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THE EFFECT OF ENVIRONMENTAL UNCERTAINTY, MANAGEMENT CONTORL SYSTEMS AND STRATEGY ON PERFORMANCE

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ABSTRACT

Contingency theory has been widely used in management accounting research, particularly in study of management control systems. The effectiveness and increased performance of a company have been attempted to explain by investigating environment, management control systems and strategy. The aim of this research is to examine the affect of perceived environmental uncertainty on strategy, management control systems and performance in profit-making service and manufacturing organisations.

Most of the contingency- based studies have been conducted on manufacturing and service industry. Management control systems in service organisations have been examined however, studies have been mainly case studies and the organisations have been non-profit oriented. This study attempts to investigate and compare the contingency relations in profit-oriented service and manufacturing companies.

The results are conducted from 66 responses (response rate 13%). The findings of the study suggest that industry does not make a difference in the contingency relations. The results confirmed the existence of some contingency relations. Organisations which have adopted prospector strategy perceive higher environmental uncertainty. Companies which perceive high environmental uncertainty are likely to use non-financial management control systems. Additionally, there is a positive relationship between non-financial control systems and performance.

Keywords: Contingency theory, performance, service industry

1. INTRODUCTION

The key theme in management accounting research has been to find a match between management control systems, environment and performance and thus, much theoretical and empirical effort has been put on understanding organisation –environment correlation. From the contingency perspective, theoretical formulations have been developed to relate the most suitable match. However, the results have been to some extent fragmentary and conflicting (Dent 1990; Simons 1990).

The past contingency research has been mainly focused on manufacturing industry as it is a major component of world economies (Sharma 2002). Additionally, profit seeking companies such as manufacturing firms are more likely to implement and utilise management control systems. Due to these characteristics, manufacturing industry has been more appealing as a research object. There has been surprisingly little contingency research conducted on service sector and there is a clear paucity of research on how contingency variables affect on performance. Also, comparisons on how contingency relations differ between service and manufacturing industries have not been studied to large extent. The existing studies of management accounting on service sector have primarily focused on non-profit organisations (Sharma 2002).

This study attempts to combine the two types of past research by addressing whether the use of management control systems, strategy and perceived environmental uncertainty affect performance in service and manufacturing industries, furthermore, how strong the causal relationship is will be examined as well and some comparisons between these industries will be provided. The earlier studies reveal that there appears to be some consensus regarding the relationship between information systems used and environment, as companies facing higher environmental uncertainty are more likely to institute accounting systems that assist them to cope with the environmental conditions (Sharma 2002). Additionally, strategy has been linked to reflect operating environment and consequently, companies' management accounting systems are deigned accordingly.

1.1 Purpose of the study and contribution

The design, use and effectiveness of management control systems (MCS) in relation to business strategy and environmental uncertainty has been researched much in accounting literature (Langfield-Smith 1997, Govindarajan and Gupta 1985, Govindarajan 1988). These researches have often been contingency- based. The contingency theory is based an assumption that MCS are designed and used in such a way that increases organisational performance or to achieve the desired outcomes (Rehaul A. 2006).

Earlier studies have concentrated on finding a correlation between management accounting systems (MAS), perceived environmental uncertainty (PEU) and performance (Gordon and Narayanan 1984; Gul 1991; Abgejule 2005) or have attempted to gain further understanding on the effects of strategy on MCS in creating competitive advantage (Govindarajan & Gupta 1985; Simons 1987; Simons 1990). The purpose of this study is to gain further understanding how the contingency variables: strategy, MCS, PEU affect performance and whether the contingency relations differ in service and manufacturing companies.

The theoretical contribution of this research is to provide further understanding of how contingency variables affect performance. This study may provide new knowledge for the current research of the contingency variables and how they differ in service and manufacturing organisations. The distinguishable feature of this study is that companies operating in service and manufacturing industry are examined and comparison is made between the industries. The results can provide empirical contribution by giving further understanding in how performance can be improved in service and manufacturing industries and what combinations of the variables can lead to an improved performance.

The outcome of this research might be beneficial for organisations operating in manufacturing and service industry. Understanding how the contingencies and performance are related and how strong is the correlation and causal relation, is valuable information in a fast changing business environment. Increased performance resulted from a competitive advantage is a distinctive function and valuable resource and therefore, companies want to control it (Henri 2006).

This study could also provide further empirical information for companies of how performance and the contingencies are causally related and how competitive advantage

with the right match of MCS, strategy and PEU may lead to improved performance and higher profitability. A more holistic and comprehensive view might assist managers to build the right organisational settings and improve the match between the contingencies and MCS which may result enhanced performance. The figure below summarises the variables studied. The hypothesis of the study and the construction model which specifies the relationships between the variables are presented later.

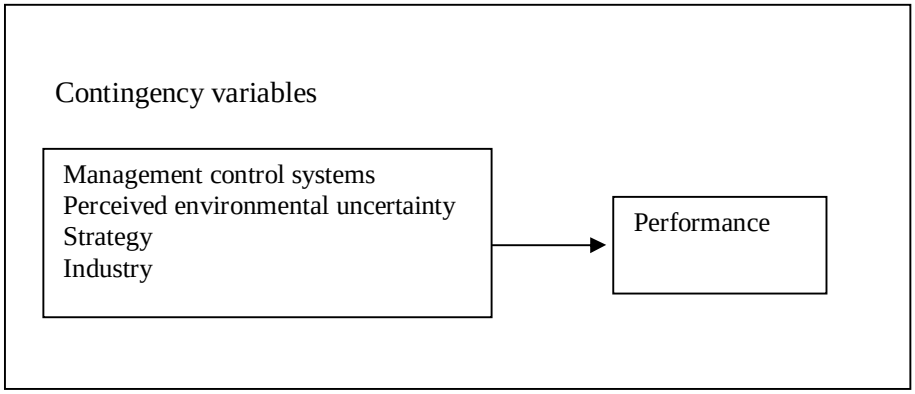

Figure1. Contingency variables of this study.

1.2 The objectives and hypothesis of the study

In summary, the aim of this study is to research the causal relationship between the contingency characteristics and performance. The relationship is examined by employing a survey methodology. Based on the conducted survey, the relationship is examined, conclusion of the strength of the relationship is made and comparisons between the industries are made.

The hypothesis of the study is as follows:

Hypothesis 1 (H1) *Perceived environmental uncertainty has a positive relationship with prospector strategy*

Hypothesis 2 (H2) *Use of strategy has a positive relationship with performance*

Hypothesis 3 (H3) *Strategy has a mediating effect on perceived environmental uncertainty and performance*

Hypothesis 4 (H4) *Perceived environmental uncertainty has a positive relationship with non-financial management control systems*

Hypothesis 5 (H5) *Use of management control systems has a positive relationship with performance*

Hypothesis 6 (H6) *Management control systems has a mediating effect on perceived environmental uncertainty and performance*

Hypothesis 7 (H7) *Perceived environmental uncertainty has a positive relationship with prospector strategy and use of non-financial management control systems to increase performance*

The hypotheses are conducted from previous studies and each hypothesis has a research question. Figure 2 in previous studies chapter presents how the questions and hypothesis are linked.

The relations between the research hypotheses are presented in a form of a construction model. The model is presented in figure 18.

Positive results of the research would indicate that the developed hypotheses are confirmed and the contingency theory is the suitable way to examine the relation of the variables and performance in both industries. The study proves that the results can be generalised to companies regardless of the industry they operate in.

Negative results of the study would reveal that the hypotheses are rejected. The framework is not suitable to examine the relation of the variables and performance. However, negative results would not risk the study being unapproved. The research may provide further evidence for other researchers attempting to examine the causal relationship of the contingency variables and performance.

1.3 Research method and approach of the study

The framework for this study comes from the contingency theory. The theory claims that organisational context (characteristics of the organisation's culture, environment, technology and size) and structure must fit together to ensure an organisation performs

well (Drazin et al. 1985). The design and use of MCS in relation to environment, technology, structure, strategy, size and national culture have been examined for years. However, two contextual variables have gained a lot of attention in the accounting: strategy and perceived environmental uncertainty (Chenhall 2003). Therefore, those variables together with MCS and industry are included in the research. The effect of industry is included in the study due to a lack of conducted research of its effect on performance. Additionally, comparisons between the industries are provided. The amounts of contingency variables are kept in minimum to avoid complexity and keep the survey short to maximise the response rate.

The study is defined to include companies operating service and manufacturing industries in Finland. The service industry includes the following sectors (Tilastokeskus 2007):

- Hotels
- Transport, storage and communication
- Financial intermediation
- Renting of machinery and equipment
- Computer and related activities
- Other business activities: legal, accounting, book-keeping, tax consultancy
- Advertising

The manufacturing industry includes following sectors (Tilastokeskus 2007):

- Manufacture of food products and beverages
- Manufacture of pulp, paper and paper products
- Manufacture of rubber and plastic products
- Manufacture of basic metals
- Manufacture of machinery and equipment
- Manufacture of transport equipment
- Manufacture of textiles and textile products
- Manufacture of wood and wood products

The industry sectors are restricted those mentioned above to gain a better control for the sectors influence on the research variables as recommended by Rehaul A. et al (2006). The research is quantitative in nature and approximately 450 companies are sent a questionnaire through e-mail. The research method of the study is further explained in

chapter 4. Companies included in the study have 50 or more full-time employees. They have existed at least five years and are profit-making organisations. Non-profit organisations are not included in the study as the contingency relations may not function the same in non-profit organisations. Companies with less than 50 employees are discarded due to a risk of lacking organised management accounting systems. The organisations included in the study are drawn from Voitto+ database. Additional information about the companies such as contact details of the management are collected from Inoa company registry. The questionnaire includes questions regarding MCS, strategy, perceived environmental uncertainty and organisational performance. The questionnaire is send to the CEOs in the selected sectors. The results of the research are analysed by using a software program Partial Least Squares.

1.4 Limitations and structure of the study

This study has its limitations and therefore, the results should be viewed critically.

The contingency research argues that different types of environments require different types of strategies (Hambrick 1984: 31). A company must choose a particular strategy to achieve competition advantage and increase performance. Environmental uncertainty is related to particular strategy typologies. For example, companies which have adopted innovative strategy tend to face more environmental uncertainty. The adopted strategy should be supported by appropriate MCS to be optimal and to perform better. Under high perceived environmental uncertainty companies increase the use of management control systems and the use of management accounting systems increase performance when environmental uncertainty is high. Although, prior studies confirm the relations between the contingency variables, it is noteworthy that the variables may only explain the increased performance to a limited extent. This study only examines variables such as perceived environmental uncertainty, strategy, management control systems on performance. Jeremias and Gani (2004) notify that there are other variables for instance size, technology and management style which may have a significant influence on performance. Additionally, due to small sample sizes in prior studies most contingency-based studies do not report statistical power of the study (Chenhall 2003: 156).

This study aims to examine the contingency relationships and compare them between the service and manufacturing industries. An advantage of investigating two different industries is that comparisons can be made. However, the business environment and

cost structure within the industries and even sectors are different and it may be challenging to make generalisations. Additionally, this study consists of companies which employ 50 or over people. Consequently, there are companies which have 50 employees and organisations employing over 4000 people. Such a size difference may cause the controls and strategies used being different even within an industry. Another limitation of the study is the location of the companies. The research only consists of companies which are in the list of Finnish trade register.

The structure of this research is as follows. At the beginning, the prior studies relevant to the research are reviewed. The earlier studies are divided into two categories based on the contingency characteristics. The theoretical framework for the topic is presented and the theory is applied to the research data. The research method is presented and justified and the research process is described. Finally, a summary of the findings are presented, discussion of the results are also provided along with limitations and recommendations for future studies.

2. PREVIOUS STUDIES

In this chapter, the most substantial earlier studies are reviewed. The theoretical framework presented in later is based on the studies examined in this chapter.

The previous studies are divided into four subchapters according to the topic and characteristics of the studies. The contingency variables: strategy, management control systems, perceived environmental uncertainty, performance and industry are combined in such a way that in the first section the effect of environmental uncertainty and strategy on performance is discussed. In the second section, findings of perceived environmental uncertainty, management control systems and performance are examined. The third section focuses on perceived environmental uncertainty, management control systems, strategy and performance. In the last section, the effect of industry on perceived environmental uncertainty, management control systems, strategy and performance is reviewed. The first three sections discuss studies conducted in manufacturing industry and the last section focuses on research finding from the service sector.

The contingency characteristics investigated in this study are based on the previous contingency studies in management accounting. The prior literature suggests that the chosen variables may be important elements affecting performance (Chenhall 2003). This study therefore, examines variables that have been investigated to a great extent in accounting literature. However, there is a lack of research on contingency relations in profit-making service organisations. The research questions of this study linked to the each hypothesis are presented below (See Figure 2). The questions are formed based on the aim of this research.

Research question	Hypothesis
1. Does increase in perceived environmental uncertainty increase the use of strategy?	1. Perceived environmental uncertainty has a positive relationship with prospector strategy
2. Does use of strategy increase performance?	2. Use of prospector strategy has a positive relationship with performance
3. Does perceived environmental uncertainty increase use of strategy and enhance performance in service and manufacturing industries?	3. Prospector strategy has a mediating effect on perceived environmental uncertainty and performance
4. Does increase in perceived environmental uncertainty increase the use of contemporary or traditional management control systems?	4. Perceived environmental uncertainty has a positive relationship with non-financial management control systems
5. Do contemporary or traditional management control systems increase performance?	5. Use of management control systems has a positive relationship with performance
6. Does increase in perceived environmental uncertainty increases the use of management control systems (contemporary or traditional) to enhance performance in service and manufacturing industries?	6. Management control systems has a mediating effect on perceived environmental uncertainty and performance
7. Does perceived environmental uncertainty increase the use of strategy and management control systems to enhance performance in service and manufacturing industries?	7. Perceived environmental uncertainty has a positive relationship with prospector strategy and use of non-financial management control systems to increase performance

Figure 2. Research questions linked to the hypothesis of the study.

The prior studies and the above research questions provide a base for the hypotheses formed later in the study.

2.1 Environmental uncertainty, strategy and performance

Environment is one of the key concepts in understanding organisational behaviour and performance and perceived environmental uncertainty is widely used in accounting

literature. According to Fisher (1994:495) environmental uncertainty can be defined as (1) “lack of information regarding the environmental factors affecting a given decision-making situation”, (2) “not knowing how much the organisation will lose if a specific decision is incorrect”, (3) “the difficulty in assigning probabilities with any degree of certainty as to how environmental factors are going to affect the success or failure of a decision”. Other academics describe it as uncertainty about goals and unpredictability of input and output relations (Thompson 1967; Macintosh 1985). Khandwalla (1977) uses environmental variables such as turbulence, hostility, diversity and complexity to define uncertainty in an environment. Duncan (1972) classifies environments into dynamic and complex categories based on elements of environment that may generate pressure or provide opportunities. Companies can influence the external environment by adopting different strategic orientations. Miller (1988) and Miller and Friesen (1984) claim that strategy has a strong relationship with environment and therefore, environment can and should influence strategy.

An examination of environment and strategy is challenging due to the fact that there is no identical strategic settings (Hambrick and Lei 1985). The relation has been studied in three different ways. Proposers of situation-specific view have mainly conducted case studies in order to understand the settings of an organisation and draw conclusions. The opposite view of the situation-specific claims that there are universal laws of strategy and the settings are therefore the same. The typical and most commonly known strategic classifications are developed by Porter (1980), Snow and Miles (1972) and Gupta and Govindarajan (1984). The third view is the contingency theory, which states that the “appropriateness of different strategies is dependent on the competitive settings of organisations” (Hambrick and Lei 1984: 765). However, others claim that companies can choose strategies (Child 1972). Strategies influence environment by focusing attention to particular niches of an environment and environment encourages particular strategies to be induced through customer needs and competitors’ challenges (Miller 1988). Finding the right match between environment and strategy affects performance by increasing it whereas a poor match between the variables may lead to decreased performance.

There are a variety of strategic typologies in management accounting literature. Miles & Snow (1978) identify four different strategies: prospectors, defenders, analyzers and reactors. Reactors are described to be essentially unstable where as prospectors, defenders and analyzers are stable forms of organisations. Miles & Snow’s typology is based on the speed of change in products and markets (Langfield-Smith 1997).

Prospectors search continuously new market opportunities. They are creators of change and uncertainty to which the competitors must respond. Prospectors emphasise marketing and research and development over production and finance and therefore, maintaining industry leadership in product innovation is considered as important. Defenders do not make heavy investments on products and market development. They have a narrow product range and organisational success comes from factors such as finance, production and engineering. Analyzers combine the strongest elements of defenders and prospectors. (Langfield-Smith 1997).

Porter (1980) identifies three generic strategies: cost-leadership, differentiation and focus. Each of the strategies has a competitive advantage within the industry and it defines the context of actions in an organisation. The implementation of the strategies requires specific resources and skills, supportive organisational arrangements and control systems. Cost-leadership companies aim to be the low-cost producers in the industry and its competitive advantage comes from factors such as economies of scale, superior technology and access to inexpensive raw material prices. Differentiations focus on providing products that are highly valued by customers. These may consist of quality, after-sales service, excellent availability of products and product flexibility. In a focus strategy a company concentrates on a market segment which is poorly served by competitors or the segment has a special need. Their competitive advantage is based either on low-cost or differentiation (Langfield-Smith 1997) (See figure 3).

Study	Identified typology	Features
Miles & Snow (1987)	Defender	Stable environment, limited product range, competes through low cost or high quality, efficiency paramount, centralised structure
	Prospector	Always seeking new product and market opportunities, uncertain environment and flexible structure
	Analyzer	Hybrid. Core for traditional products, enters new product market after availability established, matrix structure
	Reactor	Lacks of coherent strategy, structure inappropriate to purpose, misses opportunities, unsuccessful
Porter (1980)	Overall cost leadership	Low price, high market share focus, standardised product, economies of scale, tight cost control
	Differentiation	Product uniqueness brings brand loyalty, emphasis on marketing and research
	Focus	Focus on defined buyer group, product line or geographic market. Niche strategy

Figure 3. A summary of strategic typologies by Miles & Snow and Porter. Source: Simons (1990)

Another way to categorise strategies is provided by Miller and Friesen (1982). Their taxonomy is based on the extent of product innovation. In this typology companies are either conservative or entrepreneurial and the types differ from each other in their degree of environmental hostility, organisational differentiation, environmental heterogeneity and technocratisation. Miller and Friesen describe conservative organisations as innovative with reluctance to take serious challenges. On the other hand, entrepreneurs aggressively focus on innovation but however, they are cautious about excessive innovation. (Langfield-Smith 1997).

Gupta and Govindarajan (1984: 31) divides organisations into four strategic missions based on an organisation's intended trade-off between market share growth and short-term earnings maximation (Langfield-Smith 1997). The missions are built, which intends to focus in improving market share and competitive position and harvest, which aims to maximise near-term earnings and cash-flow without much concern for slippage in market-share that may ensue. Additionally, there is a hold mission which attempts to

maintain market share and competitive position and finally divest which intends to withdraw from the business.

The different classifications and differences and similarities between the taxonomies have caused confusion in accounting literature and may have prevented research integration (Langfield-Smith 1997). Such research integrations can be made if the differences between the strategies are viewed based on scope and focus. The strategies can be described with three dimensions: typology, strategic mission and competitive position (see Figure 4). Prospectors and defenders have broad scope whereas cost-leaderships and differentiators have narrower scope. Broad scope of information is described as being more future oriented and predictive and non-financial (Chenhall 2003). Similarly, entrepreneur and conservative classification concentrates on product innovation, build and harvest missions are vase on market-share versus short-term profit trade-off (Langfield-Smith 1997). Each of these typologies and variables are subjected to different degree of environmental uncertainty.

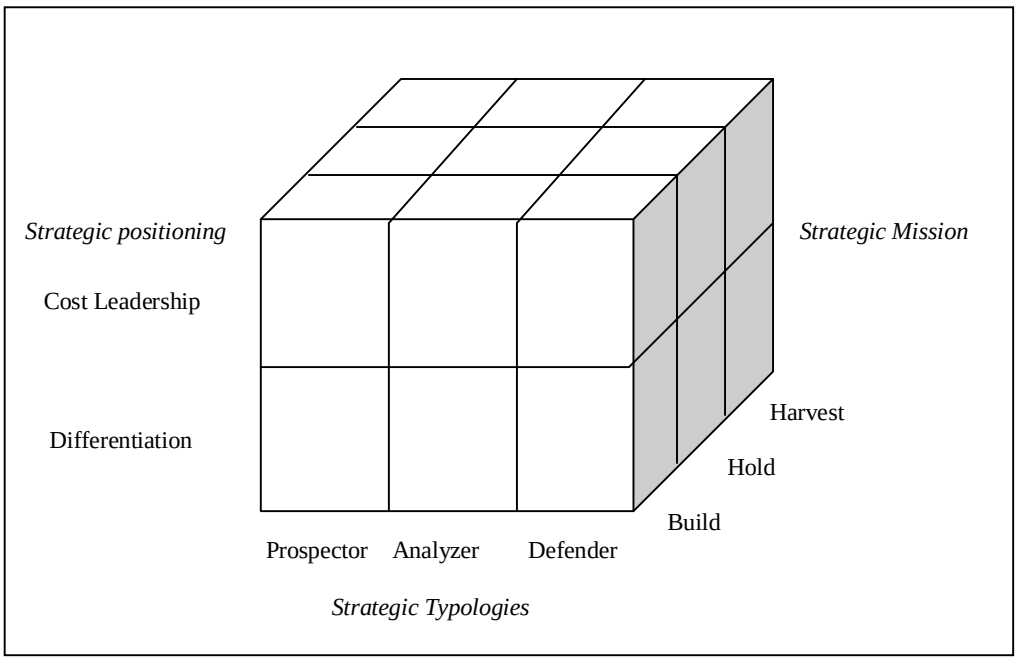

Figure 4. Strategic matrix. Source: Langfield-Smith (1997)

Although particular strategic typologies are related to higher level of uncertainty, companies can survive in the same environment with different strategies (Miles et al. 2003; Miller and Friesen 1984). However, enhanced performance requires that strategy is well implemented and internal structures are consistent. Hambrick (1983) found that

in industries which are innovative and dynamic, prospectors perform better than defenders. This is due to prospectors' significant industry adaptability. Simons' (1987) study supports this argument as he found that industry dynamism is positively associated with ROI for prospectors and negatively associated with ROI for defenders. The results also proved that companies which fit their strategies well with the industry environment perform better.

Some prior studies see environment as a factor moderating the strength of correlation between the strategy of a business unit and performance (Prescott 1986; Prescott, Kohli & Venkatraman, 1984) (See figure 5). The authors claim that companies should "develop strategies to either adapt to changing environmental conditions or to proactively influence their environment" (Prescott 1986: 342). Therefore, identifying the strategic variables which affect performance in the environment and altering the strategies accordingly is essential. Prescott (1986) further emphasises the importance of not changing the strategy adopted completely if there are changes in the environment, instead companies should make changes in the relative emphasis of strategies to match the environment.

Jauch, Osborn and Glueck (1980) also investigated strategy –environment-performance relation. Precisely, they examined interacting effects of environmental changes on strategic decisions and performance measures and found that environmental changes have little effect on performance. However, strategic decisions relating to financial changes and production efficiency had an impact on performance. Additionally, objective characteristics of industries for example growth rate and concentration levels have an impact on the behaviour and strategy of companies and performance (Prescott 1986).

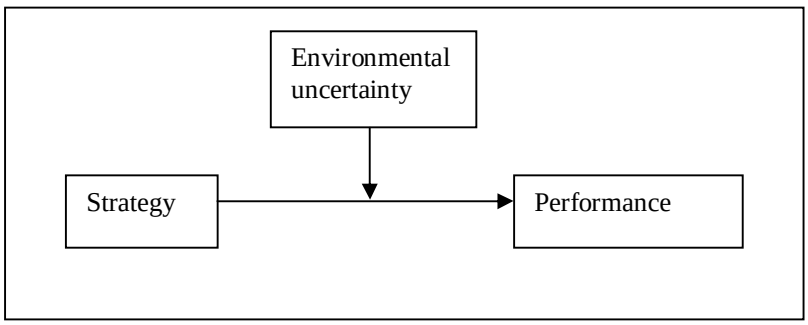

Figure 5. The relationship between strategy and environment on performance. Source: Prescott 1986.

Other studies claim that companies need to make quick adaptations to the market environment by implementing appropriate strategies to maintain competitive advantage under increasing competition (Day 1991). However, the market structure of an environment cannot be seen as an independent variable directly affecting performance. Studies by Porter (1980) and Rockmart (1979) found that there is a set of critical success factors which vary and depend on the business environment that affect performance.

Khandwalla (1972) investigated environment and performance and reports a negative relationship between profitability and the level of price, product and marketing channel competition. Competition is affected by these factors however; Mia and Clarke (1999) argue that Khandwalla did not consider other environmental aspects such as number of competitions, technological change, government regulation and substitute products available and how these impact competition in his study. These factors shape competition simultaneously and in combination (Mia & Clarke 1999). Secondly, they continue claiming that Khandwalla overlooked the fact that companies facing high level of competition may adopt multiple strategies to battle the competition. The use of management accounting systems may assist companies to identify, evaluate and implement appropriate strategies to enhance performance.

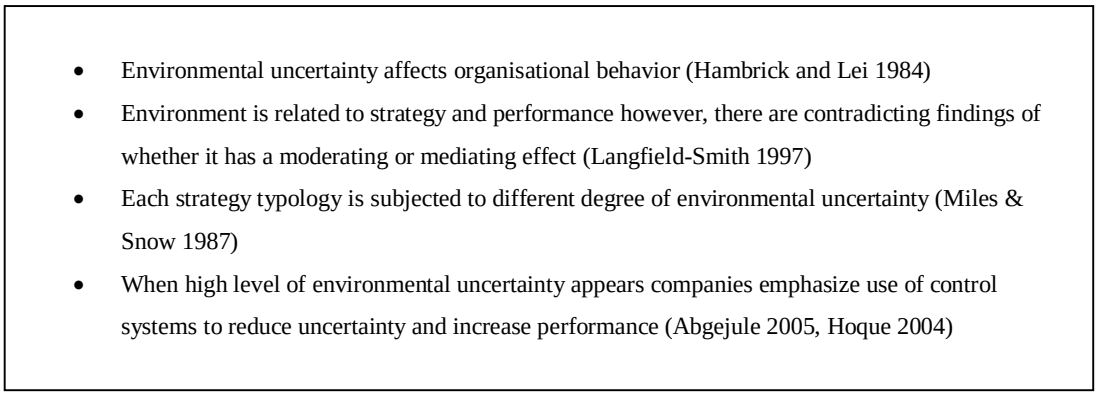

Figure 6. A summary of the findings on environmental uncertainty, strategy and performance.

Based on the review of prior studies above, the following hypotheses are conducted:

H1: Perceived environmental uncertainty has a positive relationship with prospector strategy

H2: Use of prospector strategy has a positive relationship with performance

H3: Prospector strategy has a mediating effect on perceived environmental uncertainty and performance

2.2 Environmental uncertainty, management control systems and performance

Number of contingency accounting research provides evidence to support the view that environmental uncertainty is positively associated with the design of management accounting systems (Agbejule 2005, Hoque 2004, Gul 1991). The studies argue that as the perceived environmental uncertainty increases relating to organisational performance, greater importance is placed on management accounting systems information to cope under the uncertainty. Management accounting systems information may help companies to gain understanding of uncertain conditions (Mia 1993).

Much has been found about how certain aspects of management accounting systems relate to broader organisational controls and performance. The use of MAS can improve performance in two ways (Mia & Clarke 1999). Firstly, the use of appropriate information can help managers in positioning their companies in competitive market. Monitoring and scanning environment is essential to identify the potential threats of competitors and their substitute products and respond to the bargaining power of customers and suppliers (Porter 1985). The appropriate MAS information can help assessing the price, attributes and the cost of substitute products available (Mia & Clarke 1999). By benchmarking, companies can influence the bargaining power of customers which is dependent on substitute products, prices and product attributes. Secondly, the use of MAS can improve performance by providing relevant feedback on implementation plans and directing behaviour to gain the valued targets (Mia & Clarke 1999). Mia & Clarke (1999) also found that under intensive competition use of MAS can improve a business unit's performance and that an increase in the level of competition is related to increasing use of MAS. The results were in accordance with studies conducted by Gordon and Narayanan (1984), Chenhall & Morris (1986) and Mia (1993).

Different dimension of MAS such as broad scope, timeliness, integration and aggregation on performance have been examined by many academics (See figure 7) (Agbejule 2005, Chenhall and Morris 1993, Lacker 1981). Prior studies have used different combinations of the MAS dimensions in the researches. It has been suggested that broad scope of information which offers a great variety of qualitative and quantitative information, financial and non-financial and ex ante and ex post data is essential for companies which perceive high environmental uncertainty (Chenhall et al. 1993).

Studies of the impact of environmental uncertainty on MAS information usage prove that companies are likely to use more non-financial controls for performance evaluation. Financial controls such as budgets are therefore used less when the level of uncertainty is high (Govindarajan 1984, Abernethy and Stoelwinder 1991). Broad scope of MAS information may help organisations to be more effective in uncertain conditions. Broad scope of information includes external information related to markets and competitors. It also includes non-financial information related to production processes, predictive information and a broad assortment of mechanisms which support decisions and informal personal and social controls (Chenhall 2003: 129).

The study of Chenhall and Morris (1986) suggests that non-financial control systems may be more effective control and communication device as they tend to deal with matters external to the organisation and are more future-oriented than traditional control systems. Under high level of environmental uncertainty effective organisations rely less on financial performance measures (Chong and Chong 1997, Mia 1993, Chenhall and Mia 1994).

Scope	External information Non-financial information Future-oriented (e.g. probabilistic)
Timeliness	Frequency of reporting Speed of reporting
Aggregation	Aggregated by time period Aggregated by functional area Analytical or decision models (e.g. marginal analysis, DCF, inventory models)
Integration	Precise targets for activities and their interrelationships within sub-unit Reporting in intra-sub-unit interactions

Figure 7. Information characteristics. Source: Chenhall and Morris (1986)

The figure 7 above summarises the characteristics of MAS information. Agbejule (2005) suggests that timely MAS information has potential to decrease uncertainty. Timely information enables companies to continually adjust the activities in accordance to the changes in the environment. Also integrated information is essential to companies when uncertainty is high as information sharing and coordination between subunits can decrease the transfer cost of knowledge. However, integrated information may require more autonomy over decision making.

Accounting systems are used in organisations in contractual design: in decision rights allocation, performance measurements and reward mechanism. Appropriate aggregation of information enables managers to make optimal decisions. The use of MAS would transfer the required information for decision making with low cost and minimise the transfer costs of information. Therefore, if companies facing high environmental uncertainty have better knowledge and information performance is likely to increase. (Abgejule 2005).

Mia (1993) found that use of broad scope of information acted as a mediator between perceived environmental uncertainty and performance. In figure 8 below the construction models of Mia and Agbejule are presented. When perceived environmental uncertainty increased, the use of broad scope of MAS information also increased. Mia's argument was that under high level of uncertainty, broad scope of information may improve accuracy of decisions. Gul (1991) concluded that under high environmental uncertainty, broad scope of MAS has a positive relation to performance. However,

under low level of environmental uncertainty, broad scope MAS information has a negative impact on performance.

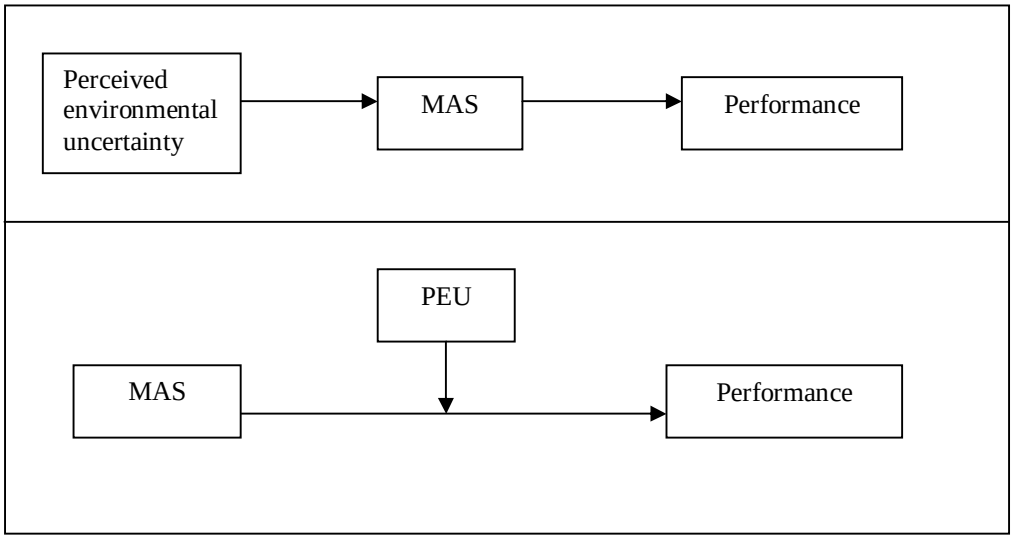

Figure 8. The contradicting results of the role of MAS between PEU and performance. Source: Agbejule 2005, Mia 1993.

Contradicting findings suggests regarding to high level of perceived environmental uncertainty, MAS information and performance that when uncertainty appears, formal controls and emphasis on budgets seems to be the best. Extreme pressure tightens control for short- term survival, but more organic controls are adopted later (Khandwalla 1972).

However, both views see perceived environmental uncertainty as a lack of information and it can be reduced by gaining more information. Additionally, the objective of both views is to decrease uncertainty by using MAS information to cope uncertainty and make optimal decisions (Chenhall 2003).

- MAS information has positive relationship with performance under high level of environmental uncertainty (Abgejule 2005).
- Broad scope: non-financial information has a positive relationship with performance under environmental uncertainty (Mia 1993).
- Non-financial information has a negative relationship with performance when environmental uncertainty is high (Chong & Chong 1997).

Figure 9. Summary of the findings concerning MAS, PEU and performance

Based on the findings of the prior studies, the following hypotheses are formed:

H4: Perceived environmental uncertainty has a positive relationship with non-financial management control systems

H5: Use of management control systems has a positive relationship with performance

2.3 Perceived environmental uncertainty, strategy and management control systems

Much of the prior management accounting studies have focused on finding the characteristics of management control systems that match with organisational strategy (Simons 1987). Although the prior research on strategy have been based on well-recognised frameworks, the findings have been fragmentary and conflicting causing confusion of the type of accounting systems should be used with different strategies (Abernethy and Guthrie 1994).

A company's environment and its adopted strategy evidently influence performance (Porter 1980). Ittner & Lacker (2001) suggest that therefore, the key element in studying strategy and management control systems is to identify the precise factors which lead to strategic success. So far it is evident that an organisation's management control systems should be tailored in such a way that it supports adopted strategy and consequently will lead to superior performance (Dent 1990). Also, high organisational performance may

be a consequence of a match between organisational environment, strategy and internal structures and systems (Govindarajan 1988).

In the contingency framework of strategy's influence on MCS, there are two opposing views. It is evident that companies pursuing different strategies use MCS in different ways. The accounting literature has mainly focused on examining prospector and defender strategies and their affect on MCS. Chenhall (2003), Simons (1990) and Govindarajan and Gupta (1985) argue that characteristics of prospector –type of control systems are in direct contrast to defender –type of control systems. Chenhall & Morris (1995) and Dent (1990) claim that companies following differentiation or prospector strategy use informal and flexible management control systems to maximise performance. Prospectors control systems are likely to be very detailed while focussing on reducing uncertainty with emphasis put on problem solving. However, the control systems often are unable to assist in product development and market opportunity location. Due to the dynamic and changing nature of prospectors' environment, prospectors have difficulty in implementing a comprehensive planning system. Therefore, control systems that focus on problem finding instead of problem solving are required. The structures may have to be flexible to create rapid change and processes are to assist the company to react quickly to changes in the environment. (Simons 1987).
In contrast, defenders structure reflects on specialisations of products, markets and technology. According to Miles and Snow (1978) defenders control systems rely heavily on feed forward control and are likely to be centralised. Job roles may be highly specialised and formally described to achieve control. A combination of simple sequential relationships between subunits, repetitive operations, the absence of non-routine decisions and the stabile environment can contribute simple and inexpensive forms of co-operation. Defenders enquire control systems that signals drops in market share, reductions in sales and declining profitability to indicate the need for product innovation.

Prior studies suggest that strategic orientation is related to the level of perceived environmental uncertainty. High environmental uncertainty is linked to more innovative prospector strategy instead of defender strategy (Simons 1980, Fisher 1995). The studies claim that as prospectors pose themselves to a greater environmental field, a greater amount of information is needed. Therefore, managers use broad scope of MAS information: non-financial and future-oriented to deal with uncertainty (Chong & Chong 1997; Mia 1993; Agbejule 2005). In contrast, defender-type strategy adopters

which operate in more stable environment, use narrow scope management accounting system information. Chenhall and Morris (1986: 20) propose three contextual variables which affect the extent broad scope of information is found useful. He claims that in decentralised sub-units, it is likely that a broad scope of information is useful to assist decentralised manager in the decision-making process. Secondly, performance evaluation in sub-units includes high level of organisational interdependence and therefore, broad scope information is likely to be found useful. Thirdly, broad scope information mitigate the difficulties faced caused by perceived environmental uncertainty. Govindarajan (1984) found traditional financial evaluation measures to be ineffective for evaluating activities exposed to environmental uncertainty. Although, it cannot be claimed that this type of information improves the decision outcomes, it is certain that broad scope of information is found useful in high uncertainty.

Agbejule (2005) and Gul & Chia (1994) found that the higher the perceived environmental uncertainty, sophisticated, broad scope MAS are essential in evaluating competitors and calculating market demand. Rapid responses are required to cope under the uncertain circumstances. Consequently, timely and frequent information is found useful (Abgejule 2005). Strategy and perceived environmental uncertainty has a positive relationship between use of MAS and performance (See Figure 10).

Figure 10 presents the finding of Chong & Chong (1997). They claim that SBU strategy and perceived environmental uncertainty determine the MAS design. They also found broad scope of MAS information to be an important antecedent of SBU performance (Chong & Chong 1997: 273).

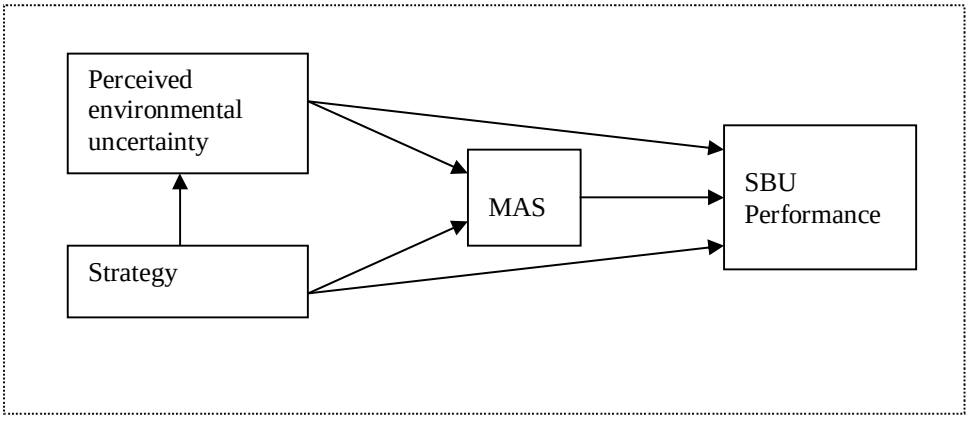

Figure 10. Relation between strategy, PEU, MAS and performance. Source: Chong & Chong (1997)

Abernethy and Guthrie (1994) found that broad scope information has a more positive effect on performance in prospectors than in defenders. These results indicate that companies which adopt more innovative strategic posture need traditional MAS supplemented by broader focussed information. However, Bhide (1994) claim that if prospectors which have tendencies to have more perishable nature of opportunities in highly uncertain environment, focus on sophisticated planning when facing high environmental uncertainty, they may lose that opportunity. Whereas for defenders, the time to respond to the opportunities is less significant, as they tend to focus more on routines and internal processes.

The past researches have found contradicting results concerning the type of MCS used with particular strategies. The opposite view to the arguments presented above claims that prospectors use formal management accounting systems intensively due to the greater need of information (Miles & Snow 1978; Simons 1987; Govindarajan & Gupta, 1985). In contrast, Simons (1987) found that there was a weak negative relation between cost control and performance in large defenders. Evidence can be found to support the both views. Dent (1990) proposes some explanation for the contradicting results. Firstly, prospectors control systems may limit risk taking in situation where authority for product development and market innovation is delegated (Langfield-Smith 1997: 218). Therefore, prospectors control systems may prevent excessive innovation. Secondly, prospectors may emphasise performance monitoring under high environmental uncertainty to encourage organisational learning. Thirdly, financial controls may be the only way for prospectors to capture activities. Finally, defenders may not need such a heavy cost control due to environmental stability and may gain efficiency through non-financial measures.

Earlier studies also claim that companies emphasising product differentiation strategy, may find traditional accounting practises such as budgeting techniques for planning and control and performance measures like ROI and divisional profit reports insufficient to evaluate how production processes support customer-oriented strategies. Traditional accounting practises are more suitable to low price strategy adopters. However, Chenhall and Langfield-Smith (1998) found that strategic orientation does not determine the type of accounting practises used. Low price and product differentiation strategy adopters find both traditional and contemporary accounting practices beneficial. Contemporary practises were defined as benchmarking, activity-based techniques, balanced performance measures and strategic planning in the study. In fact, they found

that traditional accounting practices were the most beneficial among the studied companies.

Simons (1994) found four dimensions of MCS related to strategy: belief systems, which communicate and strengthen the basic values and mission of an organisation, boundary systems, which define limits and rules and ensures they are followed, diagnostic controls to measure outcomes and correct deviations in outcomes and interactive controls which enable interaction between managers and subordinates and forces dialog and learning. (Chenhall 2003). However, it is not important to identify the controls associated with particular strategic typologies; rather attention should be paid to identify the distribution of managerial attention among controls (Langfield-Smith 1997: 223).

Understanding the role of strategy is important and it could encourage managers to assess the combinations of environmental conditions, technologies and structures to improve performance (Chenhall 2003: 151). MCS could assist in this process by aiding in strategy formulation concerning markets and products and building the appropriate structures and technology. MCS could be involved in strategy implementation and monitoring and it could provide essential feedback for learning and strategy formulation (Chenhall 2003). However, these issues have been less examined.

Due to the great amount of contingency studies on MCS, the generalisability of results concerning MCS is challenging (Chenhall 2003). The studies on MCS can be divided into two categories: studies concentrating on single themes of MCS and studies investigating unconnected elements of MCS and context. Chenhall (2003: 130) argues that both types of studies are needed to ensure the relevance of the research and also to identify the contingencies surrounding the design and implementation of contemporary MCS. He further points out the lack of published contingency research on balanced scorecard, target costing and life cycle costing. Additionally, there is an obvious lack of studies conducted in service and non-profit organisations. This is surprising as these organisations are becoming significantly important to the world economy.

- Under high environmental uncertainty, managers use sophisticated management accounting systems
- Broad scope of MAS information is found useful in decentralized sub-units with high organizational interdependence and uncertain environment
- Broad scope information has a more positive effect on performance in prospectors than in defenders
- Strategy and perceived environmental uncertainty have relationship with MAS and performance

Figure 11. A summary of the findings on strategy, PEU and MCS on performance

Based on the review of the prior studies, the following hypotheses are conducted:

H6: Management control systems has a mediating effect on perceived environmental uncertainty and performance

H7: Perceived environmental uncertainty has a positive relationship with prospector strategy and use of non-financial management control systems to increase performance

2.4 Service industry and management control systems, perceived environmental uncertainty, strategy and performance

The qualities of intangibility, heterogeneity, simultaneity and perishability make management control and performance measurement challenging in the service industry (Fitzgerald, Johnston, Brignall, Silvestro and Voss 1991). These qualities pose difficulty and affect performance measurement. Additionally, the lack of inventory, difficulty in quality control and measurement of management's effectiveness and productivity makes management accounting in service organisation somewhat different (Anthony and Govindarajan 2000). Due to these features, the role of management accounting is argued to be more important in service organisations than in manufacturing (Hussain 2000).

The prior studies of MCS in service organisation have mainly been case studies examining organisations in a single industry for example health care industry or on a single organisation (Sharma 2002). Additionally, much of the researches undertaken have focused on non-profit service organisations. From such a narrow focused studies, generalizations may be limited (Auzair and Langfield-Smith 2005). It is claimed that profit –seeking companies such as manufacturing firms are more likely to use and

implement management control systems (Sharma 2002). This is because they often have shared performance and profitability goals and targets (Brignall 1997). However, the shared goal of profitability could also be applied to profit-oriented service organisations and it is possible to imply the studies of MCS design to profit-making service organisations as well (Auzair et al. 2005).

In accounting literature, there is a limited amount of analysis in similarities and differences between service and manufacturing industries. The obvious differences between the industries are the nature and measurability of outcome (Lowry 1990). Also differences in structural features seem to be industry related. Chenhall (2003:144) describes organisational structure as "a formal specification of different roles for organisational members, or tasks for groups, to ensure the organisational activities are carried out". He further argues that structure has an impact on work efficiency, motivation of individuals, information flows and control systems.

Burns and Stalker (1961) classify structure into organic and mechanistic approaches (Chenhall 2003). Rules and procedures, openness of communications and decision processes are heavily influenced by the type of structure. Perrow (1970) identified structure in terms of bureaucratic and non-bureaucratic (Chenhall 2003). The past literature have emphasised the importance of MCS being consistent with the intent structure of an organisation and consequently, it is useful to identify MCS which are organic and mechanistic.

Accounting is said to be a central part of organisational structure and accounting practises unquestionably differ between companies (Jensen 1983). The internal environment of an organisation affects and is affected by management control. Organisational structure has a great impact on an organisation's ability to adopt and implement innovations (Anthony & Govindarajan 2000, Gosselin 1997). Three different dimensions: centralisation, vertical differentiation and formalisation have been widely used in innovation literature to determine organisational structures (Gosselin, 1997: 111). Centralisation relates to concentration of decision-making authority at a particular level in organisational hierarchy. It has been found that mechanistic organisations are more centralised than organic organisations and consequently, there is a negative relationship between centralisation and innovation (Gosselin 1997, Damanpour 1991).

Vertical differentiation is related to the depth of the structure and it is referred to the number of levels in the organisational hierarchy below CEOs. Vertical differentiation is

supposed to be lower in organic organisations and higher in mechanic organisations. Hull and Hage (1982) found that vertical differentiation prevents the spread of innovation in manufacturing organisations. However, vertical differentiation has been known to have a positive relation to innovation in non-profit and service organisations (Aiken, Bacharach and French 1980). Formalisation represents the degree to which jobs in an organisation are standardised. The innovation literature suggests that there is a negative relation between formalisation and innovation. Damanpour (1991) found insignificant relationship between formalisation and innovation however, the results on innovation were significant in manufacturing organisations (Gosselin 1991: 112).

A large body of literature suggests that more organic structure is associated with uncertain environment. Chenhall (2003) reviews a work by Lawrence and Lorsch (1967) in which they found that to cope in uncertain environment, a high level of differentiation is required. Additionally, sophisticated liaison mechanisms such as interactive personnel and meetings are needed instead of rules and procedures to survive.

It is generally believed that differentiated and divisional structures are associated with strategies characterised by diversification (Chenhall 2003). However, in evaluating contingency relations between MCS and structure, characteristics of environment and strategy influence the relationship and therefore, should be considered simultaneously (Chenhall 2003).

Service firms are seen as environmentally dependent and the environmental conditions are more complex and uncertain in comparison to manufacturing firms (Lowry 1990). The sensitivity arises from the involvement of customers in service production. Unlike in a manufacturing organisation, a service organisation provides customers to buy intangible contribution towards satisfaction of their wants and needs. As the complexity of the intangible products increase, more interaction is required between customers and an organisation.

The differences between service and manufacturing organisations can also be seen in managerial spans of control, hierarchical levels, the interaction of firms size and task complexity which is referred to a relation between fundamental work values and decision decentralisation (Lowre 1990). These findings suggest that “the relationship between technology and structure is weakened by the necessity to decentralise decision initiation and review” (Lowre 1990: 170). In other words, in service organisations when

complexity increases, spans of control also increase. For manufactures the complexity arises from internal sources –elaborate administration and co-ordination. In service firms the structure is simpler, but greater complexity arises from external sources, that is, their greater environmental dependency (Lowry 1990:181).

The inconsistencies between service literature and service and manufacturing context may be explained by an organisation's objective of being non-profit or profit-making (Sharma 2002). Therefore, regardless of the fact that profit- making service organisations have not been widely investigated in accounting literature, there is no reason to assume that the contingency relationships may not apply to them. The contingency relations might vary accordance in the industry however, industry type cannot be perceived as a discriminating factor (Sharma 2002).

Service industry is significantly heterogeneous. Service process type has been used in prior studies to describe the characteristics of service organisations. The typology was proposed by Silvestro, Fizgerald, Johnston and Voss (1992) and it is based on the extent of customer existence within the production process. Silvestro (1992) used six dimensions of service organisations. The dimensions are equipment/ people focus, customer contact time per transaction, degree of customisation, degree of discretion, value added back-office/ front-office and product /process focus. Silvestro et al. (1992) indentified these dimensions based on an aim to gain further understanding of service organisations' competitive strategies, the nature of the service processes and consequent tasks and challenges faced by service managers. In the study, the service organisations were ranked along each of the six dimensions and it was found that the dimensions seems to correlate with volume of customers processed per unit each day. Additionally, as the volume of customers processes increases, the organisations tend to be more equipment oriented (provision of certain equipment is the core element in the service delivery), customer contact time decreases, degree of service process customation decreases, decentralisation decreases, a larger number of employees are in back-office compared to front-office and emphasis is placed on what customers buy instead of service delivery. Based on these dimensions Silverstro et al. (1992) identified three service archetypes: professional services, mass services and service shop.

1. **Professional services** are organisations with relatively few transactions, highly customised, process oriented, with relatively long contact time, with most value added in the front-office and where considerable judgement is applied in meeting customer needs. Examples are management consultancies and corporate banking.
2. **Mass services** have many customer transactions, involving limited contact time and little customation. The offering is predominately product-oriented with most value being added in the back-office and little judgement applied by the front-office staff. Examples are newspaper retailers and transport.
3. **Service shop** is in a categorisation that falls between professional and mass services. Examples are hotels and rental services. (Auzair et al., 2005).

The purpose of the typology is not only to classify service organisations but also to provide some strategic insights. Silvestro et al. (1992) claims, that management control systems and performance measurement systems vary between these service types. The service process type can be seen as a continuum that ranges from mass service firms to professional service organisations (Auzair et al. 2005).

Fitzgerald et al. (1991) found that the measures of quality in professional service firms is focused on customer satisfaction measured at the individual customer level. However, in mass service companies, quality is measured between the customer and organisation as a whole. Therefore, less direct responsibility for quality, less authority to consider at the front-line and more structured quality control systems are required in mass service organisations in comparison to professional service firms. Fitzgerald et al. (1991) also found that more flexible MCS, which allow quick responses, are used in professional service firms than in mass service companies.

Likewise studies on MCS and strategy on manufacturing industry, the same contingency relations can be applied to service organisations. There is a large body of literature conducted in similar areas that suggest that mass service firms emphasise more bureaucratic MCS than professional service firms. Also, service organisations which have adopted cost leadership strategy tend to use more bureaucratic MCS than

service firms pursuing differentiation strategy (Miller and Friesen 1986; Abernethy and Brownell 1997; Van der Stede 2000; Auzair and Langfield-Smith 2005).

Auzair et al. (2005) propose that the level of uncertainty also differs between the service process types. Mass service companies are likely to perceive low level of environmental uncertainty, whereas professional tend to face high environmental uncertainty. The level of human aspect in the production process is the main cause of uncertainty (Auzair et al. 2005).

Much of the studies focused on uncertainty in the service industry have been examining task uncertainty (Eisenhardt 1985 and Lowry 1990). Eisenhardt (1985) found that when task uncertainty increases, result controls are likely to be used. When a task is easy to define, tight controls are used to guide behaviour. However, when a task is highly uncertain, these controls may limit creativity and may create dysfunctional behaviour (Auzair and Langfield-Smith 2005). Auzair and Langfield-Smith (2005: 406) argue that to increase efficiency, some controls have to be loose to accommodate uncertain work demands.

In other words, the prior literature suggests that professional service companies are likely to use less bureaucratic form of MCS, whereas for mass service companies more bureaucratic form of MCS are more suitable (Auzair and Langfield-Smith 2005). More bureaucratic controls are controls that emphasise monitoring employee's decisions, actions and contribution towards targets. There are written rules, procedures and policies and communication is highly formal. In contrast less bureaucratic controls underline loose control in which employees have discretion in obtaining targets to decide the best way to achieve goals. Communication is informal in nature.

- The qualities of intangibility, heterogeneity, simultaneity and perishability make management control and performance measurement difficult in service industry (Fizgerald et al. 1991)
- Service firms are more environmentally dependent and the environmental conditions are more complex and uncertain in comparison to manufacturing firms (Chenhall 2003).
- Strategy, MCS, perceived environmental uncertainty and structure vary according to service type process (Silvestro et al. 1992)
- Mass service organisations face low level of uncertainty and tend to use more bureaucratic forms of MCS (Auzair and Langfield-Smith 2005)
- Professional service organisations perceive higher environmental uncertainty and are likely to use less bureaucratic forms of MCS (Auzair and Langfield-Smith 2005).

Figure 12. A summary of the findings on service industry and MCS

2.5 Summary

Contingency relations have been studied much and the literature proves that there is a correlation between strategic orientations, management controls systems and performance (Dent 1990, Simons 1987, 1990): management accounting systems, perceived environmental uncertainty and performance (Agbejule 2005, Gul and Chia 1994, Gul 1991). Although, some of the research findings have been rather contradictory, a holistic view of the relations has been provided and explanations for the contradictory finding have been presented.

Much of the earlier studies have been conducted in manufacturing industry. Service industry have been investigated too, however, the studies have focused in examining some contingency relations on non-profit service organisations (Sharma 2002). Additionally, there is an obvious lack of contingency studies focused in providing comparisons of the contingency relations in manufacturing and service organisations. However, the contingency relations found for manufacturing industry, may provide a base for this study.

The table 1 summarises the prior studies conducted on the variables which are studied in this research. The authors are listed on the left side and the relationship which they

have examined is indicated. The variables included in this study have been studied to a large extend in the accounting literature. It can be argued that strategy, management control systems and environmental uncertainty variable are the antecedents of performance. The prior studies have mainly been conducted on manufacturing companies.

Examples of Authors	Year	Relationship studied
Prescott Kolhi and Vekataraman Simons Hambrick	1986 1984 1987 1983	*PEU - STRATEGY - PERFORMANCE*
Abgejule Hogue Gul Mia Mia and Clarke Chenhall and Mia	2005 2004 1991 1993 1999 1994	*PEU - MAS - PERFORMANCE*
Simons Fisher Abernethy and Gutherie Chong and Chong	1980 1999 1994 1997	*PEU - STRATEGY - MAS - PERFORMANCE*

Table 1. A summary of the contingency relationships studied.

It is obvious that the effect of industry has not been studied. This study therefore, attempts to make a contribution for the existing studies by also examining profit-making service organisations and providing comparisons of the two different industries.

The hypotheses of the research are conducted from the prior studies. A complete model with hypotheses are presented in figure 22. The hypotheses and the relationships between the variables are tested with structural equation modelling, which will be further discussed in the next chapter. The aim is to investigate which of the relations are significant and whether any of the variables has a mediating role between the contingency characteristics and performance.

3. THEORETICAL FRAMEWORK

In this chapter, the well known contingency framework is presented for the study. A contingency based management control theory is reviewed first and in the second section contingency fit theory and the choices made in the contingency theory approach are clarified. In the third section, the variables used in this study are further described and their effect on performance is examined.

3.1 Contingency approach

The basis for the generalised propositions between the elements of management control system and it context comes from prior literature. The literature can be categorised into four different levels according to the level of complexibility (Fisher 1998). The complexibility is dependent on the contingency variable, control and outcome variable (Fisher 1998). The research design becomes more complex as the level of analysis increases. Each level has its strengths and weaknesses. The levels are simply named as first, second, third and forth level of analysis.

At the first and the most basic level, a contingent factor is correlated with one control mechanism. The existence of a contingency characteristic increases the likelihood that a company uses a particular control mechanism. Correlation to other variables and possible outcome is not assessed. This level of analysis have been used by Macintosh and Daft (1987), Merchant (1985), Simons (1990), and Rockness and Shields (1984). The effect of particular contingents to the outcome is examined in recent studies for example by Gerdin (2004). The findings of his study supports that companies adapt their management accounting systems design based on the control requirements (Jokipii 2006).

The second level of analysis takes into account the joint effect of a control mechanism and contingent variable on an outcome variable. The typical outcome variable examined is performance (Jokipii 2006). Govindarajan and Gupta (1985), Ginzberg (1980), Simons (1987) and Fisher (1994) used this level of analysis in their studies. Simons (1987) examined how control system attributes differed between companies with different strategies: defenders and prospectors. Simons found negative correlation between defenders' cost control and performance. However, the results were contradicting with earlier studies by Miller and Snow (1978). They found that defenders

use detailed cost information to gain competitive advantage. Fisher (1994) examined firm technology, interdependence with the control systems used to maximise performance. He claims that the nature of technological interdependence might establish key individuals and therefore, to enhance performance, the control systems should be designed to motivate the key individuals.

On the third level, the analysis assumes that there is a joint effect of a contingent characteristic and multiple control mechanism on an outcome variable. In other words, interrelationships between the control mechanisms are considered and control is investigated as a system, instead of an independent control mechanism (Jokipii 2006). In this level of analysis, structural equation models can be used and the models show if a control mechanism affects an outcome variable and whether some mechanisms complement each other creating a greater effect on the outcome variable (Jokipii 2006). Researches done by Govindarajan and Fisher (1990) and Merchant (1981) have used this level of analysis. Govindarajan and Fisher (1990) studied how strategy, management control systems and resource sharing affect on strategic business –unit (SBU) performance. The results supported the notion that strategy, resource sharing and the control systems have an interactive impact on a sub –unit's performance. Additionally, they found that sub-units which have applied a low-cost strategy use high level of resource sharing and use of output control combined with resource sharing increases effectiveness.

In the fourth level, the analysis includes multiple contingent variables when designing the appropriate control systems. The major difference compared to the previous level is that this level recognises that a control system must be geared to multiple contingences (Jokipii 2006). Cluster analysis is used in this level of analysis. Fisher (1995) claims, that designing a control system to address several contingency variables is complex. The challenges arise if contingencies demand different control systems and therefore, these results in trade-offs to exclude a fit to all contingences. The existences of conflicting contingencies increases the probability of control system design and will differ from the demands of at least one of the contingences, making optimal design difficult (Jokipii 2006: 43). To solve the problem; Fisher (1995) suggests that one dominant contingent is taken into account and ignoring the other contradicting variables when designing the optimal system, however, may lead to a decreased performance. A study by Fisher and Govindarajan (1993) examined sub-units strategy and mission with uncertainty and incentive compensation. They discovered that the control design requirements were alike for build and differentiation strategies and for harvest and low-

cost strategies. However, if differentiation strategy is adopted with a harvest mission and a low-cost strategy is employed with a build mission, conflicts appear. Consequently, this leads to the trade –off situation mentioned earlier.

This study falls onto the third level of analysis. It is assumed that perceived environmental uncertainty, MCS and strategy have a joint effect on performance. The management control systems are divided into categories based on the factors analysis. Each factor may have a different impact on performance depending also on the level of uncertainty and strategy. The optimal combination of MCS, strategy and PEU on performance is examined in this research. Additionally, the effect of industry is taken into account by comparing the results between service and manufacturing industries.

3.2 Contingency fit approach

The contingency theory in management accounting is based on the premise that there is no one appropriate accounting system that applies to all companies (Otley 1980). The approach of contingency can be divided into two extremes. The theory claims that the settings of a business determine the appropriateness of the control system (Fisher 1998). In contrast to this situation –specific model, universalistic model recommends that there is only one contingency setting and therefore, optimal system design holds in all settings and organisations (Fisher 1995). The situation- specific model suggests that in building the optimal accounting system, the circumstances need to be considered and therefore, the factors affecting the decisions are unique. General rules and models are not applicable to this model. Case studies are often used in situation-specific approach as each company is an individual and generalisations cannot be done (Jokipii 2006). The fit approach is located somewhere between the two extremes: situation-specific and universal approach. The fit theory states that more contingency variables may influence the control system. In this study, the fit-theory is chosen. Since the situation-specific approach is often applied to case studies and universalistic approach highlights that there is only one optimal control combination, those approaches may not be applicable for this study.

To the fit theory, there are two alternative approaches (see Appendix 1): Cartesian and Configuration. According to Gerdin et al. (2004: 305), Cartesian is characterised by reductionism while Configuration takes a holistic view. The two approaches lead to different ways to how the fit is obtained. Jokipii (2006) describes the fit between

organisation structure and context as a continuum that allows organisations to make small and frequent movements from one state to another. There is a structure of each point of the line and therefore, all points are equally effective (Donaldson 2001). The Cartesian approach emphasises how single contextual factors affect single structural attributes and how these context-structure pairs affect performance (Drazin et al. 1985). On the other hand, the Configuration approach emphasises that in order to understand the relationships, contextual and structural variables ought to be analysed simultaneously. However, in theory there are only few states of fit between context and structure and the intermediary positions between the states are ineffective and incapable (Jokipii 2006). In this research the Cartesian approach is employed to examine the correlation of the multiple variables and how they affect performance.

The two concepts under the Cartesian approach are Congruence and Contingency. The Congruence approach suggests that contextual factors such as size, strategy and environment affect an organisation's structure. It is assumed that an organisation's structure depends on context without any examination of whether this relationship affects performance (Gerdin et al. 2004). In contrast, in the contingency approach fit is thus understood as a positive impact on performance due to certain combinations of context and structure (Gerdin et al. 2004: 307). In other words, (Drazin et al. 1985: 515), in the Contingency theory the structure and process of an organisation must fit its context to be effective. The success of high performing companies is explained by more successful combination of structure and context. The research task here is to explain why variations in performance exist. Variations are studied in terms of interactions effects between context and structure (Gerdin et al. 2004). The Contingency approach is employed in this study as it is suggested to be the most appropriate method for analysing fit between variables (Gerdin et al. 2004).

The Contingency theory explains the relationships between variables several ways. The two most common variables used in management accounting research are mediation and moderation (Gerdin et al. 2004). The mediation approach assumes that for example competition strategy has an effect on performance through management accounting systems. This approach allows some variables, apart from being contributors, to be dependent on other variables (Jokipii 2006: 48).

The moderation approach differs from the mediation approach from having a variable, so-called moderator which moderates the effect that the independent variable has on the dependent variable (Luft & Shields 2003). For instance (see Figure 13), competition

strategy may moderate the degree by which a certain management accounting system design affects performance (Gerdin et al. 2004). The fundamental idea behind the moderation approach is that the moderator has non-significant, bivariate relationships with both independent and dependent variable (Shields and Shields 1998)

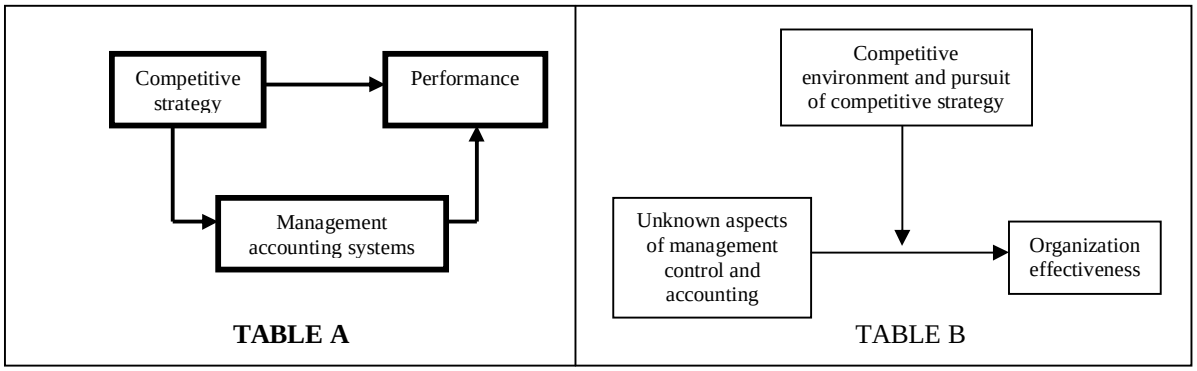

Figure 13. Functional forms of fit: Mediation (Table A) and Moderator (Table B). Modified from Gerdin et al. (2004).

Within the Cartesian mediation form, the results can be analysed by path analysis. When the relation of perceived environmental uncertainty and strategy and management control systems on performance is examined, both moderation and mediation models may be appropriate however, only one of the models provides a true picture of the relationship. See figure 17 for the forms of fit. Since, it has been suggested that strategy and management control systems play a mediating role in perceived environmental uncertainty-performance relation; the mediation form of fit is tested. Path analysis is the most common statistical method to test the mediation forms of fit and therefore, it is employed in this research to investigate how the contingencies affect performance and provide the comparisons between manufacturing and service industries.

3.3 Summary

The contingency theory provides a framework for this research. A mediating approach is chosen to examine the relationship between the variables and therefore, a path analysis is chosen to test the developed model.

The specific feature of the study is to compare the contingency relations between perceived environmental uncertainty, management control systems, strategy and performance in service and manufacturing industries. The contingency theory provides an appropriate method to test two different relationships: how environmental uncertainty affects strategy- performance relation and management control systems-performance relation. Models for service and manufacturing organisations are developed based on the findings of the survey.

4. RESEARCH METHOD

The previous chapter provided the framework for this research and presented the variables and described the measures to be used. The objective of this chapter is to describe the methodological choices for the data collection and present the hypothesis and research questions of the study. This chapter consists of the following sections: survey design, mode of data collection, sample, reliability and validity, pilot test, potential bias and errors and structural equation modeling followed by hypothesis and research questions.

4.1 Survey design

The survey research method is associated with deductive researches and it is the one of the most popular research method in business studies (Ghauri & Grönhaug 2002). Surveys are popular when large amounts of data need to be collected from a large sample. Additionally, the collection of data can be done in an economical way (Vahvaselkä, 2006). Data collected by surveys are often standardised and therefore, comparisons are easy to make. Another advantage of surveys is that they are easy to understand and explain. Surveys allow a better control over the research process and ideally the information collected by using survey strategy represents the whole population (Saunders 2007). Surveys are also an effective way to examine cause and affect relationships (Ghauri et al. 2002). The major drawbacks of survey strategy are relatively low response rate and complicatedness of collecting in –depth information (Vahvaselkä 2006).

In this study, the aim is to examine the relationship between the contingency characteristics. The survey research method is employed to examine the relationship. E-mail is used as a method of survey instrument in the research. Web site and E-mail surveys are alike with conventional mail surveys. However, the main difference lies in the method of distribution, complete and way of return. The electronic survey provides some advantages in comparison to conventional mail surveys. The survey implementation time is significantly reduced in electronic surveys. The electronic survey method provides effective and cost-effective ways to gather data from a large population. Also, the response rate and response time are claimed to be better in electronic surveys (Jokipii 2006). The major disadvantages of the electronic survey

method are that email may have a limited and biased population of users. Additionally, anonymity of respondents cannot be ensured (Dillman 2000).

There is evidence to prove that sampling error surveys conducted by using electronic survey method is at the same level with those conducted by conventional mail (Schonlau, Fricker and Elliot 2001). Therefore, it is claimed that data collected using traditional mail and web are comparable.

The electronic survey method is employed to include a large number of organisations in the research, reduce the time and cost of data collection and obtain a higher response rate. Tailored Design method by Dillman (2000) provides principles and procedures to ensure a successful survey. The proposed suggestions in implementation process and questionnaire design are taken into account. The questionnaire is kept short and questions are made easy to understand by ensuring an interesting layout and design. The pilot test procedure is later in subchapter 4.3. Additionally, the questionnaire is pilot-tested to obtain validity and reliability. The convenience of responding is increased by providing an alternative way to return the questionnaire. Finally, the results of the survey are provided as an incentive to respondents.

In the e-mail, a uniform resource locator (URL) is enclosed with a unique identifier (ID). By clicking the URL, respondents are directed to the website where the questionnaire is located. This method allows the response rate to be checked and also respondents have a convenient access to the questionnaire.

The questionnaire is divided into four individual parts. The variables measured are chosen from previous studies to increase reliability and validity of the measures. The first part includes description of different strategic typologies, the second part has questions relating to performance, the third part consists of questions to perceived environmental uncertainty and the last part is relating to MCS. All the parts in the questionnaire are first developed in English and later translated into Finnish. The relevance and construct of the questionnaire is pre-tested by an academic. Consequently, some spelling typos are corrected and the instrument to measure MCS is changed. The questionnaire is presented in Appendix 6 and 7.

The researcher sent the first email to respondents (companies' CEOs) in May 2007 and the respondents are given a month time to fill the questionnaire. The email includes a cover letter including information about the study. The email consists of the URL to the

questionnaire. Respondents are sent a follow-up after two weeks after the first contact. Earlier studies claim that a follow-up is an effective method to increase response rate. In the follow-up, the participants are asked to fill the questionnaire in two weeks. After the two weeks, the respondents are sent a reminder and asked to answer the questionnaire within a week (See Figure 14).

Contact n:o	Description	Days	No. of responses
1.	E-mail with link to questionnaire	0	29
2.	E-mail follow-up	14	23
3.	E-mail follow-up	30	8
	Closing day of the survey	35	3
	TOTAL	79	63

Table 14. Survey timetable

4.2 Sample

The research sample is drawn from the VOITTO+ database. The database consists information of over 98 000 Finnish companies with special characteristics available of the companies. The selected companies have been in operation for more than five years and they all employ 50 or over employees in 2007. The aim of these is to ensure the companies have formal management accounting systems and practises in use. Therefore, the organisations included can be classified as medium and large size Finnish companies. The organisations are profit-making organisations and they operate in the following sectors:

- Hotels
- Transport, storage and communication
- Financial intermediation
- Renting of machinery and equipment

- Computer and related activities
- Other business activities: legal, accounting, book-keeping, tax consultancy
- Advertising

The manufacturing industry includes following sectors:

- Manufacture of food products and beverages
- Manufacture of pulp, paper and paper products
- Manufacture of rubber and plastic products
- Manufacture of basic metals
- Manufacture of machinery and equipment
- Manufacture of transport equipment
- Manufacture of textiles and textile products
- Manufacture of wood and wood products

Because of the functions of VOITTO+ database and how the sample was drawn from it, the number of companies included the above sectors cannot be provided. All other industries are excluded due to non-profit or retail and trade orientation. The database used to collect the information of the companies does not provide e-mail addresses of the CEOs. Due to the Web based survey method, it is essential to have the current addresses. Therefore, Inoa and Internet is used to get the e-mail addresses. The e-mail addresses of CEOs are used to gain an access for the target population. As a result of the selection criteria, 506 organisations are included in the sample. The organisations are all consolidated corporations, subsidiary companies are excluded. The response rates of web conducted studies have decreased and top management is found to participate the least in surveys. To ensure, statistical methods can be used to analyse the results, all 506 firms are included in the sample.

65 CEOs did not receive the e-mail with the link to the questionnaire due to wrong or expired e-mail addresses. Additionally, four CEOs refused to take part in the research due to a busy schedule and their company's policies. Therefore, the sample size is decreased down to 437 companies. Seven of the responses are unusable due to a small number of employees. The Figure 19 presents the response pattern of the study.

	No. of companies	%
Total number of companies included in the research	506	100
Companies which did not receive email	65	12,8
Companies which refused to respond	4	0,7
Companies which did not return questionnaire	364	71,9
Companies which returned completed questionnaires	73	14,4
Companies excluded due to small no. of employees	7	1,3
No. of usable responses	**66**	**13,0**

Figure 15. Response pattern of the study

Response rate of the survey (13 %) is fairly low. However, low response rate is common with web-based questionnaires.

4.3 Reliability and validity

According to Saunders et al. (2007) much of the internal reliability and validity depends on the design of the questions, the structure of the questionnaire and punctuality and accuracy of the pilot-test. Questionnaire validity is referred to the extent to which the questionnaire measure what is it supposed to measure. In order to a questionnaire to be valid, it has to be reliable (Saunders et al. 2007). Reliability is referred to the extend the findings are generalisiable and data is collected congruently.

The prior literature divides validity as follows: content, criterion-related and construct validity. Content validity indicates the extent the measurement instrument is adequate. Each concept dimension ought to have one or more measures and therefore, multi-item measures are recommended. To increase validity, a throughout literature review is commended to find how the concept have been used before. Additionally, the questionnaire should be pre tested. Criterion-related validity assesses the extent the measures make precise predictions. A statistical analysis such as correlation can be used to examine criterion-related validity. Construction validity refers to the extent to "which the measurement questions measure the presence of the constructs which they are intended to measure" (Saunders et al. 2007: 367).

Reliability is related to consistency. Respondents may understand questions differently than intended (Saunders et al. 2007). Therefore, reliability is referred to the strength of

the questions and whether they produce findings that are consistent regardless of the different time and different conditions. To increase reliability of the survey, the contingency characteristics are drawn from prior studies and therefore, they have been tested before. The questionnaire is sent to top management of the organisations who have the best knowledge of the organisation's strategy, MCS, perceived environmental uncertainty and performance. The measurement scales are another source of unreliability (Vahvaselkä 2006). The Likert scale is used to provide a reasonable number of alternative answers and to ensure easy comparisons. Also, the questionnaire includes only closed questions to ensure the different responses are caused by dissimilarity among respondents, not due to differences in the stimuli. The reliability of the questionnaire can be assessed by statistical methods and thus, factor analysis is employed. Besides, high response rate and non-systematic missing values are signs of reliability when the questionnaire is assessed qualitatively (Jokipii 2006).

The questionnaire was pilot tested with a group of CEOs or accounting managers to improve the focus and design of the questionnaire. The three CEOs included in the pilot test group were known by the researcher of this study. To reduce misunderstanding that may arise from unfamiliar terminology; the pilot test group was asked to focus on indicating the questions that were difficult to understand. Additionally, they were asked to include additional comments relevant to the survey. Finally, the pilot test group was requested to determine whether the survey is applicable to service organisations since the measurement instruments chosen for the survey have been used in studies conducted in manufacturing industry. There were no evidence of misunderstanding of the questions in the survey however, the measure instrument for management control systems was changed for an instrument more suitable for the study and is coherent with the research hypothesis and research questions.

4.4 Variables

The determinants related to performance: strategy, management control systems, perceived environmental uncertainty and industry are independent variables. All measures for the variables are drawn from existing instruments.

Independent variables

Management control systems

Management accounting research has investigated MCS as both independent and dependent variables (Chenhall 2003). Many of the studies have used the generic MCS characteristics developed by Chenhall and Morris (1986) to examine MCS practices. The main problem in MCS measurement has been the lack of coherence in measurement development and little replication (Chenhall 2003). Additionally, the past researches have focused on examining specific elements of accounting controls and generic information dimensions of MCS.

Chenhall (2003) suggests that by identifying a variety of control taxonomies and examine the relation of such typologies to certain aspects of MCS, would address the issue. Therefore, in this research forms of MCS are measured by traditional or contemporary types of control systems. The instrument used in this research to measure a variety of management accounting practices is developed by Chenhall and Langfield-Smith (2004) and it has been used by several other academics. Chenhall and Langfield-Smith (2004) measured the use of traditional and contemporary management accounting practices. They divide the practices into two different categories. The first category consists of following:

- Improving existing processes
- Manufacturing system innovations
- Traditional accounting techniques: e.g. budgeting for planning and control, performance measures like ROI, divisional profit reports, cost-profit-volume techniques for decisions
- Activity-based techniques

The second category includes the following practices:

- Quality systems
- Integrated systems
- Team-based structures
- Human resource management policies
- Balanced performance measures
- Employee-based measures

- Benchmarking
- Strategic planning techniques

The instrument consists of 42 survey items relating to two categories (See Appendix 6 and 7 for a complete list). A seven point scale is provided to rate the extent of how beneficial the practises are found, varying from 1= not beneficial 7= highly beneficial.

Industry

To provide comparisons the effects of independent variables on performance, the respondents are asked to indicate the industry to which their main products and services are related. In the figure 16 below is presented the amount of organizations which responded to the survey. There were 40 manufacturing and 26 service organizations included in the study. In the questionnaire the respondents asked to state the industry they operate. Some of the respondents stated precise sectors however, most participants did not. Therefore, there is no statistics available of which sectors the companies operate.

Industry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Manufacturing	40	60,6	60,6	60,6
	Service	26	39,4	39,4	39,4
	Total	66	100,0	100,0	100,0

Figure 16. Statistics for the industry

Perceived environmental uncertainty

The dimensions within the external environment are important to the design of MCS (Chenhall 2003). The prior literature provides a large body of literature of discussion on perceived environmental uncertainty and its measurement. However, interpretation of the studies is challenged by the variety of measures used to measure the same environmental construct. To apply a single valid and reliable environmental uncertainty measure, would make result comparisons easier and assist in building a coherent body of knowledge on the effects of environmental uncertainty of MCS design (Chenhall 2003: 138). Therefore, the same instrument which has been used in Hoque (2001) and

Jokipii (2006) is employed. The items have been widely used in accounting research and they were developed by Govindarajan (1984) and Gordon et al. (1984). The level of environmental uncertainty is evaluated by using eight items:

1. Suppliers' actions
2. Customer demands and tastes
3. Deregulation and globalisation
4. Market activities of competitors
5. Production technologies
6. Government regulation and policies
7. Economic environment
8. Industrial relations

In the questionnaire, the respondents are asked to indicate the perceived environmental uncertainty of their companies using a five point scale, varying from 5=completely unpredictable to 1=completely predictable.

Strategy

In management accounting literature strategy has been examined at different levels (Chenhall 2003). Possibly the most common level of examining strategy has been at subunit level. The other way of classifying strategy level is to corporate strategy and business strategy level.

There is variety of strategic typologies developed relating competitive strategy. In this research, the typology developed by Miles & Snow (1987) is used. It is one of the most commonly used and it can be applied to a wide range of industries. Their typology provides a useful framework for identifying the characteristics of control systems appropriate to particular strategies. Additionally, it has been empirically tested in several studies (Simons 1987, 1988, 1990; Hambrick 1981, 1983).

A brief description of each strategic typology is presented to the respondents and asked to indicate the one that applies the best to their organisation. The description of the typologies is developed by Gosselin (1999).

1. Defender: This type of organisation attempts to locate and maintain a secure niche in a relatively stable product or service area. The organisation tends to

offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering high quality, superior service, lower prices and so forth. Often this type of organisation is not at the forefront of developments in the industry –it tends to ignore industry changes that have no direct influence on current areas of operation and concentrates instead on doing the best job possible in limited area.

2. Prospector: This type of organisation typically operates within a broad product or service –market domain that undergoes periodic redefinition. The organisation values being "first in" in new product and market areas even if not all these efforts prove to be highly profitable. The organisation responds rapidly to early signals concerning areas of opportunities, and responses often lead to a new round of competitive actions. However, this type of organisation may not maintain market strength in all of the areas it enters.

3. Analyzer: This type of organisation attempts to maintain a stable, limited line of products or services, while at the same time moving out quickly to follow a carefully selected set of more promising new developments in the industry. The organisation is seldom "first in" with new products. However, by carefully monitoring the actions of major competitors' areas compatible with its stable product or service market base, the organisation can frequently be "second in" with more cost efficient product.

The figure 17 represents the respondents strategic orientations. There were 13 defenders, 22 prospectors and 31 analyzers. Therefore, the most respondents stated that they have adopted analyzer strategy which is a combination of prospector and defender strategies. It has traditional products with matrix organisational structure. It enters the market after availability is established (See figure 3 for more details).

Strategy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Defender	13	19,7	19,7	19,7
	Prospector	22	33,3	33,3	53,0
	Analyzer	31	47,0	47,0	100,0
	Total	66	100,0	100,0	

Figure 17. Strategic orientations of companies

Dependent variables

Performance

It is claimed that outcome variable should be such as that measures a combination of desired organisational goals and managerial performance. The goal of MCS research should be to provide results that would help managers to achieve their goals or the origination's targets. Effectiveness of an organisation also determines the appropriate fit between MCS and organizational variables (Langfield-Smith 1997). However, much research has been conducted to examine the use and usefulness of MCS. Additionally, performance has been included as an independent variable, providing explanations for the particular characteristics of MCS. In interpretation of such studies, attention should be paid to issues such as that MCS may be used although they are not perceived useful, beneficial and satisfactory. However, regardless of the level of use and usefulness of MCS, organisational performance may still be high (Chenhall 2003). To address such challenges, Chenhall (2003) suggests using a combination of non-financial and financial measures to measure performance.

The prior research have been dominated by measuring organisational outcome i.e. performance by self-assessment process. The issue of validity in self-assessment has been raised (Chenhall 2003: 134). The evidence against the issue claim that an employee's self-assessment correlates with objective assessments (Venkatraman and Ramajunam 1987). However, evidence also exists to support subjective performance assessment (Furnham and Stringfield 1994). A subjective self-assessment by subordinates is used to evaluate performance in this research.

The respondents are asked to rate the company's performance for the main product or service in comparison to their closest competitor, using a seven point scale from 1=significantly lower to 7=significantly higher. This instrument is developed by Solier (2000). To review the questions related to this variable, see Appendix 6 and 7.

The above variables and measurement instruments provide the base for the questionnaire. The responses received from the survey are analysed in structural equation model program. The next subchapter reviews the technical analysis of the study.

4.5 Structural Equation Modeling

General overview

Structural equation modelling (SEM) is used in a variety models in an attempt to discover relations among observed variables. The aim of structural equation modelling is to examine whether the theoretical research model supports by the data (Schumacker and Lomax 2004). Additionally, SEM enables simultaneous analysis of multiple relationships; it determines the significance of each relationship among variables (Schumacker and Lomax 2004). Smith and Langfield-Smith (2004) claim, that SEM provides a way to build a comprehensive model to test relations between contingency variables.

The basic SEM models include path analysis, regression analysis and factor analysis. SEM is particularly useful when a dependent variable in one equation becomes an independent variable in another equation (Smith et al. 2004:50). It also enables both direct and indirect effects to be examined thorough a mediating variable.

SEM has some advantages over multiple regression analysis and path analysis. Firstly, it provides a holistic approach to build a theoretical model as a variety of variables can be included in the analysis. Secondly, in regression analysis and path analysis, the variables should be free of measurement error to avoid bias in the estimation and weaken the significance. In SEM the effects of measurement error can be accounted.

There are several widespread methods of structural equation modelling such as covariance based LISREL and AMOS. These methods are used as a synonymous with the term SEM (Chin 1998). The major disadvantage of LISREL and AMOS is that they are poorly suited with small data samples and may provide improper and unmeaningful cases . An alternative method for SEM-based analysis can also be done by Partial Least Squares (PLS). PLS has a minimal demand for measurement scales, sample size and residual distribution. The PLS approach can be used in theory confirmation, to determine whether relations between variables exist and to test research propositions. Additionally, in situations where goal is to test prediction of a model, PLS is claimed to be an appropriate (Smith & Langfield-Smith 2004). However, one of the majors disadvantages of PLS is that it does not provide a range of fit indices to examine the overall fit of the model to the data. PLS provides Bentler-Bonett normed fit index however, it is argued to be meaningless because “the statistics are based on assumption

that the estimated parameters are chosen in an attempt to minimise the difference between the observed and the reproduced covariance matrices" (Hulland 1999: 202). According to Hulland (1999) this assumption is not PLS. Fit information is important due to the fact that the relations between the variables may be statistically significant however; the model may have a poor fit and lacks validity (Jokipii 2006). Due to the low theoretical information PLS provides, additionally SPSS is employed to run basic statistics and analysis of the research data.

Due to these advantages mentioned, SEM provides a way to overcome some limitations and problems related to regression and path analysis. Due to the small sample size, PLS approach is favoured over AMOS and LISREL and is therefore, used in this research.

Partial Least Square Analysis

The methodological considerations relevant to PLS are firstly to assess the reliability and validity of measures. Secondly, to determine the nature of the relationships between the latent variable and observed variables and thirdly, to interpret the path coefficients and to determine model adequacy and to select final model from the set of alternatives (Hulland 1999).

Latent variables are opposite to observed variables. Latent variables cannot be directly measure or observed. Rather they can be inferred from other variables that can be directly observed (Saunders 2007). In this study, performance is a latent variable whereas management control systems, environmental uncertainty, strategy and industry are observed variables.

Although, determining the links between the measures and constructs and interpretation of the path coefficients can be done simultaneously in PLS, the analysis of a model is often divided into two stages: on the first stage, the reliability and validity of the model is assessed and on the second stage the structural model is assessed (Hulland 1999). The objective of the two step approach is to ensure the measures are reliable and valid before drawing conclusions about the nature of the relationships between variables.

To determine the subsequent loadings and path estimates, PLS uses a three-stage algorithm. First, an interactive scheme of simple and multiple regressions variables on the model are run until the solution converges with the weights and loadings obtained

(Hulland 1999). Once the estimates for the latent variables are attained the path coefficients and mean scores for the variables are determined.

The theoretical model is evaluated by determining R-square for the latent variable. This interpretation is similar to that of traditional regression analysis. The path estimates of the model can be analysed the same way. The impact of a specific independent variable on dependent variable can be explored by checking the change in R-square. The path which decreases the R-square value can be deleted and the optimal model can be obtained.

The bootstrapping approach provides a method to test whether the path coefficients are significantly different from zero by determining t-values (df=500) for each path. This method resamples the data randomly. Therefore, the significances of the paths may vary depending on the number of times bootstrapping is carried out. The variation between the significances can be explained by randomisation (Smart PLS, 2007).

The quality measures of the model are also assessed in PLS. Internal consistency can be assessed by calculating composite reliability developed by Werts, Linn and Jöreskog (1974). Composite reliability differs from Crobach's alpha, although both of them measure reliability. According to Chin (1998) alpha is likely to be a lower bound estimate of reliability. Compose reliability is based on an assumption that the parameter estimates are accurate and all the indicators are equally weighted. However, it is noteworthy that compose reliability is only available for latent variables with reflective indicators for example, in factors analysis model in which a change in each indicator produces a change in the latent variable. Composite reliability and Crobach's alpha values should both be over >0,7 to consider the variable to be reliable (Nunnally 1967).

Average variance extracted (AVE) created by Fornell and Lacker (1981) measures the amount of variance that the latent variable component captures from its indicators in comparison to the amount due to measurement error (Chia 1999:321). It is recommended that AVE value should be over ,50 indicating that 50% or more variance of the indicators should be accounted for.

4.6 Hypothesis and research questions

The relations between perceived environmental uncertainty, management control systems, strategy on performance are reviewed in prior studies and research methods. Additionally, in the literature review each hypothesis was related to the relevant literature. This subchapter provides a summary of the hypothesis are where they are conducted.

It is stated earlier that certain strategic typologies are related to higher environmental uncertainty. The use of strategy offers organisations a method to interact with its environment. Chenhall (2003) proves that strategy can influence the nature of the external environment, the organisational technologies and structural arrangement of the control. It is argued that prospectors perform better in more dynamic and innovative environment than defenders (Hambrick 1983, Simons 1987). Simons (1987) further argues that industry dynamism is positively associated with ROI for prospectors and negatively correlated with ROI for defenders. Based on theses studies conducted, the following hypothesis is presented:

Hypothesis 1 (H1) *Perceived environmental uncertainty has a positive relationship with prospector strategy*

Regardless of the strategic orientation, companies can survive in the same environment with the same strategy (Miles et al. 2003). To increase performance, strategy has to be well implemented and internal structures should be consistent. Strategic decisions relating to financial changes and production efficiency have an impact on performance. To test this perspective, the following hypotheses are conducted:

Hypothesis 2 (H2) *Use of prospector strategy has a positive relationship with performance*

Hypothesis 3 (H3) *Prospector strategy has a mediating effect on perceived environmental uncertainty and performance*

Earlier studies have used different combinations of MCS dimension to examine the effect on performance. It is suggested that usefulness of broad scope of management accounting systems information is related to the level of perceived environmental uncertainty. As the level of perceived environmental uncertainty rises, companies use

more non-financial management control systems to cope and increase performance. Based on these studies, the following hypothesis is conducted:

Hypothesis 4 (H4) *Perceived environmental uncertainty has a positive relationship with non-financial management control systems*

In the accounting literature, high environmental uncertainty has been linked to usefulness of broad scope and timely information (Chenhall and Morris 1986, Chong and Chong 1997, Gul and Chia 1994). Broad scope of information tends to be more future-oriented, non-financial and external. It has been suggested that this type of information is essential for companies which perceive high environmental uncertainty. Additionally, the relation between PEU and performance is found to be indirect depending on the extent to which MCS are used. Therefore, the following hypothesis is presented:

Hypothesis 5 (H5) *Use of management control systems has a positive relationship with performance*

Hypothesis 6 (H6) *Management control systems has a mediating effect on perceived environmental uncertainty and performance*

Prior studies confirm the relations between perceived environmental uncertainty, strategy on performance and perceived environmental uncertainty, use of management control systems on performance. Therefore, the following hypothesis is conducted based on earlier studies and justifications presented above for the other hypotheses:

Hypothesis 7 (H7) *Perceived environmental uncertainty has a positive relationship with prospector strategy and use of non-financial management control systems to increase performance*

These research questions are related to the hypotheses developed.

Research Questions

1. Relating to H1: Does the level of perceived environmental uncertainty determine organisations' strategic orientation?
2. Relating to H2: Does strategic orientation determine the level of performance?

3. Relating H3: Does perceived environmental uncertainty increase use of strategy and enhance performance?
4. Relating H4: Does increase in perceived environmental uncertainty increase the use of non-financial management control systems?
5. Relating H5: Do use of certain type of management control systems increase performance?
6. Relating to H6: Does increase in perceived environmental uncertainty increases the use of non-financial management control systems to enhance performance?
7. Relating H7: Does perceived environmental uncertainty affect prospectors, defenders and analyzer by encouraging companies to use certain management control systems to enhance performance?

The hypotheses presented above are tested by calculating the standardised regression coefficients to determine the nature of the paths. Additionally, t-values are developed to investigate the significance of the relationships.

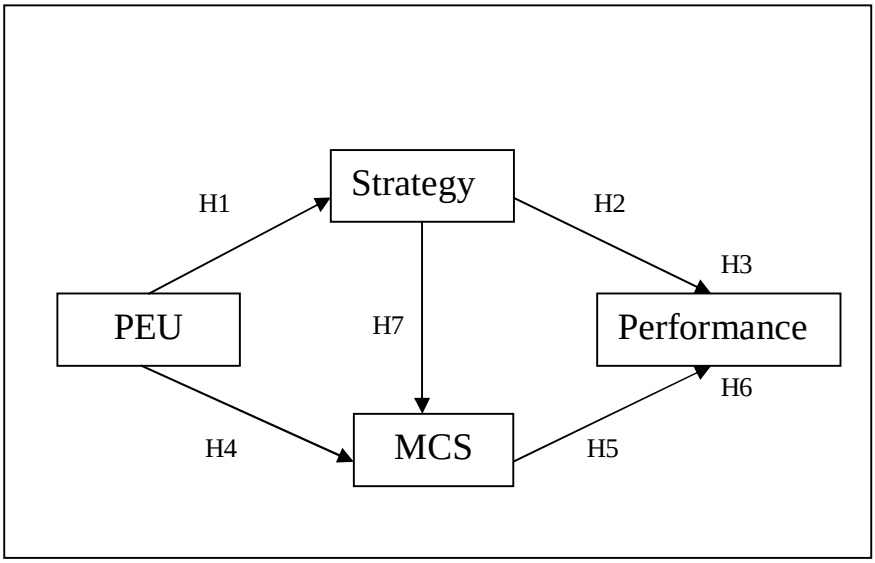

Figure 18. The construction model of the study, developed based on the hypotheses.

4.7 Summary

This study is conducted by employing a survey method. Over 440 service and manufacturing companies are sent an online questionnaire to investigate the

contingency relations between the research variables. The research sample consists of profit making organisations with 50 or over full time employees. The organisations have been in operation more than five years.

The companies included in the study are sent an e-mail including a link to the questionnaire. The survey is available for the respondents over a month. Reminders are sent to the participant to increase the response rate.

The questionnaire consists of questions relating to the research hypothesis. This study aims to examine the mediating role of strategy and MCS between perceived environmental uncertainty and performance in manufacturing and service industries.

The hypotheses are tested by regression coefficients and t-values to determine the significance of each path.

5. RESULTS

The research data relating to management control systems is analysed by using a factor analysis. The data falls into five categories: Mixed, benchmarking, financial, non-financial and traditional accounting practices. See appendix 8.8 for the factor loadings.

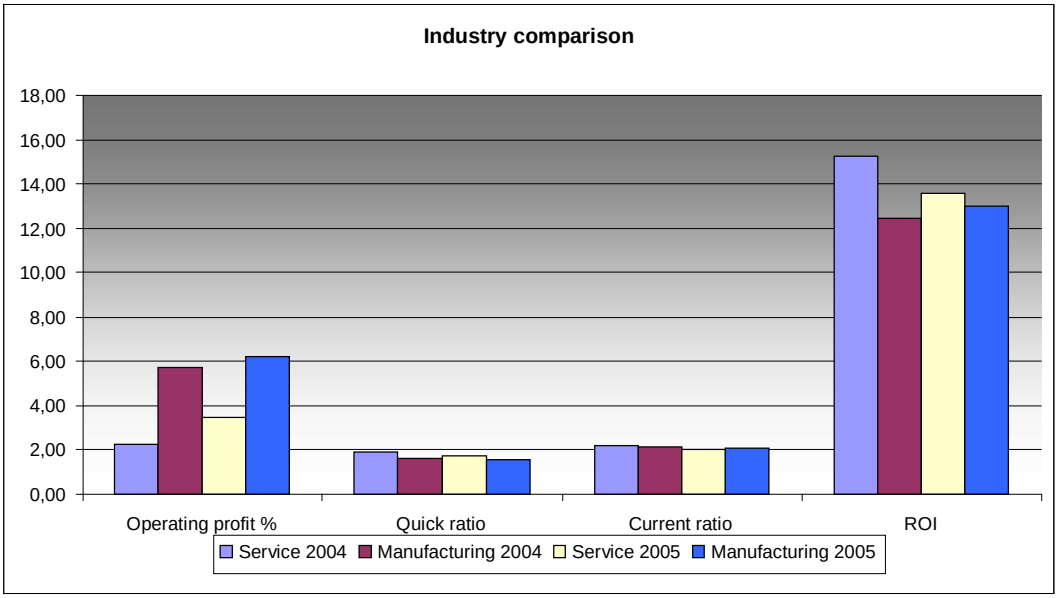

Figure 19. Comparison of ratios between service and manufacturing companies.

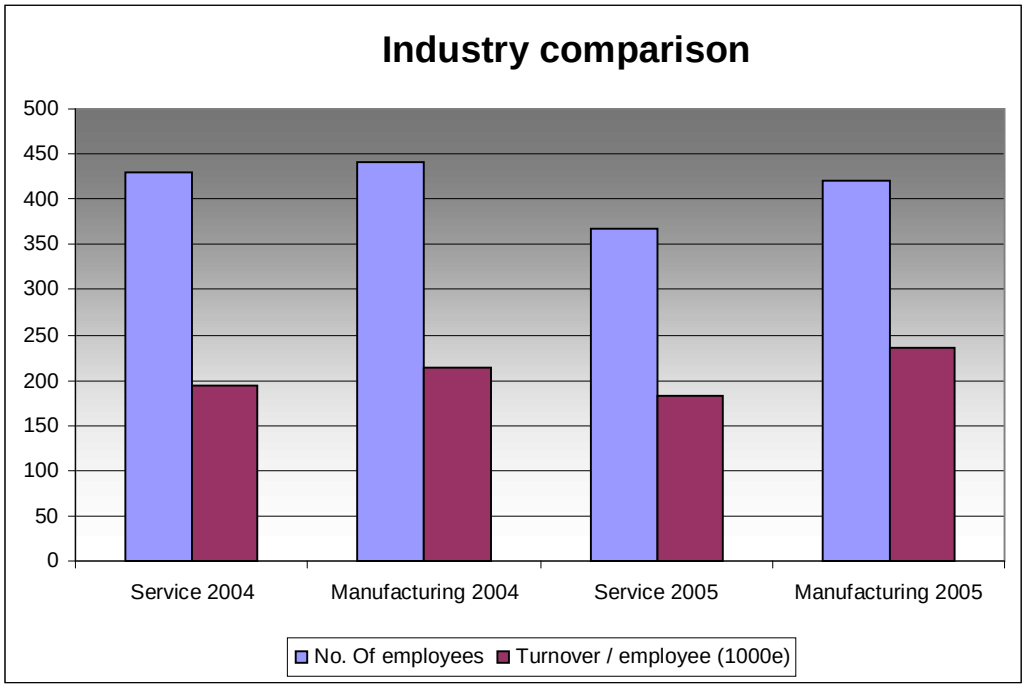

Figure 20. Comparison of number of employees and turnover in manufacturing and service organisations

The figure 19 and 20 provides some background information about the companies included in the study. The ratios are drawn from Voitto+ database. According to the financial information provided by the data base, in 2005 and 2004 manufacturing companies on average had higher operating profit ratio than service organisations. In regards of liquidity measured by quick and current ratios, there is little difference between the industries. Return on investment seems to be higher in service organisations than in manufacturing companies. This may be due to the financial structure of the companies.

In figure 20 is presented turnover and a number of employees in both industries. Service organizations employ twice the amount of people for the same turnover in comparison to manufacturing companies.

The research data from the survey is analysed by means of the Partial Least Squares (PLS) approach. The analysis is started by examining distributional characteristics of the data. There was no missing data as the participants were required to answer a question in the questionnaire before moving on to the next question. Missing data could influence the sample size requirements and deteriorate the power in the study (Marcolides and Sounders 2006). Additionally, strategy and industry variables were changed to dummy variables (0,1) and long decimals were rounded up. The analysis was started by assessing reliability by calculating Cronbach's Alpha, Composite reliability and Average Variance Extracted (AVE) (See Table 2). The values for2the data show satisfying levels indicating sufficient reliability.

Reliability

	AVE	Compose Reliability	Crobach's Alpha
MCS	0,4667	0,8065	0,7458
PEU	0,5283	0,8977	0,8813
Performance	0,5182	0,8049	0,7557

Table 2. Reliability of the variables

Descriptive statistics

Variables	Min	Max	Mean	Standard deviation
PEU	1,13	4,13	2,54	0,650
Financial performance	2,44	7,00	4,56	1,051
Quality performance	2,75	6,75	5,00	0,775
HR performance	2,75	6,25	4,75	0,783
MP performance	3,00	7,00	5,04	0,849
Performance	3,41	6,55	4,77	0,722
MCS	2,10	5,76	3,83	0,791
Mix MCS	2,00	6,70	4,41	1,092
Benchmarking MCS	1,17	7,00	3,71	1,251
Financial MCS	1,75	6,38	3,76	1,069
Non-financial MCS	1,29	5,71	3,15	1,155
Traditional MCS	1,67	7,00	3,56	1,194

Table 3. Descriptive statistics for variables

The analysis was continued by estimating the descriptive statistics for the variables. Table 3 provides the statistics. The statistics show that most respondents indicated that they operate in an environment in which their competitors' actions are relatively easy to predict. Also, the participants rated their performance in comparison to their closet competitor to be in the same (4= same) level as their competitors. Management control systems seemed not to be highly beneficial or no beneficial to the respondents. However, it is noteworthy that this scale did not measure what control systems were implemented and used by the companies.

Pearson Chi-Square values for variables

	Manufacturing	Service
PEU	,341	,341
Perf Quality	,760	,119
Perf HR	,119	,760
Perf MP	,254	,254
PerfAll	,307	,307
MCS	,267	,267
MCS Mix	,118	,118
MCS Benchmark	,446	,446
MCS Fmeasures	,101	,101
MCS Non-F measures	,626	,626
MCS Traditional	,610	,610

Table 4. Chi-Square test results

Table 4 above represents the results of the cross tabulation analysis. Chi-Square test values prove that since all the values of the variables are above 0,05, there is no dependence of the industry type on them. Consequently, there is no difference between the bivariate relationships in comparison to manufacturing and service industries.

In order to further analyse the data, PLS is employed. The paths between the latent variable were estimated. The path weighting scheme is used. According to Chin (1998) and Jayawardhena, Kuckertz, Kautonen and Karjaluoto (2007) it is the only scheme that evidently considers the conceptual model directions of the causal relationships between exogenous and endogenous variables in path analysis. To determine the significance of each estimated path, a standard bootstrapping procedure is applied with 500 resamples consisting of the same amount of cases as in the original sample. Results show that the independent variables explain little amount of performance's variance (R^2=0,193) (See table 4) indicating that the variables have no explanatory power of the model. Therefore, the results of PLS- analysis does not support the theoretical model of the research.

This research aimed to investigate the contingency relations between perceived environmental uncertainty, management control systems and strategy on performance in service and manufacturing industries. The analysis in PLS and correlation matrix revealed that that some statistically significant relationships exist between the contingency variables. The correlation matrix is presented in appendix 9.

The matrix indicated that there is a significant relationship between perceived environmental uncertainty and non-financial MCS. Additionally, financial management control systems are significantly correlated with performance. The industry did not correlate with any of the relationships however, there is a more positive relationship with service organisations and performance than manufacturing organisations however; the correlation is not statistically significant.

The analysis in PLS gave the same results. In the table 5 below, the correlations between the variables are presented. The results of the correlation analysis are reviewed based on the bivariate hypothesis.

Significant relationships

As mentioned above, a significant relationship between perceived environmental uncertainty and non-financial MCS was found. The correlation was 0,457 at the 0,01 level. Also there was a significant relationship between financial MCS and performance, correlation being significant -0,376. The results also confirmed the negative correlation between MCS and performance (-0,289) at the 0,05 level.

PEU –strategy relationship

An insignificant positive relationship was found between prospector strategy and PEU. With defender and analyzer strategies the relationship was negative and insignificant. This is in accordance with the earlier studies, which have suggested that companies that have adopted prospector strategy may face higher environmental uncertainty (Simons 1990).

The correlation analysis also revealed that prospectors and defenders were negatively correlated with performance. However, analyzers had a positive relationship with performance. Theses correlations were no significant.

PEU- MCS relationship

There was an insignificant positive relationship between PEU and MCS. MCS practises which consists of for example, ABC, target costing, value chain analysis and CVP analysis were negatively correlated with PEU. Financial, non-financial, benchmarking and traditional MCS had a positive correlation with PEU, non-financial MCS having a significant relationship to PEU. These associations were not significant.

The correlation analysis also indicated that financial (-,376) and mixed (-,260) MCS and MCS (-,289) in which all the five factors were combined were significantly correlated to performance. The relationship was negative. Table 4 demonstrates the correlations between financial performance and each factor of MCS.

MCS –performance relationship

Performance was significantly and negatively associated with MCS (-,289 at 0,05 level). Product and service quality performance was positively correlated with non-financial MCS and negatively with financial, traditional and mixed MCS. Human resource and managerial performance were negatively and insignificantly associated with MCS. Financial performance was significantly correlated with MCS (-,353, at 0,01 level) and financial MCS (-,367, at 0,01 level) and mixed MCS (-,248, at 0,05 level). With non-financial, benchmarking and traditional MCS the association was also negative but insignificant.

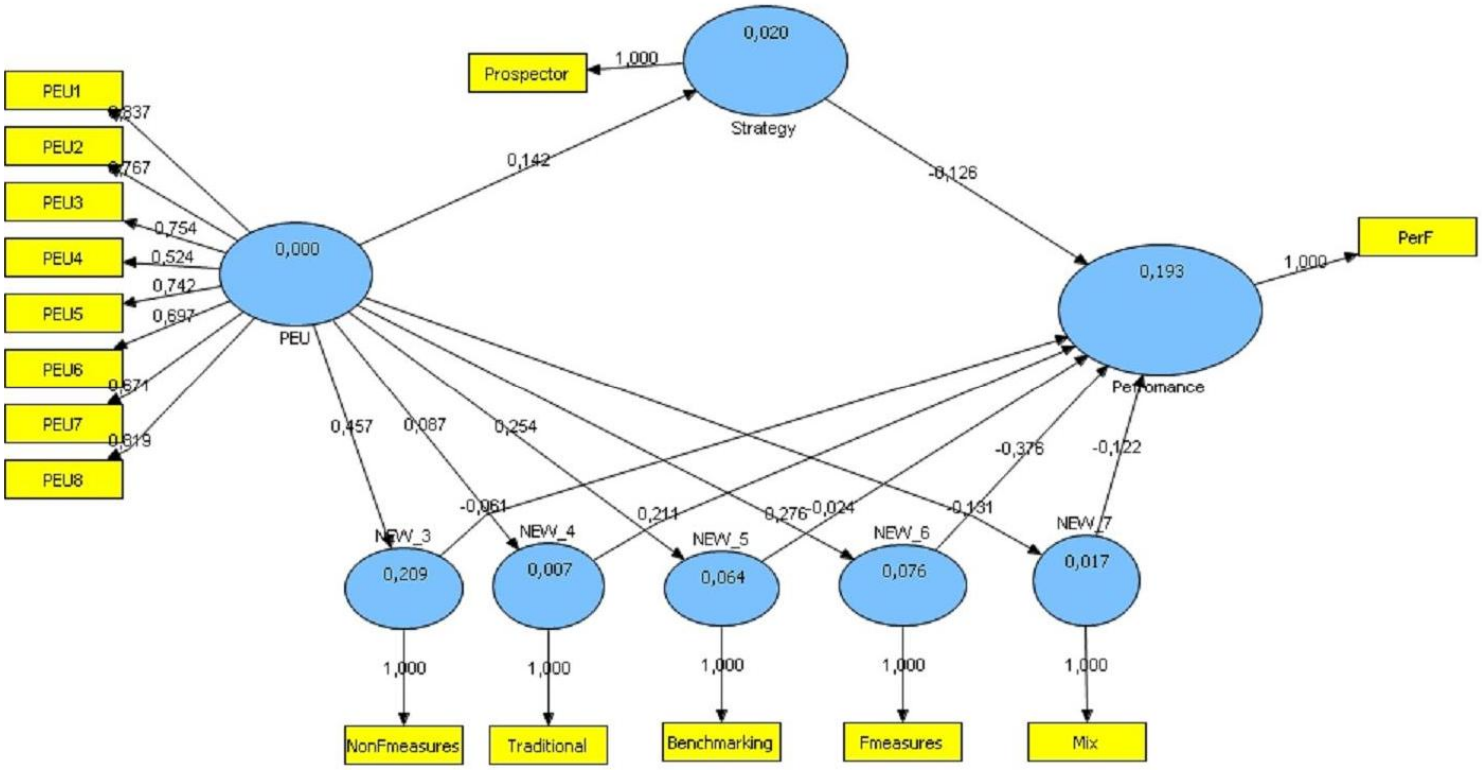

Table 5. Correlations between the variables.

The analysis in PLS indicated that perceived environmental uncertainty has a significant direct relationship to management control systems (t-value = 2,37, p≤ 0,01). Non-financial, financial, traditional and mixed control systems have positive relationship

with performance. Benchmarking did not contribute the R-square value of model indicating that it did not explain an increase in performance.

Defenders have a significant direct relationship with non-financial management control systems (t-value = 1,693, p≤ 0,01). Defenders and analyzers have a positive relationship with performance and prospectors have negative relation to performance however, these relations do not seem to be statistically significant.

Prospector strategic orientation seems to be adopted the most in both manufacturing and service organisations than defender strategy. The relations are however, statistically non –significant.

The results also show a significant direct and positive relationship between PEU and non-financial management control systems (t-value = 3,704, p≤ 0,01) and benchmarking (t-value = 1,955, p≤ 0,01) and significant negative relationship with financial control systems (t-value = 2,281, p≤ 0,01).

Financial control systems have direct significant and positive relationship with performance (t-value = 1,460, p≤ 0,01)

After the direct relationships were tested, the indirect relationships were examined. According to the results, there was no indirect relationship between perceived environmental uncertainty, strategy and performance. Instead, there was indirect relationship between perceived environmental uncertainty, MCS and performance. As stated above, PEU has a direct positive relationship with non-financial control systems and negative relationship with financial control systems. Financial controls systems have direct relationship with performance.

5.1 Implications

The findings of this research have some practical relevance. The results prove that prospectors face higher environmental uncertainty than defenders. Prospectors are said to be the creators of change and are continuously in search for new market opportunities. Therefore, they should invest on R&D to increase the predictability of the future to increase performance. Although, investing on appropriate things is important

and finding the right match between environment and strategy is vital for companies because a poor match between strategy and environment may lead to decreased performance.

The findings suggest that use of management control systems affect performance. Using the right systems increases performance in both service and manufacturing industries, regardless of the strategic orientation of the company. Non-financial control systems are particularly useful for companies facing high environmental uncertainty. The level of environmental uncertainty is an important ingredient that affects the type of control systems beneficial. Therefore, managers who find themselves in high environmental uncertainty should use non-financial control systems to help to predict the future.

This research has drawn attention to the importance of use of management control systems and it effects on performance. To increase financial performance, companies should use a combination management control systems. The use of non-financial, financial and traditional control systems may increase performance, whereas use of benchmarking does not help companies to increase financial performance of an organisation.

This study offers some verifications and understanding for what controls systems companies should use when facing high environmental uncertainty and when specific strategic orientation has been adopted to increase performance. Additionally, this research has provided some comparisons of the contingency relations between the service and manufacturing industry and the effect of industry on the relations. However, there are some questions to be answered. How does the size and structure of a company affect strategy, MCS, PEU and performance –relation? The service sector is said to be highly heterogeneous. Is there a general pattern among companies within the service industry? Do sectors have similarities in MCS and strategies used? Based on the findings of this study it seems that contingency relationships found from manufacturing industry are applicable to service organisations. These conclusions are however subject to the study's following limitations.

5.2 Limitations

In interpretation of the results of this study, certain limitations must be considered. First, the measurement of performance is based on self-rating. Self-ratings have been

criticised for lacking objectivity. However, there is no clear evidence to suggest that subjective measures would be more reliable and valid (Brownell and Dunk 1991).

Secondly, the response rate of the study was fairly low 13 % and therefore, this decreases the generalisability of the findings.

Thirdly, the use of self-typing in the measurement instruments proposes some challenges. The relevant strategic typology could have been indicated on the basis of intended strategy, realised strategy or emerged strategy (Minzberg 1978, Gosselin 1999). Additionally, the respondents may have indicated the strategy which they believe to be the best. To minimise this limitation, the questionnaire stated that the three alternatives cannot be ranked.

The self-rating limitation was also related to management control systems measurement. The use of self-rating to indicate how beneficial the management accounting practises may have caused misunderstanding and confusion amongst respondents. Most respondents may not have been familiar with the practises and thus indicated the practises being non –beneficial. However, the accounting practises may be highly beneficial, but due to a lack of resources, the systems are not implemented and not in use in the organisations. Additionally, self-rated performance measure instrument in which the respondents are asked to rate their performance against the closest competitor may provide less subjective view. The instrument however, may be more convenient for the respondents as exact figures of financial, quality and human resource performance are not required. This may have affected the response rate of the questionnaire. Likewise with the performance measurement instrument, perceived environmental uncertainty is a subjective measure of the level of uncertainty. Each respondent determines the level of environmental uncertainty and therefore, it is an individual's perception rather than an absolute fact.

Despite these limitations, this study makes a contribution to the accounting research by verifying the relations between the research variables and stating that industry does not affect the contingency relations.

5.3 Summary

Based on the research findings, H1 can be accepted. Perceived environmental uncertainty has positive relationship with prospectors. This finding is in accordance with the strategic typologies and features developed by Porter (1980) and Miles and Snow (1972). However, none of the strategic orientations seems to perform better than one another. Therefore, prospector strategy has no mediating effect on PEU and performance and consequently H2 and H3 is rejected. As stated earlier in the literature review, none of the strategic orientations perform better. The success and increased performance comes from cohesion between organisational environment, strategy and internal structures and systems (Govindarajan 1988).

Non-financial management control systems have a positive relationship with perceived environmental uncertainty and therefore, H4 can be accepted. The usefulness of broad scope of management control systems and MCS- relation was also found by Chenhall and Morris (1986), Chong and Chong (1997), Gordon and Narayanan (1984) and Gul and Chia (1994).

H5 is accepted as there is a positive correlation between non-financial management control systems and performance. The relation is also statistically significant. According to Chenhall (2003) in the accounting literature, evidence for such a link does not exist. Rather some aspects of MCS are found to be useful than others. The usefulness of the aspects of MCS increases the use of such systems and may increase job satisfaction among employees. Consequently decision making is improved and organisational goals can be achieved which therefore, may lead to increased performance.

H6 can be accepted. Perceived environmental uncertainty has a relation to non-financial MCS and these control systems have correlation to performance. Therefore, MCS have a mediating effect on performance.

H7 cannot be accepted either due to the fact that according to the results PEU, prospector strategic orientation and MCS relation does not increase performance.

6. CONCLUSION

Contingency theory has been widely used in management accounting research, particularly in the studies of management control systems. The effectiveness and increased performance of a company have been attempted to explain by investigating various contingency variables. One of the major challenges of contingency research has been low explaining power of the models (Chenhall 2003). This is due to a limited number of variables studied in the researches. The aim of this research was to examine the effect of perceived environmental uncertainty on strategy, management control systems and performance in profit-making service and manufacturing organisations.

The research objective is based on contingency theory, which suggests that there is no universally applicable management control system (Fisher 1998). Rather, the choices of control techniques are dependent on surrounding circumstances of an organisation. A better fit between the context and design of controls leads to an increased performance.

Much of the earlier studies in accounting have been conducted in the manufacturing industry (Silvestro et al. 1992). The service industry has been investigated too, however, the studies have focused on examining the contingency relations in non-profit service organisations or they have been focused in a specific sector in the service industry (Silvestro et al. 1992). The service industry is said to be more environmentally uncertain. Also, the cost structure of service organisations and the qualities of intangibility, heterogeneity, simultaneity and perishability make management control and performance measurement challenging in service industry (Silvestro et al. 1992). These factors may make contingency relations in service organisations dissimilar in comparison to manufacturing organisations. Comparisons between the contingency relations between service and manufacturing have not been studied much. In fact, there is an obvious lack of contingency studies focused on providing comparisons of the contingency relations in manufacturing and service organisations. Due to this, the contingency relations found for the manufacturing industry provide a foundation for this study.

The accounting literature claims that there is a correlation between strategic orientations, management controls systems and performance. It also suggests that particular strategic orientations are likely to use specific aspects of MCS to increase performance. Prospectors have a tendency to use non-financial control systems where as

defenders are likely to use more financially oriented control systems. Additionally, it has been found that there is an obvious link between management accounting systems, perceived environmental uncertainty and performance. Prospectors are argued to operate in more environmentally uncertain surroundings than defenders. Prior studies also suggest that the higher the perceived environmental uncertainty, the more companies use MCS to increase performance. It is noteworthy that the results of prior studies relating to perceived environmental uncertainty- strategy –management control systems –performance relation have rather contradictory and the explaining power of different variables on performance has been low. Additionally, there have been variety in results concerning the type of effect of these variables have on performance. For instance, both moderating and mediating effect of environmental uncertainty between strategy and performance have been found.

The research hypotheses of this study were conducted from the earlier studies. Each hypothesis was linked to a research question. Based on the earlier studies conducted on manufacturing industry, the relationships tested were mediating forms of fit. This form of fit may be analysed by developing a path analysis. The hypotheses and the relationships between the variables were tested with structural equation modelling program called Partial Least Squares. The aim was to investigate which of the relations are significant and whether strategy and MCS have a mediating role between PEU and performance.

This research was quantitative in nature and over 500 profit-making service and manufacturing organisations are included in the study. The number of companies included in the study was decreased down to 437 due to various reasons. The contact details of the companies were collected from Voitto+ database and the Internet. The respondents who mainly consist of CEOs and CFOs were sent an email containing a link to the survey. The respondents were given a month in total to fill the questionnaire. The response rate of the study was rather small (13%).

The basic analysis of the results claim that most organisations that participated in the study operate in an environment in which their competitors' actions are relatively easy to predict. Also, the respondents stated that they perform as well as their competitors. Management control systems seemed not to be highly beneficial or no beneficial to the respondents.

The findings of the study suggest that industry does not affect the contingency relations. Therefore, the same contingency relationships seem to be applicable for both manufacturing and service organisations. The correlation analysis revealed a significant relationship between perceived environmental uncertainty and non-financial MCS. Also there was a significant relationship between financial MCS and performance and a negative association between MCS and performance.
The results confirmed the existence of some contingency relations found in the earlier studies. Organisations, which have adopted prospector strategy, perceive higher environmental uncertainty than defender and analyzer strategy adopters. However, none of the strategic orientations perform better. Additionally, companies which perceive high environmental uncertainty are likely to use non-financial management control systems. Additionally, there is a positive relationship between non-financial control systems and performance. Therefore, when companies face high environmental uncertainty, they prefer using non-financial control systems to increase performance.

These findings have some practical relevance. The results recommend that managers finding themselves in high environmental uncertainty should use non-financial control systems. Benchmarking does not increase the financial performance of an organisation. The results also suggest that prospectors operate in more turbulent environment and therefore, investing on R&D could be beneficial for them to increase performance. Although, appropriate investments at the right time are vital for companies, they should also pay attention to the fit between environment and strategy. The use of management control systems in general increase an organisation's performance and therefore, it is highly recommended that companies make investments on them.

When interpreting the results of this study, certain limitations must be acknowledged. Due to the low response rate of the study the generalisability of the findings is decreased. The measurement instruments of performance, MCS and strategy may have caused confusion among respondents due to the self-rating indicators. Also, when indicating the strategic orientation, respondents could have marked strategy as intended, realised or emerged. The other limitations were concerning the size and location of the companies. There was a great variance in the size of the companies included in the study, differing from 50 up to 4000 employees. Additionally, the study only consisted of Finnish companies.

Despite of these limitations, this study makes a contribution to the accounting research by verifying the relations between the research variables and stating that industry does not affect the contingency relations.

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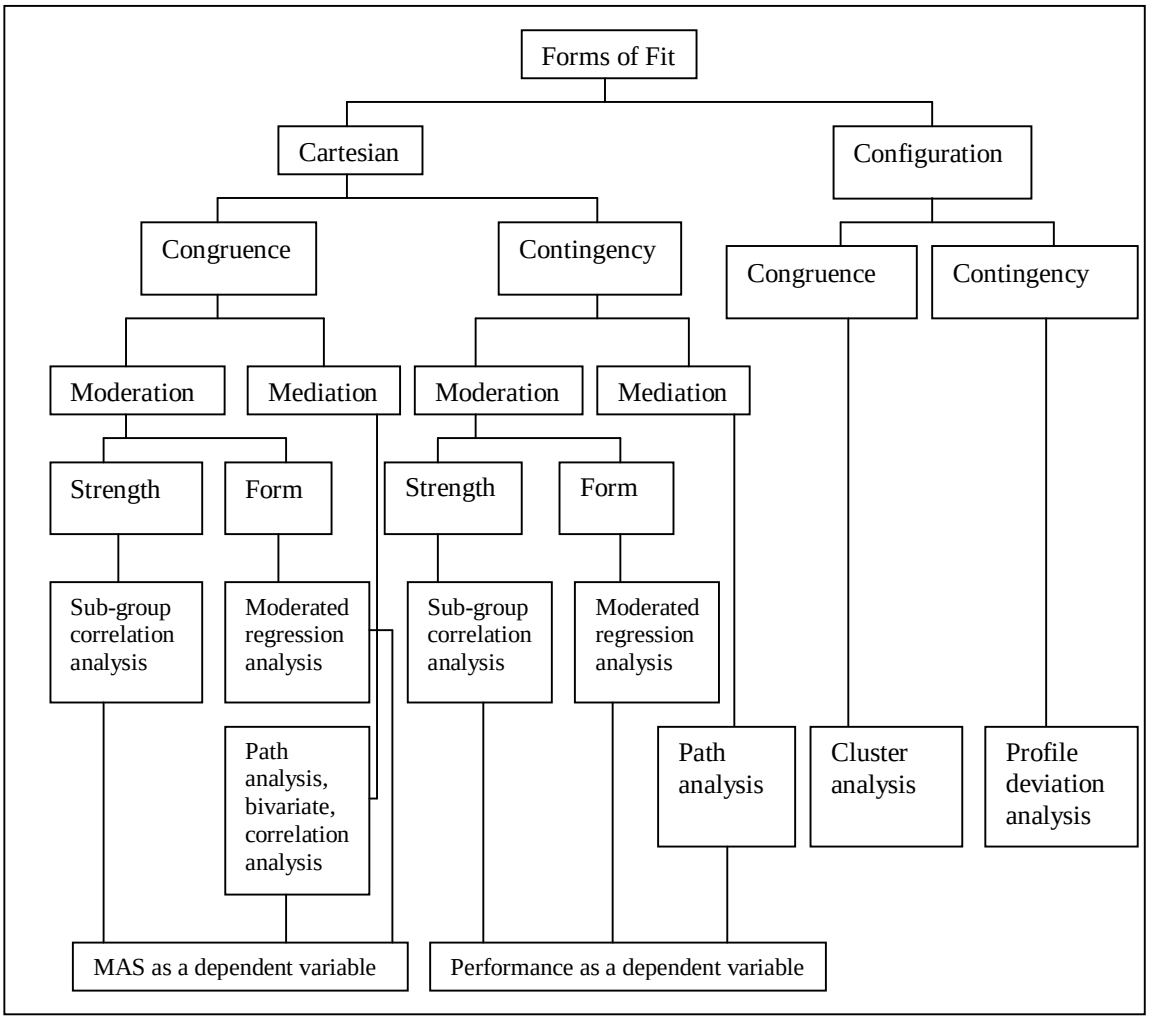
8. APPENDIX

8.1 Appendix 1: A classificatory framework for mapping contingency fit



A classificatory framework for mapping different forms of contingency fit used in strategy –MAS research. Source: Gerdin et al. (2004: 304)

8.2 Appendix 2: The cover letter for the respondents

Arvoisa vastaanottaja,

Yrityksissä tehdään jatkuvasti investointeja ohjausjärjestelmiin, jotta pystyttäisiin ennakoimaan muutoksia toimintaympäristössä ja ennustamaan yrityksen tulevaisuutta. Yrityksen johtamiseen ja suorituskykyyn kohdistuu odotuksia, joihin on vaikea vastata ilman ajantasaista ja objektiivista tutkimustietoa.

Tutkimuksellani pyrin tuottamaan tietoa, jota voitaisiin käyttää hyväksi yrityksen toiminnan johtamisessa ja tuloksen parantamisessa. Tämän tutkimustiedon tuottamisessa Teidän näkemyksenne yritysmaailman asiantuntijana ovat ensisijaisen tärkeitä.

Pyydän nyt apuanne tutkimukseni eteenpäin viemisessä. Oheisesta linkistä pääsette kyselyyn. Jos ette pääse linkistä automaattisesti täyttämään kyselylomaketta, kopioi ja liitä linkki internetin osoitekenttään. Toivoisin Teidän vastaavan kyselyyn mahdollisimman pian, kuitenkin 15.6.2007 mennessä. Vastaaminen vie ajastanne vain noin 5-10 minuuttia.

http://forms.uwasa.fi/lomakkeet/132/lomake.html

Vastanneiden kesken arvotaan kolme uutuuskirjaa: Aaltonen, Petri jne. (2006).: Organisaation strategian toteuttaminen suunnitelmista käytäntöön. Lisäksi kaikki vastanneet saavat halutessaan tiivistelmän tutkimustuloksista niiden valmistuttua.

Vastauksianne käsitellään erittäin luottamuksellisesti, eikä yksittäisten yritysten tunnistettavia tietoja esitetä missään yhteydessä.

Vastaan erittäin mielelläni kaikkiin asiaa koskeviin tiedusteluihin ja kysymyksiin, joten älkää epäröikö ottaa yhteyttä.

Terveisin,

Jonna Huusko

E-mail: jonna.huusko@uwasa.fi

8.3 Appendix 3: The cover letter for respondents in English

The cover letter of an email to the respondents

Dear recipient,

Companies are making constantly investment in tools for management and control systems in order to enable to predict changes in the business environment and predict the future. New expectations are made on management and performance from outside and responding to these challenges is difficult without up-to-date research data.

My forthcoming research aims to generate knowledge that could be utilized in development of company management and performance. As a representative of business life, your views are essential in the generation of such research knowledge.

Therefore, I am asking for your assistance and contribution for my research. The link below takes you to the questionnaire, copy and paste the link in your web browser. If you would kindly fill out the questionnaire as soon as possible, no later than 15th June 2007. Responding only takes 5-10 minutes.

http://forms.uwasa.fi/lomakkeet/132/lomake.html

There is a lottery among the respondents and three new books by Aaltonen, Petri et al. (2006). Organisaation strategian toteuttaminen suunnitelmista käytäntöön are given away. Additionally, all respondents will be given a summary of the results once the research is completed.

Your responses are confidential and no things that could help in identifying your company are presented.

If you have any questions or enquiries, please do not hesitate to contact me.

Best Reagrds,

Jonna Huusko

E-mail: jonna.huusko@uwasa.fi

8.4 Appendix 4: Reminder for respondents

Arvoisa Vastaanottaja,

Jonkin aikaa sitten pyysin apuanne koskien yritysten suorituskykyä käsittelevää tutkimustani. Lähetin Teille sähköpostia ja linkin kyselyyn, jonka toivoin teidän täyttävän omaa yritystänne silmälläpitäen. Yritystoimintaan liittyvien kiireiden vuoksi ette ehkä ole vielä ehtinyt vastaamaan.

Lähestyn Teitä vielä kerran, koska jokainen täytetty kyselylomake on erittäin tärkeä tutkimuksen onnistumiseksi. Kyselyyn pääsette oheisesta linkistä tai kopioimalla osoitteen selaimen osoitekenttään.

http://forms.uwasa.fi/lomakkeet/132/lomake.html

Muistattehan, että vastannet yrityksen saavat halutessaan koosteen tutkimustuloksista sekä mahdollisuuden osallistua kirja-arvontaa, jossa on palkintona kolme kappaletta Aaltonen, Petri jne. (2006).: Organisaation strategian toteuttaminen suunnitelmista käytäntöön – kirjoja.

Toivon, että vastaisitte mahdollisimman pian, kuitenkin 15.06.2007 mennessä. Vastaaminen vie aikaanne vain 5-10 minuuttia.

Toivon aktiivista osallistumista tutkimukseeni. Vastaan mielelläni asiaa koskeviin kysymyksiin ja tiedusteluihin.

Ystävällisin terveisin,

Jonna Huusko

jonna.huusko@uwasa.fi

8.5 Appendix 5: Reminder for respondents in English

Dear recipient,

A while ago I asked your assistance for my forthcoming research about organizations'' performance. I sent you an email with a link to the questionnaire and I hope you would complete it with regard to your company. Due to your schedule and pressure of work, you may have not had time to complete it yet.

I am writing to you a second time as every completed questionnaire is essential for the success of the research. By clicking the below link you get to the questionnaire.

http://forms.uwasa.fi/lomakkeet/132/lomake.html

As you may recall, all respondents get a summary of the findings and an opportunity to take part in a book lottery in which three books by Aaltonen Petri et al. (2006), Organisaation strategian toteuttaminen suunnitelmista käytäntöön are given away.

I wish you colmpleted the questionnaire as soon as possible, the latest by 15th June 2007. Responding only takes 5-10 minutes.

I look forward you taking part in the research. If you have any questions or enquiries, do not hesitate to contact me.

Best Regards,

Jonna Huusko

jonna.huusko@uwasa.fi

8.6 Appendix 6: The research questionnaire in English

Present job title:
[ ] CEO
[ ] Other, please specify _____

Age:
[ ] Under 30 years
[ ] 30-39 years
[ ] 40-49 years
[ ] 50-59 years
[ ] 60- years

How long have you been in current position:_____ yrs

Main business of your organisation? (if you know your organisation's standard industrial classification TOL 2002, you may mark it) _____

Number of full-time employees in your organisation: _____ persons

Total sales turnover in 2006: _____ €

1. **Which of the following descriptions most closely fits your organisation compared to other firms in your industry?** Please consider your company as a whole and note that none of the types listed are good or bad.

   (A) This type of organisation attempts to locate and maintain a secure niche in a relatively stable product or service area. The organisation tends to offer a more limited range of products or services than its competitors, and it tries to protect its domain by offering high quality, superior service, lower prices and so forth. Often this type of organisation is not at the forefront of developments in the industry –it tends to ignore industry changes that have no direct influence on current areas of operation and concentrates instead on doing the best job possible in limited area.

   (B) This type of organisation typically operates within a broad product or service –market domain that undergoes periodic redefinition. The organisation values being "first in" in new product and market areas even if not all these efforts prove to be highly profitable. The organisation responds rapidly to early signals concerning areas of opportunities, and responses often lead to a new round of competitive actions. However, this type of organisation may not maintain market strength in all of the areas it enters.

   (C) This type of organisation attempts to maintain a stable, limited line of products or services, while at the same time moving out quickly to follow a carefully selected set of more promising new developments in

the industry. The organisation is seldom "first in" with new products. However, by carefully monitoring the actions of major competitors' areas compatible with its stable product or service market base, the organisation can frequently be "second in" with more cost efficient product.

2. **In comparison to your closest competitors in your industry, how would you rate your firm's performance for its main products along each of the dimensions, at the current time?** Check one box for each dimension by using a scale from 1=significantly lower to 7=significantly higher.

Financial performance

	Significantly lower			Same			significantly higher
1. Sales growth	1	2	3	4	5	6	7
2. Market share	1	2	3	4	5	6	7
3. Operating profits	1	2	3	4	5	6	7
4. Capital structure	1	2	3	4	5	6	7
5. Profit margins	1	2	3	4	5	6	7
6. Cash flow	1	2	3	4	5	6	7
7. ROA	1	2	3	4	5	6	7
8. ROI	1	2	3	4	5	6	7
9. Return on sales	1	2	3	4	5	6	7

Product or service quality

10. New product development	1	2	3	4	5	6	7
11. Existing product innovation	1	2	3	4	5	6	7
12. Product or service quality	1	2	3	4	5	6	7
13. Product or service reputation	1	2	3	4	5	6	7
14. Customer service	1	2	3	4	5	6	7
15. Cost effectiveness	1	2	3	4	5	6	7
16. Overall competitive position	1	2	3	4	5	6	7
17. No of complaints	1	2	3	4	5	6	7

Human resource performance

18. Quality of work force	1	2	3	4	5	6	7
19. Employee turnover	1	2	3	4	5	6	7
20. Labour productivity	1	2	3	4	5	6	7
21. Cross-training of workforce	1	2	3	4	5	6	7

Managerial performance

22. Managerial abilities to guide the firm in achieving goals 1 2 3 4 5 6 7

3. How well can you predict the changes in the environment of your organisation? Please indicate the correct number for your organisation using a scale of 1= completely unpredictable to 5=completely predictable

	Completely unpredictable				Completely predictable
1. Suppliers' actions	1	2	3	4	5
2. Customer demands, tastes and preferences	1	2	3	4	5
3. Deregulation and globalisation	1	2	3	4	5
4. Market activities of competitors	1	2	3	4	5
5. Production technologies	1	2	3	4	5
6. Government regulation and policies	1	2	3	4	5
7. Economic environment	1	2	3	4	5
8. Industrial (workplace) relations	1	2	3	4	5

4. **Indicate the extent of benefits obtained from each of the following activities over the past three years.** Please use a scale of 1= highly benefit 7= no benefit

1. Formal strategic planning
2. Capital budgeting techniques (NPV, IRR)
3. Strategic plans developed together with budgets
4. Strategic plans developed separate from budgets
5. Long range forecast
6. Detailed budgeting system for controlling costs
7. Detailed budgeting system for compensating managers
8. Detailed budgeting system for coordinating activities across the business units
9. Detailed budgeting system for linking financial position, resources and activities (ABC)
10. Planning day-to day operations
11. Planning cash flows
12. Planning financial position
13. Absorption costing
14. Variable costing
15. Activity-based costing
16. Target costing
17. Performance evaluation based on budget variance analysis
18. Performance evaluation based on controllable profit
19. Performance evaluation based on divisional profit
20. Performance evaluation based on residual income (interest adjusted profit)
21. Performance evaluation based on return (profit) on investment
22. Performance evaluation based on cash flow return on investment
23. Performance evaluation based on non-financial measures
24. Performance evaluation based on team performance
25. Performance evaluation based on employee attitude
26. Performance evaluation based on qualitative measures

27. Performance evaluation based on balanced scorecard (mix of non-financial and financial measures)
28. Performance evaluation based on customer satisfaction measures
29. Performance evaluation based on ongoing supplier evaluation
30. Cost-volume-profit analysis
31. Product lifecycle analysis
32. Activity-based management
33. Product profitability analysis
34. Benchmarking of product characteristics
35. Benchmarking of operational processes
36. Benchmarking of management processes
37. Benchmarking of strategic priorities
38. Benchmarking carried out within the wider organisation
39. Benchmarking carried out outside organisation
40. Shareholder value analysis
41. Vale chain analysis
42. Operations research techniques

8.7 Appendix 7: The research questionnaire

Tehtävänimike:
[ ] Toimitusjohtaja
[ ] Muu (mikä_____)

Ikä:
[ ] Alle 30 vuotta
[ ] 30-39 vuotta
[ ] 40-49 vuotta
[ ] 50-59 vuotta
[ ] 60- vuotta

Kuinka kauan olette olleet nykyisessä tehtävässä: _____vuotta

Yrityksenne päätoimiala:_____
(jos tiedossanne on toimialakoodi TOL 2002, voitte merkitä myös sen)

Yrityksen nykyinen työntekijöiden määrä täysipäiväisiksi muutettuna:_____ henkilöä

Yrityksenne liikevaihto vuonna 2006:_____€

1. **Yrityksenne strategia:** Rengastakaa se strategia, joka lähinnä vastaa yrityksenne strategiaa kulunee vuoden aikana. Huomaa, että mikään strategia tyypeistä ei ole toistaan parempi.

(A) Yritys pyrkii sijoittamaan ja ylläpitämään varmaan markkinaan suhteellisen vakaassa tuote tai palvelu alalla. Yrityksellä on taipumus tarjota rajoittuneempaa tuote tai palvelu valikoimaa kuin kilpailijat ja se pyrkii kilpailemaan tarjoamalla koreaa laatua, parempaa palvelua, halvempia hintoja jne. Usein tämän tyyppinen yritys ei ole kehityksen edelläkävijä alallaan, pikemminkin se jättää huomioimatta toimiala muutokset, joilla ei ole suoraa vaikutusta sen senhetkisiin toimintoihin. Yritys keskittyy tekemään parhaansa rajoitetulla toiminta-alalla.

(B) Tämän tyyppinen yritys tyypillisesti toimii laajalla tuote tai palvelualalla – markkina-ala, joka ajoittain uudelleen määritellään. Organisaatio haluaa olla ensimmäisenä uusilla tuote- ja markkina-aloilla, vaikka tämä ei olisikaan kannattavaa. Yritys vastaa nopeasti signaaleihin, jotka liittyvät mahdollisuuksiin ja vastareaktio johtaa usein uusiin kilpailu toimintoihin. Tämän tyyppinen yritys ei ehkä kuitenkaan pysty ylläpitämään markkina voimiaan kaikilla aloilla, joille se ryhtyy.

(C) Yritys pyrkii ylläpitämään vakaata, rajoitettua tuote ja palvelu valikoimaa, samalla kuin se yrittää seurata huolellisesti valittuja uusia kehitystapahtumia toimialallaan. Organisaation on harvoin ensimmäinen, jolla on uutuustuote tai palvelu alallaan. Huolellisesti seuraamalla kilpailijoidensa toimintaa sopivilla aloilla, se pystyy omalla vakaalla tuote ja palveluvalikoimalla tuomaan usein kilpailevan tuotteen

uutuustuotteelle, joka on kustannustehokkaampi kuin ensimmäisenä markkinoille tuotu tuote tai palvelu.

3. Jos vertaat yritystänne sen lähimpään kilpailijaan, kuinka arvioisit yrityksenne päätuotteen tai palvelun suorituskykyä, tällä hetkellä, seuraavissa asioissa.
Arvioi käyttäen asteikkoa 1-7**,** 1=merkittävästi huonompi 7=merkittävästi parempi

1. Myynnin kasvu	1	2	3	4	5	6	7
2. Markkinaosuus	1	2	3	4	5	6	7
3. Toiminnan tulos	1	2	3	4	5	6	7
4. Velka: pääoma suhde	1	2	3	4	5	6	7
5. Voittomarginaali	1	2	3	4	5	6	7
6. Kassavirta	1	2	3	4	5	6	7
7. Investointien tuotto	1	2	3	4	5	6	7
8. Käyttöpääoman tuotto	1	2	3	4	5	6	7
9. Toiminnan tulos verrattuna myyntiin	1	2	3	4	5	6	7
10. Uudet tuotekehitykset	1	2	3	4	5	6	7
11. Olemassa olevien tuotteiden uudistus	1	2	3	4	5	6	7
12. Tuotteiden laatu	1	2	3	4	5	6	7
13. Tuotteiden ja palveluiden maine	1	2	3	4	5	6	7
14. Asiakaspalvelu	1	2	3	4	5	6	7
15. Kustannustehokkuus	1	2	3	4	5	6	7
16. Yleinen kilpailuasema	1	2	3	4	5	6	7
17. Reklamaatioiden määrä	1	2	3	4	5	6	7
18. Työvoiman laatu	1	2	3	4	5	6	7
19. Työvoiman vaihtuvuus	1	2	3	4	5	6	7
20. Työvoiman tehokkuus	1	2	3	4	5	6	7
21. Työvoiman kouluttaminen uusiin tehtäviin	1	2	3	4	5	6	7
22. Johdon taidot johtaa yritystä saavuttamaan asetetut tavoitteet	1	2	3	4	5	6	7

3. **Kuinka hyvin pystyt ennakoimaan yrityksenne ympäristöön liittyviä tekijöitä,**
käytä asteikkoa 1-5. 1= hyvin ennakoitavissa ja 5= ei lainkaan ennakoitavissa

1. Toimittajien ja alihankkijoiden toiminta	1	2	3	4	5
2. Asiakkaiden vaatimukset ja maku	1	2	3	4	5
3. Markkinoiden vapautuminen ja kansainvälisyys	1	2	3	4	5
4. Kilpailijoiden toiminta	1	2	3	4	5
5. Tuote tai palveluteknologian muutokset	1	2	3	4	5
6. Toimintaan vaikuttavat lait ja asetukset	1	2	3	4	5
7. Taloudellisen toimintaympäristön muutokset	1	2	3	4	5
8. Työntekijöiden työsuhdeasioiden muutokset	1	2	3	4	5

4. **Arvioi missä määrin seuraavat toiminnot ovat olleet hyödyllisiä yrityksellenne viimeisen kolmen vuoden aikana.** Käytä asteikkoa 1-7, 1= erittäin hyödyllisiä ja 7=ei lainkaan hyödyllisiä

    1. Strateginen suunnittelu
    2. Pääoman budjetointi tekniikat (NPV, IRR)
    3. Strateginen suunnittelu budjetoinnin yhteydessä
    4. Strateginen suunnittelu budjetoinnista erillään
    5. Pitkän aikavälin ennusteet
    6. Yksityiskohtainen budjetointi kustannusten hallintaan
    7. Yksityiskohtainen budjetointi johdon palkkoihin
    8. Yksityiskohtainen budjetointi toimintoihin osastojen välillä
    9. Yksityiskohtainen budjetointi rahoitukseen, resursseihin ja toimintoihin (toimintoperusteinen budjetointi)
    10. Toiminnan suunnittelu päivä kerrallaan
    11. Rahavirran suunnittelu
    12. Rahoitusaseman suunnittelu
    13. Omakustannushinnoittelu
    14. Muuttuvakustannuslaskenta (Variable costing)
    15. Toimintoperusteinen kustannuslaskenta (ABC)
    16. Tavoitekustannuslaskenta (Target costing)
    17. Toiminnan arviointi perustuen budjettiero analyysiin
    18. Toiminnan arviointi perustuen toiminnan tulokseen
    19. Toiminnan arviointi perustuen osastojen tulokseen
    20. Toiminnan arviointi perustuen jäännöstuottoon (Residual income)
    21. Toiminnan arviointi perustuen pääoman tuottoon (ROI)
    22. Toiminnan arviointi perustuen kassavirran tuottoon (Cash flow on investment)
    23. Toiminnan arviointi perustuen ei taloudellisiin mittareihin (Non-financial measures)
    24. Toiminnan arviointi perustuen tiimin tulokseen
    25. Toiminnan arviointi perustuen työntekijöiden asenteisiin
    26. Toiminnan arviointi perustuen laadullisiin mittareihin (Qualitatvive measures)
    27. Toiminnan arviointi perustuen tasapainotettuun mittaristoon (Balanced Scorecard)
    28. Toiminnan arviointi perustuen asiakastyytyväisyys kyselyyn
    29. Toiminnan arviointi perustuen jatkuvaan toimittajien arviointiin
    30. Kriittisen pisteen analyysi
    31. Tuotteen elinkaari analyysi (breakeven point)
    32. Toimintoperusteinen hallinta (Activity based management)
    33. Tuotteen kannattavuus analyysi
    34. Benchmarking tuotteiden ominaisuuksissa
    35. Benchmarking toimintaprosesseissa
    36. Benchmarking johtamisprosessissa
    37. Benchmarking strategisissa prioriteeteissa
    38. Benchmarking toteutettuna yrityksen sisällä
    39. Benchmarking toteutettuna ulkopuoliseen yritykseen
    40. Osakkeenomistajien arvoanalyysi
    41. Arvoketjuanalyysi (value chain)

42. Operatioanalyysi tekniikat (operations research techniques)

8.8 Appendix 8: Factor analysis

Factor Analysis

Factor loadings for MCS instrument

Factor	1	2	3	4	5
1. Mixed accounting practises					
Performance evaluation based on residual income	0,792				
Operations research techniques	0,780				
Activity based management	0,698				
Value chain analysis	0,677				
Detailed budgeting systems for compensating managers	0,664				
Product life cycle analysis	0,609				
ABC	0,565				
Target costing	0,558				
CVP analysis	0,537				
Sharefolder value analysis	0,505				
2. Benchmarking					
Benchmarking of operational processes		0,880			
Benchmarking carried out outside organisation		0,836			
Benchmarking of strategic priorities		0,794			
Benchmarking of management processes		0,773			
Benchmarking of product charasteristics		0,635			
Benchmarking carried out within the wider organisation		0,533			
3. Financial accounting practises					
Detailed budgeting systems for controlling costs			0,825		
Detailed budgeting systems for linking financial position, resources and activities			0,705		
Performance evaluation based on ROI			0,659		
Performance evaluation based on employee attitude			0,59		
Planning financial position			0,577		
Detailed budgeting systems for coordinating activities			0,562		
Performance evaluation based on budget variance			0,547		
Performance evaluation based on cash flow			0,521		
4. Non-financial accounting practises					
Formal strategic planning				0,737	
Product profitability analysis				0,694	
Performance evaluation based on non-financial measures				0,694	
Strategic plans developed together with budgets				0,678	
Performance evaluation based on qualitative measures				0,663	
Performance evaluation based on controllable profit				0,556	
Performance evaluation based on customer satisfaction				0,548	
5. Traditional accounting practises					
Absorption costing					0,691
Variable costing					0,555
Planning cash flows					0,534

8.9 Appendix 9: Correlation matrix

CORRELATION MATRIX										
	PEU	Perf Financial	Perf Quality	Perf HR	Perf MP	Perf All	MCS	MCS Mix	MCS Benchmark	MCS Fmeasures
PEU										
Pearson correlation	1	-,082	-,112	-,038	-,177	-,109	,159	-,166	,190	,223
Sig. (2-tailed)		,514	,369	,763	,154	,382	,201	,182	,127	,071
Performance Financial										
Pearson correlation	-,082	1	,500**	,354	,496**	,877**	-,353**	-,248*	-,208	-,367**
Sig. (2-tailed)	,514		,000	,004	,000	,000	,004	,045	,094	,002
Perf Quality										
Pearson correlation	-,112	,500**	1	,517**	,444**	,814**	-,177	-,032	-,032	-,111
Sig. (2-tailed)	,369	,000		,000	,000	,000	,348	,799	,799	,376
Perf HR										
Pearson correlation	-,038	,354	,517**	1	,307*	,626**	-,127	-,055	-,055	-,121
Sig. (2-tailed)	,763	,004	,000		,012	,000	,309	,661	,661	,333
Perf MP										
Pearson correlation	-,177	,496**	,444**	,307*	1	,582**	-,150	-,041	-,041	-,115
Sig. (2-tailed)	,154	,000	,000	,012		,000	,229	,745	,745	,357
Perf All										
Pearson correlation	-,109	,877**	,814**	,626**	,582**	1	-,289*	-,149	-,149	-,292*
Sig. (2-tailed)	,382	,000	,000	,000	,000		,232	,232	,017	
MCS										
Pearson correlation	,159	-,353**	-,177	-,127	-,150	-,289*	1	,758**	,727**	,778**
Sig. (2-tailed)	,201	,004	,348	,309	,229			,000	,000	,000
MCS Mix										
Pearson correlation	-,166	-,248*	-,032	-,055	-,041	-,149	,758**	1	,441**	,450**
Sig. (2-tailed)	,182	,045	,799	,661	,745	,232	,000		,000	,000
MCS Benchmark										
Pearson correlation	,190	-,208	-,032	-,055	-,041	-,149	,727**	,441**	1	,380**
Sig. (2-tailed)	,127	,094	,799	,661	,745	,232	,000	,000		,002
MCS Fmeasures										
Pearson correlation	,223	-,367**	-,111	-,121	-,115	-,292*	,778**	,450**	,380**	1
Sig. (2-tailed)	,071	,002	,376	,333	,357	,017	,000	,000	,002	

MCS Non-Fmeasures Pearson correlation Sig. (2-tailed)	,0381** ,002	-,216 ,082	,060 ,630	-,025 ,839	-,068 ,589	-,114 ,364	,648** ,000	,167 ,181	,419** ,000	,481** ,000
MCS Traditional Pearson correlation Sig. (2-tailed)	,036 775	-,037 ,771	-,076 ,546	-,37 ,768	-,020 ,870	-,060 ,634	,506** ,000	,290* ,018	,214 ,085	,470** ,000
Defender Pearson correlation Sig. (2-tailed)	,008 ,950	,012 ,922	-,064 ,608	,025 ,845	-,101 ,418	-,007 ,954	-,043 ,734	-,029 ,815	-,005 ,969	,114 ,362
Prospector Pearson correlation Sig. (2-tailed)	,089 ,476	-,115 ,357	,064 ,608	-,041 ,728	-,038 ,761	-,054 ,669	,058 ,643	-,024 ,850	,049 ,697	-,029 ,817
Analyzer Pearson correlation Sig. (2-tailed)	-,091 ,470	,099 ,428	-010, ,939	,020 ,876	-,051 ,686	,056 ,653	-,021 ,868	,046 ,715	-042, ,736	-,063 ,613
Service Pearson correlation Sig. (2-tailed)	-,037 ,769	,154 ,217	,066* ,031	,010 ,937	,010 ,418	,154 ,217	-,023 ,852	-,182 ,144	,052 ,672	-,016 ,902
Manufacturing Pearson correlation Sig. (2-tailed)	-,037 ,769	,154 ,217	,066* ,031	,010 ,937	,010 ,418	,154 ,217	-,023 ,852	-,182 ,144	,052 ,672	-,016 ,902

	MCS Non-Fmeasures	MCS Traditional	Defender	Prospector	Analyzer	Service	Manufacturing
PEU Pearson correlation Sig. (2-tailed)	,0381** ,002	,036 775	,008 ,950	,089 ,476	-,63 ,617	-,037 ,769	-,037 ,769
Performnace Financial Pearson correlation Sig. (2-tailed)	-,216 ,082	-,037 ,771	,012 ,922	-,115 ,357	,099 ,428	,154 ,217	,154 ,217
Perf Quality Pearson correlation Sig. (2-tailed)	,060 ,630	-,076 ,546	-,064 ,608	,064 ,608	,027 ,829	,066* ,031	,066* ,031
Perf HR Pearson correlation Sig. (2-tailed)	-,025 ,839	-,37 ,768	,025 ,845	-,041 ,728	0,00 1,00	,010 ,937	,010 ,937
Perf MP Pearson correlation Sig. (2-tailed)	-,068 ,589	-,020 ,870	-,101 ,418	-,038 ,761	-,089 ,476	,010 ,418	,010 ,937

Perf All Pearson correlation Sig. (2-tailed)	-,114 ,364	-,060 ,634	-,007 ,954		,040 ,748	,154 ,217	,010 ,418
MCS Pearson correlation Sig. (2-tailed)	,648** ,000	,506** ,000	-,043 ,734	-,054 ,669	,009 ,949	-,023 ,852	,154 ,217
MCS Mix Pearson correlation Sig. (2-tailed)	,167 ,181	,290* ,018	-,029 ,815	,058 ,643	,045 ,720	-,182 ,144	-,023 ,852
MCS Benchmark Pearson correlation Sig. (2-tailed)	,419** ,000	,214 ,085	-,005 ,969	-,024 ,850	-,025 ,842	,052 ,672	-,182 ,144
MCS Fmeasures Pearson correlation Sig. (2-tailed)	,481** ,000	,470** ,000	,114 ,362	,049 ,697	-,100 ,424	-,016 ,902	,052 ,672
MCS Non-Fmeasures Pearson correlation Sig. (2-tailed)	1	,386** ,001	-,191 ,125	-,029 ,817	,079 ,526	,094 ,452	-,016 ,902
MCS Traditional Pearson correlation Sig. (2-tailed)	,386** ,001	1	,070 ,574	,192 ,122	,070 ,574	,291* ,018	-,094 ,452
Defender Pearson correlation Sig. (2-tailed)	-,191 ,125	,070 ,574	1	-,350** ,004	-,466** ,000	-,102 ,404	-,102 ,404
Prospector Pearson correlation Sig. (2-tailed)	,192 ,122	,045 ,719	-,350** ,004	1	-,665** ,000	,196 ,115	,196 ,115
Analyzer Pearson correlation Sig. (2-tailed)	-,030 ,814	,033 ,793	-,466** ,000	,291* ,018	1	-,104 ,407	-,104 ,407
Service Pearson correlation Sig. (2-tailed)	,094 ,452	,291* ,018	-,102 ,404	,196 ,115	-,104 ,407	1	-1,000** ,000
Manufacturing Pearson correlation Sig. (2-tailed)	-,094 ,452	,291 ,018	-,102 ,404	,196 ,115	-,104 ,407	-1,000** ,000	1

** Correlation is significant at the 0,01 level (2-tailed)
* Correlation is significant at the 0,05 level (2-tailed)