a potential non-response bias. First of all, a trend analysis was performed assuming that firms responding late are characteristic for the non-responding firms. No significant differences in responses and characteristics were found between early and late respondents. The second test for non-response bias that was carried out



was a subsampling test. As after the survey a group of 38 firms were selected for company studies out of the group of non-respondents, they can be considered as a subsample. No significant differences in responses occurred between this subsample and the responding firms.

The profile of the respondents in terms of industry, size and company performance is presented in Table 1 and Table 2. For the statistical analysis, the results of the retail industry and the hotel and restaurant business were grouped together into one category. The results of the food and the textile industry were taken together in the category processing industries.

*- INSERT Table 1 & 2 -*

A further analysis of the profile of respondents shows that there is a significant correlation between the year of establishment of the firm and the number of employees. This implies that in our sample the smallest firms are also the youngest firms. With regard to independence, we find a significant correlation between independence and the number of employees in the sense that the more employees a company has, the less independent it is. So the larger the firm, the more it is likely to be a subsidiary of another company. Further, the industrial companies in our sample are significantly more independent than the commercial companies. This must be kept in mind when analyzing the differences among industries. No significant correlation exists between successfulness and independence or between successfulness and the number of employees.

### **Research Methodology**

In the first stage of the research we perform a univariate analysis between each individual planning method or control method and firm performance. For this purpose *t*-tests

have been used. In the second stage of the research we use cluster analysis to investigate the combined use of MAS and company performance from a longitudinal perspective. To be able to study the relation between the use of planning and control systems and company performance from a longitudinal perspective, we have added to the survey information of the responding companies, the data on the financial performance of the responding companies from the financial years 1995, 1996, and 1997. Gross return on assets and net return on assets were calculated for each company for the financial years 1995, 1996, and 1997. Those two ratios measure to a large extent the performance of the company which results from its business activities and are not influenced by financing activities and extraordinary or exceptional results. The questionnaire was filled out by the companies at the end of 1995. This implies that we have information about the management accounting systems in use in the period 1994 – 1995. As we know from the survey data that management accounting systems are not changed that often, we assume that the majority of the management accounting systems in place in 1995 are still used in 1997.

After analyzing the relationship between one single planning or control element of the company and company performance, we investigated whether we could detect different patterns of fit between the variables planning and control methods and company performance. This approach is called in the contingency literature the “systems approach” (Chenhall 2001). In this respect the technique of cluster analysis was used. Cluster analysis is a more sophisticated technique for determining the way in which variables combine (Aldenderfer and Blashfield 1984; Everitt 1993). For the purpose of this paper we have chosen Ward’s method. Ward’s method has been widely used within the social sciences (Everitt 1993). Cluster analysis has been widely used in prior research on the way in which

accounting techniques, accounting practices and strategic priorities combine (Chenhall and Langfield-Smith 1998).

The financial performance over the years 1995-1997 of the responding companies were added to the survey data in order to detect some patterns of improvement or deterioration of firm performance in relation to the combined use of planning and control methods. In this manner, the longitudinal aspect was introduced in the study.

As cluster variables we have chosen the following constructs: long-term planning, short-term planning, financial planning, financial control, operational control, benchmarking, the use of scorecards and variance analysis. We have assigned for each firm values to these variables according to the number of long-term plans, short-term budgets, financial performance indicators, non-financial performance indicators, variances, benchmarked elements and scorecard aspects used in each company. The cluster variable was always assigned value zero if a company did not prepare or use that particular management accounting element. With regard to long-term planning the maximum value to be obtained was six, as six different long-term plans were listed in the survey: marketing plan, personnel plan, production plan, research and development plan, investment plan and financial plan. The maximum value for the variable short-term planning was nine. The following nine budgets were mentioned in the survey: sales budget, production budget, cash budget, capital budget, total cost budget, materials cost budget, labour budget, indirect variable cost budget and fixed costs budget. For financial planning the maximum value was three, this value was obtained by firms which prepared a projected cash flow, a projected profit and loss account and a projected balance sheet. With regard to financial control and operational control the maximum values which could be obtained were much higher as 32

financial performance indicators and 33 non-financial performance indicators were included in the questionnaire. For the practice of variance analysis the maximum value to be obtained was ten. This maximum value is obtained if a firm uses all of the following variances: sales price, sales volume, materials usage, materials price, labour efficiency, wage rate, variable efficiency, variable expenditure, fixed overhead expenditure, and fixed overhead volume variance. The benchmarking value was assigned to a firm according to the number of benchmarking sources the firm used. The following sources could be indicated on the survey: business publications, professional magazines, customers, suppliers, networks. The variable scorecards was dichotomous (zero or one).

In order to run the cluster analysis, the cluster variables are normalized and the z-scores are used for the interpretation of the results.

A further major element to check before one uses variables for clustering purposes is the correlation between those variables. The correlation matrix, presented in Table 3, shows that there is a strong correlation between the variables short-term planning and financial planning. Hence the variable financial planning will not be used as a cluster variable.

- *INSERT TABLE 3* -

## ***Research Results***

### **Univariate Analysis**

On the basis of the survey data we tested the first three research questions. These three questions approach the use of MAS in an SME in a univariate way. These questions related to the differences in use of planning and control methods according to the size,

industry and performance of the company. The company performance was based on a high return on assets or a negative return on assets in three consecutive years. The first three research questions are tested both on the total sample (SMEs and large companies) and on the subsample of SMEs only. The results can be summarized as follows.

With respect to the first research question, the results show that the use of planning and control methods is indeed different according to the size of the company. In particular, larger companies make more use of planning and control methods. This result is not surprising since it confirms the results of previous research (Risseuw and Masurel 1994; Robinson and Pearce 1984; Shrader, Mulford and Blackburn 1989).

Mixed results are obtained in relation to the second research question dealing with the relationship between the use of MAS and the type of industry. The results are summarized in Table 4 and Table 5.

*- INSERT Table 4 & 5 -*

With regard to planning practices no significant differences were found between commercial companies versus industrial companies for the existence of formal long-term plans and formal short-term budgets (except for those items which are typical for industrial companies like the production budget and inventory turnover of work in process). In both commercial and industrial companies the control function appears to be the most important function of the budget. Significant differences emerged in relation to the kind of information companies collect in order to prepare long-term plans. Commercial companies gather significantly more information on economic indicators, sales data and the relative position of the firm versus the competitors. Studying the budgeting practices, there appears to be no significant difference between industries with regard to the types of budgets which

are prepared (except for the production budget). However, investigation of the use of budgets in the company showed that industrial companies in the total sample use budgets significantly more for price setting, whereas commercial companies use budgets significantly more for determining the sales strategy. Concerning the data used for the preparation of the budget, the results suggest that commercial companies use significantly more market research data than industrial companies for the planning of the turnover<sup>1</sup>.

With regard to control practices the following significant differences are worthwhile to report. First, commercial companies appear to keep significantly more track of individual product profitability data, gross sales margin and net sales margin data than industrial companies. Second, commercial companies appear to adapt their control systems significantly more when competition changes whereas, as expected, industrial companies change their control systems significantly more when production technology changes. Third, the results indicate that commercial companies keep more track of information about the economy, the competition and the sales of the product or service. Finally, the results suggest that two relatively new control elements, namely benchmarking and the use of scorecards have a higher adoption rate within commercial firms. However, it must be kept in mind that there was a correlation between independence and industry. Commercial companies in our sample are less independent. Hence the use of planning and control methods might be imposed on them by the controlling company.

The results of the third and main research question of the survey, dealing with the relationship between the use of MAS and company performance are summarized in Table 6 and Table 7.

*- INSERT Table 6 & 7 -*

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<sup>1</sup> It is noted that these significant differences only occurred in the total sample but not in the subsample.

The most important significant differences between the use of MAS and company performance were found in the area of long-term planning. With regard to the six different long-term plans put forward in the questionnaire (marketing plan, production plan, personnel plan, R&D plan, investment plan and financial plan), significant differences occurred for three of them. Successful companies seem to make more use of long-term investment plans, whereas non-successful firms seem to make more use of long-term production plans and long-term personnel plans. The latter stems probably from the fact that non-successful firms have a more urgent need to keep costs under control or even to reduce costs. With regard to information gathering non-successful companies seem to keep significantly more track of the position of the competitors than successful companies.

For short-term planning methods no significant difference was found in relation to the different budgets which are prepared by successful and non-successful companies. However, the perception on the function of budgeting and advantages of budgeting differed significantly. Unsuccessful firms indicated significantly more that budgets are a means in helping to run the production process in an efficient manner. Investigating the perception on the advantages of budgeting further, we notice that successful firms seem to appreciate ‘the ability to take timely corrective actions’ significantly more than non-successful firms<sup>2</sup>. Further we find a significant difference with regard to the information used for budgeting purposes. Successful companies seem to work more with market information (in particular the opinions of the sales personnel) than with historical data for the preparation of budgets. This means that unsuccessful firms rely more often on historic data for the preparation of the budget. As such they plan in fact for a status quo situation.

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<sup>2</sup> It is noted that this significant difference only occurred in the total sample.

Concerning control practices only two significant differences occurred. Non-successful companies control significantly more the accurateness of financial reports than successful firms. Further we observe that non-successful firms indicate significantly more the introduction of new software as reason for a change in the control system.

In sum, the results on the individual planning and control items of the survey data show that the larger the firm, the more formal planning and control systems are used. Commercial companies appear to make overall more use of formal planning and control methods. Analyzing the differences with regard to the successfulness of the firm, the results suggest that especially long-term planning practices are different, that the input data used in the planning process are different and that the perception of budgets as being a tool for taking corrective actions and for controlling the efficiency of the production process are different. With regard to control practices no significant differences were found.

### **Cluster Analysis**

After the univariate analysis between a single planning or control item and company performance, the combined use of these practices and the relation with company performance is investigated with cluster analysis. The results of the cluster analysis presented below relate to the entire sample<sup>3</sup>.

On the basis of the agglomeration coefficient and the analysis of the dendrogram, presented in Figure 1, a five cluster solution was selected. Each cluster can be characterized by the mean z-score of each variable. With regard to the planning and control methods, Table 8 illustrates the mean standardized ratio for each of the individual clusters.

- *INSERT Figure 1 & Table 8* -

To visualize the position of each cluster vis-à-vis the use of a certain planning or control method, ranks are assigned to the clusters. If companies in a cluster make on average the most use of a method then the cluster is assigned value one. In the opposite case when firms in the cluster make the least use of a method, a value five is assigned. Table 9 presents these ranks. Adding together the total of the obtained ranks provides an insight on how intensively planning and control methods are used.

- *INSERT Table 9* -

Observing the obtained totals, it appears that there are two clusters namely two and five which make relatively less use of planning and control methods vis-à-vis the other three clusters. Cluster three makes most use of planning and control methods, followed closely by cluster one and four. With regard to the total score obtained cluster one and four look similar, but in cluster one the emphasis is more on planning methods, whereas cluster four is more control-oriented.

In order to judge the improvement or deterioration in relative performance of a cluster versus the performance of other clusters, the main average ratio of gross return on assets and net return on assets are calculated. The mean ratios are presented in Table 10 for the financial years 1995 and 1997.

- *INSERT Table 10* -

When ranking the clusters, we can detect patterns of changes in the relative performance of one cluster versus the others. The cluster ranks with respect to relative financial performance are presented in Table 11. It appears that the relative position of

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<sup>3</sup> For the subsample of SMEs only, the clusteranalysis provided similar results.

cluster five deteriorates drastically. Cluster three has a status quo position, while all the other clusters make a slight improvement in relative position.

- *INSERT Table 11* -

If we compare the total scores with respect to the use of planning- and control methods and the changes in relative performance, the following patterns emerge. The most drastic deterioration in financial position is encountered by cluster five. This cluster has also obtained the highest score in Table 9, which means less use of planning and control methods vis-à-vis the other clusters. This would suggest that there is a positive relationship between the use of planning and control methods and financial performance.

However, cluster two shows an opposite pattern of cluster five. While the firms in both clusters use less planning and control methods compared to the firms in the other three clusters, it appears that the change in relative position with regard to firm performance evolves in opposite directions. The financial performance of companies in cluster five evolves from strong firm performance to extremely weak firm performance. In contrast, the firms in cluster two improve both their absolute and relative financial performance. Focusing on the company characteristics of the firms in cluster two versus cluster five, it is noted that the firms in cluster two are significantly larger and more independent. The fact that the firms in cluster two are more mature, make the obtained results consistent with the results of Moores and Yuen (2001), which find empirical evidence for the fact that MAS formality across organizational life-cycle stages will increase from birth to growth, relax at maturity, and increase slightly at revival. The fact that firms in cluster two are more independent could reveal that they are typically family businesses<sup>4</sup>. Hence the findings are consistent with other empirical studies (Chaganti and Schneer 1994; Westhead 1997)

showing that family businesses make less use of formal planning and control methods than non-family firms. Further, cluster two contains relatively more industrial firms which make less use of planning and control practices. This finding might imply that planning and control methods are perhaps more useful in commercial companies to enhance a company's profitability.

An analysis of cluster three suggests that when the financial situation of the company is threatened planning and control practices are present. Firms in this cluster have the weakest firm performance vis-à-vis the firms in the other clusters and they make most use of planning and control methods. This result suggests that the relationship between planning and performance can be bi-directional, while prior research generally assumed a unidirectional causality. Within stressed firms planning will be increased because of the bad results. Not only will  $X_1$  (in our case MAS systems) affect  $X_2$  (in our case company performance), but in some situations  $X_2$  can affect  $X_1$  (Shields and Luft 2001 ). The results imply that in studying MAS practices company performance should be considered as a contingent variable. The direction of the relationship between the use of MAS and firm performance reverses when the performance of the firm is very weak.

## ***Conclusions***



The empirical research presented in this paper on the use of MAS in SMEs and the relationship with company performance allows us to put forward the following observations. The results of the survey with regard to the contingency variables size, industry and success revealed that dimension clearly has an impact on the use of planning and control systems. The larger the company, the more these systems are used. We also noticed significant differences

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<sup>4</sup> In contrast, in the annual accounts of subsidiaries profit can be decreased through transfer pricing.

with regard to the industry variable. Commercial companies use significantly more benchmarking and scorecards in the area of control. With regard to planning commercial companies seem to be more outward looking than industrial firms, since they collect more information from the market. Focusing on the contingency variable success, it appears that successful companies make more use of long-term planning. The presence of a short-term plan does not appear to be related to firm performance. However, successful companies make significantly more use of market data for planning purposes instead of historical data. With regard to control practices, no relevant significant differences appeared.

Studying the combined use of planning and control methods and the relationship with firm performance from a longitudinal perspective resulted in some additional insights. First of all, the relation between planning and control methods and firm performance appears to be not only unidirectional but also bi-directional. While prior research generally assumed a unidirectional causality, our cluster results suggest that the relationship between planning and performance can be bi-directional. When firms are less successful or when they become stressed, the use of planning and control practices seems to become necessary for survival. Second, it appears that intervening variables influence the relationship between planning and control practices and firm performance. The size and industry of the firm stepped out in the cluster analysis as intervening variables. These results imply that for further research purposes the relationship between MAS systems and performance should be studied with a methodology controlling for these intervening variables. Further the relation between the use of MAS systems and performance should not be studied exclusively from a unidirectional causal relation point of view.

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**Table 1**  
**Distribution of All Respondent Companies by Dimension and Successfulness**

	<b>Less than 20 Employees</b>	<b>21 -50 Employees</b>	<b>51-100 Employees</b>	<b>More than 100 Employees</b>
Non-successful	15 (39,5) <sup>a</sup>	10 (38,5)	13 (43,3)	18 (60,0)
Successful	23 (60,5)	16 (61,5)	17 (56,7)	12 (40,0)
Total	38	26	30	30

<sup>a</sup> Column percentages are given between brackets

**Table 2**  
**Distribution of All Respondent Companies by Industry and Dimension**

	<b>Retail, Hotel &amp; Restaurants</b>	<b>Wholesale</b>	<b>Food &amp; Textile</b>	<b>Construction</b>	<b>Metal</b>	<b>Total</b>
Less than 100 employees	22	16	21	14	21	94
More than 100 employees	3	10	9	3	5	30

**Table 3**  
**Pearson Correlation Matrix**

	<b>LTP</b>	<b>STP</b>	<b>FIP</b>	<b>FIC</b>	<b>VAR</b>	<b>OPC</b>	<b>BENCH</b>	<b>SCORE</b>
LTP	1							
STP	0.584 <sup>***</sup>	1						
FIP	0.574 <sup>***</sup>	0.768 <sup>***</sup>	1					
FIC	0.264 <sup>***</sup>	0.392 <sup>***</sup>	0.361 <sup>***</sup>	1				
VAR	0.277 <sup>***</sup>	0.343 <sup>***</sup>	0.287 <sup>***</sup>	0.205 <sup>**</sup>	1			
OPC	0.255 <sup>***</sup>	0.288 <sup>***</sup>	0.308 <sup>***</sup>	0.343 <sup>***</sup>	0.206 <sup>**</sup>	1		
BENCH	0.143	0.000	0.018	0.267 <sup>***</sup>	0.076	0.087	1	
SCORE	0.235 <sup>***</sup>	0.364 <sup>***</sup>	0.411 <sup>***</sup>	0.370 <sup>***</sup>	0.085	0.223 <sup>**</sup>	0.134	1

<sup>\*\*\*</sup>  $p < 0.01$    <sup>\*\*</sup>  $p < 0.05$    <sup>\*</sup>  $p < 0.1$

where:

LTP: Long-term planning  
 STP: Short-term planning  
 FIP: Financial planning  
 FIC: Financial control  
 VAR: Variance analysis  
 OPC: Operational control  
 BENCH: Benchmarking  
 SCORE: Scorecard

**Table 4**  
**Significant Differences in Planning- and Control Methods between Commercial versus Industrial Companies for Entire Research Population (Large Firms and SME's)**

<b>Planning and Control Methods</b>		<b>Commercial</b>	<b>Industrial</b>	<b>Total</b>	<i>p</i>
Information gathering					
Economic indicators	Yes	45 (90) <sup>a</sup>	49 (69)	94 (77.7)	0.006
	No	5 (10)	22 (31)	27 (22.3)	
Sales	Yes	49 (99)	63 (86.3)	82 (88.2)	0.025
	No	1 (2)	10 (13.7)	11 (11.8)	
Position versus competitors	Yes	49 (98)	56 (76)	105 (85.4)	0.001
	No	1 (2)	17 (23.3)	18 (14.6)	
Use of budgeting					
Price-setting	Yes	28(77.7)	35 (83.4)	63 (81)	0.046
	No	8 (22.3)	7 (16.6)	15 (19)	
Sales strategy	Yes	33 (89)	38 (90)	71 (90)	0.028
	No	4 (11)	4 (10)	8 (10)	
Market research data	Yes	6 (16.7)	1 (2.5)	7 (9)	0.001
	No	30 (83.3)	39 (97.5)	69 (91)	
Use of financial performance indicators					
Gross profit margin	Yes	41 (82)	40 (57.1)	81 (67.5)	0.004
	No	9 (18)	30 (42.9)	39 (32.5)	
Net sales margin	Yes	23 (46)	15 (21.4)	38 (31.7)	0.004
	No	27 (54)	55 (78.6)	82 (68.3)	
Individual product profit	Yes	31 (62)	21 (30)	52 (43.3)	0.0005
	No	19 (38)	49 (70)	68 (56.7)	
Use of benchmarking	Yes	31 (67.4)	23 (33.3)	54 (47)	0.003
	No	15 (32.6)	46 (66.7)	61 (53)	
Use of scorecards	Yes	29 (70.7)	28 (45.9)	57 (55.9)	0.013
	No	12 (29.3)	33 (54.1)	45 (44.1)	

<sup>a</sup> Column percentages are given between brackets

**Table 5**  
**Significant Differences in Planning- and Control Methods between Commercial versus Industrial Companies for SME Population**

Planning and Control Methods		Commercial	Industrial	Total	<i>p</i>
Information gathering					
Economic indicators	Yes	32 (86.5) <sup>a</sup>	38 (67.9)	70 (75.3)	0.042
	No	5 (13.5)	18 (32.1)	23 (24.7)	
Sales	Yes	36 (98)	46 (82.1)	82 (88.2)	0.027
	No	1 (2)	10 (17.9)	11 (11.8)	
Position versus competitors	Yes	36 (97.3)	41 (73.2)	77 (82.8)	0.003
	No	1 (2.7)	15 (26.8)	16 (17.2)	
Use of financial performance indicators					
Gross profit margin	Yes	31 (83.8)	30 (55.6)	61 (67)	0.005
	No	6 (16.2)	24 (44.4)	30 (33)	
Net sales margin	Yes	16 (43.2)	10 (18.5)	26 (28.6)	0.010
	No	21 (56.8)	44 (81.5)	65 (71.4)	
Individual product profit	Yes	22 (59.5)	16 (29.6)	38 (41.8)	0.005
	No	15 (40.5)	38 (70.4)	53 (58.2)	
Use of benchmarking	Yes	21 (63.6)	16 (30.8)	37 (43.5)	0.003
	No	12 (36.4)	36 (69.2)	48 (56.5)	
Use of scorecards	Yes	19 (65.5)	16 (36.4)	35 (47.9)	0.015
	No	10 (34.5)	28 (63.6)	38 (52.1)	

<sup>a</sup> Column percentages are given between brackets

**Table 6**  
**Significant Differences in Planning- and Control Methods between Successful versus Non-Successful Companies for Entire Research Population (Large Firms and SME's)**

Planning and Control Methods		Non-successful	Successful	Total	<i>p</i>
Personnel plan	Very important	11 (46) <sup>a</sup>	6 (7.1)	17 (33)	0.026
	Less important	13 (54)	22 (79)	35 (67)	
Investment plan	Very important	17 (68)	24 (77)	41 (73)	0.005
	Less important	8 (32)	7 (23)	15 (27)	
Information gathering on the competition	Yes	52 (92.9)	53 (79.1)	105 (85.4)	0.031
	No	4 (7.1)	14 (20.9)	18 (14.6)	
Uses of budgeting Run production process efficiently	Yes	15 (45)	17 (53)	32 (49)	0.019
	No	18 (55)	15 (47)	33 (51)	
Advantages of budgeting Ability to take corrective actions in time	Yes	27 (65.9)	34 (85)	61 (75.3)	0.046
	No	14 (34.1)	6 (15)	20 (24.7)	
Type of data used for preparation budget Use of market data	Yes	19 (48.7)	17 (70.3)	45 (59.2)	0.056
	No	20 (51.3)	11 (29.7)	31 (40.8)	

<sup>a</sup> Column percentages are given between brackets

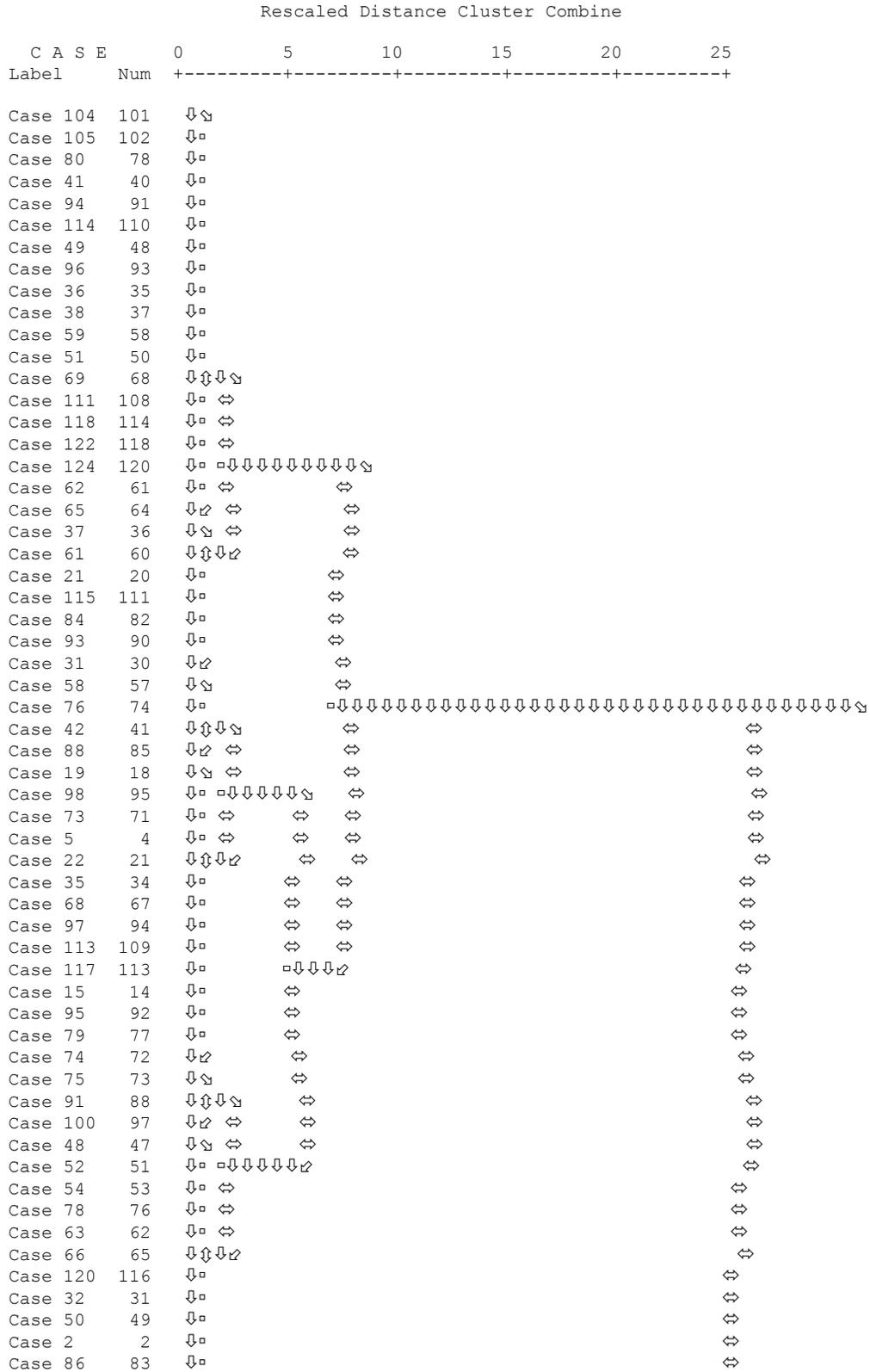
**Table 7**  
**Significant Differences in Planning- and Control Methods between Successful versus Non-Successful Companies for SME Population**

<b>Planning and Control Methods</b>		<b>Non-successful</b>	<b>Successful</b>	<b>Total</b>	<b><i>p</i></b>
Personnel plan	Very important	5 (38) <sup>a</sup>	3 (14)	8 (23)	0.043
	Less important	8 (62)	19 (86)	27 (77)	
Investment plan	Very important	8 (62)	16 (73)	24 (69)	0.009
	Less important	5 (38)	6 (27)	11 (31)	
Production plan	Very important	10 (77)	5 (14)	15 (43)	0.018
	Less important	3 (23)	17 (77)	20 (57)	
Information gathering on the competition	Yes	35 (92.1)	42 (76.4)	77 (82.8)	0.048
	No	3 (7.9)	13 (23.6)	16 (17.2)	
Uses of budgeting					
Run production process efficiently	Yes	11 (58)	10 (43)	21 (50)	0.051
	No	8 (42)	13 (57)	21 (50)	
Type of data used for preparation budget					
Use of market data	Yes	8 (34.8)	17 (63)	25 (50)	0.047
	No	15 (65.2)	10 (37)	25 (50)	

<sup>a</sup> Column percentages are given between brackets

**Figure 1**

**Dendrogram**







**Table 8**  
**Mean Ratios of Clusters with respect to Use of Planning- and Control Techniques**

<b>Planning and Control Techniques</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>	<b>F</b>	<b>p</b>
<i>n</i>	37	37	6	14	26		
Long-term planning	0.82 <sup>a</sup>	-0.64	0.92	0.51	-0.66	29.626	0.000
Short-term planning	0.95	-0.54	1.36	0.25	-0.86	51.333	0.000
Financial control	0.20	0.10	0.77	0.81	-1.06	51.333	0.000
Operational control	0.18	0.15	1.27	0.64	-0.98	16.730	0.000
Benchmarking	-0.20	-0.29	-0.13	2.11	-0.29	36.749	0.000
Scorecards	0.34	0.07	0.10	0.81	-0.90	11.829	0.000
Variance-analysis	0.058	-0.27	3.33	-0.09	-0.33	42.305	0.000

<sup>a</sup>Normalized values

**Table 9**  
**Cluster Ranks with respect to Use of Planning- and Control Techniques**

<b>Planning and Control Techniques</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>
Long-term planning	2	4	1	3	5
Short-term planning	2	4	1	3	5
Financial control	3	4	2	1	5
Operational control	3	4	1	2	5
Benchmarking	3	5	2	1	4
Scorecards	2	4	3	1	5
Variance-analysis	2	4	1	3	5
Total	17	29	11	14	34

**Table 10**  
**Mean Ratios of Clusters with respect to Financial Performance**

<b>Financial Performance</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>
Gross ROA 1995	11.89	16.96	6.35	14.62	18.63
Gross ROA 1997	10.84	20.03	4.27	10.41	5.30
Net ROA 1995	5.46	9.44	-1.28	7.39	9.65
Net ROA 1997	2.73	13.40	0.43	3.92	-3.81

**Table 11**  
**Cluster Ranks with respect to Relative Financial Performance**

	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>
Gross ROA 1995	4	2	5	3	1
Gross ROA 1997	2	1	5	3	4
Net ROA 1995	4	2	5	3	1
Net ROA 1997	3	1	4	2	5