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Management control system design and the organisational role of controllers

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Abbreviations

AAA	American Accounting Association
BU	Business Unit
CA	Cost Accounting
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operation Officer
CIMA	Chartered Institute of Management Accountants
CIGMA	Chartered Global Management Accountants
FA	Financial Accounting
FEI	Financial Executives International
ICV	International Controller Verein / International Controller Association
IGC	International Group of Controlling
IMA	Institute of Management Accountants
KPI	Key Performance Indicator
NIE	New Institutional Economics
NIS	New Institutional Sociology
MA	Management Accounting
MAS	Management Accounting System
MC	Management Control
MCE	Magyar Controlling Egyesület / Hungarian Controlling Association
MCS	Management Control System
OC	Organizational Control
OIE	Old Institutional Economics
SMA	Strategic Management Accounting

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"In practice, people with the title of controller have functions that are, at one extreme, little more than bookkeeping and, at the other extreme, de facto general management." (R. N. Anthony, 1965, p. 28)

1 INTRODUCTION

Regulatory differences in financial accounting do exist between regions such as US and Europe due to the differences between the US-Gaap and IFRS standards, and even the local regulations of European countries may somewhat differ (Lakatos, 2014). But there is not much doubt about the main role of financial accounting: to trustfully record and report on the financial and economic situation of an organisation. Therefore, it is well defined and highly regulated how accountants act in an organisation. Yet at the same time, the role of controllers is heavily debated. Some regulatory aspects should be taken into consideration in this regard, but the degree of uniformity is far below that of financial accounting or auditing. Management control practices are shaped to a greater degree by the needs of the organisations and their operating environments.

As management control (MC) is more strongly characterized by the organisations' specifics, it is less easy to characterize management control systems (MCSs) and the work of controllers in general. Controllers are engaged in a wide range of activities in diverse organisational contexts (Ahrens & Chapman, 2000). They use diverse tools to support these activities and to provide diverse sets of information to managers, and may play diverse roles in their organisations while fulfilling their tasks.

Understanding the contemporary role of controllers has always been a research topic of interest, but during the last decade it has gained in popularity. Company crises indicate not only the failure of external control mechanisms, but also the shortcomings of internal control. Questionable accounting practices, poor internal reporting (and auditing partners which are under pressure) have caused the bankruptcies of mammoth corporations such as Enron and WorldCom. Some years after these accounting scandals the financial crisis of 2008 made it unequivocally clear that there is a need for changes in control

mechanisms. Today, both academics and professional bodies increasingly report that this change has at least been partly achieved, and among these changes, controllers now own a wider range of tasks and have more responsibilities.

The joint global survey of CIMA (Chartered Institute of Management Accountants) and the University of Bath, which involved over 5000 professionals as respondents, highlighted the clear trend away from traditional recording and reporting roles to value adding roles (W. Van der Stede & Malone, 2010). Similarly, the Germany-based International Controllers Association (International Controller Verein, ICV) and the International Group of Controlling (IGC) write in their latest statement that controllers are the 'business partners' of top executives and state that 'controlling' is one of the key success factors of enterprises (IGC & ICV, 2012).

This change in the significance and the role of controllers may be derived from radical changes in the wider environment in which they operate (Dobák, 2009; A. Dankó & Barakonyi, 2012; Horváth, 2012). The main drivers are both external (changing business market conditions, new managerial philosophies) and internal (organisational re-design, IT system developments, implementation of management technique innovations, human resource developments) (Burns & Baldvinsdottir, 2005).

The contextual factors that are influencing controllers' roles are well-researched, and so are the contingencies influencing underlying management control systems (MCS). Less focus has been placed on the link between the two lines of research. This thesis investigates the relationship between management control systems and the organisational role of controllers, without explicitly discussing the wider environmental context and influencing factors. While recognizing the importance of the wider context, I focus more on the relationship between the tools that are applied, the information provided by MCS and the roles acted out by the controllers.

Investigating the association between MCSs and the role of controllers is interesting for several reasons. Although both the environmental changes and management gurus call for new roles for controllers, this cannot happen from one day to the next. It requires changes in other elements of MCS: the formal tools used in daily practice that can produce more and broader-based information, and IT systems that enable the effective production and distribution of information.

At the same time, the availability of better information does not necessarily mean that it will be used. If it will be used in business activities (i.e. the MC has an impact), the relevant information can still be provided on the side-line, without any involvement by controllers in business, without any change in the organisational roles they play.

Several role concepts are applied in MC research. I follow a functionalist approach and interpret roles in three dimensions: (1) the extent to which controllers are involved in the business processes, (2) the impact of MCS on business activities and (3) the organisational placement of controllers. The research is designed to contribute to better understanding of the functioning of controllers within their organisational context. Are their possible roles linked to the design of the MCSs applied in business corporations? How does controllers' positioning in the overall organisational structure affect their involvement?

The research work characterizes the management control system designs and controllers' roles at Hungarian companies, but the findings may be relevant to other CEE countries that have similarities in the development of the profession. MCS will be characterized in two aspects: (1) tools in use and (2) information provided.

MC has a changing nature. Its social, organizational and economic context is constantly changing both in time and space (Chapman, Hopwood, & Shields, 2006). Therefore, what is subsumed under the mantle of MC has changed, not only with time, but it is very different among countries as well. In order to highlight this diversity, before discussing the relevant findings of MC-related literature, I provide an overview of the current interpretations of contemporary management control and management accounting. The current thesis aims to describe MC in the contemporary Hungarian context, although this is impossible without including a discussion of the underlying Anglo-Saxon and German approaches.

Chapter 2 presents all three approaches in a structure recommended by Scapens (2006). The interpretations of both the textbooks, the practitioners and the researchers will be reviewed. Chapter 2 ends with a two-page summary of my understanding about MC and controllers that will be later used. Management control is conceptualized here in a narrow sense. The research work is concerned with formal management control: those parts of management control that are supported by formal systems (R. Anthony & Govindarajan, 2006). Controllers are defined as those organisational members who support management

in their control-related activities. Practices applied by both managers and controllers as regards formal control are summed up under the mantle of MC tools.

Chapter 3 provides insights into methods and underlying theories predominantly used in the pre-existing, relevant MC-related literature. Both the traditional and emergent theories used to study MC are reviewed, but more emphasis is given to the functionalist approach that was and probably still remains the dominant paradigm of the discipline. Chapter 4 contributes to the better understanding of prior research results. First, findings on applied tools are reviewed with a subsequent discussion on the nature of the information provided by these tools. Chapter 4.1. is closed by the brief review of how IT systems are related to MC systems

In order to better interpret the findings of role studies, the diverse concepts of role are briefly discussed. This is followed by a summary of research into the role of controllers with a focus on more objectivist papers (Chapter 4.2.). Chapter 4.3. links the two lines of research: MCS and the role of controller. Studies that claim that the implementation of MC tools alters the information provided by MCSs (that in turn has an effect on the organisational role of controllers) are reviewed. Subsequently, further studies are critically discussed that incorporate the performance effect into this logical chain, and measure the influence of MCS and / or the controllers' role on managerial or organizational performance (Chapter 4.4.). Finally, research gaps are identified (Chapter 4.5.).

Derived from the research gaps, Chapter 5 describes the planned research model. After positioning the research on the paradigm map, research questions and hypothesis are presented. For the operationalization of the research construct, a questionnaire survey conducted in 2013 among Hungarian enterprises is used. The survey is part of the research program "Competing the World", launched by the Institute of Business Economics at the Corvinus University of Budapest.

The major aim of this research work is to investigate the nature of MCS and the role of controllers in contemporary profit-oriented organisations and to assess the relationship between them using multivariate statistical tools. Studying the role of controllers, MCS and their link to other organisational features is usually based on the responses of controllers. While the self-image of the profession is very important, perception gaps and perception failures are well known (Pierce & O'Dea, 2003). Therefore, this research

investigates this topic mainly using the perspective of executives, based on responses from chief executive officers (CEO), chief financial officers (CFO) and chief operation officers (COO). Results of statistical analysis are presented in Chapters 6.1, 6.2 and 6.3.

Using method-triangulation, the results of the quantitative study were the subject of focus group discussions and individual interviews. Focus groups, as a qualitative technique, were used to improve understanding of the relationships between set of variables identified by quantitative analysis. During the interaction with and between participants I uncovered aspects of relationships that might otherwise have remained hidden. Finally, research findings were discussed with top executives.

Outcomes are presented in the discussion section (Chapter 6.4.). While the disappearance of controllers' traditional role as providers of data has often been claimed in the literature, this study indicates that the role is very much alive. The evidence shows that the traditional role of controller as data provider is being enriched, while the role of consultant is limited to injecting economic common-sense.

Based on the concept of role maturity, controllers who perform well with data provision may 'move forward' and engage more deeply in analytical processes and proposal making. But the statistical analysis revealed a group of cases where the proposal maker and consultant role of controllers appear to have no antecedent: more involved roles for controllers may replace traditional roles, controllers are not perceived in their traditional roles at all. While some explanatory factors have already been uncovered, the conclusion is that behavioural and perceptional factors play a role in these cases.

Path analyses revealed significant relationships between tools in use, information provided and roles acted out by the controllers: it is evidenced that controllers' involvement into business is supported by providing external and non-financial information to the managers and it is influenced by their personal contribution as perceived by the top executives. The level of involvement could be limitedly reasoned by selected features of MCS design. Variables investigated within the statistical model account for 57% of the variance of the role of controllers as consultants. Out-of-model factors were subject of focus group discussions and individual interviews.

The dissertation closes with some conclusions about how the research findings relate to prior results in the literature. Finally, implications, limitations and research directions for the future are defined (Chapter 7).

2 INTERPRETATIONS OF MANAGEMENT CONTROL

There are many terms concerning control that are used interchangeably by management researchers and which need further clarification. This chapter provides an overview of contemporary interpretations of management control and related terms. At the end of the chapter I offer a sound definition of the key terms that are used throughout this thesis.

Organisational control (OC) is seen as the most broad category of control activities and processes, including all types of control such as quality control in production or just-in-time management (Chenhall, 2003). Focusing among all control types at a management level, **management control** (MC) is understood as "*the process by which managers at all level ensure that the people they supervise implement their intended strategy*" (R. Anthony & Govindarajan, 2006, p. 4).

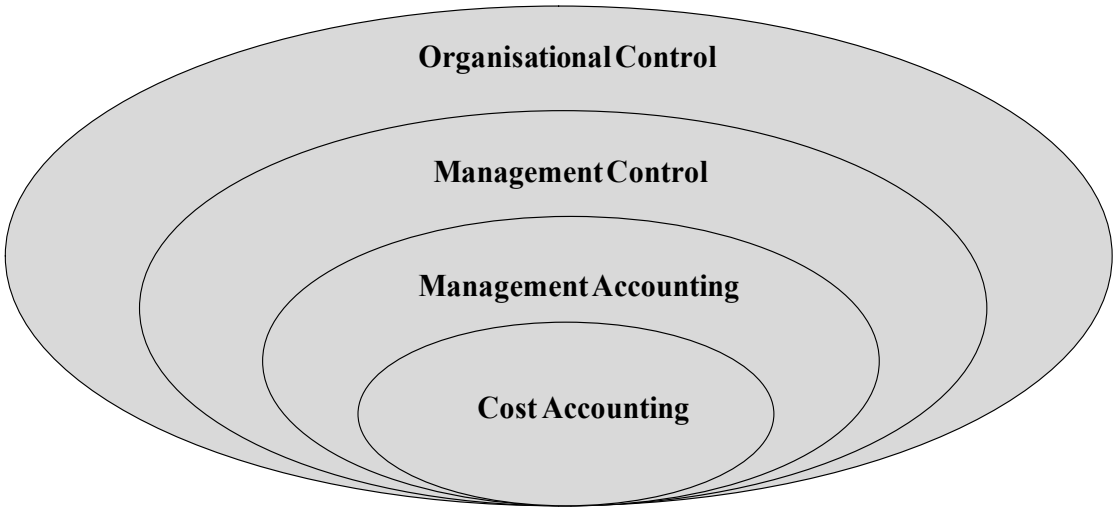
The term **management control system** (MCS) denotes the totality and interplay of control mechanisms: devices that ensure that an organization's strategic intentions are achieved (R. Anthony & Govindarajan, 2006). MCS is defined by Simons as "*the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities*" (Simons, 1994, p. 5). In his seminal book "Levers of Control" the aforementioned author identifies four parts of control systems used by managers: belief systems, boundary systems, diagnostic control systems and interactive control systems. His theory about the four levers of controls implies that management control is still a broad term that encompasses more control types, such as personal or clan controls and formal practices.

Management accounting (MA) is usually interpreted as being part of formal management control. While MC involves the behaviour of the managers itself, MA encompasses a wide variety of practices. A management accounting system (MAS) denotes the systematic use of MA (Chenhall, 2003). Management accounting is also called managerial accounting. Hereafter, the term management accounting will be used.

Although MA is the narrowest field of practice among the three, it is still challenging to provide it with a uniform definition that is widely accepted and constant in time. The term management accounting appeared in the 1930s and 1940s in America when several related practices were already in use. In 1983, the Chartered Institute of Management Accountants published the handbook "Management Accounting Research and Practice"

which reported on the lack of a generally agreed definition of MA (D. Cooper, Scapens, & Arnold, 1983). More recently, the Handbook of Management Accounting Research defined MA in its preface as a still "*loosely coupled set of fragmented practices*" (Chapman et al., 2006, p. ix) that is constantly changing both in time and space.

Figure 1 shows the relationship of accounting and control related terms that is shared by most practitioners and researchers and that will be used in the remainder of this dissertation.



1. Figure: Overview of management control related terms

Source: Author's own construction

The focus of this dissertation paper is on management control. According to Scapens (Scapens, 2006), control related terms can be defined on three ways:

- how they are taught to students of undergraduate, postgraduate and MBA-level,
- how they are put into practice by practitioners, and
- how they are understood and investigated by researchers.

The next sub-chapters provide an overview of the interpretations in the three areas while emphasizing the regional differences between the Anglo-Saxon and German schools and discussing the particularities of the Hungarian approach.

2.1 Textbook approach

A review of top-ranked textbooks was used to identify conceptualizations of management control systems by a variety of researchers (Strauß & Zecher, 2013). Textbooks indicate the first way of defining MC, which Scapens (1983) calls 'conventional wisdom'.

The US-born textbook ‘Management Control Systems: Performance Measurement, Evaluation and Incentives’ defines management control in a broad sense. MC “*includes all the devices or systems managers use to ensure that behaviours and decisions of their employees are consistent with the organization’s objectives and strategies*„ (K. Merchant & Stede, 2012, p. 6). The authors discuss four control types: action, personnel, cultural and result controls. Under the headings ‘Financial Results Control Systems’ and ‘Performance Measurement’ are described those core management control issues that are usually referred to as **formal management control**.

The term management control system was introduced to the academic world by Anthony: Anthony’s and Govindarajan’s ‘Management Control Systems’ (2006), which is by now well-know and well-used in education. It focuses mainly on formal management control: on those parts of management control that are facilitated by a formal system.

Anthony defined MCS as a management subsystem that supports the control function of managers that is used for planning and controlling corporate performance. MCS is a set of broadly-defined activities listed by Anthony and Govindarajan as the following: planning, coordinating, communicating, evaluating, deciding and influencing.

Strategy implementation was placed into the focus of management control; he therefore inserted management control between two managerial activities: strategy formulation and task control. For separating management control from strategic and operational control he was later criticized (D. Otley, 1994; Langfield-Smith, 1997).

Garrison et al. (2014) identified three functions of managers in organisations. Managers should plan operations, control activities and make decisions. Their book, with a symbolic lighthouse on the front cover, explains what kind of information is needed for managers to perform these functions, how to collect the required information and how to analyse and interpret it. This is why Garrison et al. (2014) focuses on **management accounting** (MA), particularly on costing issues: cost concepts and cost calculation and allocation methods, including a detailed description of the opportunities for analysis.

To label these costing tasks part of MA, **cost accounting** (CA) is used. Cost Accounting was adapted as a title of a book by Stanford and Harvard professors (Horngren, Datar, & Rajan, 2011); however, they cover a wide range of other management accounting and control issues such as budgeting, and even strategic control. This shows again some

confusion about the exact delimitation of the terms CA, MA and MC and their relationship to each other (for a more detailed discussion, see Lázár, 2002).

Literature that focuses on formal management control systems refers to management accounting as the underlying toolset that provides the necessary information. MA should be clearly differentiated from financial accounting (FA) which is designed to produce information for external parties. "*Management accounting is the branch of accounting that produces information for managers within an organization. It is the process of identifying, measuring, accumulating, analysing, preparing, interpreting and communicating information that helps managers fulfil organizational objectives."* (Horngren et al., 2011, p. 5)

The landscape of potential interpretations of the term MCS in 'Anglo-Saxon' (mainly US) textbooks should be completed with those of Continental Europe. The regional differences between the Anglo-Saxon countries and **German-speaking countries** (Germany, Austria and part of Switzerland) are well known. Yet the naming conventions for the field of study are different. The English 'control' should not be translated into German as 'Kontrolle' as it involves not merely a comparison between plans and factual data. According to Horváth (2011), the English 'controllership' should be used as a synonym of the German 'controlling'. Others suggest that 'controlling' overlaps with what is internationally termed 'management accounting' (D. A. Becker, 2004; Wagenhofer, 2006).

How 'controlling' is interpreted is far from uniform among German authors. The dominant views have changed with time as well. Here, the three schools that are dominant today are described. An old, but still important school is the **information-oriented** school that is maintained by Thomas Reichmann. In this view, the core of 'controlling' tasks is provision of information. This is why he describes 'controlling' in his textbook through the lens of KPIs and management reports (Reichmann, Hoffjan, Kißler, Palloks-Kahlen, & Richter, 2011). Critics point out that although information provision is an important function of "controlling", it is only one part of it (J. Weber & Schäffer, 2014). The **coordination-oriented approach** describes 'controlling' mainly as a coordinative task. Péter Horváth (2011) defines it as a function that coordinates planning, 'Kontrolle' and information provision in order to enhance the management abilities of organisations. His

view is based on a system-oriented theory, whereby different management subsystems of the organisation need to be coordinated. This approach was followed by Hans-Ulrich Küpper (2013), who further developed this theory by including and expanding the subsystems that need to be coordinated by 'controlling'.

Weber and Schäffer (2014) developed a third approach: 'controlling' as **a rationality safe-guardian** of management. The authors revisted Anthony's definition of management control and applied a management perspective. Weber and Schäffer define 'controlling' as a management function that is carried out by different employees, among others controllers that shape planning processes, monitor goal achievement and provide relevant information to management. Using this definition, 'controlling' corresponds more to the Anglo-Saxon management control approach.

The introductory chapters of publications of all aforementioned German authors discuss expansively the foundations of "controlling": how it can be defined and how it is related to the practice outside of Germany, especially in the US. This motivation of German authors – namely, to discuss the relationship between Anglo-Saxon management accounting and control and German "controlling" – is not characteristic of Anglo-Saxon authors. As Lázár (2002) also noted, it is an unequivocal sign that Anglo-Saxon tradition is influencing German practice, but not the contrary.

Interestingly, none of the Anglo-Saxon authors place as much emphasis on the management control of functional areas as German authors do. Almost all German language textbooks discuss expansively the specialities and tools of so-called functional 'controlling' that addresses the different areas of a company, such as marketing, logistics, HR or production.

To conclude, from a review of German textbooks, two clear trends can be identified. On the one hand, differences in the approach seem to be ebbing away due to the strong influence of Anglo-Saxon traditions on the German-speaking countries. On the other hand, the former understanding of 'controlling' as a toolset that assists with the coordination of information provision is widening and it is more commonly viewed as a wider notion of management control.

Besides the Anglo-Saxon and the German understanding of management control, the understanding and practices of MC and MA from several other regions and countries

deserve mention. Here I focus only on the Anglo-Saxon and German approaches because these had a prevailing influence on **contemporary Hungarian discipline and practice**. Due to the parallel – but not equal – influence of the two approaches, the Hungarian naming convention of this field is even more confusing than that of German-speaking countries.

As Germany is a major economic player in Europe, German practices and phrasing spread across many of the countries of Continental Europe, including Hungary, through the local subsidiaries of German multinationals. Similarly with German-speaking countries, 'controlling' is the well-accepted name used for describing the field in Hungary, with a slight difference in spelling. 'Controlling' spelt with a 'c' or with a 'k' are used. Hungarian authors often state that it is a term that originates from the English word 'control' (Francsovics, 2005; Boda & Szlávik, 2005; Hanyecz & Kristóf, 2011; Körmendi & Tóth, 2011).

Modern Hungarian academic thinking and practice are influenced by both international considerations and the roots of Hungarian accounting. Hungary and other CEE countries that were part of the former eastern bloc only have a 25 year history of modern 'controlling'. But this does not mean that after the end of the communist regime Hungarian practice was built up from zero. Lázár (2002) showed how varied the Hungarian cost accounting literature was even from the beginning of the 20th century. After the economic and political transition of 1989-1990, the easy availability of foreign literature gave a huge boost to Hungarian academic life and research in this field. For a detailed review of the first 10 years, see Bodnár (1999) and Lázár (2002).

The influence of international thinking, especially the German 'controlling' school of Péter Horváth, undoubtedly remains significant. His book on this topic (Horváth, 1991) was the first to be translated into Hungarian. It made western management thoughts available to a local audience at a time when 'controlling' was yet rarely practiced (Bodnár, 1997).

Literature currently available in the Hungarian language includes translations of English language literature (Anthony R. N. & Govindarajan, 2009), translations from German literature (Horváth & Partners, 2008) and books and papers from Hungarian authors. The remainder of this chapter focuses only on the most recent literature from authors affiliated

to institutions that are located in Hungary. It is designed to highlight the main differences and similarities from international usage.

Boda and Szlávik (2005) define 'controlling' as an organisational subsystem that is designed to enhance the efficiency of management. It is seen as the complexity of tools that ensure that a manager can reach their goals. Taking a rather traditional approach, they underline that it is a mistake to enlarge this interpretation with value-creation. Added-value is not created by 'controlling': it should merely enhance the efficiency of organisational value creation.

The 'controlling' is often interpreted management subsystem that is concerned with planning and budgeting, variance analysis (comparison of budgeted and actual figures) and decision-supporting information provision (Körmendi & Tóth, 2011; Tóth & Zéman, 2006). All authors share the view that the main service of 'controlling' is management decision support. In line with this, Sinkovics (2012) understands it as a management supporting function that supports management activities in defining and realizing organisational goals. 'Controlling' services focus on information-provision, decision preparation, analysis and control.

Bodnár, in the preface of the Hungarian translation of Anthony's and Govindarajan's book, emphasizes that the main dilemma is whether to consider '**controlling' a management function or a management support toolset** (Bodnár, 2009). The above-presented textbook definitions are more in line with the second interpretation.

The Hungarian understanding of 'controlling' mainly follows the German tradition with its roots in cost accounting. A sound example of this influence is the 'controlling' of the functional areas often discussed in both the German and Hungarian textbooks. Some of them focus exclusively on functional 'controlling' issues (Dénes & Lukács, 2004) or even on the 'controlling' of only one specific functional area (Ambrus & Lengyel, 2011). Dénes and Lukács (2004) defined functional 'controlling' as a part of 'controlling' that focuses on the management control of only one functional area, such as procurement, sales, investment, production, logistics or IT.

The most important information source for 'controlling' is what in Hungarian is called 'vezetői számvitel'. The word-by-word translation of it is 'management accounting' although this is misleading because it concerns MA in only the narrow sense of the term. Although they are often treated as synonyms, Körmendi and Tóth (2011) also pointed out

that the international understanding of MA often covers the whole philosophy and toolset of ‘controlling’, not only that of ‘vezetői számvitel’.

‘Vezetői számvitel’ as part of the “controlling’ system is limited to typical cost accounting issues such as:

cost and performance accounting and

additional economic calculations, investment and financial appraisals (Horváth & Partners, 2008).

In this view, cost and performance accounting collects, processes and analyses the relevant information. It covers a wide range of activities. It begins with setting up of a relevant cost and income structure; i.e. a definition of cost types, cost centres and cost objects, a definition of cost allocations and diverse cost calculation and variance analysis methods. With its clearly defined three subsystems (cost type accounting, cost centre accounting and cost object accounting) it follows the German cost accounting tradition. Calculations and appraisals are based on the data that is collected from these three subsystems.

Somewhat different approach is followed by an another recently published ‘Vezetői számvitel’ textbook (Bosnyák, Gyenge, Pavlik, & Székács, 2010). The authors with more financial accounting background built their concept on the Anglo-Saxon management accounting roots that is strongly related to financial accounting. In their view, ‘Vezetői számvitel’ is aimed to support managerial decision making based on data retrived from the financial accounting systems. While limiting the information source to FA, the textbook used in higher education discusses not only cost accounting and variance analysis issues, but far reaching topics such as pricing and performance measurement.

2.2 Interpretations by practitioners and their professional bodies

MC is a research field that follows practice: researchers merely try to understand and theorise about practice, with few exceptions such as the Balanced Scorecard, where academics have partly promulgated the practice. The typical case is that practical developments occur before theoretical developments. This is why the second type of definition – namely how practitioners define it – may be relevant.

As shown above, management control is understood as a management activity and formal systems are used to support it. These formal systems are operated by employees of the organisation here referred to as practitioners. Both the labels used by the profession and the discipline are regionally different: "*in the US ... academicians tend to use the term 'managerial (or management) accounting' to include what most ... academicians in Europe call management control*" (Strauß & Zecher, 2013, p. 242).

The established term of the profession used in Anglo-Saxon countries is **'management accountant'**, as the names of professional bodies such as CIMA, CIGMA or IMA also indicate. Almost all practitioners are members of one of the institutes. The membership of management accountants without relevant degrees is well accepted; the relevant training is ensured by the professional institutes. Members complete their studies in their first years of work experience. After successfully passing the examinations and proving they have had at least three years relevant work experience they can become certified management accountants.

The term 'controller' is known in Anglo-Saxon countries as well. One of the most important professional institutes, the Financial Executives International (FEI), was founded in 1931 as the Controllers Institute of America. It was renamed in 1962 to cover a broader set of professionals.

Management accountants can be referred to today as controllers in Anglo-Saxon countries as well (see, for example, de Loo et al., 2011). However, readers must be cautious as the term is often used in a much broader sense, especially in the US. Sathe's (1983) often cited research paper about "strong" controllers explicitly refers to controllers as people who have financial reporting and internal control responsibilities as well.

The recent book "The Controller's function", with its subtitle "The Work of Management Accountants" (Bragg, 2011), might suggest that controllers do management accountancy.

But according to Bragg, controller's responsibilities extend far beyond the field of MA. Besides budgeting, planning, cost accounting, financial analysis and control, controllers complete accounting transactions, deal with fixed assets, record keeping, and tax preparation and prepare financial statements and do internal audits as well.

The American Accounting Association (AAA), according to its 1958 Committee on Management Accounting, summarized the core of the profession as follows:

"The application of appropriate techniques and concepts in processing the historical and projected economic data of an entity to assist management in establishing plans for reasonable economic objectives and in the making of rational decisions with a view toward achieving these objectives. It includes the methods and concepts necessary for effective planning, for choosing among alternative business actions, and for control through the evaluation and interpretation of performance."

(American Accounting Association, 1972, p. 1)

Since these times, the self-definitions used by professional bodies have changed mainly in respect of the service potential and rarely include a detailed list of practices to be used. The service potential and the role of management accountants defined by professional bodies is constantly growing. The above definition from 1958 sees the main role of the profession as data processing in order to assist management. In 1972, AAA stated that the "*role of managerial accounting encompasses the entire formalized information function of an organization*" (1972, p. 2) In 1982, the also US based Institute of Management Accountants (IMA) made a small distinction between financial and management accounting which still reflected a transaction and compliance orientation. This was changed only after the Millennium. In 2008 IMA stated that "*management accounting is a profession that involves partnering in management decision making ... to assist management in the formulation and implementation of an organization's strategy."* (Institute of Management Accountants, 2008, p. 5).

In 2014, the CGMA (Chartered Global Management Accountant, covering two of the world's most prestigious bodies on both the American and the European market) posted on their homepage that MA drives sustainable business success (CGMA, 2014). The focus has been shifted from simply assisting managers to creating value in its own right. The CIMA (Chartered Institute of Management Accountant) also emphasizes business

success on their webpage and defines management accounting as financial accounting (FA), plus added-value services.

The more common interpretation is that financial accounting and management accounting are different but strongly related subsystems; the differentiation is made based on the end-users of the accounting information. In contrast to FA, MA delivers information to internal parties, without the constraints of generally accepted accounting principles (gaap) in a future-oriented, flexible way (Horngren et al., 2011). MA information relies mainly, but not exclusively, on FA data.

In **German-speaking countries** the label for the profession is **controller**. The word controller originates from the American 'controller' and was incorporated into the German language with German pronunciation (Ahrens & Chapman, 2000; Horváth, 2011; J. Weber & Schäffer, 2014).

As discussed above, in Britain the profession is organized under the mantle of CIMA. In Germany, 'controlling' training is largely part of university education. German controllers study business economics (BWL, *Betriebswirtschaftslehre)* and controllers rarely hold non-relevant degrees (Ahrens & Chapman, 2000). The German professional body of controllers (CV, Controller Verein) which provides different sorts of training and workshops, includes only a minority of active controllers.

Several researchers outside Continental Europe use the term "controller" as well. Using the same label does not always mean that same function is identified with it. As a result, readers must be careful and check what authors mean by the definition 'controllers'.

German authors suggest using the term 'controllership' for the group of tasks of the controller in order to bridge the naming gap between the German and the Anglo-Saxon approach (Horváth, 2011; Jung, 2011; J. Weber & Schäffer, 2014). At the same time, 'controllership' is often used in a much broader sense overseas. The US-based Financial Executives Institute lists seven functions of controllership, only three of which belong to MA: planning, reporting and interpreting, evaluating and consulting. Besides these three functions, controllership is concerned with issues beyond MA and even MC: tax administration, government reporting, protection of assets and economic appraisal as well. This shows again that the border between managerial and financial accounting is

less strict in Anglo-Saxon companies and in many cases the same employees are engaged in both fields. Weber and Schäffer offer more insight into the reason why (2014, p. 6).

In contrast to the approach delineated above, in Continental Europe 'controlling' is usually sharply distinguished from financial accounting (i.e. 'Buchhaltung' or 'Finanzbuchhaltung' in German), from internal auditing and from the treasury function (for details of a possible system of classification, see Jung, 2011, p 10).

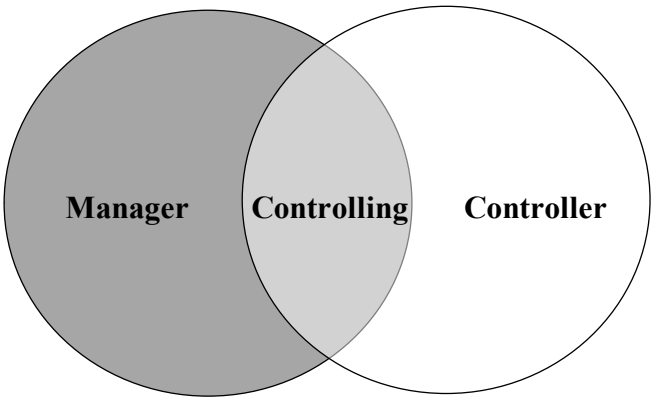
The latest 'publication from the two Germany-based professional bodies, International Controller Association (ICV) and the International Group of Controlling declared that 'controlling' is a management activity that is a key success factor for companies in German-speaking countries (IGC & ICV, 2012, p. 2). 'Controlling' as a management activity corresponds with the concept of management control. Based on this view, Deyhle does not recommend labelling the organisational department of controllers the 'controlling' department. This could wrongly suggest that 'controlling' is the exclusive task of controllers.

In Hungary, the German spelling (**controller**) and the Hungarian spelling (kontroller) are used in parallel for labelling the profession. While 'controller' is the widely accepted and normally used naming convention, the profession might be labelled very differently according to day-to-day Hungarian organisational practice – especially in the Hungarian subsidiaries of Anglo-Saxon companies where employees who are called finance experts, financial analysts, data or business analysts execute MC related tasks.

The educational background and institutional system in Hungary is very similar to that which exists in Germany. The Hungarian professional body of controllers (Magyar Controlling Egyesület, MCE) was established in 1993. Similarly to the German IGC, MCE comprises only a minority of active controllers and provides them with different types of training and workshops. 'Controlling' is also a part of university education. Introductory classes are available for bachelor students from diverse business administration faculties and masters students can specialize in it.

When considering the meaning of 'controlling', MCE refers to its German counterpart's, the ICV's statement (IGC & ICV, 2012). This follows the thoughts of Albrecht Deyhle (Deyhle & Hauser, 2010) that is in line with Horváth's (2011) 'controllship' concept as well. The essence of 'controlling' is presented as two, partly overlapping circles. It is the

intersection between manager and controller: that part of a manager's activity that is supported by a controller. See Figure 2.



2. Figure: 'Controlling' as the interaction between managers and controllers

Source: ICV, 2012, adapted from Albrecht Deyhle

This subchapter has provided a review of the interpretations of professional bodies about the activities and roles of those practitioners that are actively involved in the operation of MCS. The next subchapters review the researchers' understanding.

2.3 Researchers' understanding

Textbooks cover only those conceptualizations of MCS that are already established in the academic world. A review of contemporary research articles might be able to add interesting insights to these and new lenses from emerging theory, not yet established in the field of education. This subchapter is concerned with how researchers understand MC: the third way of defining MC.

Placing the discipline of management control on the map of research journals is already a challenge (see Figure 29 in Appendix I). Formal management control issues are often discussed by (Anglo-Saxon) academics under the heading 'management accounting', thereby appearing at the intersection of journals dedicated to accounting and / or organisation studies and / or management studies.

Two types of articles published in these journals can enhance our understanding about how researchers interpret MC: literature reviews and papers that explicitly focus on the

concept of MC. Strauss and Zecher (2013) prepared a summary about how MCS are conceptualized in research papers from the sixties until now. The most powerful conceptualizations of papers from the last century comprise essential parts of contemporary textbooks.

One of the newly-developed MCS frameworks, developed by Malmi and Brown (2008), provides a typology of MCS based on a synthesis of the literature from the past forty years. The authors provide a broad understanding of MCS which includes five areas: planning, cybernetic, reward & compensation, administrative and cultural controls. Administrative controls (policies and procedures, governance and organisational structure) build the basis of control systems. Cultural control provides a broad set of controls through values, beliefs and social norms that are established in the organisation.

Formal MCS are focused on control types at the centre of this framework: planning, cybernetic control, reward and compensation. Cybernetic control based on the traditional approach of feedback process covers budgets, financial, non-financial and hybrid measures.

Besides similar papers attempting to conceptualise MC, literature review studies give a powerful insight into what constitutes MC, according to researchers. In a review paper by Otley and his colleagues (Berry, Coad, Harris, Otley, & Stringer, 2009) emerging topics in MC were identified in the light of recently-published research: decision making for strategic control, performance management for strategic control, control models for performance management and measurement, management control and new forms of organisation, control and risk, culture and control. Some topics discussed under these labels (i.e. Balanced Scorecard, KPI systems) are unambiguously within the scope of formal MC, but others (i.e. heuristics applied in decision making) are certainly outside of it.

The core understanding of management control that emerges from the literature encompasses the narrower view of MCS: formal management control. Literature reviews provide evidence that formal control practices are very often in the focus of MC research. Hesford et al. (2006) prepared a bibliographic study about a 20-year period of research into formal MC and MA. The authors investigated relevant papers in 10 leading journals between 1981 and 2000 and provided an overview about the research topics. They included:

- costing practices (e.g. cost allocation, activity-based costing, target costing)
- control practices, including budgeting, performance measurement and evaluation, and
- other related practices such as accounting information systems or transfer pricing.

An another taxonomy of contemporary research themes was provided by a recent study that focused on articles published between 2008 and 2010, taken from four key journals (Harris & Durden, 2012). They included:

- management control: budgeting, organisational control, performance measurement and evaluation
- cost accounting
- intellectual resource management

Intellectual Resource Management refers here to a broad heading that could be called "other". It covers areas of accounting information systems, knowledge management, management information presentation and organisational learning.

These kinds of taxonomies of review papers are of course influenced by the prior selection of research topics. Certain topics gain popularity in research, and others so not, although they may be present in daily practice.

This daily MC practice of organisations is typically discussed in German-language 'controlling' journals. These mainly address practitioners and are concerned with real-world problems. Articles are pragmatic and do not follow the rigorous structure of research papers. The short articles of 4 to 8 pages freely discuss up-to-date topics such as cloud solutions for reporting, or present details about concrete innovative tools that were successfully applied by a specific organisation. Even those authors, who are well-known from English-language research journals, formulate their message there in a much practical way (e.g. compare Goretzki et al. (2013), published in Management Accounting Research, with Goretzki et al. (2014) published in the German-speaking Controlling & Management Review: both articles are about the changing roles of controllers).

Authors in German-speaking 'controlling' journals not only come from research communities but they are very often practitioners. The cooperation between academics and practitioners is much more intensive than in English speaking academic journals where practice relevance is often missing from research engagements. Articles written together by academics and practitioners are highly welcome.

As the articles are not research-driven, definitions are not discussed in detail and are usually the local interpretations of generally-used terms. See for example, the Senior Vice President Corporate Controlling of BASF reports together with Professor Schäffer, WHU (Otto Beisheim School of Management) about how 'controlling' is understood at BASF. In their view, "controlling" secures management understanding of the economic situation of BASF (Hagen, 2014).

The more academically-oriented papers in these journals reach back to the textbooks (see Table 26 in the appendices). After a careful review of the contemporary German literature, Jaroschinsky and Sekol (2014) identified four activity fields for "controlling": planning, control, monitoring of companies and their environment, and information provision and communication towards the management. These kind of definitions offer a synthesis of the existing definitions of 'controlling' presented above, based on the textbook review.

Wagenhofer (2006) reviewed 240 articles by authors affiliated to institutions located in German-speaking countries, published both in German, and in international journals between 1998 and 2004. He offers an interesting taxonomy of 'controlling' topics from the German academic literature, as follows:

- Cost accounting systems
- Management accounting for decision making (costs for decision-making purposes, production planning, pricing decisions)
- Cost management and strategy (cost management, activity-based management, target costing, benchmarking, use of the balanced scorecard for strategic decisions)
- Value-based management
- Risk management
- Management control (variance investigation, management incentives, performance measures, budgeting, capital budgeting, transfer pricing)
- The role of controllers

Not surprisingly, the role of controllers was listed as separate point as it is major issue in current practice-oriented German journals. Wagenhofer (2006) highlighted the fact that costing issues (categories 1 to 3) are more frequently included in German journals and wider management control topics (category 6) more frequently occur in Anglo-Saxon

ones. The author claimed that this proves that the German tradition of 'controlling' is based much more on cost accounting ('Kostenrechnung') than on management control.

The main **Hungarian forum for MC-related research papers** is the leading Hungarian academic management journal, the Budapest Management Review (Vezetéstudomány) which focuses on all kinds of management studies. 'The controller' ('A controller') journal was established in 2006 and served as main forum exclusively for 'controlling'-related publications. Controllers once had their own Hungarian language journal, but not for long after a merger with the 'Bookkeeper' ('A könyvelő'). Today, it is published under the name of 'Accounting consultant' (Számviteli tanácsadó) and mainly focuses on financial accounting and auditing. To fill the gap, 'Controller Info' was establish with a similar aim: to provide MC related articles to Hungarian practitioners and academics. Beyond this, journals from other disciplines publish MC related articles that focus on the specialities of an industry (see, for example, Bodnár-Papik (2013) about 'controlling' in the Hungarian health care industry) or which focus on functional 'controlling' issues (see, for example, Fábián (2013) about logistics 'controlling' in Hungarian enterprises).

Similarly to with German publications, Hungarian papers address both practitioners and academics. Publications usually report on the adaption of a tool in a Hungarian context, or provide a Hungarian language summary of internationally recognised literature. Original research papers make up only a smaller part of the publications. Individual research findings are usually published based on PhD research work, or as a part of larger research projects, such as the 'Competing the world' research program launched by the Corvinus University of Budapest. In the next few sections, I provide details about the conceptualization of **MC as used by Hungarian scholars** in their research.

Dobák et al. (1997), in their early study about the 'controlling' tools of Hungarian-based profit-oriented enterprises, gave an interpretation of management control that was new to Hungarian practice at that time. They defined management control as a managerial activity. 'Controlling' was interpreted as a managerial activity and as its supporting management subsystem concerned with cost and performance accounting, operative planning and management reporting (Dobák et al., 1997, p. 14). Performance measurement was handled as part of management reporting. Pricing, transfer pricing and responsibility centres were included in the field of cost and performance accounting.

Bodnár's (1999) survey of 'controlling' was concerned with responsibility centres, strategic, business and operative planning, management reporting cost and performance accounting and analytical methods. The subsystem of cost accounting was interpreted and analysed in detail by Lázár (2003). Cost accounting was defined by him as a toolset in the hand of management that is concerned with the measurement, evaluation and planning of the resource-utilization process and which supports decision making and better coordination of value creation in the company.

Performance measurement and evaluation has probably been the best-researched organisational subsystem in Hungary (for an exact delimitation of performance measurement and evaluation see Székely, 2005, p. 57). Management accounting systems serve as the primary but not exclusive information base of performance measurement. Székely (2006) pointed out the two other subsystems are closely related to performance measurement and evaluation: human resources and strategic management. Wimmer (2000) stressed the importance of logistics and production subsystems as further information bases for performance measurement.

But why do organisations need performance measurement and evaluation? How can companies benefit from a good performance management system? In Wimmer's view (2000), performance measurement contributes to better decision-making in value-creating processes. The goal of performance measurement and management is to support value-creation in the company. Value can be created and maximized for customers, shareholders, stakeholders, etc. Among these, the shareholder-value concept has had an influence on many Hungarian researchers of control systems (Fónagy-Árva, 2006; Kazainé Ónodi, 2008; Turner A., 2003; Tirnitz, 2012). These authors have provided miscellaneous findings about how and to which extent the intended value-orientation of MC systems can be revealed.

2.4 Management control approach applied in the dissertation

After providing the former review of Anglo-Saxon, German and Hungarian interpretations of management control, I now offer a synthesis of the material presented. This synthesis represents the approach I follow in my further work and research.

Management control is about powerful influence of behaviour in organisations (R. Anthony & Govindarajan, 2006; K. Merchant & Stede, 2012). There are many ways in which this behaviour can be influenced. Management control in a broad sense involves both formal and informal control mechanisms. These control types are not mutually exclusive but are applied in parallel in an organisation, at different intensities.

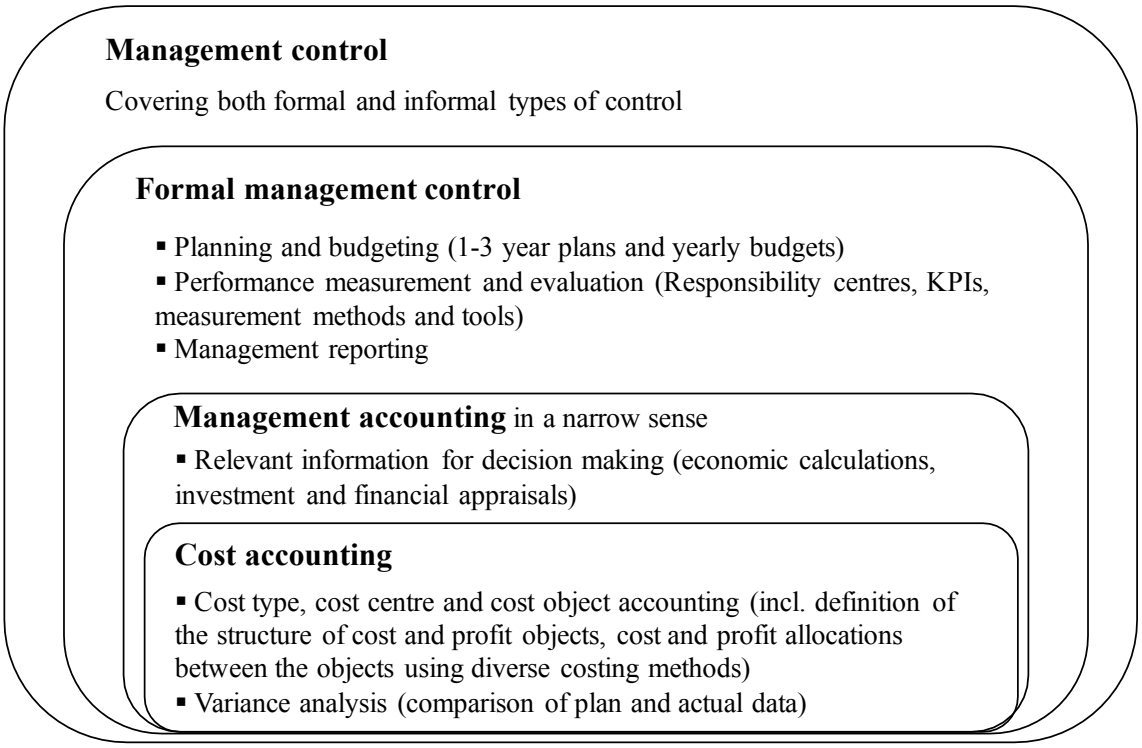
One possible classification of control types was offered by Merchant and Van der Stede (2012). They take a similar approach to Ouchi (1980), but distinguish, instead of three control types, four: action, personnel, cultural and result control. Action control is the most direct form of management control, where the activities of employees are the focus of control. One type of action control, administrative behavioural constraints such as restrictions on the decision making authority of lower level managers, are willingly used in every setting. Personnel controls are built on human nature: employees tend to control and motivate themselves. Employee selection, training and proper job design are typical types of personnel control. Cultural control uses group values and norms to influence individual behaviour.

The fourth type of control is defined by Merchant and Van der Stede (2012) as financial result control, referred to as management control in a limited and tactical sense (Macintosh & Quattrone, 2010) or more often as **formal management control** (R. Anthony & Govindarajan, 2006). It is "*only part, albeit usually a very important part, of the entire spectrum of control mechanism used to motivate, monitor, measure and sanction the actions of managers and employees in the organization*" (Macintosh & Quattrone, 2010, p. 2)

Authors' conceptualization of MC often considers only formal management control. At the same time, practices applied in formal management control are often summed up under the mantle of management accounting in the US and other Anglo-Saxon literature. Management accounting in this broad sense includes all formal control practices: planning and budgeting, and performance measurement, evaluation, management

reporting as well. It is for this reason that I build on several papers in the literature review that have MA in their title.

Management accounting in a narrow sense corresponds to the Hungarian "vezetői számvitel" which is the essential part of MC. Cost accounting provides the information basis for this. Cost accounting is designed to measure the cost (and income) of any cost object, such as products, services, customers, projects.



3. Figure: Own interpretation of management control and related terms

Source: Author's own construction

The Hungarian term 'controlling' as a management subsystem corresponds with formal management control. The tools of 'controlling' are those listed under formal MC. Figure 3 summarizes the definitions of the terms in use.

While recognizing the importance of informal control mechanisms, the current paper focuses on formal management control. In line with the functionalist approach of the dissertation, the systematic (formal) aspects of MC will be investigated. As Anthony has stated "*it is very difficult, except in general terms, to describe the appropriate actions for managers encountering situations not contemplated in the formal systems"* (R. Anthony & Govindarajan, 2006, p. 6). Research into informal control mechanisms such as cultural control would require other theoretical lenses.

Although papers translated into English often use the term ‘controlling’, it is used in Anglo-Saxon literature in another sense. I will focus on what is considered in Hungary to be ‘controlling’ under the label of MC.

I use the term **controller** for those employees of organisations who **support managers in their management control activities, facilitated by formal systems**.

3 DIVERSITY OF THEORIES AND METHODOLOGIES APPLIED IN MANAGEMENT CONTROL RESEARCH

Organisational phenomena, such as management control practice, have been studied with diverse methods and theorized from diverse perspectives. The empirical research in MC has changed notably during the last decade (in terms of the focus of research topics and methodologies). New theories have appeared that were not used before for explaining MC, while other theories widely used in prior research have significantly dropped in popularity. Subsequently, the emergence of new theories and new research methods has been borrowed from other disciplines.

Here, I provide a brief overview of the theories and methodologies in modern research, focusing on controllers' roles and tools. This helps to position my own research on the paradigm-map provided in Chapter 4.

3.1 Traditional theories using an objectivist perspective

Theories using objectivist perspectives see the structures systems of an organisation as the 'reality' and infer that the objectivist researcher can get acquainted with this reality. Objectivists believe that control and accounting practices can be investigated, learnt and explained on their own. By identifying patterns and relationships, predictions can be made. MC research from the last century was dominated by theories that employed objectivist epistemological assumptions.

The mainstream theories applied in MC research are summed up as a **functionalists paradigm** in the 2x2 matrix scheme of Burrell and Morgan (1979). Functionalists follow an objectivist perspective, meaning that organizational phenomena, such as MC systems, exist independently of organizational members. The functionalist paradigm is built on social theories that emphasize regulation and stability: they focus on improving the efficiency of the existing systems and take power and political arrangements as a given, in contrast to radicalists. A detailed discussion of radical structuralist and humanist paradigms is beyond the remit of this dissertation. This subchapter describes the main

theories applied by functionalist MC scholars and is followed by a description of some of the newly-applied theories of a more subjectivist approach.

MA and MC research has initially had a strong link to **economics**. Researchers developed and used primarily mathematical models during most of the last century and research was underpinned mainly by theories from organizational economics such as **transaction cost theory** and agency theory. The initial proposal of transaction cost economics (by Coase and Williamson) explains why firms exist. It assumes rationality and profit maximization. In today's MC research this approach is rare but still present and is typically applied concerning theorizing outsourcing decisions (Sedatole, Vrettos, & Widener, 2012).

Agency theory, also called the principal-agent model, is an economic model based on expected utility analysis. Research papers underpinned by agency theory are concerned with one basic issue: how to create an optimal incentive contract. Although they are based on assumptions such as the rationality of the actor, they are still valid, and the theory is still used in compensation-performance studies. Today's performance and incentives studies have realized that incentives, in practice, usually consist of subjective elements as well. Investigating subjectivity in performance evaluation is a new direction in MC research. Studies theorized by the principal-agency model are still based on mathematical models and seek to measure immeasurable components of subjectivity (Bol & Smith, 2011; Woods, 2012; Grabner & Moers, 2013b). Due to the involvement of subjectivity, today's performance studies often receive new theoretical underpinning from cognitive bias and motivation theories.

Among all organisation theories, **contingency theory** has probably had the biggest impact on MC research of the last century. The original focus of contingency theory was on the formal organizational structure that effects organizational effectiveness. There is no one optimal solution for organizational structure; it should be adjusted to the environmental and internal factors (contingencies) of the organization. Following this logic, MC researchers adapted contingency theory to explain the effectiveness of management control and accounting practices (D. T. Otley, 1980). They examined diverse environmental factors, production and IT technology, company size, organizational structure, strategy and national culture that best fit with certain MC practices (Chenhall, 2003).

At the heart of contingency studies is “fit”. The fit between the contingencies and the control practices should produce higher organizational performance. A significant number of papers, called ‘selection fit studies’ do not explicitly concern performance. Gerdin and Greve (2004) distinguished selection fit (labelled ‘congruence’ in their overview article) from contingency fit; the latter explicitly includes performance. In selection fit studies, performance is not addressed but assumed to be at an optimal level. Due to the logic of natural selection, underperformers drop out in the long run. It is therefore implied that researchers observe only organizations that have optimal MC solutions for their contexts (Hoque, 2006).

Contingency-based management control literature has been criticized for its methodological limitations and contradictory research findings. A lack of attention to measuring performance (D. T. Otley, 1980), to processual aspects (Chapman, 1997), to the difficulties of measuring the effects of performance (Chenhall, 2003), and the mismatch between the verbalized statements of hypotheses and the statistical tools used for hypothesis testing (F.G.H. Hartmann & Moers, 2003) are often subjects of criticism. Despite the many critiques, theorizing contingencies remains valuable even now. A significant number of recent publications theorizing contingencies and newly-published studies exploring new forms of fit and novel statistical techniques supporting this show that contingency theory is still one of the most prominent theories applied in MC research (Burkert, Davila, Mehta, & Oyon, 2014).

Contingency theory is willingly used in research into management control systems. MC practices can be examined as both dependent and independent variables. Among contemporary Hungarian contingency-based studies both research settings can be found. Lázár (2002), in a selection fit study investigated the contextual factors (independent variables) which influence cost accounting systems (the dependent variable), without having an explicit focus on performance. Zárda (2009) and Székely (2006) examined MA practices as independent variables and performance as a dependent variable. Zárda proved the positive impact of management accounting tools on business efficiency while Székely investigated how the design of performance measurement and evaluation systems influences performance, while controlling for other variables.

The contingency-model of MC systems is the most commonly used theoretical background for objectivist-type studies about the roles and tools of controllers. Academics have identified the impersonal forces (environmental uncertainty, task

uncertainty, IT technology, etc.) that shape the characteristics of MC systems and that have an impact on the role of controllers.

3.2 Emergent theories of subjectivist perspective

Following the dominance of positivistic MC research, theoretical diversity has increased over the last two decades of the 20th century. Now, in the new millennium, many researchers are pleased to report more significant extension of this diversity (Baxter & Chua, 2003; Scapens, 2006; Baldvinsdottir, Mitchell, & Nørreklit, 2010). Besides economics and organizational studies, a wider range of social sciences have nurtured MAC research: sociology, psychology, politics and social anthropology (Scapens, 2006). Opening towards new disciplines has gone hand in hand with the emergence of new theories. MA researchers have willingly turned to alternative theories such as structuration theory, institutional theory, role theory, labour process theory, political economy and Foucaultian theory (Parker, 2012).

Research underpinned by emergent theories can be divided into two main parts: critical theorising and the interpretive research of MC. **Interpretive researchers** study how social reality emerges from subjective understanding. Hence, they focus on exploring and holistically understanding MC processes in their own context (Parker, 2012). **Critical research** investigates MC not only in its social but in its historical context; it emphasizes power and conflict related to MC systems and structures and it focuses on social improvement (D. J. Cooper & Hopper, 2006).

The legitimacy and popularity of these interpretive and critical perspectives in MA research is demonstrated by their institutional support and the high number of recent publications. The American Accounting Association (AAA) published as early as 1974 a supplement to 'The Accounting Review', formally acknowledging behavioural accounting as a legitimate research field (Macintosh & Quattrone, 2010). These studies have not only found their place in mainstream journals, but have launched their own, highly ranked journals (see for example Accounting, Organizations and Society, Behavioural Research in Accounting, or Critical Perspectives of Accounting).

Interpretivists do not believe in the existence of a single reality that can be identified and described. Each organisational member interprets his or her situation individually. Their

subjective understanding becomes reality through the actions they take based on these different perceptions.

Although textbooks are still dominated by the objectivists' perspective, some recent books have investigated MC in its social context. Macintosh and Quattrone (2010) take an organizational and behavioural approach that slowly became accepted not only by the research community but in education as well. Readers can recognize at first sight that they have something different in their hands. The table of contents does not list any costing or budgeting methods, nor even any of the practices included in previously-discussed textbooks.

Theories using the interpretive paradigm have provided a powerful new theoretical basis for researching the role of controllers as well. Two of the newly-applied theories have been widely used by role-researchers: role theories and the institutional theories. Role theories are concerned with the organization of behaviour at different levels: the individual and collective (R. H. Turner, 2001). **Role theory**, one of the most important social psychology theories currently applied in MC, assumes that roles are influenced by norms and expectations that are derived from other people. The investigation of role ambiguity and role conflicts is the focus of research (Birnberg, Luft, & Shields, 2006). Role ambiguity concerns the uncertainty that is experienced by individuals about expected behaviour. Role conflicts concern the conflicting role expectations towards controllers when it is not possible to comply with all expectations.

Besides theories from social psychology, **organisational sociology** has nurtured MC research. Especially the institutional approaches of sociology developed in organisation theory since the late 1970s have had a big impact on MC scholars. It is worthwhile noting that institutional approaches are composed of two other main branches besides new institutional sociology: the old institutional economics and the new institutional economics. Old institutional economics (OIE) is concerned with the role of institutions in shaping economic behaviour. New institutional economics (NIE) adds to the assumptions of the neoclassical economics paradigm and has a strong link to the transaction cost economy that is rooted in the functionalist paradigm. It explains the existence or disappearance of institutions based on cost benefit ratios (Hoque, 2006).

According to **new institutional sociology** (NIS), internal procedures and structures, such as MC systems, are not primarily shaped by the cost-minimizing objective emphasized

by NIE. These are institutions composed of rules, behavioural norms, habits, routines and the way of how they are enforced.

MC researchers have been dominantly influenced by OIE and NIS. Here, MC is not considered much more than as a set of practices that supports decision-making, but as an institutional arrangement of an organization comprised of institutionalised rules and routines. This approach has been widely applied in MC research since the seminal paper of Burns and Scapens (2000) was published. They conceptualise, using 'old' institutional economics theory, how management accounting is premised in the rules and routines of action that become institutionalised (taken-for-granted) activities.

Institutional theory is used today to justify all kind of MC and organisational change through focusing on understanding and explaining the process of change. Within these 'change studies' an increasing number of papers are dealing with the changing roles of controllers (Yazdifar & Tsamenyi, 2005; Järvenpää, 2007; Baldvinsdottir, Burns, Nørreklit, & Scapens, 2009; L. Goretzki et al., 2013). Institutional role research does not seek to identify the general impersonal factors that determine or influence the organizational role of controllers. They typically interpret the case of a single company and investigate deeply the organizational context (Burns & Baldvinsdottir, 2005).

3.3 Methodologies applied

New theoretical bases have opened up the opportunity to move away from applying conventional positivist methodology. Therefore today the same diversity can be explored from a methodological point of view that is seen in the landscape of theory.

Economic MC research uses **mathematical models** that still prevail in research that applies agency theory or transaction cost economics. **Archival data** is also often used and analysed using quantitative methods. Contingency studies willingly use **survey methods** that enable the study of causal relationships in large samples using multivariate statistical tools (W. A. Van der Stede, Young, & Chen, 2005).

Research questions addressed with these statistical tools may be addressed with another kind of methodology rarely used in MC research: **controlled laboratory experiments**. The unique features of experimental research can enhance our understanding of MC:

independent variables can be manipulated, all the variables that influence the dependent variables can be controlled for and people can be randomly assigned to treatments (Shields, 2011). Controlled laboratory experiments have been and can be used to explore a wide range of topics such as the agency problem of performance valuation and incentives or problems with processing MC information.

Field (case) research is widely applied by scholars using various paradigms. Field research can be quantitative or qualitative in its data orientation. **Quantitative field research** mainly uses numerically presented data and statistical methods (Anderson & Widener, 2006). Field research does not presume that any specified number of organisations should be investigated. Even a quantitative field study can be limited to one organisation if multiple time periods or multiple individuals and teams are involved in the analysis. **Qualitative field studies** are based on qualitative data and have more or less a subjectivist perspective. This is the dominant methodology of institutional theory studies.

The methodology used in research about controllers' roles and tools depends on the perspective of the researcher. Early studies about the role of controllers were dominated by the functionalist paradigm and researchers almost exclusively employed quantitative methods, typically surveys (Hopper, 1980; Mouritsen, 1996). Even today, objectivist studies usually include questionnaire surveys (Loo, Verstegen, & Swagerman, 2011), multiple field studies (Lambert & Sponem, 2012) or content analysis (Drótos, 2013). Subjectivist studies are mainly based on singe case studies (L. Goretzki et al., 2013).

A growing number of studies are using both qualitative and quantitative techniques. Mixed methods are used in order to enhance the validity of research findings (Balaton & Dobák, 1982). Combining diverse methodologies is often called **method triangulation.** This approach is not new to MC, but it has recently gained more attention. The majority of this mix method research can be classified into the functionalist paradigm (Modell, 2010).

The most common form of method triangulation in functionalist MC research is mixing case study and survey methods (Modell, 2005). The chronology of methods applied depends on the aim of triangulation. Hypotheses and casual relationships can emerge from a small-sample qualitative pilot study that is later corroborated by quantitative research in a following step. By using multivariate statistical tools, the strength of

relationships can be measured. Explanations suggested by quantitative data from questionnaire surveys can be enriched with subsequent interviews.

Not only methods, but also theories can be combined within a research setting. **Theory triangulation** concerns the combination of different theories. If theories associated with different paradigms are mobilized in the examination of a phenomenon, this is often referred to as **meta triangulation** (Modell, 2010). In MC research combining elements from the functionalist and interpretive paradigms are widespread. Some academics warmly welcome this approach. Ahrens (2008) emphasizes the importance of overcoming the subjective-objective divide in contemporary MC research. Triangulation across paradigms may sensitize researchers to a wider range of explanations by engaging them with multiple theoretical perspectives (Modell, 2009).

Critics claim that studies that straddle the line between the two paradigms face considerable obstacles (Vaivio & Sirén, 2010). The integration of theories rooted in different paradigms is problematic, as notions of research validity may differ. The ontological and epistemological assumptions embedded in the paradigms are not identical. Consequently, claims about validity by functionalists and interpretivists are irreconcilable. The proposition about their incommensurability (Kuhn, 1970) is heavily debated by scholars, even now (for a detailed review of the incommensurability debate see Primecz (2008) and Gelei (2002)).

Due to these difficulties, meta-triangulation is still rare in MC research. Method triangulation is widespread (see, for example, Ahrens and Chapman, 2000; Emsley, 2005). Theory triangulation is also used: this is defensible, especially if confined to the functionalist paradigm (Modell, 2005) (see for example research by Byrne and Pierce (2007) about the roles of controllers). While they take a basic functionalist perspective, to interpret their findings the theoretical lenses of contingency and role theory were used in parallel.

4 FINDINGS ABOUT MANAGEMENT CONTROL SYSTEM DESIGN AND THE ROLE OF CONTROLLERS

After reviewing the interpretations of management control and describing the theories and methodologies used in MC research, this chapter is concerned with the research findings. First, the focus is on how formal management control systems are characterized and how they can be related to IT systems. This is followed by a discussion about the organisational role of controllers. In a subsequent chapter I review those studies that link these two fields: MC systems and the role of controllers.

Although not the focus of the planned research, I also describe in brief the next logical link between MCS, role and organisational performance. Finally, research gaps are identified.

4.1 Management control system design

Objectivist research characterizes formal management control in two terms: by its tools and the information provided by the tools. The term ‘tool’ denotes here not the required IT support but the calculation, evaluation methods and procedures. The totality of MC tools applied in an organisation is termed a ‘package’ or ‘system’. These two terms are often used interchangeably, but some authors draw attention to the fundamental difference between the underlying concepts. Grabner and Moers (2013a) have dedicated a whole paper to this issue. They claim that the term ‘package’ should be used if interdependencies among the management control practices that are in place are not assumed or are not investigated. Interdependencies among tools means that the utility of one MC practice depends on what other MC practices are also in use. In this case, the choice of one MC practice should be connected to the choice of the other MC practices, otherwise benefits will be foregone. Due to the interdependencies among practices, the totality of practices in use should be referred to as a management control system.

Following the definition of MC provided in Chapter 2.4, a management control system is conceptualized here as a formalized control subsystem designed to provide information to managers (D. T. Otley, 1980; Bouwens & Abernethy, 2000).

This view corresponds more with the conventional objectivist approach that perceives MC as a (passive) tool for providing information to assist managers. However, approaches that take a more subjectivist view find that MC consists more of "*active, furnishing individuals with power to achieve their own ends"* (Chenhall, 2003, p. 129). While not denying the importance and relevance of this perspective, my research questions are of a more objectivist nature and therefore this literature review focuses more on the findings that have emerged from the research of the objectivists.

4.1.1 Instruments

Positivistic MC literature is instrument-oriented. It is not only textbooks that are concerned with MC tools, but MC research willingly focuses on them. At the same time, it is still not unambiguously clear what the term 'MC tool' involves. Researchers have different understandings about the notion of 'tool'. Tools are often referred to as instruments, techniques or practices. While these terms are often handled as synonyms, some authors draw attention to the differences between them: see, for example, the discussion by Becker and Baltzer (2009). The CIMA (2009b) proposes that general approaches should be discussed as well as applied techniques under the mantle of 'tools'. In the remainder of this paper, I do not further differentiate.

4.1.1.1 Classification of tools

Literature investigating MC tools can differ in two aspects: what can be considered an MC tool and how they can be classified. The number of MC tools identified varies significantly depending on the researchers' understanding of MA and MC which can have a narrow or broad scope (see interpretations of MC and MA in Chapter 2).

The identified tools are classified into categories using different criteria. A typology based on the tasks served by the tool (budgeting, costing, etc.) is applied by research papers and textbooks as well. Market-leading Anglo-Saxon textbooks (see table 25 in Appendices) discuss a constantly growing set of tools using the relatively typical structure of:

- costing,
- planning and budgeting,
- performance measurement and evaluation, reporting and

- other control-related practices.

Costing tools are often discussed under the mantle of "accounting for decision making" which relates to the basic purpose of helping with managerial decisions by providing relevant information.

One of the most exhaustive lists about tools was developed by CIMA (2009b). More than 100 management accounting, control and related tools were identified and classified into the 3 main categories of operational, managerial and strategic tools.

Operational tools support the traditional operational tasks of costing, pricing, budgeting, profitability analysis and investment appraisal. **Costing** tools are concerned with costing of activities. **Pricing** tools are concerned with pricing of products and services, both external and internal. Transfer pricing between BU is part of this category. **Budgeting** tools the support effective allocation of resources by means of budgeting. **Profitability analysis** tools are concerned with the analysis of the profitability of revenue generating activities. Product/service profitability analysis, customer profitability analysis and break even analysis are typical techniques included in this category. **Investment decision making** is supported by tools that calculate net present value, payback or internal rate of return.

According to CIMA's (2009b) approach, the managerial toolset consists of performance measurement, performance management and reward systems. **Performance measurement** tools concern indicators such as return on capital employed, cash flow return on investment or profit before tax. **Performance management** tools include the Balanced Scorecard, value-based management, activity-based management and some other techniques such as six sigma that can only loosely be coupled to formal MC. **Reward** and related systems such as profit sharing schemes and executive and management incentive schemes are discussed as managerial tools.

Finally, **strategic tools** support strategic decision making by means of SWOT analysis, competitor analysis or long-range planning.

Becker and Baltzer (2009) define a list of MC tools that are typically discussed by German scholars as a 'controlling instrument'. Not that much difference can be found between the toolset of a German controller compared to its US-based counterpart. At the same time, differences within the German 'controlling' school might exist based on the underlying concepts of the academics.

Contemporary German textbooks (see Table 26 in the appendices) suggest the use of different phrasing in classifying practices. Tools are divided into two main sections in the German textbooks:

- Information provision (‘Informationsversorgung‘) and
- Planning and Control (‘Planung and Kontrolle’).

The label ‘information provision’ (‘Informationsversorgung‘) is equivalent to the Anglo-Saxon ‘relevant information for decision making’, which covers basic costing issues. The English term ‘cost accounting’ corresponds to ‘Kostenrechnung’, although the latter refers to a much more clearly defined field that is divided into three subsystems. These subsystems – cost type (‘Kostenart’), cost centre (‘Kostenstelle’) and cost object (’Kostenträger’) accounting – are not explicitly labelled as parts of Anglo-Saxon cost accounting, but cost allocations follow the same logic in practice.

Today’s textbooks by Hungarian authors (a list of these is included in Table 27 in Appendicies) suggest a triad of ‘controlling’ practices:

- cost and performance accounting, economic calculations, investment and financial appraisals,
- planning and budgeting and
- information provision.

In contrast to the views of many international scholars, ‘tools of information provision’ refers here not to cost accounting issues, but usually to KPIs, reporting and information systems.

Classification of practices by time horizon is also widely employed. Strategic and operative levels are distinguished, not only in planning, but Hungarian authors often write about strategic and operative ’controlling‘, similarly to some German authors (Horváth, 2009; Jung, 2011). These are seen as two subsystems that have different orientations in time, but are closely linked and should be methodologically uniform. Strategic ’controlling’ supports strategic management and is linked to operative ’controlling‘ via the link between strategic plans and yearly operative plans (Körmendi & Tóth, 2011). Operative ’controlling‘ focuses more on the internal side of the company and is concerned with issues of profitability and economic operations (Gyökér, Csikós, Juhász, & Kertész, 1999; Hágen & Kondorosi, 2011).

The term ‘financial controlling‘ was introduced to identify the control issues related to the financial activities of the organisations (Maczó, 2007; Sinkovics, 2012). Komáromi (2013) defined financial ‘controlling‘ as connecting system of financial management and ’controlling‘. Its tools are concerned with planning, measurement and control of financial activities and financial performance. Operative ‘financial controlling’ tools have a focus on liquidity issues, cash-flow planning and reporting.

The above typologies taken from the Anglo-Saxon, German and Hungarian literature are based on the tasks served by the tool (budgeting, costing etc.). This approach is often supplemented by distinguishing between traditional and new practices. **Traditional MC practices** build the foundation of the discipline on the techniques of cost variance analysis, overhead allocation or financial KPIs. These traditional techniques focus on company internal events, are monetary-oriented and are less able to provide non-financial information or take a strategic focus.

Scholars have claimed that traditional tools are no longer suitable for use in organisations of the 21th century (Chenhall & Langfield-Smith, 1998; P. L. Joshi, 2001). Firms operate in a more intensive globally competitive environment, technology changes rapidly and new management approaches, such as total quality management and flexible manufacturing have emerged. The needs of managers facing these new challenges cannot be met by using traditional MC tools. New practices are required in order to maintain the relevance of formal MC (H. T. Johnson & Kaplan, 1987). New tools are often called **recently-developed, innovative or contemporary practices**.

The typology of traditional-new is a supplement to the task-based typology. New, innovative tools can be identified in all task-based categories for MA tools. Even costing tools include both more traditional ones such as overhead allocation, costing for jobs and variance analysis and more innovative tools, such as activity-based-costing, target costing. Similarly, budgeting tools range from the more traditional tools such as financial year forecast, rolling forecasts and incremental budgeting to the more innovative practices of beyond budgeting and activity-based budgeting. Besides classical customer / product profitability analysis, today’s firms are engaged in using more innovative methods of analysis such as product life cycle analysis, value chain analysis or benchmarking. Classical performance measurement tools, defined mainly in monetary terms, are often supplemented or even replaced by new tools with an increasing emphasis on non-financial measures.

Several studies using questionnaires and multivariate analysis methods have investigated the adoption rates of management control practices. Researchers concluded that firms apply a mix of traditional and new tools. Traditional tools have not disappeared. The classical tools that rely on financial measures such as product profitability analysis are likely to be important in the future, but more and more emphasis is being placed on the use of newer tools (J. Hyvönen, 2005). As the CIMA report (based on input from over 400 respondents) states: "*It suggests that the discipline has a solid foundation, and principles which endure yet are refined so that the body of knowledge is continually expanding*" (CIMA, 2009b, p. 28).

4.1.1.2 The management control toolkit of Hungarian companies

Management control practices can differ among countries. The transition countries of Central and Eastern Europe (CEE) show some differences in the tools applied. CEE countries could have been characterized by their special institutional, legislative, and cultural contexts (considerably different from USA and Western European countries) over the first decade after the transition (Dobák, 2006; Dobák & Steger, 2003). Around the millennium, researchers claimed that MCSs in CEE were still in the initial stage of development, and much more emphasis was given to the development of financial accounting (Haldma & Lääts, 2002).

In post-socialist Hungary, the first MCSs were heavily built on inherited systems but their managers wanted these to be appropriate for meeting new requirements such as reporting to foreign owners (Bodnár, 1997; Lázár, 2002). Using the case of a formerly government-owned and production-oriented Hungarian company, it was proved that some tools (such as calculation practices) had been used before the transition that followed almost the same procedures. The novelty was not related to the technology, but to the practice. Changing from a command to a market economy altered fundamentally the purpose of management control (Vámosi, 2000, 2003).

New MC tools, not formerly used in the socialist area, were slowly adopted by companies. As stated in 1997, the management control practice of Hungarian companies was similar in many ways to that of US companies 10-15 years before (Dobák et al., 1997). How the management control toolkit of Hungarian organizations changed between 1996 and 2004 has been detailed by Bodnár et al. (2005).These authors concluded that a slight shift

towards more innovative practices can be identified, but the dominance of traditional MC tools still prevailed.

Using survey data from 301 organizations in 2004, three clusters of companies were identified based on their choice of MC tools. The cluster "Planners" could be characterized by their intensive use of strategic planning and budgeting tools and generally high adoption rates of MC tools. This cluster accounted for 34.5% of all companies. The "Reporters" differentiated themselves through employing well-used and sophisticated feedback mechanisms. "Lagging companies" were characterized through their low adoption of MC tools in all fields. This cluster was the biggest, involving 42% of all companies. (Dankó D. & Kiss, 2006).

Zárda (2009) claimed that the main reason for the lagging behind of Hungarian companies was the old-fashioned attitudes of corporate executives. The forty years of socialism still affects the way of thinking and retards the internalization of new approaches. Attitudes and the orientation of executives need to be changed in order to further develop MA and MC systems in Hungarian enterprises.

At the same time, Wimmer (2000) reported that the internationally considered approach of field performance measurement has already spread throughout Hungarian enterprises, although the use of the related tools is lagging. The focus of performance measurement is still on the past. Management reports dominantly involve data taken from financial accounting. Non-financial aspects of performance, such as quality or customer satisfaction, are neglected. External data is only poorly provided to management. Wimmer (2001) concludes from her quantitative analysis that the formal MC practices of Hungarian enterprises do not really support managerial decision-making.

In a later piece of research by the same author, improvements in many areas are reported: Wimmer and Csesznák (2012) investigated some formal MC tools (referred to as methods in their study) intensively used in Hungarian companies. They report about the usage frequency of tools that focus on performance measurement and operational analysis. The adoption rates of traditional tools remained nearly unchanged over this time period. New, innovative practices such as target costing (39.3% adoption rate), economic-valued added (28.0%) or Balanced Scorecard (22.1%) are known and used in many of today's Hungarian companies, but the use of traditional tools still dominates.

4.1.1.3 Contingencies influencing management control tools

There is an extensive body of literature about contingencies that influence management control practices**.** Both external firm characteristics (environmental uncertainty, market competition, national culture) and internal organisational characteristics (strategy, structure, size, adoption of diverse management techniques such as total quality management or just-in-time techniques) are used to explain why firms adopt different MC practices. Chenhall (2003) provides a detailed review of contingency studies about MCS, and for some later developments, see Abdel-Kader and Luther (2008).

The political and economic background is often theorized to have an influence on the adoption of MC tools. Emerging countries such as India are reported to be slower at adopting innovative practices and rely strongly on traditional management control tools (P. L. Joshi, 2001).

National culture is often theorized as a hindering or supporting factor of the implementation of innovative MC tools (Hofstede & Bond, 1988; P. L. Joshi, 2001; Angelakis, Theriou, & Floropoulos, 2010). At the same time, scholars argue that the influence of cultural differences in the adoption of MC tools seems to be diminishing over time. The drivers of divergence are dominated by the drivers towards convergence, and findings show the increasing international homogenization of applied practices (Granlund & Lukka, 1998a).

The convergence of management control systems is not limited to Europe and North-America. As the driving macro-level forces are homogeneous, countries with sharply different national cultures (such as Arab countries) also show convergence (Prem Lal Joshi, Bremser, Deshmukh, & Kumar, 2011).

One main driving force – probably the most relevant to Hungary and other CEE countries – is the presence of multinational companies that have spread their operations throughout the world and adopted standardized procedures and practices for all subsidiaries (Rejc Buhovac & Zaman Groff, 2012). Multiple lines of evidence have been provided suggesting that foreign ownership is one of the most important external factors when it comes to influences on the MCS of Hungarian companies (Bodnár, 1999; Lázár, 2002; Dankó D. & Kiss, 2006).

Besides external factors, firm size as an internal contingency is the most important variable as concerns the adoption of MC tools. Larger organisations are more likely to

use more tools. This fact can be explained by organizational theory. Larger organisations perform tasks of higher complexity that require the division of labour and specialization of tasks. Specialization leads to the differentiation of organizational function that in turn requires coordination and integration of the diverse activities. Coordination and integration are supported, among other ways, by formal MC practices (Chenhall & Langfield-Smith, 1998). Another often mentioned reason is that large firms have more resources and are therefore more willing to experiment with new innovations, such as contemporary MC tools.

Based on a sample of Hungarian profit-oriented organisations, Bodnár (1999) identified a significant positive relationship between the use of 'controlling' tools and company size, and, respectively, the use of tools and the level of diversification. Companies with a limited range of activity and companies of smaller size tend to apply less advanced "controlling "systems (Bodnár, 1997). Larger companies more intensively use budgeting and planning tools than smaller firms. Differences in the adoption rates of costing tools between firms of different size proved to be less significant (Dankó D. & Kiss, 2006).

Realizing the impact of organisational size on MCS, the peculiarities of small and medium sized enterprises (SMEs) have intensively been researched in Hungary. Szóka (2007), after surveying 321 SMEs, took a dim view of the use of MCS in SMEs. He claims that the majority of SMEs do not even have sound knowledge about MA and MC tools and/or their main purpose. The major weakness of MC systems of SMEs at the millennium was the insufficient level of detail awarded to planning and, consequently, the absence of cost variance analysis and the comparison of actual and plan data (Lázár, 2002). Enterprises with more organisational units, deeper hierarchy and a more bureaucratic operating style placed more emphasis on planning. Besides the size of companies, their age proved to be an important factor in shaping cost planning methods. Older organisations tend to have more sophisticated cost planning procedures. Organisations need time to become "mature" in terms of planning (Lázár, 2002).

4.1.1.4 Benefits derived from MC practices in use

Chenhall (2003) drew attention to the problematic of researching outcome variables related to the characteristics of MCS, such as use of the systems. Organisational members,

and even entire organisations such as subsidiaries, may be forced to use certain MC tools, even though they find them to be of little use.

Besides measuring the actual frequency of use, the intended use, or more often the actual utility, the benefits that can be derived from the adoption of management control tools are the subject of analysis. Reported benefits comment on future emphasis being placed on a certain MC tool. High actual adoption rates and low ranking of benefits indicates that the tool is becoming outdated, or could not meet the expectations of users (P. L. Joshi, 2001; CIMA, 2009b).

One might expect that traditional MC tools would be perceived as being less beneficial and that more benefits could be derived from the adoption of new tools. At the same time, a study among Finnish manufacturing firms – based on a research method developed by Chenhall and Langfield-Smith (1998) – showed that the three most beneficial practices in MC are still traditional ones (J. Hyvönen, 2005). The research was repeated in the same setting among Greek manufacturing firms 5 years later. Although the adoption rates for many currently-developed practices were at a high level, traditional tools were still being implemented at a marginally higher level. Benefits from newer practices were still reported as being somewhat less than the benefits derived from classical tools (Angelakis et al., 2010).

In the Hungarian context, the perceived usefulness of all MC tools decreased between 1996 and 2004. Among them, traditional MC tools witnessed the greatest decrease in perceived usefulness (Dankó D. & Kiss, 2006). The general decline can be explained by the learning process of Hungarian managers as it relates to the tools. The decrease in benefits from traditional tools was explained by the authors by new and emerging requirements that cannot be met by using traditional tools.

4.1.2 Information provided

When describing the MCS of an organisation, the tools that are applied are often listed. However, the provision of a mere list of practices that are in use does not tell us much about the appropriateness of the MCS. Accordingly, MCS is usually evaluated in other terms.

A framework developed by the International Federation of Accountants (IFAC) (1998) can be used for evaluating the MCS adapted by a company. IFAC's Management Accounting Practice Statement Number 1 deals with management accounting and control practices and explains their evolution. The four stages of control systems were identified in a way that each stage encompasses the concepts from the previous stage, and adds to it new concepts that have arisen out of the desire to meet emerging requirements. This chronological model can be used for evaluating the sophistication of MCS in the organisations under research. Sophistication refers to the ability of MCS to provide a broad spectrum of relevant information to managers (Abdel-Kader & Luther, 2008).

An MCS is usually evaluated by using the characteristics described in the information provided, even if the IFAC's framework is not used for this purpose. A description of MCS in terms of the provided information is supplied in the remainder of this chapter.

Formal management control systems are primarily characterized by a primary feature that relates to the information that is supplied: the **scope of information provided** (Chong, 1996; Gordon & Narayanan, 1984). The scope of information can be described using three main characteristics:

- the focus of information: external vs. internal information,
- the level of quantification: non-financial vs. financial information, and
- the time horizon: ex ante vs. ex post (past oriented) information.

Information of an internal nature focuses on events within the organisation, while external information relates to the organisation's environment. Financial information is expressed in monetary terms, while non-financial information cannot be this way expressed. Ex-ante information is future-oriented and deals with future events while ex-post information is past-oriented and relates to historical data.

Traditional MCS with a narrow scope of information mainly provide internal, financial, ex post information. In contrast, broad-scope MCS include information related to the external environment, they provide estimates about the future and measures that are not exclusively limited to monetary terms (Chenhall & Morris, 1986). These types of information are provided by broad-scope MCSs not instead of but in addition to internal, financial and ex post information (Gordon & Narayanan, 1984).

These three characteristics of information (referred to as scope) were extended by another three characteristics by Chenhall and Morris (1986): **timeliness, aggregation and**

integration. Timeliness relates to the frequency of reporting and speed of reporting. Frequency describes how often the information is provided. Speed describes the time lag between the request and the availability of information. Aggregation can be understood in at least two dimensions: whether the data is aggregated by time periods and / or by organizational areas. Another feature of aggregation is whether information is produced in a format required by formal decision models, such as cost-volume-profit analysis. The integration characteristics of information relates to their ability to play a role in coordinating activities among various organisational units.

These are only four of many possible dimensions of information, but MCS design is usually characterized in terms of these four characteristics: scope, timeliness, aggregation and integration (Bouwens & Abernethy, 2000). Some authors use only some of the characteristics that are most relevant to their research construct. For example, Gul and Chia (1994) examined only the scope and level of aggregation while characterizing MCS design. Gerdin (2005) focused on the level of detail and frequency of reporting while studying three aspects of MCS: the operating budget, the standard costing system and reliance on operational information. By means of cluster analysis he identified three types of MCS: rudimentary, traditional and broad-scope MCS. He interpreted the traditional and broad-scope MCSs somewhat differently than Chenhall and Morris (1986) did.

Rudimentary MCSs can be characterized by their less detailed and less frequently issued information. Traditional, narrow-scope MCS use a well-developed standard costing system, but operations-based measures are rather uncommon. Broad-scope MCS are the opposite of traditional MCS in both ways: they frequently issue detailed non-financial information but their standard cost reporting is less sophisticated.

Positivist research into MC information characteristics is designed to understand the **conditions that lead to the design of MCS** and typically has a focus on contingency studies. Scholars examine the influence of contextual factors on the effective design of management control systems or investigate their impact on performance. In the latter case, MCS is the independent variable. This situation is discussed in more detail in Chapter 3.5. In the prior case, features of MCS are dependent variables. The argumentation is that organisations in different contexts can benefit from different types of MCS. The types of MCSs are defined here not in terms of the tools they employ (as defined in Chapter 3.1.1), but in terms of the information they provide.

The relationship between perceived environmental uncertainty and scope of MCS has often been explored using these variables. Multiple sources of evidence suggest that managers that perceive a high level of uncertainty seek out more external, non-financial and ex ante information (Gordon & Narayanan, 1984; Chenhall & Morris, 1986; Gul & Chia, 1994). Uncertainty has been explored not only in an environmental context but in relation to the tasks that should be performed. Under a situation of high task uncertainty, the use of broad-scope MC information is needed, while under low task uncertainty situations a broad scope of information has been found to lead to information overload, and hence proven unsuitable (Chong, 1996).

Internal factors such as organisational structure or strategy are also related to the design of MCS. Decentralization, as a component of structure, has been found to have a positive relationship with a preference for aggregated and integrated information while organisational interdependence was positively correlated to broad-scope, aggregated and integrated information (Chenhall & Morris, 1986). Similarly, diverse strategies make different demands on MCS design. Customization as a manufacturing strategy requires more sophisticated information for managing the interdependencies that arise from the new strategic priority of customization (Bouwens & Abernethy, 2000).

The above-described studies and a large number of other papers on this issue treat MCS as a dependent variable that is influenced by contingencies. This approach restricts MCS to a strategy-implementation system (Henri, 2006). Strategy is considered as a given and the perspective is static: strategy influences the optimal design of management control and accounting systems, but not vice versa. A less well developed line of research is concerned with the opposite contingency and has suggested that MCS can also affect strategy (Bisbe & Otley, 2004a).

Although a significant body of literature describes the relationships between business strategy and MCS, the relationship is in no way straightforward (Langfield-Smith, 1997). Inconsistent findings have been reported about the relationship of MCS and other contextual factors (Chenhall, 2003). Bisbe and Otley (2004b), recognised scholars of contingency-based MC research, have argued that the contradictory results of contingency studies capture the different uses of MCS. For example, research that has identified the presence of interactive uses of MCS reported that MCS is a facilitator of innovation. Studies that focused more on the diagnostic uses of MCS reported that MCS hinders innovation.

The idea that formal management control systems can be used in different (diagnostic and interactive) ways was introduced by Simons (1994). According to Simon's levers of control framework there are opposing forces in an organization that lead to tensions between freedom, empowerment and bottom-up creativity, on the one hand, and constraints, accountability and top-down direction on the other. These tensions are managed by positive and negative control systems. Positive control systems should motivate and reward people, guide them and support learning. Negative control systems prescribe, coerce and punish. Both negative and positive control systems are needed in organizations. The coexistence of both ensure effective control.

Four levers of control have been identified by Simons (1994): belief systems and interactive control systems as positive control systems and boundary systems and diagnostic control systems as negative control systems. Two of them are formal mechanisms: the thermostat-like, diagnostic use of formal MCS and the interactive use of formal MCS.

The diagnostic use of MCS is focused on mistakes and negative variances. It monitors and reports exceptional deviations to managers. In contrast to this approach, the interactive use of MCS takes the form of the supply of important information to top managers. Such information is given frequent and regular attention throughout the organisation and is regularly discussed (Henri, 2006).

Contingency studies often appraise MCS design according to the perceived usefulness of diverse information characteristics: they ask respondents to rate the usefulness of being able to obtain non-financial information (scope) or to rate the usefulness of receiving daily reports (timeliness). Research that has addressed the different uses of MCS has not inquired into *usefulness*, but rather about the *use* of information. A tool developed by Abernethy and Brownell (1999) measures the extent to which the information is merely used for monitoring the achievement of pre-established goals (diagnostic use) or it is discussed face-to-face, requires managers' attention and can challenge ongoing activities (interactive use).

Diagnostic and interactive uses of MCS are not mutually exclusive. They are complementary, are may be present simultaneously but can be addressed to different purposes, therefore both should be present in an organisation in a balanced combination (Henri, 2006). The combined use of MCS in a diagnostic and interactive manner is

required because the establishment of the diagnostic use of MCS is necessary for introducing interactive use (de Haas & Kleingeld, 1999).

The interactive-diagnostic typology of MCSs can be easily compared to the typology based on information characteristics. It has been empirically proven that there is a positive relationship between the perceived usefulness of broad-scope MCS and the interactive use of MCS (Naranjo-Gil & Hartmann, 2007). Having a broad scope of information facilitates and encourages managerial interactions.

The contingency study of Bodnár et al (2005) draw on Simon's framework while investigating MCS in the Hungarian context. They argue that 5-10 years after the collapse of the socialist era, the sharp decrease in company sizes, the increase in foreign ownership and the growing trust among economic actors had introduced slow changes in the MCSs of Hungarian enterprises. At the beginning of the 90s MCSs were typically control-focused and results- and past-oriented: the typical diagnostic use of MCS. After 1995 a shift began towards more interactivity, more focus on decision support and future-orientation: a more interactive use of MCS. This approach shows that the diagnostic and interactive use of MCS can be represented as two poles of a continuum, on the ends of which companies are not typically located.

All of the above-discussed objectivist studies describe MCS as a toolset for control and as a collection of control techniques. They do not consider that organisational members that are involved in control processes are playing a substantial role in shaping MCS. Scholars with **a more subjectivist approach** claim that the objectivist understanding of management control creates inconsistency with findings and hinder researchers from obtaining more insight. In order to overcome the limitations of contingency theory and provide new insights into MCS, other theoretical frameworks have been used by researchers.

Alternative MC research has many identifiable streams which employ diverse interpretations of MC practices. A detailed discussion of all the alternative perspectives is beyond the scope of this research effort. Just to illustrate, I very briefly highlight the theory-building based on institutional theory that is often used in research into the role of controllers.

Institutional theory focuses on socially-generated rules that explain collective behaviour. Rules structure behaviour in organisations and society (DiMaggio & Powell, 1983).

According to this view, management control practices "*are seen as 'rational myths' that confer social legitimacy upon organisational participants and their actions*" (Baxter & Chua, 2003, p. 100). MC practices are more than technical procedures. Their emergence can be attributed to the rationalised norms that specify the appropriate means. This interpretation of MC tools makes it possible to investigate changes in MCS using case-sample organisations, a typical focus of studies that are underpinned by institutional theory.

4.1.3 IT systems

Information technology (IT) systems are not part of MCS, but nowadays MCS cannot be operated without the intensive support of IT. IT systems enable the efficient use of MC tools and the user-friendly provision of information to management. The first MC-related task supported by IT systems was data-processing, while nowadays (almost) the whole spectrum of a controller's tasks is facilitated by diverse IT applications (Drótos, 2010).

MC systems are increasingly embedded in IT systems. Therefore, while describing the MCS design of a firm, IT characteristics must be recognized, in addition to the specific MC tools that are being used, and the information they provide.

Research that focused on the relationship of information systems to MC became popular after the widespread adoption of enterprise resource planning (ERP) systems in the 1990s. The effects of ERP on diverse aspects of management accounting and control systems have been investigated, but the first studies indicated only a very moderate impact of ERP implementation on MC/ MA.

In their cross-sectional field study, Granlund and Malmi (2002a) analysed the impact of ERP on management accounting and control procedures. In contrast with prior expectations, they found that ERP had a modest impact. MC techniques (not only advanced techniques but traditional ones too) were not integrated into the implemented ERP. Consequently, the implementation of SAP systems had not fundamentally changed the MC information that was being provided (Scapens & Jazayeri, 2003).

Ten years later, researchers still report to finding the similarly moderate effect of ERP on MC tools and information. Based on a case study in an SME context, ERP was found to be able to support the "*standardized financial accounting transparency, no more*"

(Teittinen, Pellinen, & Järvenpää, 2013, p. 294). The lack of impact was rationalized by studies using the theoretical lens of institutionalism which referred to resistance to change: the old MA system was simply built into the new IT infrastructure without changing the content (T. Hyvönen, Järvinen, Pellinen, & Rahko, 2009).

MA and MC-related activities are more often supported by processes **outside of ERP** such as data warehouses, executive portals or software packages specialized in the support of BSC techniques (Rom & Rohde, 2007). Therefore, a **higher impact for MC techniques** and information is expected in this field. Despite this, research that has investigated the interface between non-ERP IT solutions and MC is very scarce. One early exception is the investigation of Strategic Enterprise Management (SEM) as an add-on to ERP, although the focus was placed more on the success of the implementation phase than on the MC-related consequences (Brignall & Ballantine, 2004). Most recently, first studies into the innovative use of internet-based technologies such as cloud computing services have been published in international academic journals. However, the link to management control is again missing from these publications. They either still have a financial accounting focus and report (for example) about the benefits and risks from the auditor's perspective (Yigitbasioglu, 2015) or they try to establish a direct link to business performance (Prasad & Green, 2015).

Is there a uni- or a bidirectional relationship between IT and MC? Information systems and management control systems coexist in organisations and evolve simultaneously. This situation assumes a more bidirectional relationship. However, most of the research that has focused on the interplay of IT and MC implies a unidirectional relationship (i.e. that IT impacts and enables MA and MC). While researchers acknowledge the existence of bi-directionality, they emphasize that information systems are more likely to have an effect on MC simply because, once implemented, IT systems are not so easy to change (Rom & Rohde, 2007). For example, in an ERP environment the configuration process defines what can and cannot be done later on with the system.

In line with this observation, my research model focuses on IT more as an independent construct that impacts management control. The logic is that innovative IT solutions can enable the efficient use of management control techniques and together become able to support the process of providing information to management. Some research into this subject already exists, but it tends to involve single case studies which have been used to investigate the effect of a concrete software package (e.g. how an ERP-linked ABC

system was able to mediate management accounting knowledge (T. Hyvönen, Järvinen, & Pellinen, 2006)). There is scarce evidence in the literature about whether and how modern, innovative IT solutions are able to influence the nature of MC information which is provided.

4.2 Organisational roles of controllers

Various interpretations of role exist. The differences are mainly rooted in the ontological and epistemological assumptions of the researcher who interprets the term 'role'. Kováts (2013) compared several role concepts that were applied by the structuralist-functionalist and the symbolic-interactionist approaches. He summarizes the **functionalist role approach** as being "*a normative expectation associated with status and based on social consensus*" (Kováts, 2013, p. 22).

The role is already given before filling the position and collective consensus about the content of the roles is assumed. The role originates from the position and not from individuals. The functionalist role model assumes that individuals accept the a-priori given roles and follow organisational norms in order to get positive feedback. They do not aim to modify or change them (R. H. Turner, 2001; Kováts, 2013). Accordingly, functionalist studies typically identify the roles of controllers from the different tasks they perform.

The **interpretive approach to role** defines role as a social construction. Through the interactions of organizational members interpretations are shared. Roles are based on these shared interpretations. Based on these assumptions, interpretative role theories are suitable for explaining the emergence of roles, or for describing the process of role change.

Role change is often theorized in MC research using institutional theory. As its common base, institutional research sees roles as institutions. But, depending on the views of researchers, these papers adopt a subjectivist-objectivist line (Ahrens, 2008). The subject of more objectivist institutional research is how the repetitive patterns and common understandings of actors develop a collective consensus around the appropriate goals and activities that are associated with a position (Scott, 2013). According to this view, role is

a normative phenomenon, has an influence on individuals and is investigated in its organisational and social context.

This more traditional approach to roles can explain how they influence individuals but is unsuitable for theorizing the reverse process; namely, the proposal that actors can have an influence on institutions as well. The more objectivist-oriented institutionalists are actor-focused and are interested in how roles as institutions change (L. Goretzki et al., 2013).

Institutionalists draw attention to the fact that controllers' roles should be distinguished from controllers' practices. Institution (role) is an abstract structure, a coherent symbolic code that guides, edits and informs the concrete actions, the practice (the use of code) (K. Weber & Glynn, 2006). Feldman and Pentland (2003) distinguish between the ostensive and performative part of organisational routines in order to be able to theorize the change of organisational routines. Drawing on this idea, Goretzki et al. (2013) stated that the role of controllers can be considered to be the ostensive part of the profession (the controller profession *in principle*) while practice is the performative part of the profession (controller profession *in practice*).

Early studies into the role of controllers took an objectivist (functionalist) approach. Recent developments increasingly follow the interpretive (and critical) perspective. Studies rooted in different paradigms investigate controllers' roles from different aspects. In the remainder of this subchapter I review findings about all the types of role studies, irrelevant of their epistemological approach, but the focus is still on research underpinned by objectivist theories. I provide an overview of how the different roles of controllers are labelled, how these roles are investigated, how they are interpreted and what the point of reference is (i.e. who the typical respondents of the research are). Finally, some insights about the relevance of discussing roles on department level are provided.

Researchers from Anglo-Saxon countries willingly refer back to the seminal work of Simon et al. (1954) – some of the first to report about the multiple roles controllers play in organisations. Simon et al. differentiated between three roles: scorekeeping, attention-directing and problem-solving. A similarly significant early study into role that emerged from German 'controlling' research was undertaken by Zünd (1978). He identified three types of roles: recorder, navigator, and innovator influenced by the external environment

of the company. The other early controller typology provided by Henzler (1974) again identifies three role-types: traditional accounting oriented controller, future- and action oriented controller, management and system oriented controller. This typology of controllers' roles is widely known and is used in the Hungarian literature as well (Körmendi & Tóth, 1996, p. 40; Halmos & Körmendi, 2000, p. 34; IFUA Horváth & Partners, 2014).

Authors often emphasize that these role types are not unambiguously delineated. They should be rather interpreted as a **spectrum of possible role types**. As Anthony stated as far back as half a century ago: *"In practice, people with the title of controller have functions that are, at one extreme, little more than bookkeeping and, at the other extreme, de facto general management"* (R. N. Anthony, 1965, p. 28).

Following this spectrum-approach, the current literature investigates the two poles of this spectrum and dominantly reports about the duality of roles. The two roles are labelled very differently in the contemporary literature. The more traditional, so called functional (accounting) oriented role is variously denoted as 'book-keeper' (Hopper, 1980), 'bean counter' (Friedman & Lyne, 2001), 'watchdog' (Granlund & Lukka, 1998b), 'score-keeper' (Loo et al., 2011) or 'corporate policeman' (Frank G.H. Hartmann & Maas, 2011). The more management / business oriented role is denoted as 'service-aid' (Hopper, 1980), 'business advocate' (Jablonsky, Keating, & Heian, 1993) and, most often, 'business partner' (Granlund & Lukka, 1998b; Frank G.H. Hartmann & Maas, 2011; Järvenpää, 2007).

Roles cannot be observed directly. Researchers capture the nature of controllers' roles very differently depending on the underlying role concept. The classical approach of classifying controllers into two or more groups requires identifying the tasks they perform. Mouritsen (1996) described 18 different tasks, while Siegel and Sorensen (1999) identified 30 separate work activities. This **activity based role concept** is still commonly applied by functionalist researchers. Using questionnaires, De Loo et al (2011) analysed how intensively controllers were occupied with diverse tasks that were identified from the literature. The 37 activities were grouped together up into 5 coherent combinations of activities ('activity types'). Controllers were segmented into groups based on the type of activities they perform and roles types were deduced from this segmentation.

Another approach within the activity based role concept is to measure the importance of diverse roles by using different activity-lists (Frank G.H. Hartmann & Maas, 2011). Controllers' decision-making support for local managers (referred to as the business-partner role) was measured by examining the presence of five tasks in their job: analysing product/customer profitability, evaluating investment opportunities, developing local business strategy, helping to meet local targets, reducing costs and increasing earnings. Correspondingly, the importance of the corporate policeman role (a focus on functional responsibility) was measured by the relevance of five different tasks: developing internal controls and procedures; ensuring that the BU observes all financial reporting requirements; developing performance reports for higher level managers; assessing whether the BU observes agreements with corporate headquarters and adheres to company regulations; and ensuring that BU managers do not spend more than strictly necessary from a corporate perspective (Frank G.H. Hartmann & Maas, 2011, p. 450).

The activity-based role concept is suitable for demonstrating the changes in the dominant roles acted out by controllers. For example, a longitudinal analysis of controller job adverts between 1949 and 1994 showed a significant shift in the activity fields occupied by controllers (J. Weber & Schäffer, 2014, p. 8).

The change of activities alters the demands made of practitioners. Accordingly, Byrne and Pierce (2007) analysed not only the activities that are performed but also investigated the individual skills required. These include business knowledge, interpersonal, communication, IT, monitoring and technical skills, flexibility and personal qualities. Understanding the **skill requirements** helped to explain controllers' roles. The same approach to identifying the skill set was also taken by Yazdifar and Tsamenyi (2005) who extended the set by collecting data about the way other managers perceive them in their organisations (based on controllers' own opinions). Completing the activity-based role concept with skill requirements is used in contemporary Anglo-Saxon (Marchant, 2013), German (Steinhübel, 2014) and Hungarian research (Radó, 2013) as well.

As a consequence of the diverse approaches to capturing roles, diversity exists in the **interpretation of the role types** as well. How can we interpret the traditional role of controllers which is located at one extreme of the role spectrum? How can we interpret the newly-advocated role at the other pole? The more traditional roles of controllers are seen as functional (accounting) oriented. This functional responsibility is related to fair

and objective reporting about the economic situation of the unit or company (Maas & Matějka, 2009).

Drótos (2013) used a two-dimensional scheme for interpreting the diverse roles acted out by controllers. Each of the roles can be characterized by a certain level of proactivity and by a certain level of business approach. The more traditional roles of controllers can be characterized by a low level of business orientation and, typically, by weak proactivity, while newly advocated roles perform high in both dimensions.

A recently conducted survey among 296 Hungarian practitioners (Radó, 2013) claimed that business orientation was more important than MC technical knowledge. A key element of this business-orientation is **providing relevant information** to managers for use in decision making (Hopper, 1980). If this relevant information is no longer provided on the sideline, controllers become business partners in their relationship to managers (Quinn, 2014).

Although the terms 'business orientation' and 'business partner' are frequently used in current literature, as Graham Colbert, Vice President Finance of AstraZeneca has stated: "*The term business partner is … a bit of a black hole. Nobody really knows what it means in practice*" (CIMA, 2009a, p. 16).

Scholars have made several attempts to define business partnering. "*The business partner role model generally denotes an increasing emphasis on a more strategic, forward-looking and collaborative role*" (Byrne & Pierce, 2007, p. 472), and "*A business partner controller is a controller who has a* ***strong, embedded, supporting relationship*** *with business managers, providing them with insights on business challenges*" (Quinn, 2014, p. 25) Insight is more than information. It covers the overall understanding of information and facts and their interrelations.

Jablonsky et al. (1993) states that the profile of business advocate has three core values: knowledge of the business, internal customer service and involvement. Pierce and O'Dea found that the partnership approach means the "*relaxation of functional boundaries in both directions, as well as management accountants becoming more involved in functional areas*" (Pierce & O'Dea, 2003, p. 279).

Involvement seems to be a common point in the diverse definitions of business orientation. Drawing on both the task and skill descriptions of controllers, the involvement vs. independence of controllers was first analysed by Sathe (1983). He

identified four different role types: involved, independent, split and strong controllers. Independent controllers are engaged with more financial reporting and internal control tasks. They desire to maintain objectivity and independence from management while focusing on monitoring tasks. Involved controllers put the emphasis on management-service responsibility which is improved if controllers are actively involved in business decision making. Strong controllers perform both of these two activities, while corporations with split controllers put emphasis on both roles. The individual controller focuses either on one or on the other role.

As Sathe (1983) has argued, fulfilment of management-service responsibility makes requirements of two kinds. On the one hand, controllers need to provide good quality information to managers. But simply making the required information available is not enough as managers might not have the depth of knowledge needed. Simply making information available gives no assurance that it will be used in decision making processes. This requires the active involvement of controllers in decision making.

Sathe's seminal work about the involvement – independence dichotomy was followed by several later studies that used a similar approach. For example, Lambert and Sponem (2012) claimed that the adoption of a business orientation is characterised by strong authority and a sufficient level of involvement.

Derived from the pre-existing literature about the characteristics of involvement, Emsley (2005) developed a tool for measuring controllers' involvement in the daily life of business units. Involvement was measured using 6 criteria: whose needs (managers, or the controllers' function) determine the daily work of controllers, with whom controllers spend their working time, to whom they directly report, who evaluates the controller's performance, whose requests receive priority in a controller's work and how the controller perceives his or her own role.

This study about controllers' involvement was based on the self-perceptions of controllers: i.e. whether they feel they are involved or not. The point of reference, namely who the respondents are, is one of the most important methodological questions when researching the role of controllers. The typical **point of reference** of role studies is self-perception. A significant number of studies are based on surveys and / or interviews of controllers and do not address the clients – the managers of the organisation (Yazdifar & Tsamenyi, 2005; Emsley, 2005; Emsley & Chung, 2010; Maas & Matějka, 2009; Frank

G.H. Hartmann & Maas, 2011). Although the controllers' self-image is very important, the role occupied by them in an organisation cannot be evaluated exclusively on their self-perceptions.

The more powerful studies involve managers and their perceptions as well. Empirical evidence has shown that there is a significant gap between managers' and controllers' perceptions about the controllers' role. Perceptions about the more traditional control and technical aspects of controllers' activities are less ambiguous. For example, Byrne and Pierce (2007) reported that controllers found the control and technical role-aspects of the job to be important, and operational managers perceived these as well performed. A major gap exists concerning the perception of fulfilling a business orientated role. Managers who were asked about the expected role of controllers desired that they had a better understanding of business and better understanding of their information requirements, controllers being "business managers with specialist knowledge of accounting and finance" (Pierce & O'Dea, 2003, p. 280).

Researchers increasingly report that a **shift** is taking place from a primarily functional oriented role toward a business orientation, and suggest that controllers are becoming business partners. Researchers who argue for role change have identified several drivers that have a huge impact on controllers' roles. Several external factors have impacted the role of controllers, such as high environmental uncertainty (Burns, Ezzamel, & Scapens, 1999; Baines & Langfield-Smith, 2003; Emsley, 2005; Byrne & Pierce, 2007) and changes in laws and regulations (Loo et al., 2011). Numerous internal influencing factors were identified as well, such as implementing new management information systems (Granlund & Malmi, 2002a; Scapens & Jazayeri, 2003), budgetary systems (Frank G.H. Hartmann & Maas, 2011) and applying new management accounting techniques (Yazdifar, Zaman, Tsamenyi, & Askarany, 2008).

Despite the extensive literature that deals with role change, there is little empirical evidence that fundamental shifts are occurring between roles (Burns & Baldvinsdottir, 2005). A static picture is painted by several studies that suggest that, with regards to the functional-oriented role "*scorekeeping and other internally oriented activities still form a major part of much of the daily work of management accountants*" (Loo et al., 2011, p. 302).

Literature is ambiguous, not only about the significance of this shift, but also about **how these different roles relate to each other**. It is unclear whether there is trade-off between functional orientation and business orientation or whether the two roles might be **complementary**. 30 years ago, Sathe (1983) predicted the spread of "strong controllers" who would be active both in traditional control roles and have advisory responsibilities at the same time. This is underpinned by the latter concept of "hybrid" controllers. Hybrid controllers are involved both in control oriented and in business support oriented types of activities (Burns & Baldvinsdottir, 2005).

Granlund and Lukka (1998b) in their ethnographic study concluded that controllers' tasks had a twofold nature. "*Even though … he or she has to participate in business decision-making and that this is something that has to be developed further, they seemed, however, not ready to abandon the role of financial monitoring either. The traditional management accountant's role of being the 'watchdog' of the organization is still there, too"* (Granlund & Lukka, 1998b, p. 198). They found it difficult to believe that controllers could be business-oriented and local-guardians at the same time, and claimed that the two roles **were not complementary**. Both roles cannot be acted out by a single individual.

Similarly, De Loo et. al (2011) reported that controllers either operate as "reporting business analysts" or "business system analysts". Maas and Matejka (2009) examined how BU controllers cope with their dual responsibilities. They found that the "emphasis on the functional responsibility of controllers is negatively associated with their ability to support local decision-making" (Maas & Matějka, 2009, p. 1249).

Psychological research findings showed that these dual responsibilities often lead to experiencing **role conflict and role ambiguity** (Birnberg et al., 2006). It was proved that BU controllers are primarily loyal to their BU managers (high level of local responsibility). Consequently, higher emphasis on functional responsibilities could lead to role conflict and role ambiguity in the case of BU controllers (Maas & Matějka, 2009).

Moving beyond examining conflicts on an individual level, some researchers studied the **role of controllers at a unit level**. This is understood as the overall position of their function within the organisation, and controllers are considered as a function of the organisation delivered by a group of individuals, who are handled as a group (R. N. Anthony, 1988). This overall function of controllers is obviously highly related to the role of individual controllers. On the one hand, individuals' self-image is influenced by the

group image, while on the other hand the overall role of controllers in an organisation is an abstraction of the roles experienced at the individual level (Lambert & Sponem, 2012).

Still, the role of controllers' functions as a department and the role of individuals differ from each other for at least two reasons: individual and the functional differences. Pierce and O'Dea (2003) emphasized the functional differences and showed that controllers' roles were perceived very differently according to sales function and production. Recent studies have pointed out the importance of the individual differences between controllers and interpreted how these differences become predictive of unit level outcomes (Naranjo-Gil, Maas, & Hartmann, 2009; Frank G.H. Hartmann & Maas, 2011; Ge, Matsumoto, & Zhang, 2011).

Studying roles at organizational level has extended the literature with valuable findings. For example, Hartmann and Maas (2011) showed that the importance of both roles can increase at an organisational level at the same time. This increase in both roles does not necessarily lead to role conflict as different roles can be acted out by different individuals.

Lambert and Sponem (2012) interpreted roles through capturing not only the activities of individual controllers but they also analysed the extent of controllers' influences over decision making and identified the group of individuals served by controllers. Drawing on this framework they investigated the centrality of the function of controllers and made it possible to define and analyse the role of controllers not at an individual but at a department level.

In their study into the overall position of controllers they identified four styles of functions: the discrete, the safeguarding, the partner, and the omnipotent controllers' function. They found that each style entails both benefits and risks at individual and organizational levels. It was also claimed that some organisations do not fit with more business-oriented types of controllers' function (the omnipotent or partner types).

Figure 4 summarizes the diverse aspects of role research in the reviewed management control literature.

The role of controllers investigated

	in a functionalist approach	in an interpretive approach
Methodology of research	Survey / field study	Field study
Underlying theories	Contingency theory, role theory	Institutional theory, role theory, motivation and related psychological theories
Level of analysis	Individual / unit level	Individual level
Focus of research	Roles in terms of •Activities carried out •Skills required •Information provided •Level of involvement Complementarity of roles or trade-off between them	Roles in terms of •Norms •Values •Expectations Process of role change Role ambiguity, role conflicts experienced on individual level

4. Figure: Role studies in management control research

Source: Author's own construction

While studying the role of controllers on a unit level, investigation of an additional dimension might be useful: the **organisational placement of the controllers' department** within the overall hierarchy of the corporation. Although this proposition seems logical, it has had little focus in the literature, at least in Anglo Saxon research.

Horváth (2011) defines three basic questions (in the preface of the last edition of his textbook) that should be answered when discussing MC.

1. What are the foundations of "controlling"?
2. Which tasks are carried out by controllers and what are the tools to be used?
3. How controllers are placed in the organisation?

Typically, the last chapters of German 'controlling' books are concerned with a topic that is rarely discussed in English publications: the organisation of 'controlling'. Where are controllers located in the organisation and how can the controllers' department be organised in the company?

Gleich and Michel (2007) edited a book with the title 'Organisation des Controlling' in order to show how neglected this research area is and what the up-to-date knowledge

about this field is at present. They lean exclusively on German authors. One of them, Horváth (2007) provided an overview of how German textbooks discuss organisation-related questions of 'controlling' and which organisational theories are explicitly used for their explanation.

The existence of the 'Controlling Organisation' as a separate research field in German-speaking countries can be traced back to the traditional separation between financial accounting activities and 'controlling' in German organisations. Papers about this issue are scarce in the Anglo-Saxon literature due to the organisational co-existence of financial and management accounting under the function of finance. Nor are organisational structural aspects of the finance function the main focus of research.

Drawing on the German traditions, Hungarian medium- and large-size companies likewise separate the 'controlling' function. A separate controller function is not typically established in companies with less than 50 employees, although internalization of the management control approach is essential even for micro-size companies Hágen (2008). As a benchmark suggestion, it is often argued that 1% of all employees is the ideal number of staff for a controllers' department (Hagen, 2014). While benchmarking the numbers, one must be aware that not all related work is done by controllers. Organisational practices are diverse in respect of their MC-related work. Employees with different titles can execute tasks that may be associated with MC.

Why might organisational structural aspects be important? It is argued that the organisational structure and the placement of the controllers' department within the overall hierarchy is a feature of relevance while researching the role of controllers. As Quinn has emphasized: "*organisational structure will affect whether or not a controller can in fact act in a really supportive and insight-providing role"* (Quinn, 2014, p. 25). Sufficient authority seems to be a prerequisite for enacting a partner role.

Researching the organisational aspects of controllers' work can have diverse focuses. It might be concerned with the task split within the controllers' department, with departmental boundaries between related areas of FA, controllers' unit and business areas or with positioning controllers' department(s) within the overall organizational hierarchy. From the role perspective, the latter is the most relevant.

The scanty academic discussion about the organisational placement of controllers has been limited to the question of centralization vs. decentralization (Horváth, 2007).

Researchers have offered evidence that controllers in decentralized controllers' units typically play different roles to those housed in centralized units. Physical proximity was found to be a key feature: decentralized controllers had the possibility to acquire a better understanding of the business and managers' information requirements. Controllers located alongside managers were reported as having more of a partner role (Hopper, 1980; Pierce & O'Dea, 2003). At the same time, evidence suggests that highly effective and innovative central departments of controllers can also play an active, business-oriented role.

Newer and newer organisational solutions are being sought for all functions in order to enhance corporate performance (Szintay, 2010). One of these relatively new concepts is that of shared services which has already proved to be appropriate for several business areas such as accounting, finance, IT, facility management and human resources. The work of controllers' work is new area for providing shared business services. But the growing number of successful implementations and operations suggests their importance (Lindvall & Iveroth, 2011).

By establishing 'controlling' shared service centres, the former discussion about centralization and decentralization seems to be passé. This new organisational solution aims to unify the advantages of centralization and the advantages of business-oriented MC services that have so far been more dedicated to decentralized solutions (Michel, 2007). The relevance of this new organisational solution was emphasized by the CIMA report (2009b) which claimed that over 50% of its respondents were organising their finance as a shared service centre which served all business units.

Studying the organisational positioning of controllers is rendered more difficult by the fact that controllers can be placed at several levels of the same organisation. Corporations might have controllers at corporate headquarters as well as controllers in each of the business units. While being aware of this, examining the overall placement of the controllers' function might contribute to a better understanding of how controllers act in their organisational context (Lambert & Sponem, 2012).

4.3 Linking management control systems and the role of controllers

New, innovative management control techniques such as activity-based costing, balanced scorecards, value based management, economic value added measurement and customer profitability analysis are likely linked with role change. Previous studies have indicated that the application or non-application of different techniques might lead to role changes (Järvinen, 2009). These papers take the assumption of one-way causality, where the innovativeness of practices is the explanatory variable. On the contrary, Emsley (2005) takes role involvement as an explanatory variable of innovativeness in MC. But, as he points out in the limitations section, the direction of causality is not at all obvious, just the association between the variables. Roles are simultaneously both influenced by and influence MC practices.

Researching MC techniques and their link to the role of controllers received more attention after Johnson and Kaplan (1987) published their seminal work "Relevance Lost". According to the major thesis of the book, MC no longer provides relevant information to managers any more. Developing and applying new, advanced techniques offers the opportunity for controllers to provide better information for use in decision making and control. Provision of relevant information consequently makes controllers relevant again within their own organisations.

The logic of Johnson and Kaplan shows that the **link between the tools that are used and the role of controllers is not direct**. New techniques firstly provide the opportunity of generating more relevant information that in the second step might lead to different roles being acted out by controllers. Later on, researchers investigated this indirect effect of one or more techniques. For example, the implementation of activity-based techniques increases directly the usefulness of MC information (Mansor, Tayles, & Pike, 2012) and as a consequence, the 'bean counter' image of controllers is weakened (Friedman & Lyne, 2001).

Strategic management accounting (SMA) literature frequently reports on how controllers can get more involved in business related issues and get closer to the business oriented role through the application of SMA techniques (Roslender & Hart, 2003; Tillmann & Goddard, 2008). Despite the popularity of these innovative techniques, a significant number of organisations still prefer to use traditional systems. This does not mean that

these organisations do not attempt to deal with the new requirements that emerge from uncertainty and complexity. Their strategy is to retain simple techniques but widen the source of information (e.g. non-financial information) and use them in different ways (Burns et al., 1999).

The different use of MCS was linked to the role of business unit (BU) controllers by Hartmann and Maas (2011). They argued that the organisational roles of controllers in BUs are different depending on the way the budgetary control system is used. Cross-sectional evidence was provided that the enabling use of the budgetary control system is positively associated with the role of controllers as business partners, and the coercive use of the budget is positively associated with the role of controllers as corporate policeman. Enabling use of budget systems means that they are primarily used to facilitate decision-making which enables flexibility at the business unit level. Coercive budget use does not mobilise local knowledge but limits the discretion of lower level organisational members: all efforts are directed at achieving corporate level goals.

Interestingly, a positive association was proved between enabling budget use and the importance of the corporate policeman role as well. This can be explained by noting that looser forms of budgeting might be compensated for by the stronger focus on the guarding roles of controllers.

While research on MC tools and systems seems to still be dominantly theorized by contingencies, a growing number of papers investigating the role of controllers are underpinned by emergent theories. Linking MCS with the role of controllers is another growing field of research that draws on institutional theory. The rationale behind this is the suitability of institutional theory for theorizing changes in management control. Longitudinal case studies provide evidence about how the change in MCS (i.e. the implementation of new tools) have affected the roles of controllers, how the new practices get accepted and how they supplement earlier norms through the process of institutionalisation.

Drawing on multi-institutional theory (underpinned by theoretical insights from new institutional sociology, old institutional economics and power perspective) an interpretive case study showed how MCS imposed by two parent companies on a subsidiary gradually became embedded in the subsidiary's routines. The change affected not only the MCS, but the role of controllers as well. A significant change in the role of the controllers was

experienced after MC information was broadly disseminated and played an informative role in day-to-day decision-making (Yazdifar et al., 2008).

Applying the neoinstitutional framework, the adoption process of SMA practices was theorized and linked to the role change of controllers in a case study of a large UK pharmaceutical company. It was argued that new practices are adopted in an organization if they fit with the organisations' strategic agenda and are relevant for reaching strategic objectives. Adoption of strategic management accounting practices emphasises a competitor-focus, long-term orientation and, as a consequence, supports the increasingly strategic role of controllers in informing strategic decision-making (Ma & Tayles, 2009).

An another stream of research links IT systems, as enablers of modern MCS directly with the role of controllers. Although the relationship between ERP and MC design proved to be weak (see chapter 4.1.3), transaction-oriented **ERP systems are able to alter the tasks of controllers**. Studies of interests unambiguously report that ERP systems left more time for analysis and routine tasks of controllers were facilitated or even replaced by the implemented system (Granlund & Malmi, 2002b; Scapens & Jazayeri, 2003)

Modern IT solutions available for and applied by controllers and other organisational members affect the availability of data probably the most: user-friendly web-based technologies make MC information available for a wider range of organisational members and the availability of data is independent of space and time. Adoption of **innovative IT solutions leads to 'hybridization'** of the professions: non-controllers with all the data available become able to do the analytical work previously dominated by controllers. At the same time controllers become hybrids as they need additional expertise in IT (Granlund, 2011). It widens and limits the role of controllers simultaneously.

4.4 Attempts to incorporate the performance effect

A significant amount of research has investigated the roles occupied by controllers and the factors that influence these roles, but only a very limited number of studies have focused on the consequences of these roles. What does the role affect? Similarly, MC tools and the information generated by them are influenced by both external and internal factors, but what do they effect?

This chapter is designed to answer these questions. It provides a short overview of studies which have employed MCSs and / or the controllers' role as an independent variable that influences performance and / or other dependant variables. I explain why measuring the performance effect of MCSs, and even more the performance effect of the controllers' role, is problematic.

The performance effect is an essential part of contingency logic, although many contingency studies do not explicitly investigate it. Those that incorporate the performance effect measure performance either in terms of managerial performance or of organizational performance. The measurement methods that are suggested vary widely in the literature. Measurements can be based either on objective measures or on subjective ratings.

Among the first to use subjective measures of overall performance was Merchant (1984). He argued that in certain cases it is impossible to get objective data that matches the research construct. He asked managers to rate their departments' performance on a five-point Likert scale (from well below average to well above average). Govindarajan (1984) also advocated subjectivity in performance evaluation. He identified 12 dimensions for measuring business unit performance. As the dimensions displayed high internal consistency, these could be summed up into a total globally-weighted performance rating. This idea was later instrumental in several management control studies (Govindarajan & Gupta, 1985; Abernethy & Guthrie, 1994; Chong & Kar Ming Chong, 1997). Another popular method of performance self-assessment is comparison of an organisation's performance with their competitors (Hoque & James, 2000)

The subjective measurement method of managerial performance was first developed by Mahoney (1963) and used extensively in other MC studies (Gul & Chia, 1994; Chong, 1996; Chong & Eggleton, 2003). Performance was rated subjectively in eight dimensions: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating and representing. As the eight dimensions should show a high level of internal consistency, these can also be summed up in a total global rating for personal performance. Middle level managerial performance is often assessed by superiors using single item-rating through a simple procedure (Mia & Chenhall, 1994).

The above-cited studies report interesting findings about how and why MCS affect subjectively rated managerial performance under different circumstances, captured by

different contextual factors. Moreover, applying an objective performance approach is also popular up to this day: certain aspects of MCS have been linked to objective organisational performance (Jermias & Gani, 2004; Macinati & Anessi-Pessina, 2014). The newest research of Macinati and Anessi-Pessina investigated the impact of MC design and MC use on financial performance. Although no statistical significance was found between MC design and the organisations' financial performance, a positive relationship was found between MC use and financial performance. It was argued that it is not MC design per se that influences performance, but its use.

Incorporating the performance effect of MCS has been intensively researched by Hungarian scholars as well. Hágen (2008) claimed that the SMEs with "controlling" practices in use perform better. He proved with multivariate statistical tools that SMEs, after implementing "controlling", operate more efficiently than before. Introducing performance management activity may lead to an increase in the efficiency of SMEs even in itself (Kurucz, 2011). Similarly, agricultural enterprises using MA practices proved to have a higher efficiency index than non-users (Zárda, 2009).

Székely (2006) defined organisational performance in terms of operative financial performance and researched it among water utility companies. Limiting the research to one sector made it possible to investigate the influence of external and internal factors on performance while controlling for other industry-specific variables. The author proved the influence of both external and internal factors on financial performance and identified performance measurement practice as a possible means of performance improvement. Among shareholder value-driven companies the positive relationship between measurement practice and company financial performance, their operating excellence and their profitability development were statistically proved (Kazainé Ónodi, 2008).

Linking certain aspects of MCS and performance follows a standard logic. Better managerial performance is linked to the enhanced personal performance of those individuals who used MCSs in order to improve their decision making. But there are broad leaps contained in this logical chain. It implies that MC tools that are perceived as useful are more likely to be used (outcome 1) and will provide enhanced information and satisfaction to the user (outcome 2). Consequently, these users will make improved decisions and perform better individually (outcome 3). Chenhall (2003) claimed that there is no evidence that such links between these outcomes really exist.

Linking managerial performance to organisational performance is also problematic. How managerial performance concretely effects organisational performance was not the focus of research. The causal link between them seems to be regarded as obvious: if managers perform better, the performance of the business unit or of the whole organization will also be improved: "*MAS will help managers improve their performance and that of their organization*" (Chenhall & Morris, 1986, p. 31).

Despite of all the difficulties, scholars continually provide new evidence about how MCS influence performance. Linking controllers' role to performance is rarely the focus of research but it is usually recommended in the last section of publications, under "future research possibilities" (for example, Byrne and Pierce (2007)). These authors studied the antecedents and characteristics of controllers' roles and identified the major organisational impacts of these roles: role interface, information impact and influence on performance. They did not measure the performance effect using statistical tools but found that the "*involvement of management accountants may mean that managers actually achieve better results*" (Byrne & Pierce, 2007, p. 492).

The link between the controllers' role and organisational performance was established and measured by Zoni and Merchant (2007) who conducted a small sample survey study among large industrial corporations in Italy. Controllers' involvement in management decisions was proved to positively correlate with long-term organisational performance. Performance was measured objectively using two indicators: profit margin in the recently completed year as a short-term measure and operating margin growth over the previous five-year period as a longer-term measure.

Although Zoni and Merchant (2007) limited the controllers' role to their involvement in the management decision process, the research provides interesting result. It implies that the newly advocated business orientation of controllers is also positively associated with organisational performance. Any direction of causality between the two constructs is neither assumed nor investigated here. Business orientation might lead to higher organisational performance and at the same time, high performing firms might tend to establish business-oriented in controllers' activities.

The diverse organisational roles played by controllers were connected to corporate performance by Szukits (2015) as well. Corporate performance was measured in subjective terms. Top executives from 220 Hungarian enterprises were asked to rate their

organizations' performance relative to that of their main competitors and to that of the industry average. Based on the role played by controllers, three clusters of companies were identified and the subjective performance of clusters was compared. A significant but weak relationship was proved: companies with more business-oriented "controlling" do perform better.

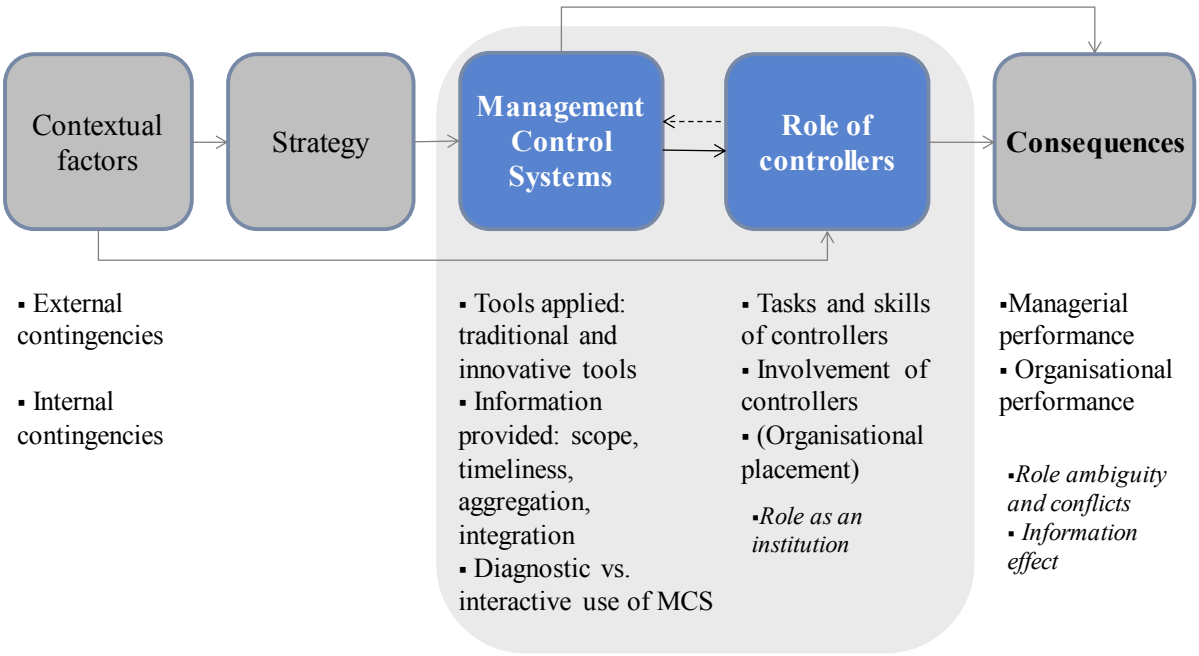
The lack of literature linking role and performance is attributable to the much broader leaps in reasoning than in the case of linking MCS and performance. Features of the role of controllers such as their involvement is implied to lead to enhanced managerial performance which in turn leads to enhanced organisational performance. At the same time, empirical evidence is scarce or completely absent about how the involvement of controllers influences decision making process, how decisions are made in processes involving controllers and how these decisions influence performance. In fact, promoting more involvement of controllers seems to be rather a normative piece of advice.

4.5 Research gaps

MC literature reports about many valuable findings concerning both the role of controllers and MCSs. Contingency studies theorize external and internal factors that influence the tools applied and / or the information provided by MCS. They try to explain why organisations have diverse MCSs and how they affect performance. External and internal factors are used to explain the diverse roles acted out by controllers, either directly linking contingencies to the roles or by treating MCSs as mediators between them. Although this topic has been intensively researched in the last 30-40 years, the results of contingency studies are somewhat fragmented.

A growing number of papers are underpinned by institutional theories with a more or less subjectivist viewpoint that explains the nature and change of MCS. Changes in MCS are investigated as an organizational process that is influenced by several factors – often the same factors measured by contingency studies as well. Roles as institutions are investigated and the process of change towards the more business-orientation of controllers is explained.

Figure 5 gives an overview of the main research topics and the links between them, as discussed in the MC literature reviewed. Issues not discussed in contingency studies are italicized.



5. Figure: Links between the main research topics in the MC-related literature reviewed

Source: Author's own construction

Interpretive case study research suggests that the role of MC systems and the role of controllers are intertwined. Functionalist studies that link MCS and controllers' roles mainly investigate how a concrete MC tool affects information provision and, in consequence, the role acted out by controllers. They measure the effect of the adoption of a concrete tool. At the same time, there is a lack of evidence about the link between MCSs and roles of controllers that are **not confined to a concrete tool or role**. To the best of my knowledge, quantitative research has been not undertaken to measure the relationship between the MC toolkit, the MC information provided and the roles of controllers.

In addition, there is scarce evidence about whether and **how modern, innovative IT solutions are able to influence the MC information**. A direct link will be established between the intensive use of innovative IT applications and the nature of the provided information.

The arrows in figure 5 represent the cause-effect relationships that are usually hypothesised. Functionalist researchers often follow the contingency logic 'of x has an influence on y' where the significance of this influence can be measured. This indicates causality. A new external or internal situation requires the implementation of new MC tools that in turn provide the possibility of changing the information provision in many

regards. In the next step, a better information basis offers the opportunity to get controllers to better accepted by the organisation and more involved in business.

It must be noted that the reverse process is meaningful as well: the redefinition of controllers' role can later on lead to the changes in the underlying MCS. Goretzki et al. (2013) provided evidence about role change of controllers in a German manufacturing firm where the new 'business-partner' role was promoted and driven by the newcomer CFO without a prior change in the MCS. But presuming an ongoing business with a stable executive level this is not the typical case.

The involvement of organisational structural aspects into role studies can be identified as another research gap. Although the organisation of the controllers' department is an issue for both practice and academics in the German-speaking countries and Hungary, it is typically not discussed in association with the organisational role of controllers. Positioning the controllers' department in the overall corporate structure might be an enabler, or on the contrary, a hindrance as concerns being involved in the business as a partner.

There is a lack of studies that report from the **executive point of view**. The majority of studies that research the role of controllers and MC tools have been based on surveys and / or interviews that have exclusively focused on controllers and other organizational members of the finance function as respondents. Although these papers presented interesting and useful findings, the problem of self-evaluation applies. Controllers may evaluate more highly the information they produce themselves, while not knowing the real information needs of managers. Pierce and O'Dea (2003) investigated this perception gap. They found that there is a difference between controllers and managers as regards how they perceive needs for information and how they evaluate MC techniques that prepare information. They provide evidence of cases where controllers have underestimated the frequency of information usage, and also for cases where controllers have overestimated this.

From these four main gaps in the literature, the research construct presented in the subsequent chapter was developed.

5 RESEARCH DESIGN

Following the above review of the literature relevant to MC, this chapter describes the research design. First, the research is placed on the paradigm map. The research construct, derived from the research gaps is presented, with a subsequent discussion of the operationalization of the constructs.

The research was done for double purposes. It is aimed to describe the status of the management control phenomena in question (research question 1) and it is aimed to explain, provide reasons in the form of (causal) relationships (research questions 2-5).

5.1 Research model and hypotheses

In the literature review the theoretical lenses of contingency theory and, to a lesser extent, institutional theory was employed. These theories comprise the guiding framework of this research. The goal is not to test the validity of the theories: they are rather seen as a "*sensitising mechanism that assists interpretations*" (Burns & Baldvinsdottir, 2005, p. 727; Byrne & Pierce, 2007, p. 470). Accordingly, the contingency framework is not used to test the fit between influencing factors and organisational settings. The main focus of the research is to investigate the organisational role of controllers that is played in contemporary profit-oriented enterprises – contingent upon MC and IT tools, information that is generated and the organisational positioning of the function.

The role of controllers is understood and investigated here not as the role occupied by an individual. It is taken to be a function (R. N. Anthony, 1988). Correspondingly, the unit of analysis is not the individual controller, but a department or group of them. Investigating the overall role that controllers play in an organization shows how controllers are viewed within the organisation generally. According to Lambert and Sponem (2012), the overall position of the controllers' function within the organisation significantly influences the role of the individual controller as well.

Role concepts of MC researchers vary heavily based on their epistemological and ontological assumptions which are deeply rooted in the theory applied to explain the role. In my research I adopt a **functionalist role approach** and assume that the role of controllers originates from the position, not from the individual.

Functionalist literature about the role of controllers often assesses role content based on the relevance of the information provided and based on the controllers' involvement in decision making. I address both issues, but the characteristics of information generated are discussed not as part of the description of controllers' roles, but as an antecedent.

I interpret roles as the extent to which controllers are involved in business. Involvement relates to both the daily decision making processes and strategy development and implementation processes. It raises the following research question, with two associated sub-questions:

Q1: To what extent is the involvement of controllers in business based on the perceptions of top executives?

Q1a: To what extent are controllers involved in operative decision making in business organisations?

Q1b: To what extent are controllers involved in strategy development and implementation in business organisations?

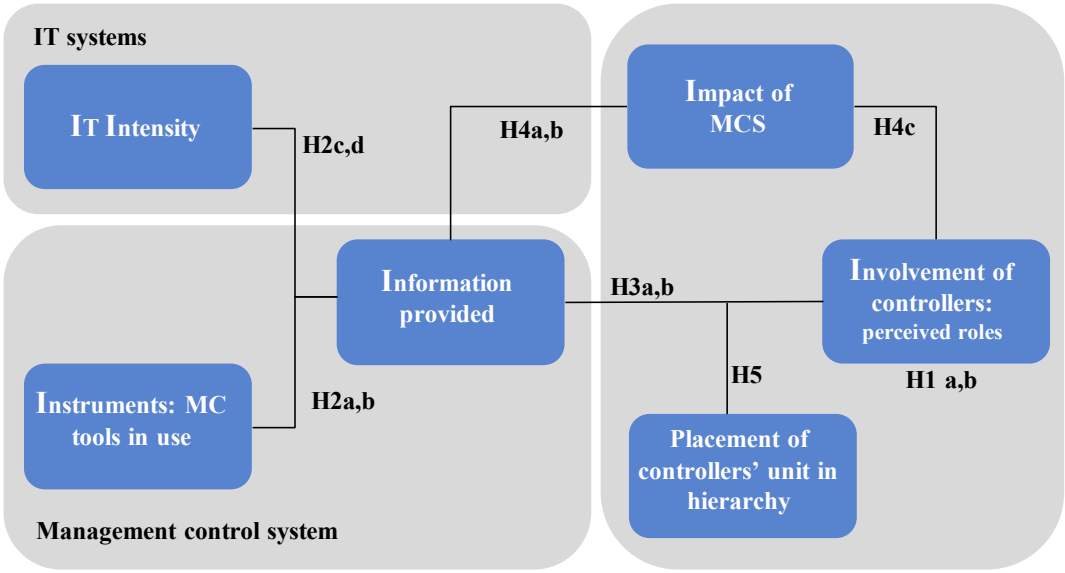
Lecturers at several domestic professional events have recently claimed that the role played by controllers in Hungarian organisations is changing and the 'controlling' function has gained more managerial attention than before, similarly to international trends. Does this increased managerial attention mean that controllers are now more involved in operational and strategic decision-making? Or does it simply mean that they are required to provide more and more information from the sidelines?

I assume that the involved controllers are present in noticeable proportions in contemporary organisations, but the majority of executives still perceive them as being mere input generators.

H1a: Although the involvement of controllers in decision making is noticeable, controllers are still mainly seen by top executives as mere number provider.

H1b: Although there is an active role for controllers in strategy development and implementation, based on the perceptions of top executives, this is only characteristic of a minority of controllers.

Besides characterizing the extent of involvement, a variety of controllers' roles will be analysed in view of their relationship to other inter-organisational features, as shown in Figure 6.



6. Figure: Research construct

Source: Author's own construction

Management control systems are characterized by the tools they use and the information they provide. Meeting the information requirements of managers forces controllers to apply a range of MC tools. As shown in the literature, MCS in an organisation is composed of a mix of diverse tools that produce the required information. It was argued that innovative tools are required for meeting the newly-emerging information requirements of managers. At the same time, tools that are often labelled new and innovative (such as BSC or target costing) are already 20-40 years old.

I characterise MC tools on the basis of whether they were originally designed to provide broad-scope information or not. A broad-scope MC tool is designed to provide external and / or non-financial and / or future-oriented information that goes beyond internal financial data. The toolkits of companies will be associated with the actual scope and frequency of information that is provided. Question 2 relates to that link:

Q2: Is the intensive use of MC and IT tools linked to the ability of providing the relevant information?

It was argued by both practitioners and academics that the financial crisis and the constantly increasing environmental uncertainty has changed information requirements. More, and broader-based information is required by management and stricter cost control has been implemented at many organisations. Are companies adopting broad-scope MC practices for better information provision?

MC information is characterized in two dimensions: frequency and scope. It is hypothesised that applying broad-scope MC practices beyond the traditional toolkit supports the frequent provision of a broad scope of information.

H2a: Applying broad-scope MC tools supports the provision of a broad scope of information

H2b: Applying broad-scope MC tools supports the function of frequent information provision.

Similarly, it is hypothesised that a more intensive utilization of innovative IT applications supports the frequent provision of broad-scope information.

H2c: IT intensity supports the provision of a broad-scope of information

H2d: IT intensity supports the function of frequent information provision.

These features MCS design will be linked in research question 3 to the controllers' role, assuming that a certain design of MCS supports the specific roles that are acted out by controllers.

Q3: **How is MCS design related to the involvement of controllers?**

It is assumed that the involvement of controllers requires both broad-scope and frequent information provision.

H3a: A broad-scope of MC information is positively associated with controllers' involvement.

H3b: The frequency of provision of MC information is positively associated with controllers' involvement.

Derived from the literature, two characteristics were identified that can modify the relationship between the MCS design and controllers' involvement: the positioning of controllers' department and the perceived impact of MCS. The impact of MCS is defined in terms of the ability of MC information to support relevant business activities.

Q4: How does the impact of MCS alter the relationship between MCS design and the role of controllers?

It is assumed that broad-scope, frequent reporting enhances the impact of MCS that in turn enables controllers to become more actively involved. The impact of MCS ***mediates*** between MCS design and role.

H4a: Provision of broad-scope information is positively associated with the impact of MCS.

H4b: Frequent information provision is positively associated with the impact of MCS.

H4c: The impact of MCS is positively associated with controllers' involvement.

The placement of controllers' unit into the organisational hierarchy is understood as the positioning within the overall organisational structure, its placement within the hierarchy. This can support or hinder controllers from playing a more active role in the organisation.

Q5: How does the organisational placement of controllers' department alter the relationship between MCS design and the involvement of controllers?

H5: The positioning of controllers' department at lower hierarchical levels hinders the active involvement of them.

Figure 6 indicates that the organisational roles of controllers will be characterized by the level of their involvement. The research intentionally disregards collecting activity lists or skill requirements of controllers, as an alternative way of characterizing controllers' role. It is also not aimed to list and investigate all possible factors that might have influence on roles. The research is aimed to investigate intensity of using MC and IT tools and MC information provided and to prove the hypothesized association between them and the roles of controllers.

5.2 Research methods

Method triangulation combining qualitative and quantitative approaches is used in order to enhance the validity of research findings (Balaton & Dobák, 1982). Within functionalist MC research, mixed method research has been used to address construct validity: statistical techniques are often supplemented with qualitative techniques in order to assess convergence (Modell, 2005, 2009).

Drawing on the idea of method triangulation, the research questions that emerged from the literature and my own previous work experience were analysed using both quantitative and qualitative techniques. First, data from a questionnaire survey was analysed using multivariate statistical methods widely employed for theory testing in MC

research (W. A. Van der Stede et al., 2005). The research was built on the analysis of a survey conducted in 2013 by the Competitiveness Research Centre of the Corvinus University of Budapest. This database served as the primary source for the testing of hypotheses.

Findings from quantitative analyses were presented and interpreted with the help of practitioners during focus group sessions. Finally, interviews with top executives were conducted. Both the group and individual interviews were designed to facilitate a better and deeper understanding of the research findings.

Data sources for both quantitative and qualitative methods are summarized in chronological order in Figure 7.

7. Figure: Data sources for research methods applied

Source: Author's own construction

5.2.1 Multivariate analysis of survey data

The cross-sectional survey was conducted as part of a larger project. The 'Competing the World' research program was launched by the Institute of Business Economics at the Corvinus University of Budapest with the aim of researching the competitiveness of Hungarian enterprises. The first survey in 1996 (Chikán, Czakó, & Demeter, 1996) was followed by further surveys in 1999 (Czakó, Wimmer, & Zoltayné Paprika, 1999), 2004 (Lesi, 2004), 2009 (Chikán, Czakó, & Zoltayné Paprika, 2010) and 2013 (Chikán, Czakó, & Wimmer, 2014).

Each survey consisted of four questionnaires addressed to the top executives (CEO) and leaders of financial (CFO), marketing and operational areas. The questionnaires were self-administered. The questions used in the 2013 survey were adapted in relation to the

former ones. While the total number of questions in the CEO survey was reduced significantly, new questions related to management control were added. Together with my colleagues at the Institute of Management of the Corvinus University of Budapest, I actively participated in elaborating the new MC-related questions for the CEO questionnaire and in the redesign of the MC-related questions included in the CFO questionnaire.

A pre-test of the survey was performed in order to enhance content validity. The measurement instruments were first pre-tested through in-depth discussions with academics from diverse institutes of the Corvinus University of Budapest. In the second step of the pre-test phase, the questionnaires were filled out by test companies to ensure that the phrasing was easy to interpret by practitioners. After pretesting, the survey was administered between May and November 2013 to 300 Hungary-based enterprises registered in the database of the Hungarian Statistical Office. Detailed characterization of the total sample has been published by the lead researchers of the program (Chikán et al., 2014; Matyusz, 2014; Csesznák & Wimmer, 2014)

For the statistical calculations IBM SPSS Statistics 22.0 was used with the aim of examining the extent to which the empirical data supports the proposed and hypothesized relationship between the variables.

5.2.1.1 Database and sample characteristics

The current research uses a database generated by the 2013 survey and focuses on a limited set of variables using a **reduced sample**. The total sample of 300 organisations needed to be reduced due to the underlying research considerations, as follows:

A) The research is designed to focus only on medium-size and large companies and exclude micro- and small-size organisations.
B) Valid analysis could only be undertaken for companies for which there were few missing values from the dependent variables. Cases with a high level of missing values had to be deleted.
C) The research is designed to reflect top executives' views about the role of controllers. Cases were eliminated when the respondents of the CEO survey were in charge of only one functional area, such as finance, IT or marketing.

(A) The sample was reduced first **based on a size variable** (number of employees). Although MC-like activities can be found even at micro-size and small companies, applying formal management control practices is more characteristic of **medium-size**, and, more typically, of **large companies**.

The appearance of MA and MC in micro-size companies (<10 employees) simply means that the application of the MA and/or MC approach goes beyond that of traditional financial accounting. In small-size companies with 10-49 employees, the activities of controllers may already be clearly distinguished from bookkeeping, and the information background for MC may already be in place, but a separate controller function has not yet been established (Hágen, 2008). Therefore, the original sample was restricted to medium (50+ employees) and large-size companies (250+ employees) based on the variable from the financial survey (variable *P9atsleb*) that shows the average number of full-time employees in 2012. The restricted sample involved 268 companies.

(B) Before any analysis was undertaken, the missing data had to be analysed. Missing data in the database are due to nonresponses by respondents. 27 variables representing the central concept of the research – the organisational role of controllers – was analysed using the **missing value analysis** module of SPSS. Table 28 in the Appendix summarizes missing values by variable. Values of the variables which refer to the organisational placement of the controllers' unit (v63k) are missing in 42,5% of all cases; data for all other variables is lacking by no more than 16%.

Missing value analysis by case (Table 28 in the Appendix) identified only about 131 complete cases out of the potential 268, and indicate a **non-random pattern for the missing values.** Two reasons for this can be identified: respondent fatigue towards the end of the questionnaire, and the concentration of missing values in a specific set of questions. Unfortunately, questions related to management control systems (v103-106) were located at the very end of the CEO questionnaire. In some cases, respondents simply failed to complete the entire questionnaire. In other cases, respondents might have had no opinion because they felt the questions to be irrelevant to their organisation. It is assumed that respondents from medium-size companies (with typically insignificant management control activities) opted not to answer these questions. Practically, this means that if a company did not provide data about one variable concerning the role of controllers and / or about the impact of MCS, they did not provide data about any other MC relevant variables either.

The non-random pattern of missing data suggested the solution of simply deleting cases with an excess of missing data. As a rule of thumb, cases which lack data for the dependent variables (v103a-d and v104 a-e) should typically be ignored (Hair, Black, Babin, & Anderson, 2014). According to this principle I reduced the database from 268 to 221 observations. Missing values in the reduced database were then sufficiently low (Table 30 in the Appendix), excluding the variable v63k which measures the organisational placement of the controllers' unit. Some companies failed to provide data about any of the related questions (e.g. the organisational placement of other functions). 81% of cases with missing information about this variable did not identify a separate controlling unit (the value of variable p3 is "2"); consequently, the question was irrelevant to them. Because having a separate unit is not a prerequisite for the operation of an MC system, and because variable v63k is used only in Research Question 5, I decided to keep the variable and cases with missing values in the database.

(C) The research was designed to investigate the role of controllers primarily based on the perceptions of top executives. Although the CEO questionnaire was addressed to **the top leader of the organisations that were surveyed**, in some cases other members filled out the questionnaire. The chief financial officer (17 cases), the chief financial accountant (8 cases), the head of the controlling unit (1 case) and other executives responsible for one organisational function (HR, IT, production, marketing, sales, quality insurance etc.) (14 cases) responded to the CEO questionnaire. As involving their answers would have undermined the primary research goals, I could not take account of these responses.

The **final restricted sample** thus involves **181 companies**. Although the original sample was significantly decreased, cases which were deleted would not have contributed to the analysis, either because these companies did not provide MC-relevant data or because the position of the respondent meant that they were not suitable for inclusion in the research.

With respect to the **representativeness** of the sample, the following statements can be made: The majority of companies (85,1%) in the restricted sample are medium-sized, while 27 (14,9%) of them may be considered big companies with respect to number of employees. Based on statistical data provided by the Hungarian Statistical Office (KSH), altogether 5449 medium-size and big companies were active in Hungary, 871 (15,98%) of which were large. The ratio of big companies in the sample is thus very close to that of the total population.

With respect to the revenues of the financial year 2012 (variable P9nettob) 48 firms (26,5%) out of the restricted sample of 181 companies can be regarded as big, having a yearly revenue of over 4000 m HUF. Based on their total asset value (variable P9merfob) 51 companies (28,2%) can be categorized as large, reporting their total assets at over 2700 m HUF. KSH data for total assets and revenues across the total population were not available for comparison.

78,5% of the organisations in the sample are in Hungarian ownership, from which 7,7% are state-owned. 21,5% of the firms are foreign-owned. Regarding the industrial distribution of the companies, processing industries are significantly overrepresented (45,9%; cf. 7,59%). The main reason for this is that the survey focuses on industries with more economic weight. The database does not cover many companies of typically smaller size that are engaged in specialized service industries, such as information and communication (industry ID 'J'), real estate agencies (L), social and health care (Q), arts, entertainment and leisure time (R).

The territorial distribution of companies in the sample is close to that of the total population. 44,8% of the companies are located in Budapest or in Pest Country (cf. 41%), 21,1% in Transdanubia (cf. 27,8%) while rest are located in lowland and eastern regions.

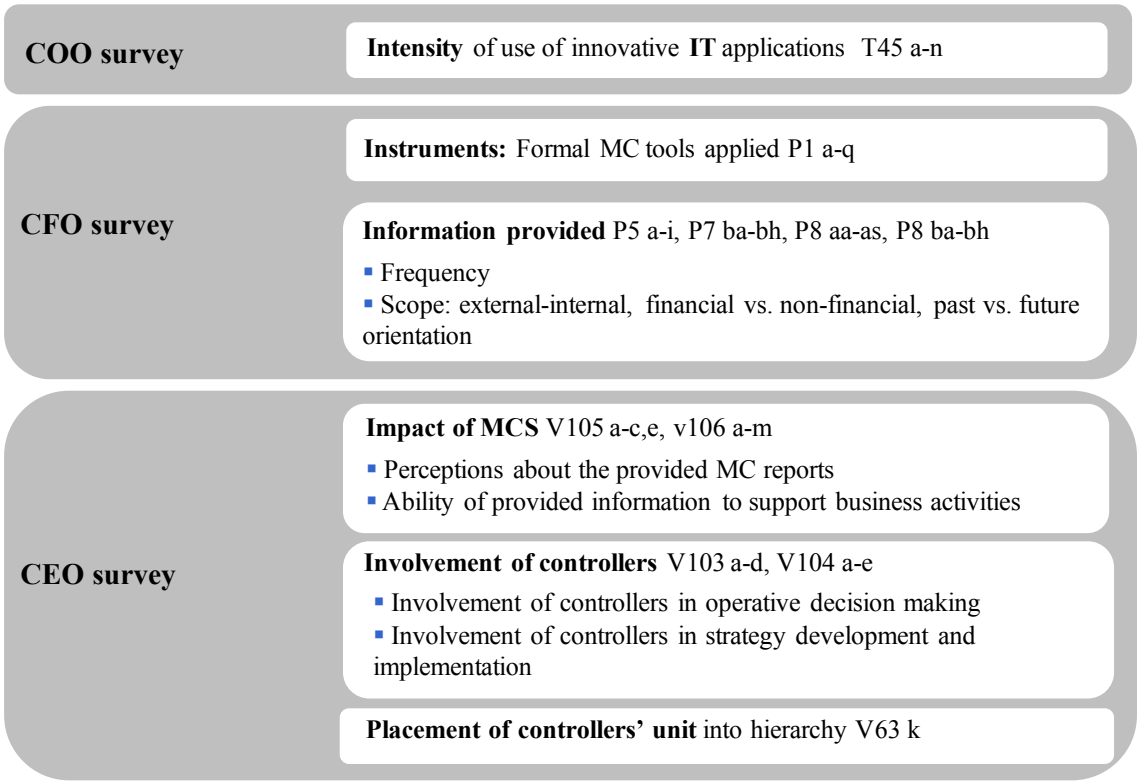
Beyond the issue of sample representativeness, quantitative research faces many other claims about validity that are discussed in detail in Chapter 5.2.1.3.

5.2.1.2 Variables and statistical methods utilized

The research construct presented in Figure 6 is a reflective model, meaning that the construct can be described by a series of interchangeable indicators widely used in pre-existing MC literature (Bisbe, Batista-Foguet, & Chenhall, 2007). The chosen measurement tools for operationalizing the constructs are not only internationally used, but have proved to be appropriate in earlier surveys of the 'Competing the World' research program in the Hungarian context. The newly-developed questions in the CEO survey (V103, V104 and V105) that were not tested earlier in a Hungarian context rely on internationally-validated indicators about the operationalization of controllers' roles.

The research is based on the **perceptions of executives**. Selected questions from the CEO questionnaire (filled out by top executives, indicated with a "V"), the CFO questionnaire (filled out by financial executives, indicated with a "P") and one set of questions from the COO questionnaire (filled out by operational and technical executives, indicated with a

"T") are used. The numbers of questions are referred to in Figure 8, and are presented in their original format in the appendix.



8. Figure: Operationalization of the research construct

Source: Author's own construction

As discussed in Chapters 2 and 4, no standard list of MC tools exists. Lists of tools assigned to the MC vary in time and space. The main aim of this research is not to investigate and describe the totality of the tools applied by controllers, but to contrast them with the information characteristics of the management control system and to the roles of controllers. The analysis is focused on a limited number (17) of MC tools that are relevant in the Hungarian context. The frequency of usage of these selected tools is analysed based on question P1.

Two of the many dimensions of information, scope and frequency, which are again widely used in MC research and which might be linked to the role of controllers are investigated (questions P5, P7, P8). Measurement of both MC instruments and information is based on the responses of CFOs. Analysis of CFOs' responses is a well-founded approach in this field. CFO's typically possess the most realistic and up-to-date information about the techniques that are applied and the information that is provided by their own department. Furthermore, several studies have shown that CFOs make the primary impact on the

choice of formal MC practices (Naranjo-Gil et al., 2009), even more than CEOs (Burkert & Lueg, 2013).

In pre-existing functionalist research, roles have typically been deduced from the different tasks controllers perform. Surveys and interviews were often based on controllers' self-perceptions. At the same time, this literature has offered evidence about the importance of the perception gap. Byrne and Pierce (2007) interviewed operational managers and management accountants from 18 companies. In some cases, the self-perceptions of management accountants were that they were playing a decision making role, while operational managers perceived their role as being more of making suggestions and recommendations, and only influencing outcomes.

This study characterizes the role of controllers by the extent of their involvement in the business processes. The role is measured based on the judgement of the CEOs of the surveyed companies (questions V103, V104). Taking CEOs' perceptions as a point of reference is justified on the one hand by failures with self-perception. On the other hand, managers (the internal customers of controllers' services), are authorized to involve functional staff such as controllers into business processes. From all of the managers, CEOs are seen as the most influential, opinion-leading executives. As Lambert and Sponem (2012) have stated, if top management chooses not to empower controllers to engage in organizational activities, the sales, marketing and production staff will organize information flows, management reporting and internal consulting for themselves.

It is not the individual controller who is the focus of the research, but controllers as an organisational group; the function they perform. This approach is supported by the phrasing used in the CEO questionnaire: executives were asked to judge the level of support that is provided by 'controlling' as a whole.

Besides measuring the direct relationship between MCS and role, indirect effects via the impact of MCS is also investigated. MCS's impact is defined and measured in terms of their perception about the reporting system (questions V105 a,b,c,e) and in terms of the usability of the information provided (questions V106 a-m) based on the perceptions of CEOs.

This study pays special attention to the organisational structural aspects of controllers' work (question V63k). The typical separation of controllers and financial accountants in Hungarian organisations creates this research opportunity. It is investigated how the

positioning of the controllers' department within the hierarchy influences the relationship between MCS and the role of controllers.

Statisticians have developed separate **methods of multivariate analysis** for data nominal and ordinal scales. But very often the methods designed for continuous data are used for variables measured using a Likert scale. Even 30 years ago, Johnson and Creech (1983, p. 398) reported that there was "*an increasing trend for researchers to treat ordinal data as if they were measured at the interval level, using statistical techniques which assume interval measures*".

The rationale behind this is that ordinal measures are considered approximations of continuous data (Rencher, 2002). When continuous variables are measured using indicators with only a few categories, categorization errors occur which produce distortion. But it has also been proved that "*bias was not sufficient to alter substantive interpretations and the estimates were efficient*" (D. R. Johnson & Creech, 1983, p. 398). The estimates described in the research proved to be inefficient only when two-, three- or four-category ordinal indicators were used, and the sample size was small.

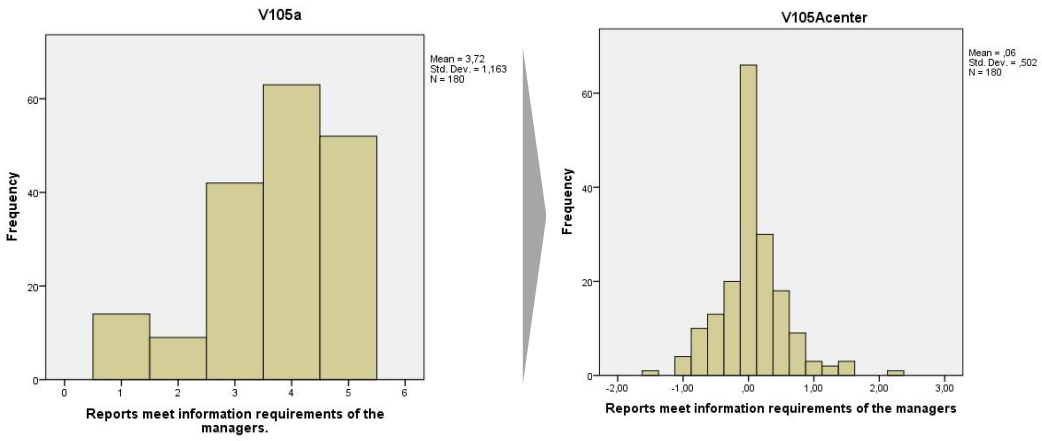
Based on this, and similar research findings, many social science researchers work with ordinal-scale data and legally use multivariate techniques that were originally designed for use with continuous measures and a multinormal distribution. In line with this process, I have applied various type of multivariate methods to analyse ordinal variables. In order to ensure the robustness of the results, **multiple methods were used in the analyses of the same questions**, and hypotheses were rejected or accepted based on the results of more statistical techniques.

The research construct (see Figure 6) presents several interrelated boxes, each of which covers a broad concept like IT intensity, information provided, or the controllers' role. These categories, covering different aspects of management control, cannot be measured directly using a single variable. Each concept is represented by several variables. Accordingly, variables were analysed, and, if needed, **data transformation methods** (e.g. centring and standardization) were used for different purposes, such as to:

- reduce the bias originating from the Likert-scale measurement method (centring)
- transform measurement scales from non-metric to metric (centring)
- meet the requirements of diverse statistical techniques (such as the standardization of variables for k-means clustering)

The variables in the CEO questionnaire were measured using a Likert scale, a five-point semantic differential scale consisting of ordered responses ranging from 1 (not at all characteristic/not at all useful) to 5 (very characteristic/very useful). Likert scale measurement typically involves systematic errors which arise from the individual preferences of respondents for a uniformly better or worse grading. A data transformation method, '**centring across the second mode**' reduces this systematic error. Centring across the second mode means subtracting the row average from each element in a row (Bro & Smilde, 2003). An average value for each respondent is calculated for one set of variables, and then the average is subtracted from each corresponding variable.

This involves linear transformation, similar to centring across the first mode, and results in a kind of normalized variable that can be seen as a scale variable; following this procedure, means can be calculated as a measure of central tendency. Here the variable mean (mean by column of the data matrix) is not zero (but the mean of the rows of the data matrix is zero). In example of this, Figure 9 illustrates the histograms of the original Likert-scale variable and its centred form for the variable v105. The histogram skewed to the right would been converted into a more normalized form.



9. Figure: Histograms of an original Likert-scale variable and its centred form

After data transformation indicators were developed, dimension reduction techniques were used to determine whether the variables could be condensed into one or more indicators. Without any a priori assumptions about the patterns of measured variables, **exploratory factor analysis** helped with understanding the structure of the variables and identifying groups of variables which form a latent dimension. In the cases where the factor analysis suggested extracting only one component, the variables were condensed

into one latent variable (an indicator) such as 'IT intensity' or 'future orientation'. These latent variables correspond to the above-mentioned concepts in the research construct. In the cases when the factor analysis suggested the extraction of more factors, variables were condensed into more latent variables, such as those for the diverse roles of controllers (four indicators identified), or diverse elements of business support (six indicators).

Principal Component Analysis (PCA) with Varimax rotation was used in the factor analysis. The aim of Varimax rotation was to simplify the factor matrix that was used later on for weighting the variables (Füstös, Kovács, Meszéna, & Simonné Mosolygó, 2004). Indicators were calculated as the weighted average of the variables. The weights are the factor loadings of the rotated component matrix: the correlation coefficients between the component and the original variable.

PCA is not sensitive to departures from basic statistical assumptions, while the main requirement is more conceptual: there should exist some degree of multicollinearity. When possible, overall measures (measure of sampling adequacy (MSA) or Bartlett's test of sphericity) are performed, showing that the database is adequate for PCA. As the correlation matrix of centred variables is singular and its determinant equals zero, adequacy cannot be calculated and tested using these measures if manifest variables have been previously centred.

Further techniques such as non-metric multidimensional scaling, ANOVA and diverse cluster analyses methods were used to supplement the results of PCA and interpret the relationship between the variables.

Statistical analysis closed with a **path analysis**. The indicators (latent variables) developed earlier were put into a model using the **latent variable partial least square (LVPLS) method**. The association measures (e.g. correlation coefficients, eta-square measures) reported beforehand were only able to show a bivariate relationship: whether two indicators are related to each other or not. The major aim was to estimate all associations simultaneously and to define significant routes in the model. More details about the LVPLS method are given in Chapter 6.3.3.

5.2.1.3 Validity of questionnaire survey research

Van der Stede et al. (2005) analysed survey research in management accounting and control over 20 years. After investigating 130 studies published in leading journals they summarized a set of conditions that high-quality survey research requires. The authors

conclude that the "*quality of survey data in management accounting is as weak as the weakest link in the survey data collection process*" (W. A. Van der Stede et al., 2005, p. 678).

The validity of inferences in quantitative empirical research is usually assessed using four components: statistical conclusions, internal, construct and external validity (Shadish, Cook, & Campbell, 2002). A discussion about the appropriate use of statistics and errors in assessing statistical covariation (addressing **statistical conclusion validity**) is included in the subsequent chapters of this thesis that report results.

To support the operationalization of the underlying construct and mitigate threats from measurement errors (addressing **construct validity**), measurement tools that are either well-established in the MC research and / or that were successfully used in previous phases of the 'Competing the world' research project were employed. The validity of the variables newly introduced into the survey was measured using statistical techniques (e.g. Chronbach's alpha). The reader may refer to the previous chapter about the development of variables and the following chapter for a description of the statistical measures of construct validity.

As Diamond (2000) has claimed, a survey should ideally focus on one specific research objective**.** The questionnaires used in this research were part of a larger research project and necessarily serve multiple research purposes. However, questions newly developed in the CEO survey (v103, v104, v105) were designed with this specific research objective in mind.

The level of analysis of the current research is the organizational level. Organizational-level phenomena should not be studied using only one respondent per organization, as this leads to the greater probability of 'natural' correlations (W. A. Van der Stede et al., 2005). The current research is thus based on the measures and self-ratings provided by more than one respondent from each organization: the CEO, the CFO and the COO.

Self-reporting is subjective. The rationale behind the choice of self-reports is that it was not always possible to obtain objective data that fit the research construct. Analysis of the controllers' organisational role as perceived by management is necessarily measured using subjective beliefs. In these cases, subjective beliefs are 'reality', at least in the eyes of the respondent (Link & Oldendick, 2000). The confidentiality promises made to all respondents should have encouraged truthful self-reporting.

External validity – the extent to which findings can be generalized – is mainly addressed by sample selection. Sampling directly affects whether the validity of inferences holds over the wider population. Although the sampling of the underlying questionnaire research should not be taken as random but rather as a convenience sample, the sample size and the sample characteristics appear to ensure a certain degree of external validity. Statistical interactions hold over the variation in companies: accordingly, the findings can be understood as being valid generally for the whole population (medium-size and large companies in Hungary). However, one should be cautious about generalizing the findings to other countries, especially to those countries in other regions with a different history of management control development.

As the current research is designed to identify causality between various aspects of management control systems, the credibility of the causal relationships between independent and dependent variables (**internal validity**, also called design validity) is of high priority. The challenges of response and non-response errors and the third variable problem must be addressed here.

Response errors (respondents responding inaccurately) that are associated with internal validity were minimized by using pre-testing. Questions were pre-tested by colleagues and by test companies in order to ensure that they were well-designed, easy to understand and therefore would not lead to any distortion of responses.

Non-response errors may have two forms. On the one hand, they can occur when companies refuse to take part in the survey. On the other hand, they occur when questions of interest are not answered, and non-responses cause a decrease in the effective sample size. While the latter type of non-response error has been discussed in Chapter 5.2.1.1., the former type remains a risk to validity. The features and reasons of companies to refuse to participate are unknown. Method triangulation has been used to compensate for problems arising from non-response errors.

The analysis of relationships – whether correlational or causal – should address a very important issue called the **third variable problem**. A third variable (often called a control variable, test variable, confounding variable or hidden factor) causes a spurious correlation. Correlations are deemed to be spurious if they are merely statistical and cannot be observed in real life. They are typically caused by an unobserved third variable that influences the variables under analysis.

As detailed in Chapter 4, previous studies have already shown that the management control systems of Hungarian companies are strongly affected by company size, as expressed in the number of employees and by foreign ownership. In order to avoid explaining spurious relationships, **company size and ownership variables are used as control variables**. These types of control variables are called **antecedent test variables** according to Babbies's elaboration paradigm (Babbie, 2009). Antecedent test variables (such as company size) precede the analysed variables, here the variables representing diverse aspects of MCS. In the simplest way, the distribution of the variables in question are studied here by company size and form of ownership. Where possible, partial correlations are calculated while controlling for the test variables. Correlation between the original variables is seen as spurious if the partial correlations are zero, or are significantly less than the zero-order relationship between the original variables.

Another type of control variable is referred to as an **intervening test variable: a mediating factor** through which an independent variable has an effect on a dependent variable (Babbie, 2009). In this research model, hypotheses H4a, H4b and H4c incorporate a mediating factor. The impact of a management control system (mediating variable) is assumed to be affected by the MCS design (independent variable) and it is assumed to affect the organizational role of controllers (the dependent variable).

While controlling for antecedent test variables is reasonable both for simple **associational inferences** and for causal relationships, intervening test variables assume causality. One set of the variables will be independent, while the other set of variables is dependent (often called as response variables or variable to be explained).

My first assumptions were limited to associational inferences; however, both real life experience and former research results suggest that there exists a causal relationship between MCS design as an independent variable and the controllers' role as a dependent variable. Additionally, finding support for causation is always more interesting than proving simple association. Beyond analysing simple associations between variables in the dataset, I make an attempt to argue for causality. The reason for this **conservatism (or cautiousness) with wording** has its origins in methodology.

Many academics are persuaded that **causal inferences** can be studied only in experimental settings (controlled and randomized studies); an idea that is increasingly recognized in management control research. Others are less rigorous about this issue and

find further research settings to be suitable for a discussion of causality (Holland, 1986). In this latter case, many requirements must be met before proposing that causality exists in a valid form.

In one of his latest papers, Van der Stede (2014) discussed whether and when cross-sectional management control survey studies are able to prove valuable casual relationships. He identified four "markers of causality":

(1) theoretical coherence,
(2) empirical covariation,
(3) temporal/physical separation, and
(4) control of third variables.

The necessity of introducing control variables (4) has already been discussed.

The requirement for theoretical coherence (1) refers to a **well-established theoretical framework** that is based on prior work. The proposed casual relations are supported by previously presented frameworks, mainly constructed using contingency literature. Consequently, the links are theoretically argued, and this research model is deemed to be plausible.

Empirical association between variables (2) will be analysed using various statistical methods. First of all, the absence of association will be tested. If no association proves to be significant, the hypothesis will be rejected and no further analysis is required, as it provides evidence that a causal relationship cannot exist. If it is found that the variables are associated (e.g. correlated) significantly, an attempt will be made to suggest causality.

However, correlation does not always support causality in a presumed direction, and may also indicate reverse causality. This reverse causality must be ruled out – similar to the effects of control variables (4), as discussed earlier. Reverse causality can be ruled out by temporally separating variables, showing that the independent variable (cause) precedes the dependent variable (effect), e.g. by conducting longitudinal surveys. However, although longitudinal data is available for MCS design, questions about the role of controllers were newly introduced into the survey, and no data from former periods are available. Another solution for meeting the separation requirement is to survey multiple informants (**physical separation of variables**). Following this approach, data about predictors were collected from the CFO and COO, and data about the effects were mainly collected from the CEO.

While van der Stede (2014) highlights the importance of theoretical coherence, Modell (2005, p. 236) stresses that theoretical frameworks "*may also induce researcher selectivity regarding the detection and further examination of rival causal explanations*".

Method triangulation can enhance not only the corroboration of hypothesised casual relationships, but it can support researchers in finding alternative casual relationships. The examination of qualitative evidence, such as additional interviews, does not change the validity of the survey per se, but it can enhance the internal validity of the whole research project (Modell, 2005).

Method triangulation as a means of decreasing threats to validity is employed in organisational research in diverse ways. The current research design incorporates questionnaire survey research conducted *prior to* the group and individual interviews. Interviews are primarily designed to enhance the internal validity of the research.

5.2.2 Individual and group interviews

Subsequent to the quantitative analysis, the research was completed by using qualitative techniques: these included focus group sessions (group interviews with senior controllers) and individual interviews with top executives.

5.2.2.1 Focus groups

Focus group methodology was used first in 1926 in social psychological research (Liamputtong, 2011). Today it is a widely used qualitative technique employed in health and social sciences. Focus groups are considered to be a type of group interview. They make it possible to collect data from several people simultaneously. But they are much more than simple summations of individual interview data. Focus groups use group interaction as part of the method: besides communication between the interviewer and the respondents, communication between group members, who can ask questions and respond to each other's responses, is encouraged (Vicsek, 2006).

My primary aim with conducting focus groups was to gain better understanding of the specific issues from the perspective of participants. The low number of participants (6-8 participants in each session) enabled in-depth discussions to be maintained for 2 hours per session. The interaction between group members helped people to explore and clarify their points of view.

At the same time, the point was not to reach a consensus about the issues discussed in the focus group. Rather, valuable contributions from the participants were collected about whether the relationships between the set of variables proved during the quantitative analysis were valid or not, and why. During the interactions between participants, the group was able to reveal issues that might have otherwise remained hidden.

Adequate sampling, which refers to participant selection, ensured the availability of a wide range of experiences and opinions. Random sampling is rarely used in focus group methodology. Rather, sampling is theoretically motivated. Participants were chosen based on their ability to provide a valuable contribution: active senior controllers with at least 5 years' work experience were invited. In order to minimize sample bias, selected practitioners represented various industries and organisations. Similar to the sample in the survey, participants represented medium-size companies and smaller big companies.

Scholars often warn that "*in institutional contexts (such as the workplace or schools), people may be reluctant to express their opinions or discuss their personal experiences in front of colleagues*" (Liamputtong, 2011, p. 8). 'Homogeneous strangers' are typical participants of focus groups (Morgan, 1997). In order to ensure the full expression of opinions, all participants came from different organisation and the sessions were located outside of their working environment.

Focus group methodology may follow a less rigid or a structured approach. As focus group methodology was used here to gain a better understanding of the findings of the quantitative research, I followed a more structured approach. Structured focus groups are characterized by high moderator involvement, and group sessions are standardized: the same questions are asked in every group session (Morgan, 1997). Standardization ensures that the results of different sessions are comparable.

As the researcher and moderator of the focus group sessions, I introduced the topic, briefly described the research project and the research questions and presented the results that emerged from the prior quantitative analysis. The same questions were asked and the same topics were raised in each focus group session (see the appendix 9.4.1. for the scenarios). After this initial phase, participants were asked to respond to the findings and each other's responses as well.

The required number of focus group sessions is often determined by qualitative researchers in terms of saturation (Krueger, 1997). If the next focus group does not

provide any new and valuable insight, the researcher can stop collecting data. As a rule of thumb, Morgan (1997) defines the required number of focus groups as between 3 to 5. A structured research approach requires typically fewer focus groups.

I stopped data collection after the third focus group session. A total of 20 senior controllers with MC-relevant work experience of 7-25 years participated. The first two sessions were organized via the Hungarian Controlling Association (MCE) in February 2016, followed by a third session in March 2016. Discussions (each lasting 90-120 minutes) were voice recorded in order to make later in-depth analysis possible.

5.2.2.2 Individual interviews

Findings from the quantitative analysis and insights gained from focus groups sessions were finally discussed in **individual interviews**. While focus groups reflected the understanding of senior controllers, individual interviews reflect the perceptions of top executives. Semi-structured interviews raised questions to top executives about how they view the organisational role of controllers and its link to the other features under examination. Executives were interviewed in March and April 2016. Interviews lasting 60-90 minutes were voice-recorded. Questions of the interviews are listed in appendix 9.4.2..

The top managers who were interviewed represent various industries and companies of various sizes. Some of them have an MC-relevant background, having started their careers as controllers, others not. The list of the interviewed top managers and focus group participants is displayed in table 43 in the appendix.

6 RESEARCH RESULTS AND DISCUSSION

This chapter presents the research results following the logic of the research questions. The chapter starts with quantitative analysis. Descriptive statistics for the variables used for operationalizing the construct are provided, alongside multivariate analysis tailored to the research question. Hypothesis are rejected or accepted based on the results of statistical analysis.

The chapter ends with a discussion that corroborates the quantitative results and / or provides alternative insights based on the focus group sessions and individual interviews.

6.1 Controllers' perceived roles

6.1.1 Identifying role types

The key concept in controllers' organisational roles is their level of involvement in business, measured by executive self-reporting. Executives were asked about two issues: the level of support of controllers in the managerial decision-making process (4 variables – v103 a, b, c, d), and the level of support provided by controllers for strategy formulation and execution (5 variables – v104 a, b, c, d, e). For both issues respondents were asked to rate the statements from 1 (not characteristic at all) to 5 (very characteristic). The variables have high internal reliability (Chronbach's Alphas: 0.84 for v103a-d; 0.92 v104a-e and 0,938 for all the 9 variables).

For ease of explanation, each variable is presented in Table 1 in centred form: the average value for each respondent has been calculated for one set of variables and then the average was subtracted from each corresponding variable. A positive mean value shows that the given variable was supported at above-average strength. Negative mean values indicate weaker-than-average support for the variable.

Based on the mean values, three distinct groups of variables can be identified. The centred variables with positive mean values (v103a, V104a) refer to the classical roles of controllers. Above-average support for these variables means that the top executives see that these classical activities are still very much alive in their companies: e.g. the controller collects and provides accurate and reliable data for use in day-to-day decision making and for strategy development. Variables with a mean value close to zero (v103b, v104b, c, d) refer to the broader set of activities of controllers such as the provision of

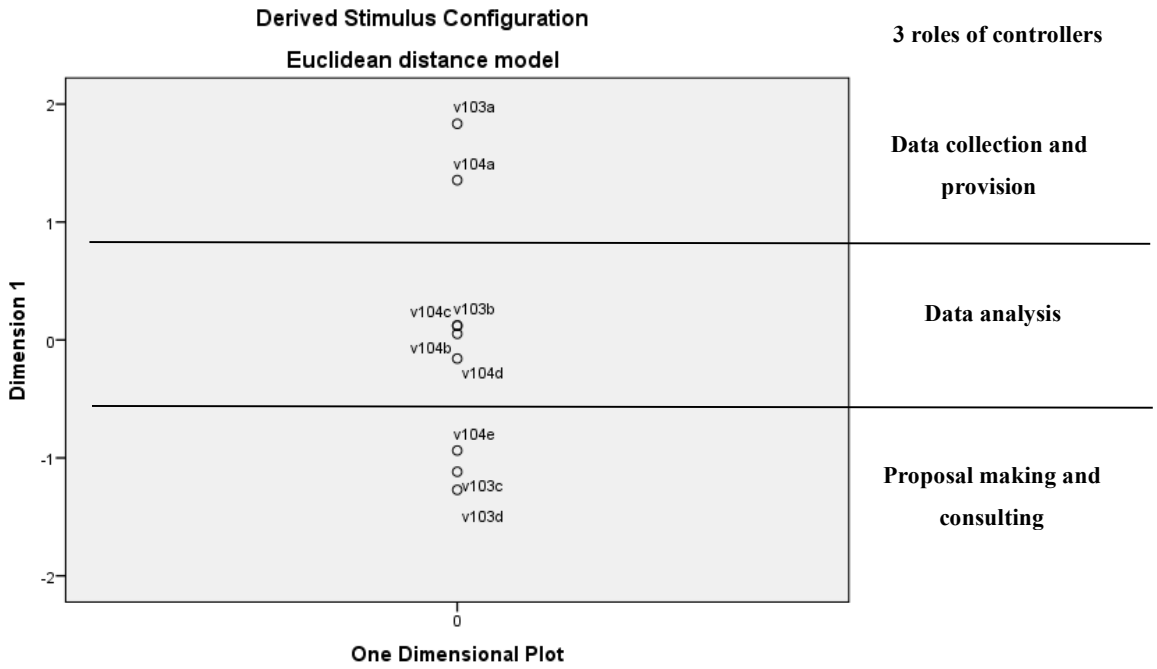
analyses, explanations and warnings in case of deviation. Variables with negative mean values (v103c, v103d, v104e) indicate a type of controllers' function that is less typical of the companies involved in the survey: the controller participates in decision making through their proposals, and consults managers during the decision-making process.

	Controller…	Variable code	Mean values of the centered variable
Involvement of controllers in the daily decision making	collects and provides cost and income data.	V103a	,3386
	analyses the data and provides explanation.	V103b	,0181
	gives proposals for enhancing corporate performance.	V103c	-,1847
	is the consulting partner of managers in the decision making.	V103d	-,3069
Level of support provided by controllers for the strategy formulation and execution	provides fact data as an input of strategy development.	V104a	,3662
	analyses the feasibility and the financing needs of the strateg	V104b	,0126
	measures the fulfilment of strategic goals.	V104c	-,0095
	warns in case of deviation from the target values.	V104d	-,0040
	gives proposal for strategy reviews.	V104e	-,2360

1. Table: Mean values of centred variables measuring controllers' organisational roles

The high negative value for the variable V103d might suggest that it should be differentiated from the other two variables in this group (v103c and v104e) but this idea was not supported by further analysis. Multidimensional scaling (MDS) of the variables was used to verify the grouping. A non-metric MDS was run for the original Likert-scale variables (ALSCAL, ordinal measures, scaling method: Euclidean distance). The one-dimensional model underpins the correctness of the above grouping at an acceptable level of goodness-of-fit (Stress value of 0,13676). A metric MDS was run for the centred variables (ALSCAL, interval measures) that resulted in nearly the same output, with a stress value of 0,17235.

The one-dimensional plot of the model (the perceptual map) portrays the pattern of similarities among the 9 variables. Based on this graphical illustration of the relative position of each variable, three distinct groups of variables can easily be detected (see Figure 10).



10. Figure: MDS plot for role-related variables

The first group refers to data collection and provision activities, the second to measurement and analysis based on data, while the last group of variables represents the highest level of a controllers' contribution: proposal-making and consulting.

Are these 3 groups of variables hierarchically structured? The mean values of the variables (Table 1) clearly decrease from group 1 to 3, suggesting **the concept of role maturity**. Role maturity means that the 3 groups of variables represent 3 levels. Being good at data provision (Level 1) is a prerequisite for a high level of involvement in data analysis (Level 2) which, in turn, is a prerequisite for being successful at proposal-making and consulting (Level 3). Involvement in higher levels requires good performance in activities related to lower levels. Controllers will not be involved more deeply in business if they are poor at data provision and analysis. Of course, companies can use controllers only at lower levels, (e.g. reporting high values for Level 1 but low values for Levels 2 and 3). However, the concept of role maturity would not permit the reporting of higher values for Level 3 than lower levels.

In order to check the validity of the role maturity concept, variables were further analysed using another dimension reduction method. A correlation matrix (see Table 31 in the appendix) was developed and used as an input for Principal Component Analysis (PCA). The PCA was run for the 9 centred variables with Varimax rotation. The PCA was used

here only for explorative purposes: to reveal the underlying structure of the variables related to the role of controllers without any a priori hypotheses about their structure.

Table 2 shows the rotated component matrix of a two-factor solution. Factor loadings in this rotated component matrix show the correlation coefficients between a component and a variable, and estimate the information that is shared by the factor and the variable.

Rotated Component Matrix[a]

	Component	
	1	2
V103Acenter	-,731	-,296
V103Bcenter	-,050	-,487
V103Ccenter	,707	-,236
V103Dcenter	,653	-,394
V104Acenter	-,828	-,055
V104Bcenter	-,011	,146
V104Ccenter	-,316	,584
V104Dcenter	,249	,693
V104Ecenter	,604	,412

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

2. Table: Rotated component matrix of the variables related to the role of controllers

The factor loadings in Table 2 reveal the 'bipolar' nature of factors which are both significantly positive and negatively loaded. This means that factors are strongly positively correlated to some of the original variables, but strongly negatively correlated to others, implying the existence of opposition between the variables that belong to the same factor.

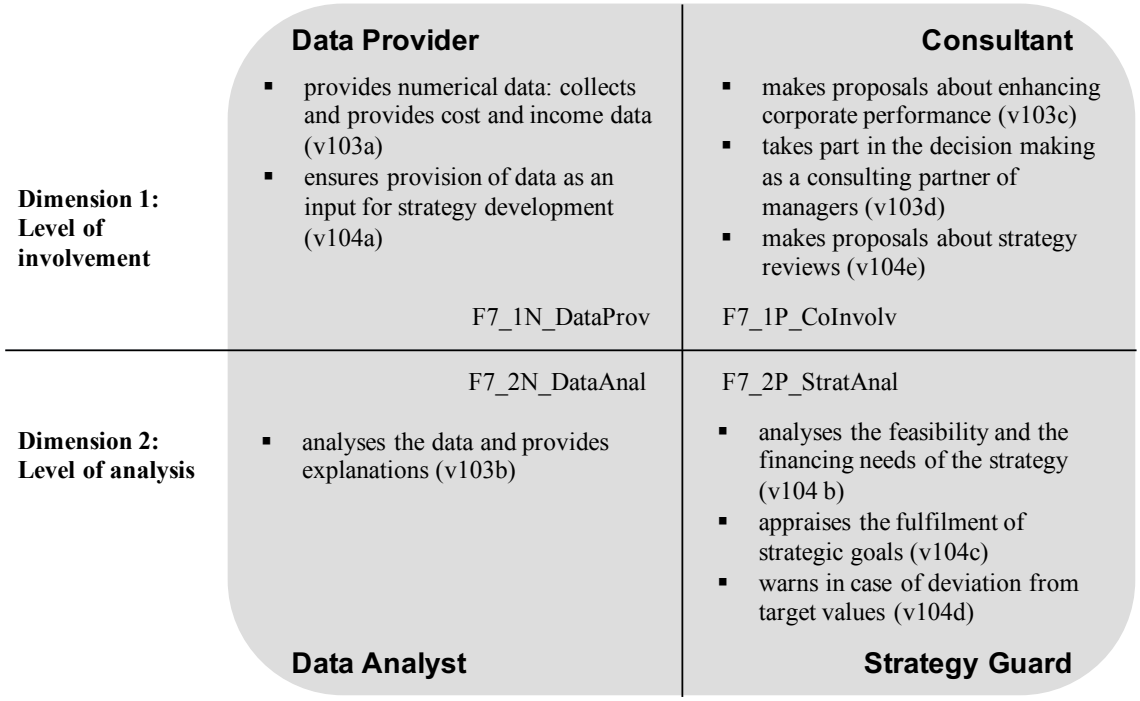
Factor 1 is strongly correlated with variables related to data provision (v103a, v104a), and, with a reverse sign, to variables related to proposal making and consulting (v103c, v103d, v104e). Variables that explain the variability of the factor do not move in the same way: if a CEO indicated a role for data provision they may not have indicated a role for controllers in proposal making and consulting. More interestingly, a company that reports high values for proposal making and consulting might report low values for data provision. **This confutes unambiguously the concept of role maturity**.

Variables related to measurement and data analysis are correlated more strongly with Factor 2 wherein the operative or strategic nature of controllers' work is appraised

differently. It is important to note that in Figure 10 (which displays the MDS plot) these variables were grouped on Level 2. Factor 2 again has a bipolar nature, as recognition of the role of data analysis in day-to-day operations (v103b) stands in opposition to recognition of measurement and analysis that supports strategic processes (v104b, c, d).

The separation of the research questions Q1a (involvement in daily decision making, v103a-d) and Q1b (involvement in strategic processes, v104a-e) assumes that executives might have different perceptions about the contribution of controllers in this regard. Examination of the mean value of variables v103a-d and the mean value of v104a-e, no difference can be identified. The MDS did not reveal any differences for this factor; group-building was based on other attributes. Factor analysis verified that data provision for strategy development (v104a) is rated similarly to data provision in day-to-day operations (v103a). Both of them are highly (negatively) correlated with factor 1. PCA analysis also verified that being involved in daily decision-making (v103 c, d) is perceived similarly to being involved in strategic processes (v104e). But the role of data analysis was divided up in the factor solution: undertaking strategic analysis (v104b), measuring goal achievement (v104c) and providing warnings about deviations (v104d) are perceived differently than operative data analysis (v103b). Separation of the variable v103b from all the other variables is already visible in the bivariate correlation coefficients: the centred form of v103b is not strongly correlated to any of the variables.

By separating out the two bipolar factors, the results of the PCA suggest the existence of four role types. Variables with high loadings for each factor with the same sign were merged into one group. Each of the four role types in Figure 11 was interpreted according to the content of the underlying variables.



11. Figure: Controller role types as defined by PCA

The role of **Data provider** is associated with data collection and data provision activities. Its counterpart can be called a **Consultant** role, which relates to proposal-making and partnership in decision-making. Variables related to data provision and consultant roles are all strongly correlated with Factor 1, either with a positive or a negative sign. What does this factor (dimension) represent? Or, in other words, what do these two roles have in common?

The explanatory dimension underlying these opposing variables is the **level of involvement in the business (Dimension 1)**. Data provision is negatively associated with Factor 1, representing a low level of involvement: controllers who are engaged in this activity collect and provide data 'from the sideline'; they are not deeply involved in business activities. Controllers as consultants are perceived more as involved partners who actively make proposals about how to enhance performance and contribute to strategy reviews.

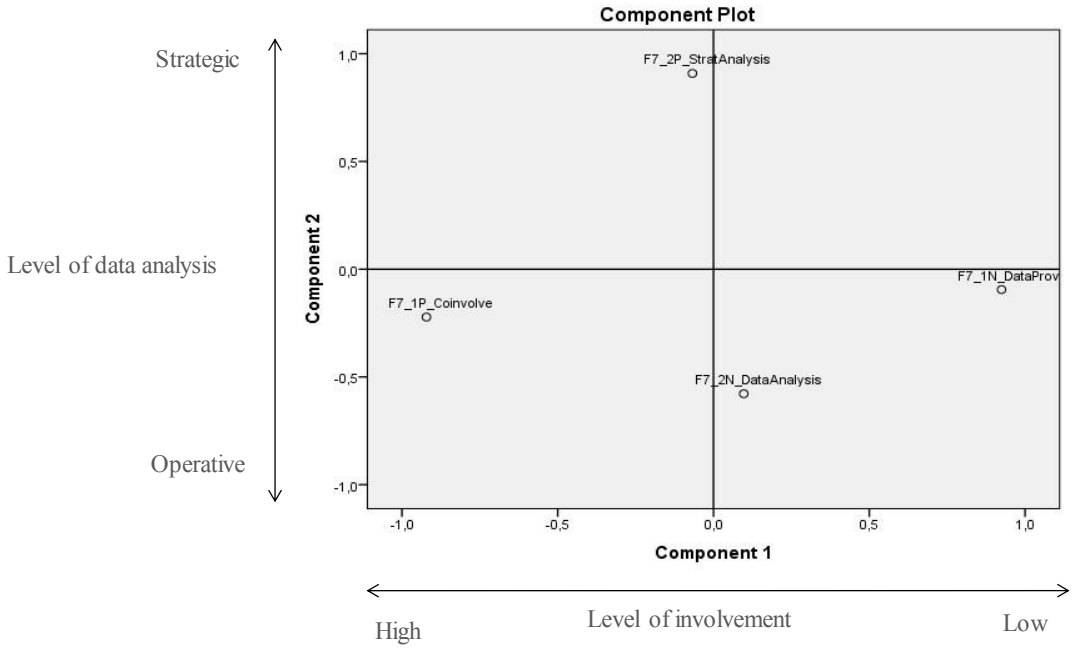
Interestingly, involvement in day-to-day operations and strategic processes are not perceived differently. Both data provision for strategy development and data provision in daily operations are both strongly negatively correlated with Factor 1. At the same time, involvement in daily decision-making is perceived similarly to involvement in strategic processes.

With respect to Factor 2, the role of **Data Analyst** is associated with only one single variable: the analysis of data and provision of explanations, with a focus on day-to-day operations. This role can be contrasted with the role of **Strategy Guard** which denotes the role of an individual who appraises the fulfilment of strategic goals and provides a warning in case of any deviation. While a data analyst deals with operative issues, a strategy guard focuses on the feedback related to strategic goals. The factor common to the opposing roles is the **level of analysis (Dimension 2)**.

Representing these four categories, new variables were calculated using the weighted average of the centred variables. Weights were determined by the absolute values of factor loadings, as listed in Table 2.

The data provider role (F7_1N_DataProv) and consultant role (F7_1P_CoInvolve) are naturally negatively correlated (ρ= - 0.714, significant at the 0.01 level) as they were calculated from opposing variables: The same finding holds for the roles of analyst (F7_2N_DataAnalysis) and strategy guard (F7_2P_StratAnalysis) (ρ= - 0.21, significant at the 0.01 level)

Figure 12 shows how the calculated variables are spread across a two-dimensional space.



12. Figure: Spread of the role-variables across a two-dimensional space

The orthogonality of Dimension 1 (level of involvement) and Dimension 2 (level of analysis) implies that they are independent from each other: these dimensions measure

the different components of controllers' roles. Therefore, no significant correlation can be detected between the roles of data analyst and data provider, or between the roles of consultant and strategy guard.

It also important to note that using factor loadings as weights means that the original variables affect the new latent variables with a range of intensity. The weights of F7_1P_CoInvolve and F7_1N_DataProv are similar so the result is close to calculating an unweighted average for the underlying variables. As the factor loading of the variable v104b is very low in absolute terms, it influences the latent variable less significantly. Consequently, the role of strategy guard should be interpreted as the measuring of strategic goals and giving warnings about deviations (v104c, v104d), and less about having a focus on analysing financing needs and the feasibility of strategy (v104b).

These variables will be used later on for describing the relationship between MCS and roles. Before the analysis of relationships is presented, I classify companies according to their controllers' roles.

6.1.2 Clustering companies by controllers' roles

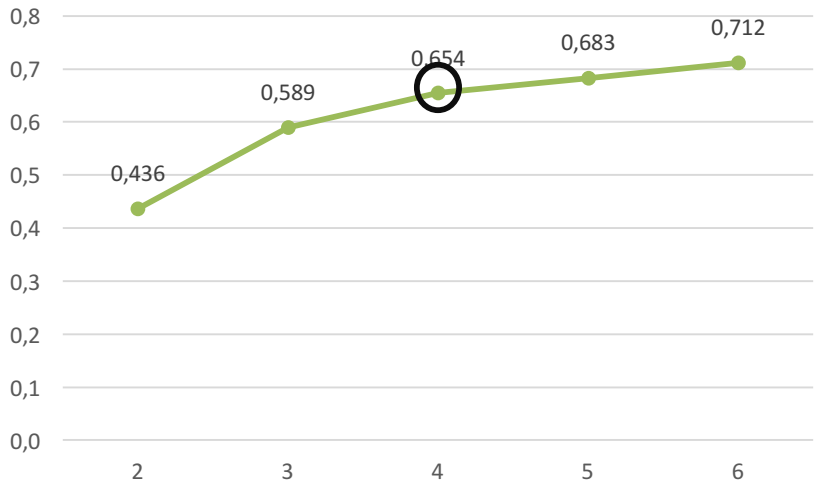
Simple observation of the centred variables' mean values in Table 1 might suggest that controllers are still mainly seen by executives as mere providers of numbers. V103a was supported much more strongly than average, verifying H1a. Similarly, v104c, d and (especially) v104e had less-than-average support, meaning that H1b could be verified: an active role for controllers in strategy development and implementation is only characteristic of a minority.

The latent structure of role variables in the total sample does not mean that two or more role types may not be present at the same time in a company. In order to highlight typical types of cases, a cluster solution was developed by incorporating the original 9 variables.

Among all hierarchical clustering processes, the Ward method is deemed to be the most sophisticated. It usually results in a transparent dendogram and it is designed to build clusters of similar size (Rencher, 2002). Ward's agglomeration method was used for cluster analysis and agglomeration was carried out in n-1 = 177 stages (analysis was made

for n=178 valid cases). The dendogram of the hierarchical clustering based on Ward's method suggested a cluster number of 3 to 4.

The adequacy of 4 clusters was verified using the calculated cluster elbow method in k-means clustering. K-means clustering requires adjusted variables in order to ensure that all variables equally influence the cluster solution. Here, the original variables are measured on the same scale of 1 to 5, but are differently dispersed. Accordingly, the variables had to be standardized before running the k-mean cluster analysis. Total variances explained by the cluster solutions were calculated for diverse cluster numbers. Results are shown in Figure 13. The diagram flattens after k=4, proving that the increase in the explained variance decreases after k=4.



13. Figure: Diagram of calculated cluster elbows

Cluster membership variables were saved for both Ward method hierarchical clustering and k-means clustering and the two different cluster membership variables were compared using crosstabulation.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	383,450[a]	9	,000
Likelihood Ratio	326,914	9	,000
Linear-by-Linear Association	31,776	1	,000
N of Valid Cases	178		

a. 2 cells (12,5%) have expected count less than 5. The minimum expected count is 2,71.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	1,468	,000
	Cramer's V	,847	,000
	Contingency Coefficient	,826	,000
N of Valid Cases		178	

3. Table: Comparison of cluster membership variables

The Chi-square test for the crosstabs has a p-value of 0 in the case of k=4, showing that the cluster membership variables created by the different methods are not independent (see Table 3). The high Cramer V-value (0,847) implies a strong relationship, proving that the outcomes of the two clustering methods are very similar. These results practically mean that 24 companies out of the total of 178 companies are clustered differently (see Table 4).

Ward Method * Cluster Number of Case Crosstabulation

Count

		Cluster Number of Case				Total
		1	2	3	4	
Ward Method	1	59	0	3	1	63
	2	0	2	14	29	45
	3	3	0	45	1	49
	4	0	21	0	0	21
Total		62	23	62	31	178

4. Table: Crosstabulation of cluster membership variables

Non-hierarchical clustering often proves to be more reliable as it avoids the undesirable early combination of cases that would lead to suboptimal results that may occur when using hierarchical methods (Hair et al., 2014). Therefore, further analysis is based on non-hierarchical k-means clustering with a predefined number of clusters (k=4) and randomly defined cluster seeds. An F-test proved the importance of each of the 9 variables in the cluster solution (see Table 32 in appendix).

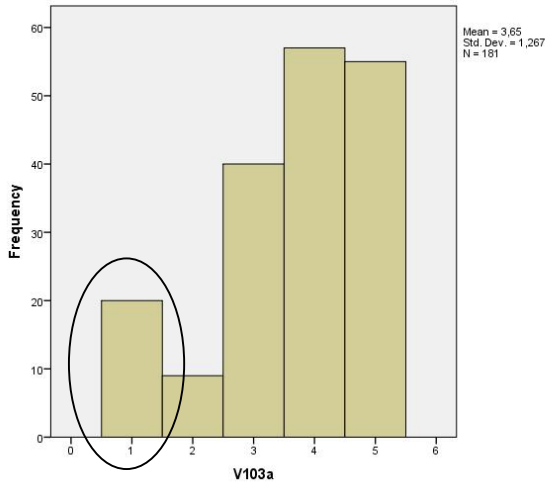
Clusters were profiled and interpreted based on the final cluster centres, as displayed in Table 5. Variables in the table are standardized variables with a mean of 0 for the total sample.

Final Cluster Centers

	Cluster			
	1	2	3	4
Zv103a	,58012	-1,71525	-,23444	,52921
Zv103b	,84258	-1,62298	-,07950	-,29789
Zv103c	,83889	-1,34630	,19804	-1,09554
Zv103d	,84902	-1,21486	,13502	-1,01928
Zv104a	,73716	-1,72501	-,31079	,42815
Zv104b	,80376	-1,63897	,03571	-,46352
Zv104c	,85006	-1,73972	-,13720	-,13720
Zv104d	,94636	-1,53832	-,06555	-,62210
Zv104e	,93259	-1,42553	,06287	-,92765
Number of cases	62	23	62	31

5. Table: Mean values of standardized variables related to the role of controllers in each cluster

The top executives of companies in Cluster 2 (23 cases; 12,9%) basically **do not perceive that controllers are engaged** in meaningful activities at all (the lowest values among all clusters are reported here for all variables) – even the data provision function is reported to be absent (v103a and v104a). This situation is reflected in the histograms of the variables as well (see, for example, the histogram of variable v103a in Figure 9). One group of companies answered almost all the related questions by indicating a frequency of 1.



14. Figure: Histogram of the variable v103a

The fact that controllers are perceived to be making no contribution does not necessarily indicate that there is a total absence of formal management control at these companies.

The values reflect the top executives' perceptions that are later compared to the variables obtained from the CFO questionnaire.

In contrast to Cluster 2, **Cluster 1** companies (62 cases, 34,8%) reported that all roles were very characteristic. This means that executives perceive **controllers as being involved** in decision making and strategy, and also see data provision and analysis as a very important component of controllers' work.

Both Cluster 1 companies (34,8%) and cluster 4 companies (17,4%) award high relevance for the functions of data collection and provision. It should be noted that in the case of the cluster solution where k=3, Cluster 2 and 3 companies are merged into one cluster, but separating them into two groups is very meaningful. The difference between the two clusters lies in how the CEOs perceive controllers' contributions in other ways. **Cluster 4** companies are 'old-fashioned' organisations whose **controllers collect and provide data** to managers and who are perceived as to be moderately engaged in data analysis, but such individuals do not make proposals and are **not actively involved** in strategic business decisions.

Probably the most interesting group of companies is described by **Cluster 3** (34,8%). Data provision is rated as below average, while the more involved roles are rated as somewhat above average. This means **controllers are involved in business to a certain extent**, although they are not perceived to be fully engaged in data provision and analytical activities. Again, this provides evidence that the concept of role maturity cannot be applied to controllers. Being involved does not require good performance in activities related to other roles, according to CEO perceptions.

Clusters may differ along another relevant dimension previously not involved in the clustering procedure. To profile the cluster solution, further characteristics were analysed: the size of the companies and their ownership. As discussed in detail in Chapter 4.1.1.3, previous studies have shown that management control systems are strongly affected by company size, as expressed by the number of employees and by foreign ownership. These two factors have played an important role in the development of MCS in post-transitional countries (Bodnár et al., 2005). If company size and ownership status strongly affect not only the MCS but controllers' perceived roles, these variables should differ significantly across clusters, and potentially also predict cluster membership.

Analysis of the relationship between cluster membership and company size (and cluster membership and ownership) indicates some association, but none significant at the 5% level (see the results of crosstabulation and related chi-square tests in Tables 33 and 34 in the appendix).

Although the chi square test indicated no significant general relationship between cluster membership and company size (p=0,462) or between cluster membership and ownership (p=0,053), some associations can be identified. Companies in Cluster 2 are typically smaller medium-size companies (50-99 FTEs) owned by Hungarian individuals, while larger-size companies with foreign owners are slightly overrepresented in Cluster 1. Smaller medium-size companies with foreign owners are somewhat overrepresented in Cluster 3, while Cluster 4 companies are typically owned by the Hungarian state or private individuals. Consequently, foreign owners are more typical of companies that report to having involved controllers. Table 6 summarizes the cluster profiles.

	Cluster 1	**Cluster 2**	**Cluster 3**	**Cluster 4**
Reported values of role-related variables	High values for all variables	Low values for all variables	Moderate values for all variables, variables related to consultant role higher rated	High values for variables related to data provision
Perceived role of controllers	**STRONG CONTROLLER** **Involved and simultaneously strong in all other areas**	**NO CONTROLLER** **Not involved, no perceived role**	**INVOLVED CONTROLLER** **Moderately involved, with weaknesses in data provision and analyses**	**DATA PROVIDER** **Not involved, but strong focus on data provision**
Further cluster characteristics (differences statistically not significant!)	Large-size companies with foreign owners slightly overrepresented	Smaller medium-size companies owned by Hungarian private persons slightly overrepresented	Smaller medium-size companies of foreign owners slightly overrepresented	Hungarian state and privately owned companies of bigger size overrepresented
Distribution of cases	34,8%	12,9%	34,8%	17,4%

6. Table: Cluster characteristics

Company size and main owner are also utilized later on as control variables in the research model (see Chapter 6.3.4).

The conclusion from the above-described statistical analysis related to the 1st research question is that **none of the hypotheses about the level of involvement of controllers can be rejected**. Thus both hypotheses are deemed **to be proved.**

H1a: Although the involvement of controllers in decision making is noticeable, controllers are still mainly seen by top executives as mere providers of numbers.

Multidimensional Scaling and Principal Component Analysis identified variables v103a and 104a as very similar, both also being represented at above average strength. Both variables relate to data collection and provision, identifying controllers as mere number providers. Although the involvement of controllers in decision making (v103d) gained much less support than average across the total sample, a significant number of companies (34,8%; cluster 1) report on the importance of the involvement of controllers in decision making (median equals 4, mode equals 5 for both variables v103c and v103d in this cluster).

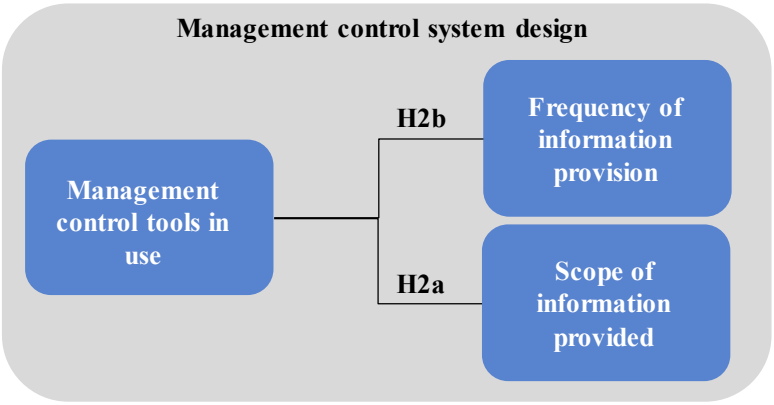
H1b: Although an active role is played by controllers in strategic development and implementation, based on the perceptions of top executives this is only characteristic of a minority of controllers.

Dimension reduction methods suggested that variable v104e (making proposals for strategy reviews) is similar to v103c (making proposals for the day-to-day operations) and to v103d (being a partner in decision making) in the reduced space. These three variables (representing the 'involved consultant' role) had much less than average support across the total sample. At the same time, a significant number of companies (34,8%; Cluster 1) reported that their controllers were active as concerns making proposals for strategy reviews (median and mode equals 4 for v104e).

It is important to note that both H1a and H1b refer to only one component of roles; namely, level of involvement. Level of analysis (Dimension 2) was revealed by PCA as an independent dimension (an orthogonal factor) that measures a different component of roles. Hereafter, a focus is maintained on the level of involvement (Dimension 1), while the roles of data provider and consultant are related to MCS design.

6.2 MCS design: Management control tools in use, and information provided

Management control systems can be characterized by the tools they employ and the information they provide. This chapter focuses on the analysis of both tools-in-use, the information they provide and the potential relationship between them, as shown in Figure 15 (c.f. Figure 6).



15. Figure: Research construct for management control system design

As discussed in Chapter 3.1.1, it is reported that a continually increasing set of MC tools are being used and researchers might be interested in the number and / or type of tools that are really used in practice. This research focuses on a limited set of MC instruments. Former surveys have proved that this list is applicable and relevant to Hungarian companies.

6.2.1 Management control tools in use

In line with the focus of the research, I characterise MC tools on the basis of whether they were originally designed to provide broad-scope information (external and / or non-financial and / or future-oriented information that goes beyond internal financial data) or not. Out of the 17 tools listed in Question P1 of the CFO survey, 6 tools can be seen as more innovative, having a focus on broad-scope information (variable names are indicated in brackets):

e) activity-based costing (ABC)
f) target costing (TC)
g) cost-based supplier evaluation (e.g. TCO - total cost of ownership) (TCO)
l) Balanced Scorecard (BSC)
o) analysis of economic value added (EVA) or other residual indicators (EVA)
q) analysis of market value indicators (Market_value)

All the other tools are categorized as traditional, with a focus on internal, financial data:

a) cash-flow analysis (CF)
b) fix/variable cost differentiation (FC_VC)
c) breakeven analysis (Breakeven)
d) cost sensitivity analysis (Cost_sens)
h) analysis of inventory turnover ratio (Inv_turn)
i) analysis of customer turnover ratio (Cust_turn)
j) analysis of supplier turnover ratio (Suppl_turn)
k) cash conversion cycle (Cash_conv)
m) capital cost analysis of investments (Capital_cost)
n) analysis of financial indicators (Fin_indic)
p) analysis of cash-flow based indicators (CF_indic)

Research question 2 is restricted to examining the extent of use of the more innovative MC tools. At the same time, a more general picture with respect to the use of MC tools requires the analysis of the use of traditional instruments as well.

Companies in the sample use on average 8,5 tools out of the potential 17 and they use on average 2 out of the 6 'broad-scope' tools. Table 7 ranks the MC tools by rates of use. Broad-scope tools are marked in grey. Usage rates are reported in more detail in Table 35 of the Appendix.

	Formal management control tools	Usage rate (%)	Modified usage rate (%)
1	n) analysis of financial indicators	82,6	78,5
2	a) cash-flow analysis	78,6	75,1
3	b) fix/variable cost differentiation	71,5	68,0
4	h) analysis of inventory turnover ratio	67,8	64,1
5	i) analysis of customer turnover ratio	60,5	57,5
6	j) analysis of supplier turnover ratio	55,6	51,9
7	c) breakeven analysis	55,5	53,0
8	p) analysis of cash-flow based indicators	54,8	50,8
9	m) capital cost analysis of investments	54,4	50,8
10	e) activity-based costing	53,0	49,2
11	d) cost sensitivity analysis	48,8	45,9
12	f) target costing	39,3	36,5
13	q) analysis of market value indicators	39,1	36,5
14	g) cost based supplier evaluation (e.g. TCO)	32,7	30,4
15	o) EVA or other residual indicators	30,4	28,2
16	k) cash conversion cycle	22,3	20,4
17	l) Balanced Scorecard	16,9	15,5

7. Table: Ranking of MC tools by proportion of use

Tools were ordered according to how many companies from all the respondent companies marked "yes" under the questions P1, thereby indicating that they used the specified tool. Some companies did not respond in the case of one or more tools. Missing values can be interpreted here as a sign of a lack of knowledge, so non-use statistics are more likely to be valid. Modified usage rates were calculated based on the total percent (essentially, missing values were interpreted as non-use of the specified tool). Ranking of tools by modified usage rates does not significantly modify the original ranking (there is a minor change between 6th and 7th place).

Table 7 clearly verifies the significant presence of traditional techniques in the day-to-day practices of firms. This finding is in line with that of other the research discussed earlier in Chapter 4.1.1. Traditional techniques still form the foundation of the discipline, suggesting that they are not being replaced but expanded upon by use of the newer tools.

This **concept of expanding** (instead of replacing) assumes that a certain structure in the reported values can be identified: a significant association should be detectable between the number of traditional tools in use and the number of 'broad-scope' tools in use.

Two variables were calculated from the original variables that measured the number of tools used by a company. The number of traditional tools (No_TRADtoolsinuse) is the sum of variables related to traditional techniques (values of 0=non-use and 1=in use). Similarly, the number of broad-scope tools (No_BROADtoolsinuse) is the sum of variables related to the broad-scope techniques. Based on a Chi-square test the independence of the variables can be rejected (p=0,000). The measures of association show that the relationship is moderately strong (0,52).

The **Concept of expanding** means that broad-scope tools are more likely to be in use at those companies where traditional tools have already been established. Consequently, the relationship between the two variables is not symmetrical, but directional. This is reflected in Table 8.

No_TRADtoolsinuse * No_BROADtoolsinuse Crosstabulation

Count

		No_BROADtoolsinuse							Total
		,00	1,00	2,00	3,00	4,00	5,00	6,00	
No_TRADtoolsinuse	,00	5	0	0	0	0	0	0	5
	1,00	3	2	0	0	0	0	0	5
	2,00	3	1	0	0	0	0	0	4
	3,00	4	5	3	1	0	0	0	13
	4,00	1	8	4	3	0	0	0	16
	5,00	1	6	4	1	0	0	0	12
	6,00	9	2	5	3	1	0	0	20
	7,00	2	4	4	8	1	0	0	19
	8,00	2	0	8	4	2	0	0	16
	9,00	1	3	2	3	0	0	2	11
	10,00	0	2	4	3	4	1	0	14
	11,00	0	1	0	1	2	2	11	17
Total		31	34	34	27	10	3	13	152

8. Table: Crosstabulation of MC tools in use

The upper triangle of the data matrix is filled with zero and close-to-zero values. That means that only those companies who are very actively using numerous traditional tools at the same time reported to using a broader scope of tools. The lower triangle shows a more heterogeneous picture. Companies which are extensively using traditional tools are not necessarily adopting (more) newer techniques.

Consequently, the usage of advanced tools is linked with the extensive use of traditional tools, but the extensive use of traditional tools does not necessarily lead to the adoption of newer techniques.

Applying and integrating all the available tools into the management control system is not expected and does not lead to a better MCS per se. At the same time, the appropriate number of tools to apply is also not easy to determine. Based on the database, I determine companies that use at least 3 different advanced tools ‘intensive users’ of advanced tools. Companies reporting to use 1 or 2 advanced tools are deemed ‘beginners’ and all others ‘non-users’. 21% of the companies do not use any of the advanced tools, 43,9% apply 1-2 tools and 35% are intensive users, with 3 or more tools in use.

For the sake of further analysis, two new variables were calculated. First, a categorical variable (CAT_BROADtoolsinuse) was developed to represent the above-described groups of companies. This takes a value of 0 in the case of companies who are not using any advanced tools. Firms who are using 1-2 tools have a variable value of 0,5 and intensive users with at least 3 tools in use are awarded a variable value of 1.

Second, a metric indicator was calculated to measure the intensity of tool usage on a continuum between 0 and 1. A PCA was run to justify the proposition that the 17 variables that are related to tool usage can be grouped into one indicator. The data proved to be adequate for PCA (KMO=0,809, p value of Bartlett's Test of Sphericity is 0). The scree plot of eigenvalues suggested extraction of only one component (with an eigenvalue of 5,24). Using the factor loadings as weights, an intensity measure for tool usage was calculated using the weighted average of 17 variables (indicator name: F1_AllTools). Table 36 in the appendix summarizes the outputs of PCA.

6.2.2 Frequency of information provision

Research question 2 relates to whether the advanced MC tools in use are connected to the provision of relevant information. Information is relevant if it is broad scope and frequently provided. These two characteristics of information are measured using several different variables from the database.

Frequency of information provision is measured by the frequency of issuing reports to management. This was operationalized using variables based on question P7 of the CFO questionnaire. CFOs were asked to indicate whether reports for management are regularly prepared and if so, how often such reports are provided to:

a) top management
b) sales / marketing
c) research and development
d) human resources management
e) logistics
f) informatics
g) production
h) finance)

A strikingly high number of companies, almost one third of the sample (53 cases), claimed that not reports were not issued regularly to management. For companies who regularly issue management reports, the frequency of information provision was measured between 1 (at least monthly) and 4 (more rarely than a year).

In order to ensure that higher values represent more frequent reporting, all variables were recoded, keeping the scale between 1 (more rarely than a year) and 4 (at least monthly). Issuing reports more rarely than once a year practically means that regular reporting does not occur. Therefore, companies who do not issue regular reports (missing values for

reporting frequency variables) were merged with companies who report more rarely than once a year (value set at 1).

The database was adequate for running a PCA (KMO=0,85) and the screeplot suggested the extraction of one component with an eigenvalue of 4,47 (see Table 37 in the appendix for the PCA outputs). The latent component represents the general reporting frequency. An intensity measure for reporting frequency (F3_Frequency) was calculated using the weighted average of the 8 variables. Weights are the factor loadings (see Table 9) that represent the relative importance of the 8 reports, influencing the overall measure of reporting frequency. The weights are very similar to each other except in the case of R&D reports. The low weight for R&D reports can be justified by the fact that research and development activities are absent at many companies. Even if R&D activities can be found in the company, they usually required a less frequent reporting.

Component Matrix[a]

	Component
	1
CXO level reporting frequency	,773
Sales reporting frequency	,776
R&D reporting frequency	,440
HR reporting frequency	,791
Logistics reporting frequency	,803
IT reporting frequency	,703
Production reporting frequency	,811
Finance reporting frequency	,811

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

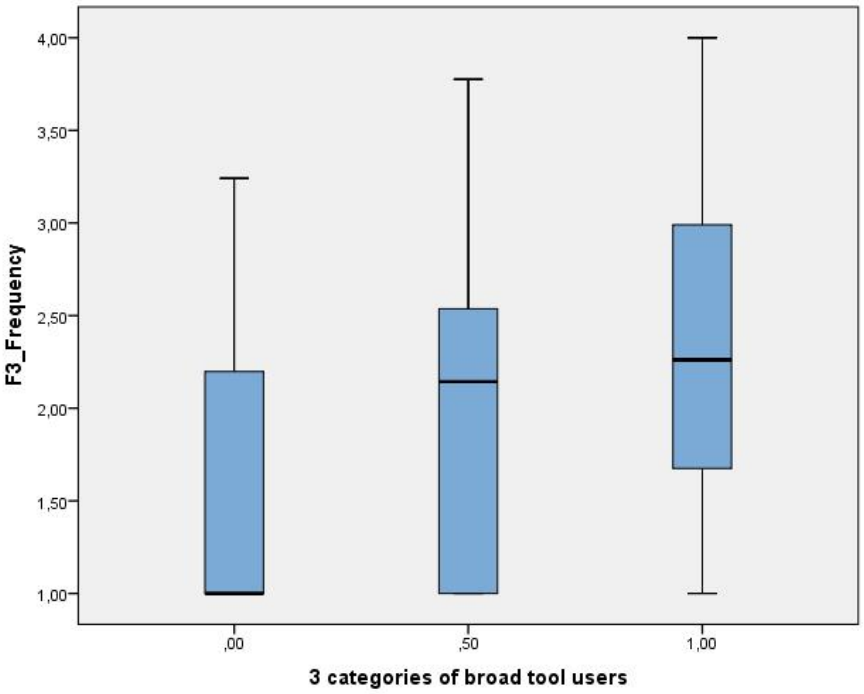
9. Table: Component matrix of variables related to reporting frequency

The mean value of overall reporting frequency F3_Frequency is 1,99, meaning that reports are prepared on average quarterly. It is important to note that this overall frequency includes both the frequency of issuance of top management reports (mean value of 2,5) and functional reports (like IT, marketing, etc.) that are issued more rarely.

H2b hypothesized that applying a broad scope of MC tools supports the function of frequent information provision.

Given the non-normal distribution of the data, a non-parametric test was used to compare the distribution of the frequency variable in k independent groups. The independent

groups are represented by the categories of the variable CAT_BROADtoolsinuse, showing how intensively advanced tools are in use (k=3). An independent sample Kruskal-Wallis test was run at a significance level of 0,05 and the null hypothesis of independence was rejected (p=0,001): the distribution of reporting frequency is not the same across companies grouped by level of intensity of tool use. The boxplot in Figure 16 shows the distribution of reporting frequency by groups of companies (0=non-user, 0,5=beginners and 1=advanced user of innovative MC tools).



16. Figure: Boxplot of reporting frequency by company groups

Based on the results of the Kruskal-Wallis test I ruled out the absence of a relationship between the variables. But unfortunately, neither the boxplot nor the Kruskal-Wallis test is able to measure the strength of relationship. In ANOVA, eta-squared is used to indicate effect size. MANOVA procedures and the univariate ANOVA assumes the existence of a normal distribution but the methods are fairly robust to departures from normality (Rencher, 2002). Thus eta-squared (η^2) were deemed acceptable for use in measuring the strength of association. They are calculated as the portion of between-groups sum of squares and total sum of squares (see Table 10).

ANOVA

F3_Frequency

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11,197	2	5,598	8,318	,000
Within Groups	103,645	154	,673		
Total	114,841	156			

10. Table: ANOVA table for reporting frequency

However intensively criticized, Cohen's interpretive framework is very helpful for evaluating the values of eta-squared (Vacha-Haase & Thompson, 2004). Invoking Cohen's benchmarks (small ~ 0,01; medium ~ 0,1; large ~ 0,25), a medium-strong relationship can be detected between the reporting frequency and the use of innovative MC tools (0,0975 at a significance level of 5%).

The metric indicators developed earlier for the intensity of tool usage can also be used here to measure the strength of association. The Pearson correlation coefficient between F1_AllTools and F3_Frequency is 0,339 (p=0,000).

Both the eta-square measure and the correlation coefficient prove the existence of a significant **relationship of a medium strength between MC tools and frequent information provision. Consequently, H2b can be accepted.**

6.2.3 Intensity of provision of broad-scope information

H2a assumes a relationship between the application of broad-scope MC tools and another component of information: scope. **Scope of information** can be measured in at least three dimensions. Information is seen as broad-scope if it is **externally focused**, **non-financial** and **future oriented**.

First, intensity measures were calculated for each of the 3 characteristic of the broad-scope information. Descriptive statistics about the intensity measures are also provided in order to describe the sample. In the last step, the 3 intensity measures were examined in relation with to the use of tools by the companies.

The orientation of the data was operationalized using the questions P8a and P8b from the CFO questionnaire. Information is externally focused if it comes from:

- actual data from external sources (e.g. statistical data) (p8bd)

- analysis, reports from external sources (p8be)
- information based on customers' opinions (p8bf)
- information from suppliers (p8bg)
- information based on the opinions of other stakeholders (e.g. local communities) (p8bh)

In contrast to this, information is considered to be internally focused if it comes from:

- corporate finance reports (p8ba)
- non-financial reports from the corporate information system (p8bb)
- information based on employees' opinions (p8bc)

First, the original variables were recoded. The recoded variables have values of either 0 (non-use) or 1(use). The **external focus indicator (F4a_External)** was calculated using the weighted average of the above-listed 5 variables. The weights are the factor loadings reported in Table 38 in the appendix.

Logically, the values of the new indicator ranges between 0 and 1. Higher values represent more focus on the organisation's environment, while zero means that only company-internal information is provided in reports (if any information is reported at all). It measures the intensity of external focus between 0 and 1.

36,5% of the companies are not externally oriented in data reporting at all (the value of intensity indicator equals 0). Only 16,6 % of the firms intensively provide externally focused information to management (intensity indicator above 0,7).

The financial vs. **non-financial nature of the information** provided was measured by variables coded under the question P8a. Information has a non-financial nature if it relates to:

- sales volumes (p8ad)
- service / product quality (p8ae)
- service time (p8af)
- timeliness of order delivery (p8ag)
- resource utilization (p8ai)
- customer satisfaction (p8aj)

In contrast to this, information has a financial nature if it concerns:

- financial accounting data (p8aa)
- financial indicators (p8ab)
- cost analysis (e.g. margin analysis) (p8ac)
- performance related to the plan (norms) (p8ah)
- m) information about product profitability (p8m)
- n) customer profitability (p8an)
- o) sales channel profitability (p8ao)

After recoding, the variables have a value of either 0 (non-use) or 1(use). The **non-financial intensity measure (F4b_Nonfinancial)** was calculated using the weighted average of the above-listed six variables with a non-financial nature. Weights are the factor loadings reported in Table 39 in the appendix.

Accordingly, the values of the calculated indicator also range between 0 and 1. Higher values represent the more intensive provision of non-financial information.

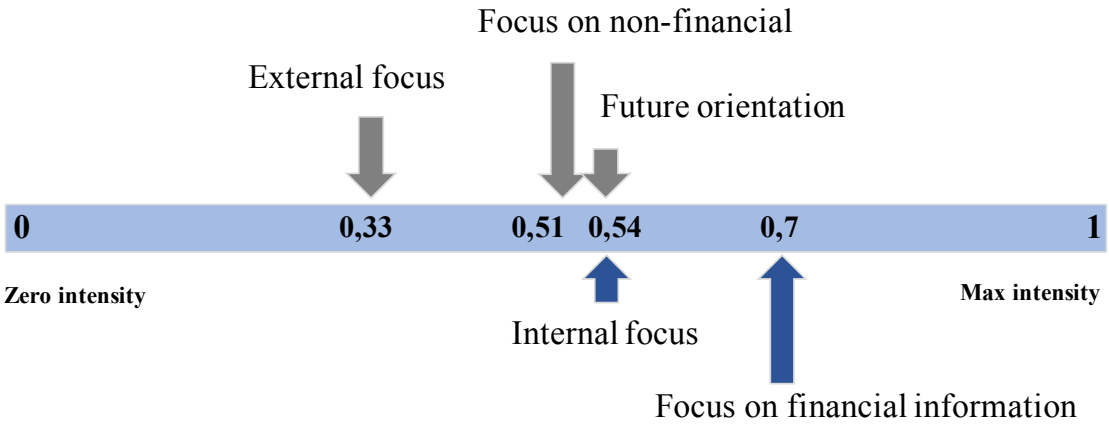
22,2% of the companies rely only weakly on non-financial information (the intensity measure is below 0,2) and 5,7% of the controllers do not provide non-financial information at all (intensity measure is 0). 34,1 % of the firms' controllers intensively provide non-financial information to management (intensity measure is higher than 0,7).

Past vs. **future orientation** was expressed in terms of the extent of planning activities (operationalized by the question P5) and in terms of extent of the preparation of pre-calculations (operationalized by the question P6). The extent of planning activity is measured by the number of different plans/budgets that are prepared (from 9 plans generally used), while the extent of pre-calculations is measured by the number of different pre-calculations prepared out of the 4 basic types of pre-calculation. After recoding, the variables have a value of either 0 (non-use) or 1(use).

Results of the PCA (reported in Table 40 in the appendix) support the proposition that preparation of diverse plans and pre-calculations can be summarized into one latent dimension: future orientation. The **Future orientation indicator (F4c_Future)** was calculated using the weighted average of the underlying 13 variables. Weights are defined by the factor loadings. The values of the constructed indicator range between 0 and 1. Higher values represent the more intensive future orientation of the MC.

Among all the features of broad-scope information, companies in the sample perform the best with respect to future orientation. Only 10,7 % of the cases indicate low intensity (below 0,2) as concerns this factor, while 29,6 % of them focus intensively on the future in their extensive planning and pre-calculation activities (intensity measure of 0,7 or higher).

Figure 13 illustrates the central tendencies of the intensity measures on a continuum ranging between 0 and 1. The feature having an external focus lags far behind having a focus on non-financial and future-oriented information provision.

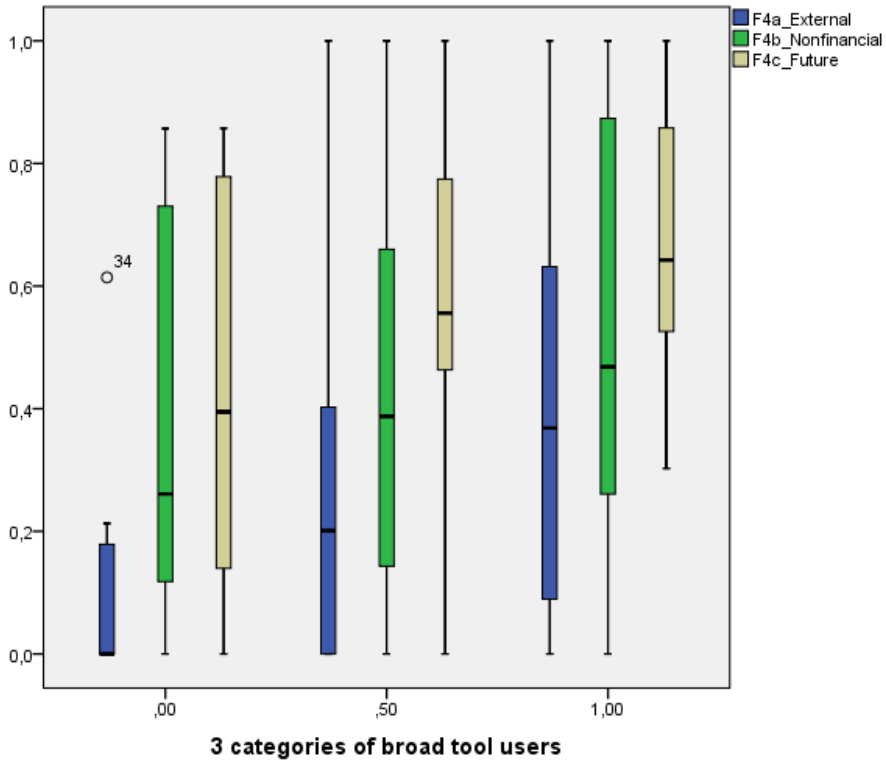


17. Figure: Evaluation of MC information provided with respect to its broad-scope nature

While higher values may be understood as a sign of the provision of broad-scope information, it is useful to contrast these values with the **intensity of providing 'narrow scope' information: internally-focused financial data**. After calculating intensity indicators for financial information and internal focus (again, as the weighted average of the underlying variables), central tendencies were defined against the 'broad-scope' indicators (see Figure 17). Reporting for the total sample shows there are significant differences between the intensity of providing financial and non-financial information, and between having an internal and external focus.

The last step involved analysing the relationship between broad-scope information and MC tools in use. *H2a hypothesized that the application of broad-scope MC tools supports the provision of a broad-scope of information.*

The distribution of intensity measures (F4a_Future, F4b_Nonfinancial, F4c_External) was analysed across the three groups of MC tool users (variable CAT_BROADtoolsinuse). Similar to H2b, the assumption of normality of parametric tests is violated so a non-parametric test was used to test the independence of the variables (the means of all groups are equal). The Kruskal-Wallis test suggests rejecting the null hypothesis of independence for all three intensity measures (p=0,002 for external focus, p=0,000 for non-financial information and p=0,000 for future orientation).



18. Figure: Boxplot of information-related intensity measures by company groups

The boxplot (Figure 18) shows how the intensity indicators distribute among the three groups of companies (0=non-users, 0,5=firms which use 1-2 tools and 1=intensive users with at least 3 tools).

Based on the results of the Kruskal-Wallis test, I was able to rule out the lack of a relationship between the variables. Subsequently, eta-squared (η^2) measures were used to measure the strength of associations. Calculated as the portion of between-groups sum of squares and total sum of squares, all associations were significant (p=0,001; p= 0,001; p=0,000 for F-test statistics) at a significance level of $\alpha = 0,05$. Detailed results are reported in Table 11.

	Sum of Squares			**Eta-squared**
	Between Groups	Within Groups	Total	
F4a_External	1,603	10,797	12,400	**0,12926**
F4b_Nonfinancial	1,518	9,847	11,365	**0,13354**
F4c_Future	1,363	7,511	8,874	**0,15358**

11. Table: Strength of relationship between tool usage and information provided

The strength of all associations is medium-size. Among all of them, the association with future orientation and the use of broad-scope tools is the highest.

Examination of bivariate Pearson correlation coefficients between tool usage (F1_AllTools) and information-related intensity indicators also support the assumption that significant associations exist, but the ranking of strength of the relationships is in this case somewhat different (*ρ=0,421 for F4a_External, ρ=0,313 for F4b_Nonfinancial and ρ=574 for Future orientation).* All correlation coefficients are reported in Table 42 in the appendix.

The above reported eta-squared procedures follow the same logic of R^2 that is used to measure the model fit in regression models. They indicate the proportion of variation in the dependent variable *y* that is attributable to differences among the means of the groups and consequently, can be used to answer the question *how well can dependent variables be predicted (i.e. the intensity measures about scope of information) by knowing what group they originate from (i.e. which group/s of companies, classified according to the number of broad-scope tools they use)*.

Therefore, the eta-square indicates not only that there is a significant association between the variables, but it might also be used to interpret the directional relationship between the grouping variable and the dependent variable(s). Knowing group-membership based on the number of broad tools in use helps predict how intensively companies provide broad-scope information. Consequently, **H2b – the application of broad-scope MC tools supports the provision of a broad-scope of information –** can be considered to be **supported**.

The scope of information refers here to three dimensions of focus, nature and orientation, measured using three different intensity variables. Some previous research findings about this issue suggest reducing the different aspects of scope of information into one dimension (one of the earliest is Chenhall & Morris' call for factor analysis (1986), for example).

In order to verify this approach, principal component analysis (PCA) was run for the three intensity variables. Both the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (0,585) and the Bartlett's Test of Sphericity (p=0,000) showed that the database is adequate meets the requirements for a PCA. One component was extracted with an eigenvalue of 1,593, explaining 53% of total variance. Pearson correlation between the intensity measures and the latent variable is high in the case of two variables (F4b_Nonfinancial: 0,772 and F4a_External 0,799) and somewhat lower for the variable

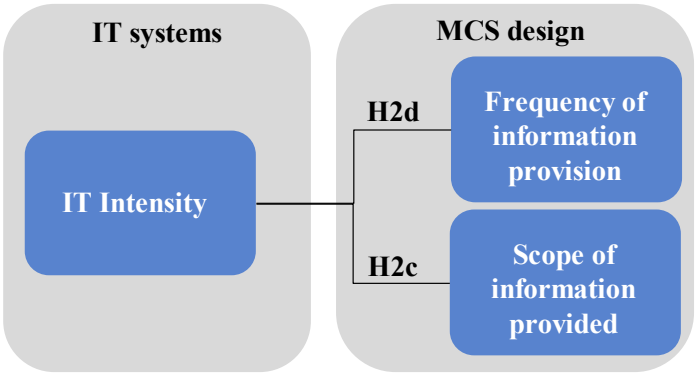
measuring future orientation (F4c_Future: 0,598). This is also reflected in the communality values showing the percentage of variance explained by the latent variable. The correlation is still acceptable (0,358) for the variable future orientation.

The extracted component represents the latent variable with respect to the **intensity of provision of broad-scope information (F4_Broad)** and accordingly, can be used as an overall measure for broad-scope information ranging from 0 to 1. Although the dimension reduction was supported by PCA, a considerable part of the information embedded in the three intensity measures was lost due to the calculation of only one overall measure for broad-scope information. This information loss does not influence the conclusions made previously about the relationship between tool usage and scope of information (hypothesis H2a).

Eta-squared for CAT_BROADtoolsinuse and F4_Broad equals 0,1599, while the Pearson correlation coefficient for F1_Tools and F4_Broad equals 0,410 (p=0,000), showing that dimension reduction does not negatively influence the relevant information embedded in the variables. The conclusions made with respect to H2a remain valid.

6.2.4 Effect of IT intensity on MCS design

Besides the management control toolkit that is applied, another enabler of a well-designed MCS is the set of IT applications that are used. As assumed, both the frequency (H2d) and scope (H2c) of information provision are positively influenced by the intensive use of IT (see Figure 19).



19. Figure: Hypothesized relationships between IT intensity and MCS design

An IT intensity indicator was developed by using the responses about the 14 diverse categories of IT application (question T45). After recoding, the variable values range from 1 (implementation not planned at all) to 4 (currently in use).

The data was adequate for PCA (KMO=0,851). The first component extracted has a high eigenvalue of 6,353 which can be interpreted as a latent dimension: an overall indicator of the intensity of the use of innovative IT applications. An **IT intensity indicator (F2_ITinnov)** was calculated as the weighted average of the 14 underlying variables. Factor loadings used as weights are reported in Table 41 in the appendix.

Correlations

		F2_ITinnov	F3_Frequency	F4a_External	F4b_ Nonfinancial	F4c_Future
F2_ITinnov	Pearson Correlation	1	,289**	,074	,047	,343**
	Sig. (2-tailed)		,003	,556	,708	,001
	N	104	104	66	66	89

12. Table: Pearson correlation coefficients between IT intensity indicator and information-related measures

Table 12 (an extraction from the overall correlation Table 42 in the appendix) shows Pearson correlation coefficients between the IT intensity indicator and information-related measures. IT intensity is correlated to the frequency of information provision (ρ=0,289; significant at a 1% significance level). Unfortunately, the correlation measures are not able to undisputedly support causal inferences. However, it is justifiable to assume that the use of IT applications supports the ability to frequently provide information to management. Therefore, the causality described in hypothesis **H2d** can be considered **supported: the intensive use of innovative IT applications supports frequent information provision.**

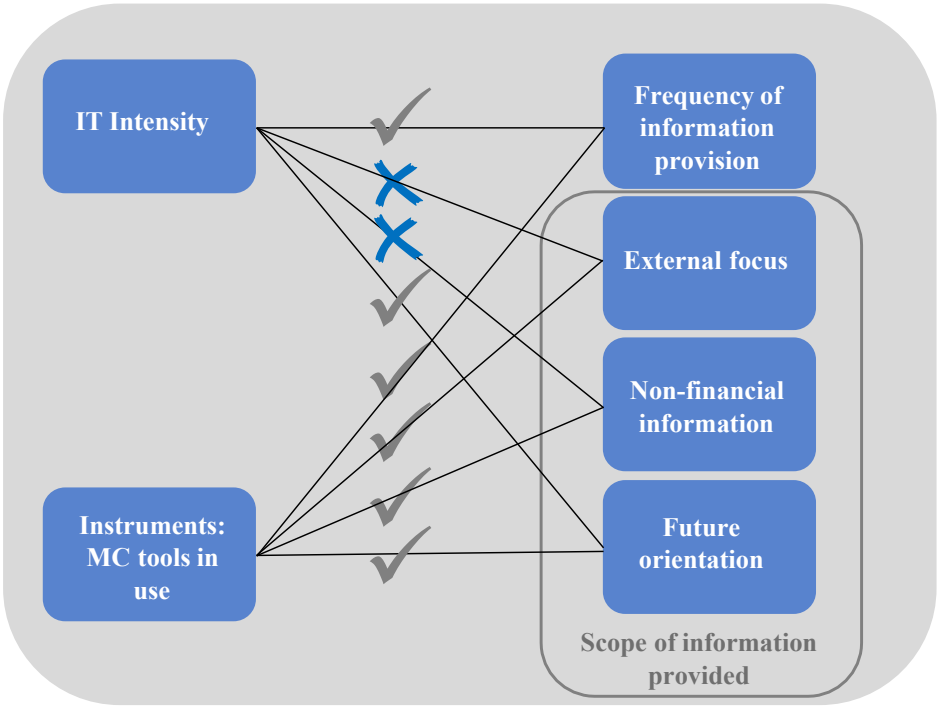
Hypothesis H2c is not supported by the data. IT intensity indicator (F2_ITinnov) does not significantly correlate with F4_Broad. Yet the absence of a significant association between the two indicator variables does not mean that the intensive use of innovative IT applications does not influence the scope of provided information at all. One aspect of 'broad-scope', namely **future orientation, is significantly correlated to IT intensity** (ρ=0,343, significant at a 1% significance level). The missing relationship with external focus and non-financial information erodes this correlation if they are compressed into the latent dimension of 'broad-scope' information.

Interpretation of these results requires acknowledgement of their limitations. An IT intensity measure was calculated from the responses of 104 companies. Due to the

absence of data about MCS design-related measures, the above-reported correlation coefficients are valid only for a very limited part of the sample.

Furthermore, responses show very low IT intensity for the firms (the indicator mean of F2_IT innov is 1,86). One IT application is used on average by 22,8% of companies. Even transactional systems such as ERP are reported to be implemented at only a modest number of companies (39,6% are currently using one, 9% currently implementing).

To sum up the statistical inferences, Figure 20 illustrates the rejected and verified relationships among the components of management control system design and IT intensity.

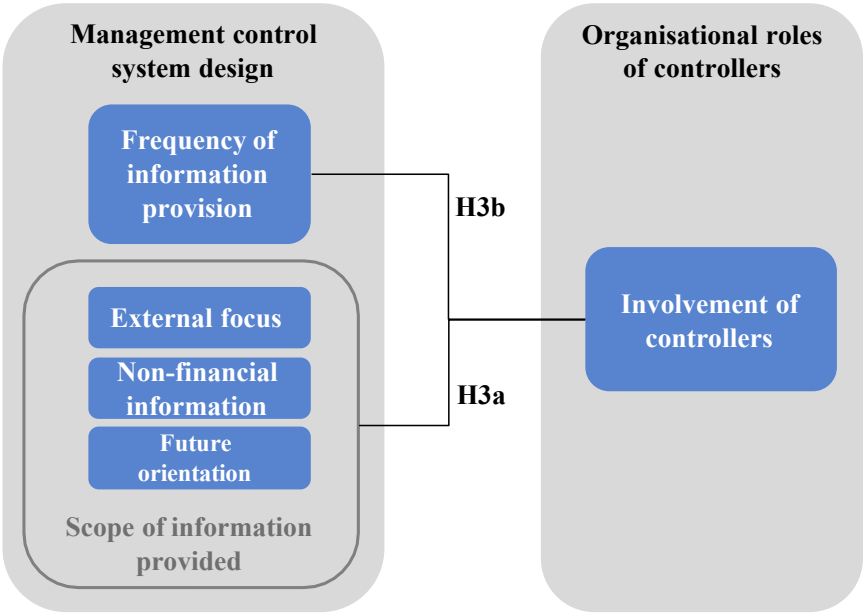


20. Figure: Rejected and verified relationships among components of MCS design, IT intensity and MC tools

A broader range of MC toolkit supports all features of MCS design. IT intensity was found to support the function of frequent information provision and the provision of future-orientated information, but the provision of externally focused and non-financial data was not found to be influenced by the IT intensity of the firms.

6.3 The link between MCS design and controllers' roles

The design of the MCS was conceptualized in terms of two dimensions: the frequency of information provision and the scope of information provided. This chapter focuses on the link between MCS design and involvement of controllers as portrayed in Figure 21. It was assumed that both the scope of information provided (H3a) and the frequency of information provision (H3b) are positively associated with the involvement of controllers.



21. Figure: Link between MCS design and involvement of controllers

Four indicators were developed earlier for describing the frequency and scope of information provision. Controllers' roles were also described earlier using another four indicators, each referring to one of the perceived role of controllers. Table 13 summarizes Pearson correlation coefficients between the variables related to MCS design in the rows and variables related to the role of controllers in the columns.

	F7_1P_ Coinvolve	F7_1N_ DataProv	F7_2P_ StratAnalysis	F7_2N_ DataAnalysis
F3_Frequency	-,303**	,149*	,074	,245**
F4a_External	,111	-,151	-,054	,135
F4b_Nonfinancial	,186*	-,184*	,010	-,058
F4c_Future	-,116	,019	,080	,050

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

13. Table: Pearson correlation coefficients of MCS and controllers' role-related variables

Frequency of information provision is significantly correlated to the data provider and data analysis roles. Due to the high negative correlation between the role-related variables (F7_1P and F7_1N; F7_2P and F7_2N), a significant positive correlation with one role-variable means that no or a negative correlation exists with the other role-variable of the same dimension. Therefore, while data provider role (F1_1N_DataProv) is positively correlated with the frequency of information provision, the consultant role (F7_1P_Coinvolve) is negatively associated with it.

Among all the indicators related to the scope of information, non-financial information is the only one that is significantly associated with any of the role-variables. **Provision of non-financial information supports the consultant role of controllers** but does not affect the level of analysis (2nd dimension of role definition, F7_2P and F7_2N).

Significant associations between MCS design indicators and role indicators imply that clusters of companies (defined based on the controllers' roles) should have diverse mean values for MCS design indicators.

	Controllers' perceived role	F3_ Frequency	F4a_ External	F4b_ Nonfinancial	F4c_ Future	F4_ BroadScope
Cluster 1	Strong controller	2,1743	,3074	,5382	,5897	,4597
Cluster 2	No perceived role	1,5344	,3115	,3977	,4044	,3883
Cluster 3	Moderately involved	1,8257	,4111	,5376	,5296	,4649
Cluster 4	Data provider	2,2822	,2750	,4164	,5055	,3835

14. Table: Mean values of indicators related to MCS design by clusters of companies

The correlation coefficients in Table 13 show that the frequency indicator has a high value in Clusters 1 and 4 where data provision is a strong feature of controllers' perceived role (see Table 14). An independent samples Kruskal-Wallis test suggests rejecting the null hypothesis of the independence of the variables (p=0,001): the cluster membership variable is not independent from F3_Frequency indicator. The eta-squared value (0,0863) shows a small-to-medium-strength relationship.

However, a Kruskal-Wallis test suggests retaining the null hypothesis of independence for all other variables related to the scope of information, even in the case of F4b_Nonfinancial which is significantly positively correlated to F7_1P_Coinvolve. This positive correlation is reflected in the higher mean values of the indicator F4b_Nonfinancial in Cluster 1 and 3 where the above-average involvement of controllers is reported. But this difference proves not to be statistically significant among the clusters.

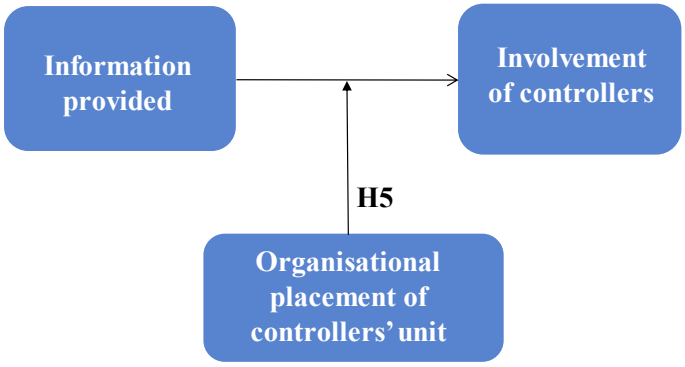
This can be reasoned by the fact that the cluster solution was developed based on all role-related variables, not only based on those measuring the level of controllers' involvement.

Consequently, none of the hypotheses about the direct effect of MCS design on controllers' involved role can be unequivocally verified. The frequency of provision of MC information is positively associated with the role of controllers as data providers is therefore negatively associated with the opposing role of the involved controller. **H3b is thus rejected.**

Generally, a broad scope of MC information is not positively associated with controllers' involvement. Accordingly, **H3a is not fully supported. Only one aspect of the 'broad-scope' provision of non-financial information is significantly correlated with controllers' involvement**. Any direct association between roles and future orientation between roles and external orientation is not found to be statistically significant.

6.3.1 The moderating effect of controllers' organisational placement

In Hungary and many of the continental European countries, management accounting and control-related activities are often organisationally separated from financial accounting. If a separate organisational unit exists, its place within the overall hierarchy of the firm might influence the involvement of controllers in decision-making. Research question 5 relates to whether the placement of the controllers' department alters the relationship between MCS design and the involvement of controllers (see Figure 22).



22. Figure: Hypothesized moderating role of the organisational placement of controllers' unit

Top executives were asked to specify the position of the responsible leaders of the management control activities within the organisational hierarchy of their company

(variable v63k). An outstandingly high number of companies (68 cases, 37,6%) failed to respond to this survey question. A high non-response rate is particularly characteristic of smaller companies (44,4 % of companies with between 50 and 99 FTE did not provide data, accounting for 64,7% of all non-responding companies). The non-response rate was 34,5 % for companies with between 100 and 249 FTE and 18,5% for big companies. This shows that non-responses can be mainly explained by the absence of a separate function for controllers which is more typical of companies of smaller size (see also Table 15).

Crosstabulation

Count

		Number of FTEs			
		1 50-99	2 100-249	3 Above 250	Total
Positioning controllers' unit	Non-response	44	19	5	68
	Department level	36	22	13	71
	CXO level	19	14	9	42
Total		99	55	27	181

15. Table: Crosstabulation: company size and positioning of controllers' unit

The 113 respondent companies located the controllers' organisational unit typically below the level of CXO (represented by variable values of 1 and 2). The mode of the variable takes a value of 4 (head of department) while the median has a value of 3 (head of general department). These results must be evaluated in the light of the positioning of other units, but the relative position of the controllers' unit compared to other functional units is not promising. Out of the 12 units which were rated, only one functional area (logistics) is positioned lower than the controllers' unit. Although the differences are small and usually not significant, the controllers' unit is located at the end of list. Marketing and sales are at the top of list, closely followed by production.

To sum up, companies, especially smaller ones (among medium-size companies) often do not have separate a controllers' unit. Those which have a dedicated group usually do not position it at the CXO level. With regard to its placement within the hierarchy, the unit lags behind not only areas which undertake core activities, but also behind most of the supporting departments such as finance or HR.

For the sake of further analysis, the original variable v63k was recoded into a new categorical variable (Controllers_org_2levels) with two possible values (1 – department level; 2 – CXO level).

It was assumed (H5) that the positioning of the controllers' department at a lower hierarchical levels hinders their active involvement. In other words, that the organisational placement of the controllers' unit moderates the relationship of the information-related variables and the role-related variable F7_1P_CoInvolve.

The moderating variable (position of the controllers' unit) is assumed to alter the relationship between the dependent and independent variables, and this alteration should show up in a weaker correlation between F4b_Nonfinancial and F7_1P_CoInvolve, while controlling for the variable Controllers_org_2levels. Indeed, the value of the partial correlation (ρ=0,148 at p-value of 0,194) is no longer significant: the relationship between the provision of non-financial information and controllers' involvement is diminished when the hierarchical level of controllers is controlled for.

The same holds for the correlation between reporting frequency and data provider role. While controlling for the position of the controllers' unit, the partial correlation between F3_Frequency and F7_1N_DataProv is no longer significant (ρ=0,144 at p=0,13). Among companies that report to having controllers at the CXO level (variable Controllers_org_2levels has a value of 2), the relationship between F3_Frequency and F7_1N_DataProv is higher (ρ=0,365 at p= 0,017) than for the total sample (ρ=0,149). The reported positive correlation coefficient is not significant for companies which have their controllers' department at a lower hierarchical level.

Consequently, **H5 can be accepted**. **The positioning of the controllers' department at lower hierarchical levels hinders their active involvement, and the role of data provision as well**.

The moderating variable (Controllers_org_2levels) alters the relationship between the dependent variables (MCS design) and the independent variables (roles). However, it does not need to be related either to the dependent role variable or to the independent variables described.

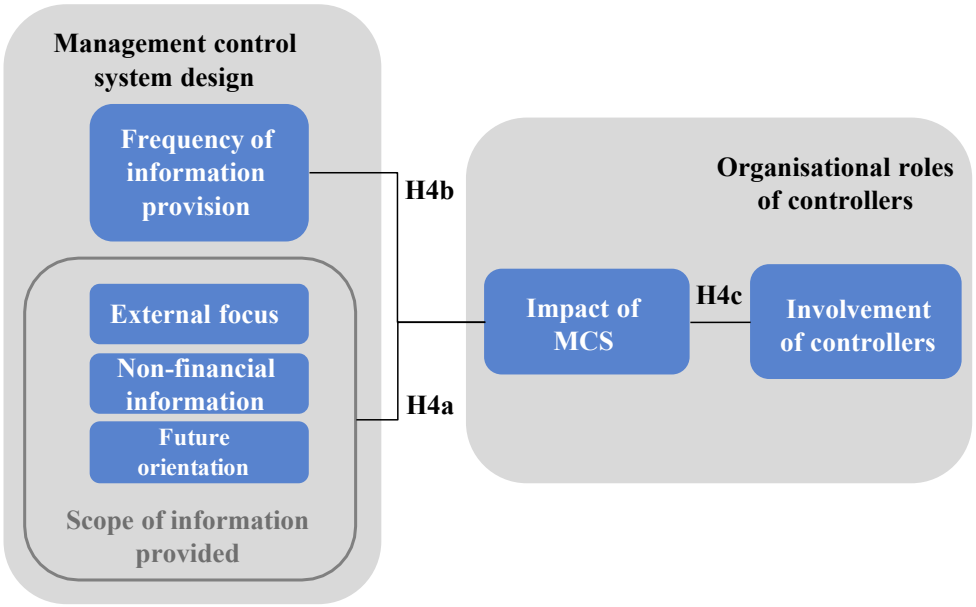
The mean values of all role-related variables were calculated for the groups 1 (department level) and 2 (CXO level).

A non-parametric independent sample test was for run to test the relationship between the role-related variables and the variable Controllers_org_2levels. The Mann-Whitney U test suggested retaining the null hypothesis of independence for all role variables: F7_1P_CoInvolve (p= 0,535), F7_1N_DataProv (p=,981), F7_2P_DataAnalysis

(p=0,398) and F7_2N_StratAnalysis (p=0,611). *Consequently, the relationship between the hierarchical level of the controllers' unit and the controllers' perceived role did not prove to be significant*.

6.3.2 Impact of MCS on executives

The impact of the management control system is defined in terms of the ability of the information provided to support business activities. It is assumed that MCS design has an effect on the *impact of MCS as perceived by the top executives*. Providing broad-scope information (H4b) and issuing reports frequently (H4a) enhances the utility of the system and thus the effect of the MCS on business activities. In turn, the impact of the MCS supports the involvement of controllers (H4c), see Figure 23.



23. Figure: Impact of MCS as a mediator between MCS design and controllers' roles

This subchapter describes how the impact of management control systems has been operationalized and how the variables used for operationalization are related to each other. Subsequently, a path analysis is developed to test the significance of these variables in the model.

The impact of MCS was measured using two sets of questions: appraisals made by top executives about reports, the outputs of MCS (4 variables) and the perceived utility of information provided with regard to its ability to support decision making and other business activities (13 variables).

Top executives were asked to assess about their reporting system whether

- the information requirements of managers are met (v105a),
- the data provided is reliable and accurate (v105b),
- the reports are user-friendly and easy to interpret (v105c) and
- the controller(s) has(ve) a large (beyond data) added-value role in the reports (variable v105e)

All related variables were measure on a Likert-scale ranging from 1 (not typical at all) to 5 (very typical). As discussed earlier, Likert-scale variables can be usefully transformed by using centring across a second mode. After data transformation, mean values can be interpreted: negative values indicate lower-than-average support, while positive values indicate support above average.

Among all the features of the reporting system, the reliability and accuracy of the provided data is perceived as being the highest (centered v105b=0,2167). Lower, but still positive mean values are offered for meeting information requirements. Issuing understandable reports is supported at a close-to-average level (centered v105a=0,0611; centered v105c=0,0333). *Top executives rated the contribution of controllers to the reports as the worst performing part of their reporting system*. The added-value they provide was evaluated as far below average (centered v105e= - 0,3111).

In order to test whether these four variables can really be integrated into one indicator that can be used to measure some kind of 'fitness of reporting', dimension reduction techniques were used.

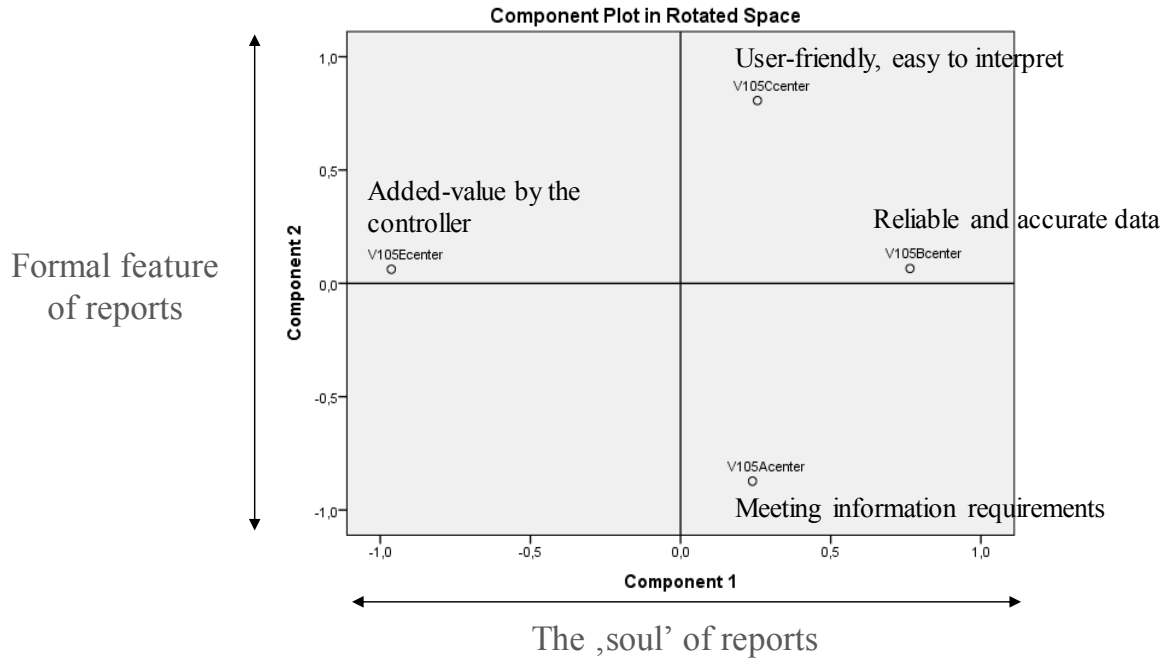
PCA with Varimax rotation extracted two factors with an eigenvalue of above 1. Both of the factors are bipolar. The first factor is strongly correlated with reliable data (v105b) and controllers' added-value (v105e), but with the opposite sign. Similarly, the second factor is strongly correlated with user-friendliness (v105c) and with meeting information requirements (v105a), but with the opposite sign (see Table 16).

Rotated Component Matrix[a]

	Component	
	1	2
V105Acenter	,239	-,873
V105Bcenter	,764	,066
V105Ccenter	,256	,807
V105Ecenter	-,963	,062

16. Table: Rotated component matrix of the variables v105a-e

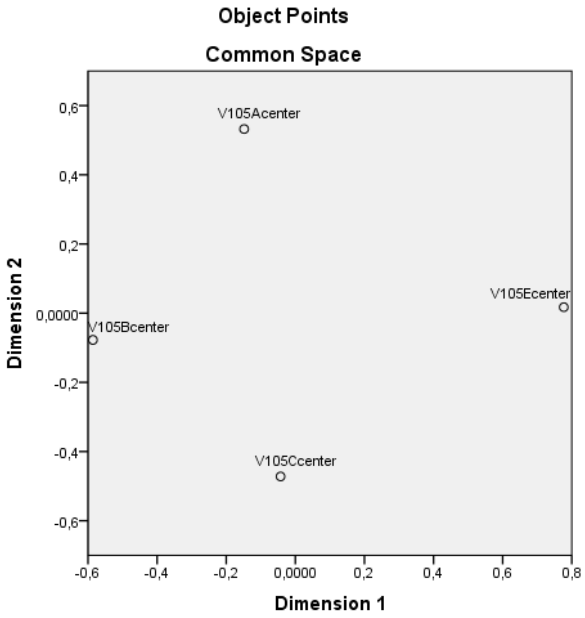
Two bipolar factors contain the four original variables, meaning that the four variables are spread over the two-dimensional space. This is very nicely reflected by the two-dimensional component plot shown in Figure 24.



24. Figure: PCA component plot of the variables related to the reporting system

Due to the use of centered variables, commonly used measures of data adequacy (KMO, Bartlett's test) cannot be calculated.

In the second step, multidimensional scaling (method: PROXSCAL with Euclidean distance) was run for the four centered variables. With almost the same plot (see Figure 25), MDS supports the results of PCA. Both normalized stress value (0,10592) and Tucker's coefficient of congruence (0,94556) show the goodness of model fit.



25. Figure: MDS plot of the variables related to the reporting system

Concluding from the result of MDS and PCA, a dimension reduction cannot be reasonably made. The variables used for measuring CEOs' perceptions about the reporting system measure diverse aspects of it. Construction of an overall indicator would be not helpful: averaging opposing variables of a dimension would erode the useful variance of the variables. Therefore, the single variables – each of them measuring different features – were retained in the model, labelled as follows: F5_1P_ReliableData (v105b); F5_1N_AddedValue (v105e); F5_2P_Userfriendly (v105c); F5_2N_RequiredInfo (v105a).

Interpreting the dimensions and the opposition of variables gives additional insights. The controllers' function of providing reliable and accurate data stands in contrast to the added-value provided by the controllers (Dimension 1). This means that the value of the reports lies either in the data itself, or in the person of the controller if the data is perceived as less accurate. This dimension can be interpreted as the '**soul of the report'**. Reflecting the bipolar nature of the factor, the variables F5_1P_ReliableData and F5_1N_AddedValue are significantly negatively correlated ($\rho = -0{,}564$).

In the second dimension, 'easy interpretation' of reports stands opposed to 'meeting the requirements' about content (information), implying that reports that meet all the information requirements are often not user-friendly and easy to interpret. On the contrary, user-friendly reports need improvements in terms of content. The common

dimension behind these two variables can be interpreted as the **formal features of the report**. Reflecting the bipolar nature of the factor, the variables F5_2P_Userfriendly and F5_2N_RequiredInfo are significantly negatively correlated (*ρ= -0,416)*.

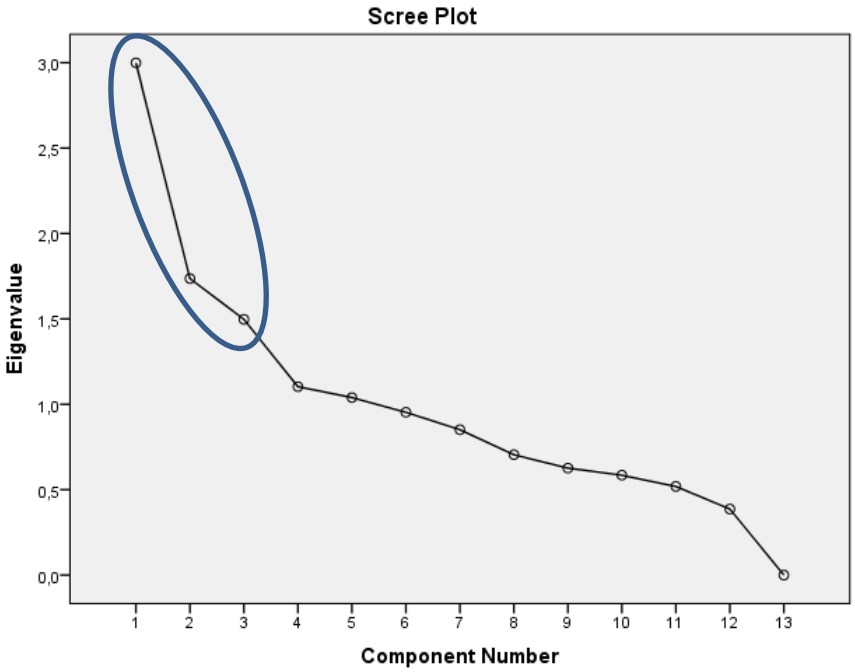
The impact of MCS was also measured using another set of questions. Top executives were asked to what extent the available information is able to **support diverse activities** (variables v106a-m):

- making strategic decisions (v106a)
- making operative decisions (v106b)
- communication, information sharing within the company (v106c)
- communication, information sharing with business partners (v106d)
- corporate performance evaluation (v106e)
- performance evaluation of business partners (v106f)
- performance evaluation of employees (v106g)
- keeping track of changes in customer satisfaction (v106h)
- keeping track of changes in employee satisfaction (v106i)
- processing employees' claims and complaints (v106j)
- development of cooperation with strategic partners (v106k)
- decision support in business development (v106l)
- decision support in corporate social responsibility related activities (v106m)

Respondents were asked to evaluate 13 activities from 1 to 5 with regard to the extent of the support they gained from the information they delivered. Variables have been centred across the second mode for the sake of further analysis.

The best-supported business activities are operative decision making (centred v106b= 0,436) and performance evaluation on a corporate level (centred v106e= 0,3753), while the less supported business activities are keeping track of changes in employee satisfaction (centred v106i= - 0,3982) and processing employees' claims and complaints (centred v106j= - 0,2988).

A PCA was run with Varimax rotation in order to identify the structure of the 13 variables. After the 1st component (with an initial eigenvalue of 3), the scree plot in Figure 26 suggests extracting the 2nd and 3rd components (eigenvalues above 1) as well.



26. Figure: PCA scree plot of the variables related to decision support

Bold numbers in the rotated factor matrix of the 3 component solution (Table 17) show which variables have the highest loadings on which component.

Rotated Component Matrix[a]

	Component		
	1	2	3
V106Acenter	**,702**	,265	-,018
V106Bcenter	**,774**	-,028	-,026
V106Ccenter	,199	**,710**	-,140
V106Dcenter	-,154	**,672**	-,044
V106Ecenter	**,735**	-,031	,120
V106Fcenter	-,063	,004	**,611**
V106Gcenter	,044	-,295	**,578**
V106Hcenter	**-,396**	-,019	,344
V106Icenter	**-,639**	-,015	,143
V106Jcenter	**-,664**	,041	-,281
V106Kcenter	-,350	**-,415**	-,104
V106Lcenter	,111	**-,590**	-,517
V106Mcenter	-,269	-,204	**-,629**

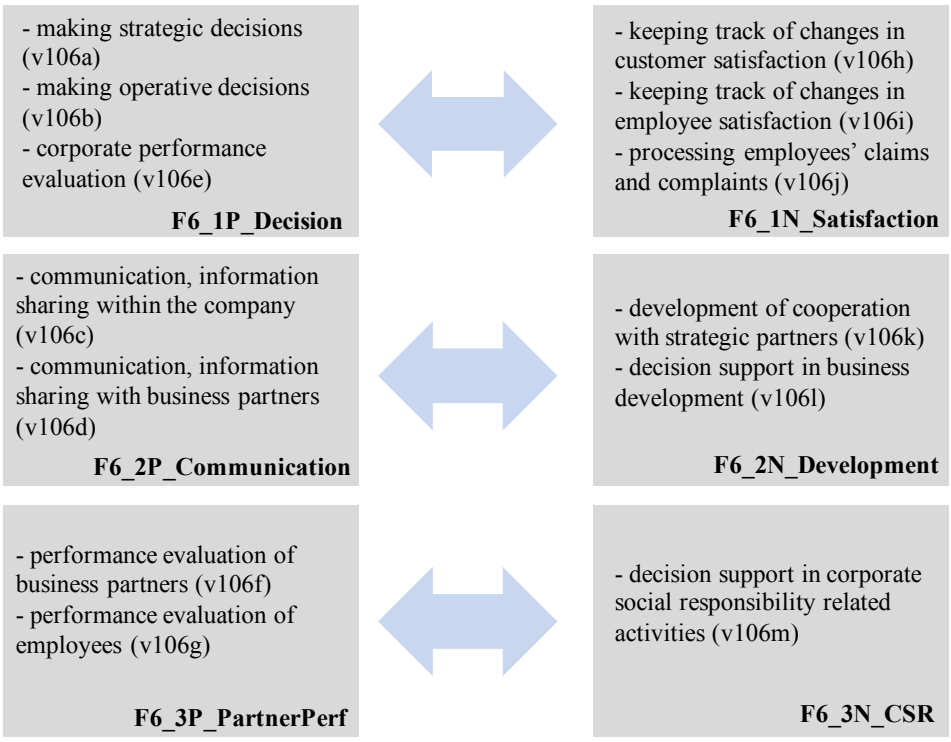
17. Table: Rotated component matrix of the variables related to decision support

The opposing signs of the high factor loadings reinforce the bipolar nature of the factors. The first factor is highly positively associated with business activities that are 'traditionally' served by MCSs: making operative (v106a) and strategic decisions (v106b) and evaluating corporate performance (v106e). The same factor is significantly

negatively correlated with keeping track of the satisfaction of customers (v106h) and employees (v106i) and with processing employees' claims (v106j).

The second dimension covers communication, information sharing within the company (v106c) and with business partners (v106d), as well as development of cooperation with strategic partners (v106k) and decision support in business development (v106l). The third factor is strongly positively correlated with the performance evaluation of business partners (v106f) and employees (v106g) and is negatively correlated with decision support in corporate social responsibility-related activities (v106m).

Using factor loading as weights, 6 new indicators were calculated as the weighted average of the underlying variables. The indicators of the same dimension are negatively correlated to each other, as they were developed through the separation of the bipolar factor. The names of the six indicators and the grouping of the original variables are illustrated in Figure 27.



27. Figure: Groups of variables related to business support

What do the opposing variables of the same dimension have in common? Variables with the highest absolute loadings for component 3 (v106 f, g, m) are all related to partners - either internal partners (employees) or external partners (business partners or the wider society within the company operates).

Variables belonging to Dimension 2 relate to relationships: the provided information is able to support either communication or cooperation and development.

As shown by the above analysis, descriptive manifest variables could not be compressed into one overall indicator measuring the level of business support or the 'fitness of reporting'. Indeed, 6 latent variables describe the ability of MCS to support business activities and 4 manifest variables measuring diverse aspects of 'fitness of reporting' were kept separately.

The subsequent chapter describes the method and results of the path analysis that was used to quantify the strength of relationships between a set of variables developed earlier. To keep the path analysis sound and understandable, only 3 measures are used for describing the impact of MCS.

Among all business support-related indicators, F6_1P_Decision consists of the 'classical' functions that will be assessed in relation to MCS: the ability of the information to support operative and strategic decisions and corporate performance evaluation.

Among all the reporting-related variables, the variables of the first dimension are more interesting for the current research: what makes the 'soul' of a report? What exactly is valued by top executives? Is it the data itself, or the person of the controller? Consequently, variables F5_1P_ReliableData and F5_1N_AddedValue are utilized in the further analyses.

6.3.3 Path analysis: an LVPLS model

How numerous indicators were developed as composite measures was described in the preceding subchapters. Bivariate associations between these indicators were examined and diverse coefficients were used to measure the statistical strength of the relationships between the variables of interest.

Calculating and interpreting bivariate coefficients is very helpful when making judgements about whether variables are associated or not. But the process has two main limitations: on the one hand, it is not suitable for making causal inferences, per se. On the other hand, it estimates the strength of relationships between pairs of variables one single relationship at a time, and it is not able to simultaneously estimate relationships among a multivariate set of data.

In order to eliminate these limitations, path analysis was developed almost a century ago. Using this method, researchers are able to determine whether a multivariate dataset fits a causal model defined a priori. **Path analysis is a special case of structural equation modelling (SEM) with a focus on causality**. The SEM technique of is an extension of factor analysis and multiple regression (Hair et al., 2014). It permits the testing of an entire logical chain, instead of focusing on bivariate relationships.

Developed earlier, this logical chain of my research is constituted of a series of dependence relationships among notions related to the MC phenomena. In SEM, these 'notions' are called constructs: latent concepts that cannot be directly measured. These constructs are represented by measured (manifest) variables. The **measurement model of SEM** defines how manifest variables constitute a construct; e.g., how the future orientation indicator was calculated using the variables measured by the CFO survey. Although SEM is able to asses these measurement properties within the model, here the research constructs (latent variables) were developed earlier using PCA. Therefore, these 11 indicators, each of which represents a construct, will be used in the path analysis instead of the manifest variables (see Table 18).

No of block	Name of construct	Name of latent variable
1	Intensity of MC tool usage	F1_AllTools
2	Intensity of use of (innovative) IT applications	F2_ITinnov
3	Frequency of information provision	F3_Frequency
4	External focus in information provision	F4a_External
5	Non-financial information provision	F4b_Nonfinancial
6	Future orientation in information provision	F4c_Future
7	Reliable and accurate data in reports	F5_1P_ReliableData
8	Added-value of controllers in reports	F5_1N_AddedValue
9	Ability of provided information to support decision making	F6_1P_Decision
10	Data provider role of controllers	F7_1N_DataProv
11	Involved consultant role of controllers	F7_1P_Coinvolve

18. Table: Variables used in LVPLS model

Path analysis is a confirmatory technique: it tests the fit of an a priori defined series of relationships among exogenous (independent) and endogenous (dependent) constructs. The logical chain of relationships (the paths) should be determined a priori by the researcher in such a way that the path to an endogenous construct must be unidirectional

(Füstös et al., 2004). If two constructs are not related a priori in the model, the strength of relationship between them is not calculated.

LVPLS (latent variable partial least squares) path analysis uses Partial Least Squares (PLS) as a mathematical algorithm for parameter estimation. Building on this algorithm, the free software package PLS 1.8 developed by Lohmöller (1989) was used for parameter estimation.

LVPLS technique requires several data inputs, as follows:

- the correlation coefficients between variables (see the overall matrix in Table 42 of the appendix),
- a design matrix of path coefficients that defines the series of relationships to be estimated (Table 19), and
- several initial settings: the number of blocks (here:11), the number of latent variables (here:11), the number of iterations (here:50), the starting values for LV-weights (here:0.9).

As one of the most important inputs, the design matrix of path coefficients describes which of the relationships should be considered and estimated. The columns of the design matrix in Table 19 represent the independents, while rows are the dependents. Accordingly, e.g the first columns of the design matrix indicate that the 1st construct (here: intensity of use of MC tools) has an effect on the 3rd construct (reporting frequency), 4th construct (external focus), 5th construct (non-financial information), 6th construct (future orientation), 7th construct (reliable data) and the 8th construct (added-value of controllers).

Design of path coefficients

	1	2	3	4	5	6	7	8	9	10	11
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	1	1	0	0	0	0	0	0	0	0	0
4	1	1	0	0	0	0	0	0	0	0	0
5	1	1	0	0	0	0	0	0	0	0	0
6	1	1	0	0	0	0	0	0	0	0	0
7	1	0	1	1	1	1	0	0	0	0	0
8	1	0	1	1	1	1	1	0	0	0	0
9	0	0	1	1	1	1	1	1	0	0	0
10	0	0	1	1	1	1	1	1	1	0	0
11	0	0	1	1	1	1	1	1	1	1	0

19. Table: Design matrix of path coefficients

Part of the relationships defined in the design matrix have already been discussed: hypotheses H2 and H3 are related to these. Additionally, the design matrix is constituted of new relationships covering H4 and other casual relationships not referred to so far (e.g. the direct relationship between MC tools and the added-value of controllers in reports).

After only 2 iteration cycles were performed, the parameter estimation stopped. The estimated strength of the casual relationships defined in the design matrix (Table 19) are given by the path coefficients (β-values) reported in the path coefficients matrix (Table 20). Higher values of path coefficients indicate stronger causal relationships, while coefficients below 0,05 are not considered relevant. Path coefficients should be interpreted as standardized regression coefficients. Accordingly, a negative coefficient means that the two related constructs move in opposite directions. Some of the latent variables in the model were developed as opposing variables: 10 (Data provider role) is opposed to 11 (Involved role), 7 (Reliable data) is opposed to 8 (Added-value of controllers). The high negative path coefficients indicate this situation. Due to this bipolar nature of the endogenous variables, a coefficient of a path leading from one exogenous variable to an endogenous one may be expected to have an opposing sign to the coefficient of a path leading from the same exogenous variable to the opposing endogenous variable.

Path coefficient matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0
3	**0,27**	**0,18**	0	0	0	0	0	0	0	0	0
4	**0,46**	**-0,11**	0	0	0	0	0	0	0	0	0
5	**0,35**	**-0,09**	0	0	0	0	0	0	0	0	0
6	**0,52**	**0,14**	0	0	0	0	0	0	0	0	0
7	**0,07**	0	0,03	**-0,2**	**-0,07**	-0,02	0	0	0	0	0
8	**0,15**	0	**-0,14**	**0,05**	0,02	0	**-0,54**	0	0	0	0
9	0	0	**0,15**	0,02	**-0,09**	-0,07	**0,12**	-0,12	0	0	0
10	0	0	**0,06**	0	**-0,07**	**0,05**	**0,19**	-0,34	0,24	0	0
11	0	0	**-0,17**	-0,01	**0,06**	**-0,06**	-0,01	0,11	-0,1	-0,58	0

20. Table: Path coefficient matrix

E.g. if provision of non-financial information (Block 5) has positive path coefficients with the involved role of controllers (Block 11) (0,06), it can be expected to have either a negative or a close-to-zero path coefficient to the opposing role of data providers (Block 10) (-0,07). Therefore, in case of opposing constructs I indicate and interpret only the significant positive paths. These positive paths describe which constructs support the data provision role, and which constructs support the involved role of controllers.

There are two negative path coefficients that do not result from bipolarity thus must be denoted and interpreted in the model. Block 2 (IT intensity) is negatively related to Block 4 (external orientation) and Block 5 (non-financial information).

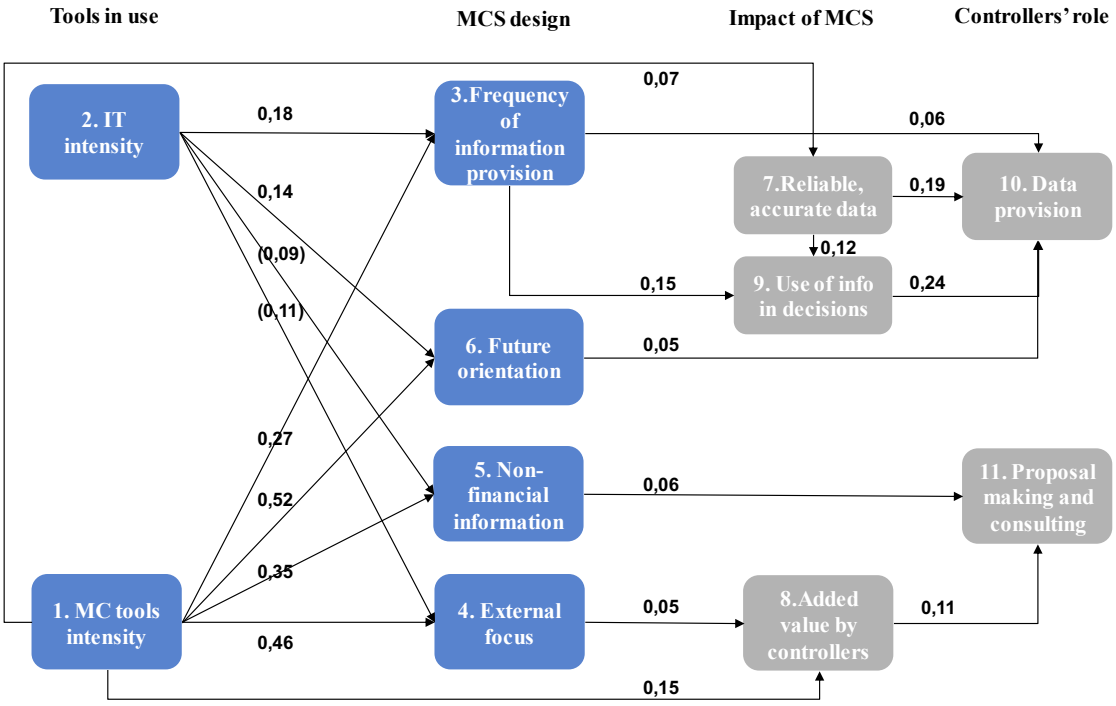
While path coefficients measure the direct effect between the constructs, reduced path coefficients (β*-values) show the total (direct and indirect) effect of all preceding constructs on an endogenous construct: e.g. the added-value of controllers (Block 8) has a direct path coefficient of 0,11 to the involved role (Block 11), but the total effect of Block 8 on Block 11 is 0,34 (refer to the reduced path coefficients in Table 21).

Reduced path coefficient matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	1	0	0	0	0	0	0	0	0	0	0
2	0	1	0	0	0	0	0	0	0	0	0
3	0,27	0,18	1	0	0	0	0	0	0	0	0
4	0,46	-0,11	0	1	0	0	0	0	0	0	0
5	0,35	-0,09	0	0	1	0	0	0	0	0	0
6	0,52	0,14	0	0	0	1	0	0	0	0	0
7	-0,05	0,03	0,03	-0,2	-0,07	-0,02	1	0	0	0	0
8	0,18	-0,05	-0,15	0,16	0,06	0,01	-0,54	1	0	0	0
9	-0,05	0,03	0,17	-0,03	-0,11	-0,07	0,19	-0,12	1	0	0
10	-0,06	0,05	0,15	-0,1	-0,13	0,03	0,42	-0,37	0,24	1	0
11	0	-0,08	-0,29	0,07	0,15	-0,07	-0,33	0,34	-0,24	-0,58	1

21. Table: Reduced path coefficient matrix

Interpretation of the significant paths is primarily made based on the path coefficients that show direct effects. If needed, the discussion is supplemented by the interpretation of reduced coefficients that show total effects.



28. Figure: Path diagram with estimated path coefficients

Direct paths are summarized in a path diagram with β-values in Figure 28. The first block, the intensity of MC tools in use, has the highest path coefficients among all independent variables. High positive β-values confirm that hypothesis H2b (accepted previously) is valid: firms that more intensively use management control tools are capable of providing broad-scope information to their managers. Among all aspects, the effect on future orientation is the highest (β=0,52). The path coefficient (β=0,27) to Block 3 confirms hypothesis H2a (also accepted previously) is also valid: More intensive use of MC tools supports more frequent provision of information.

Paths not investigated before go from Block 1 to 8 and to 7. **Controllers using more MC tools are perceived to be able to generate more added-value in reports** (Block 8). Weak but positive direct path coefficients (β=0,07) are revealed between tool usage and reliable data (Block 7), but this positive relationship erodes in the total effect (β*= -0,05).

In line with the previously made judgements about hypothesis H2c and H2d, IT intensity has a significant positive effect on reporting frequency (β=0,18) and on future orientation (β=0,14). The effect of IT intensity on the provision of external (Block 4) and non-financial information (Block 5) was not expected to be significant. Even so, significant negative β-values are indicated, showing a weak negative causal relationship. **IT-**

intensive firms tend to be less focused on providing non-financial and external information to their management.

Frequency of information provision (Block 3) has a moderate positive effect (β=0,15) on the ability of provided information to support decision making (Block 9). Frequent reporting enhances the likelihood that executives will use the provided information in decision making and corporate performance evaluation. Similarly, if the data is perceived to be accurate and reliable (Block 7), it enhances the likelihood that executives will use the provided information (β=0,12).

Both directly and indirectly, Blocks 3, 7 and 9 all have positive effects on one role: controllers as data providers. **The frequent provision of reliable data that is perceived to be useful for decision making supports the role of controllers as data providers.**

Direct path coefficient (β=0,05) indicate a weak positive effect of the future orientation on the data provider role, but the total effect of Block 6 on Block 10 (β*=0,03) suggests that it should not be considered a significant relationship.

Other aspects of broad-scope information are related to the role of controllers in consulting. The provision of non-financial information (Block 5) has a weak positive direct effect (β=0,06) on the consulting role (Block11) and a moderately high total effect (β*=0,15).

Although the direct path from external focus (Block 4) to the consulting role (Block 11) is not significant, having an external focus supports the added-value of controllers (Block 8) (β=0,05) which in turn supports the role of controllers as consultants (β=0,11). The perceived added-value of controllers in reports is the major influencer of the consulting role with a total effect of 0,34.

Consequently, **providing externally focused information enhances controllers' added-value, as perceived by executives. The added-value and provision of non-financial information supports the role of controllers as consultants in the organization**.

One component of broad-scope information, external focus, is positively associated with one aspect of the impact of the MCS: the perceived added-value of controllers. Non-financial information and future orientation are not significantly associated with any aspects of the MCSs' impact, therefore **H4a is only partly supported.**

Frequent information provision is positively associated with another aspect of MCSs' impact: reliable data and the use of information. Frequency has no significant effect on the added-value of controllers. **H4b is thus partly supported.**

Hypothesis H4c assumed that the impact of MCS is positively associated with controllers' involvement. The involved role of consultant is supported by the controllers' perceived added-value. But more intensive usage of information and increased reliability of data does not enhance the likelihood that controllers are perceived as consultants. **H4c is only partly supported.**

How reliable is this path model? Generally used fit indices for β-values require the multivariate normality of the data. If this assumption is violated, the indices will be inaccurate. Global indices developed for path modelling are available that combine the quality of outer and inner model. Here the outer model (average indicator reliability) cannot be assessed, as latent variables have been developed earlier, not as part of the path modelling. The inner model assessment is made based on the average squared multiple correlations (R^2) of the endogenous latent variables. R^2 are reported for the variables in Table 22.

Squared multiple correlations

1	2	3	4	5	6	7	8	9	10	11
0	0	14	19	10	35	5	36	9	37	57

22. Table: R^2 of latent variables in the LVPLS model

R^2 shows the percentage of the variable's variance explained by other variables in the model. Independent blocks (1, 2) are not explained within the model so their R^2 values equal 0. At the end of the logical chain, 57% of the variance of the involved consultant role (Block11) is explained by all other variables in the model. This means that other factors not incorporated in the path analysis (and most probably not measurable within a survey) account only for 43% of the variance.

There are two weak links within the portrayed logical chain: Block 7 and 9 have far less significant paths than expected and therefore their R^2 values are very low. Block 7 (reliable data) has no significant explanatory paths from all the blocks of the MCS design. So what makes data reliable and accurate in an executive's eyes? As data reliability is one of the explanatory factors of information usage (Block 9), finding an answer to this question would help with understanding why and when executives do or do not use the

information provided in decision making and performance evaluation. More about this issue is included in the discussion in Chapter 6.4.

In terms of model fit, the fitness of the above model could be increased by leaving out blocks with low R^2 values. But the major aim of this research was not to develop the perfect model that maximizes fitness measures. It was rather aimed to investigate whether certain set of variables are related or not and where unrelatedness can be informative as well.

6.3.4 Eliminating the third variable problem

Finally, all revealed relationships among the variables need to be checked for the third variable problem. A relationship can be affected by a confounding (third) variable if both the dependent and the independent variables are significantly associated with such a third variable, whose effect should be ruled out by measuring the strength of association while controlling for its presence. If variables of interest are not significantly associated with the third variable, no further tests are required.

Company size (expressed as the number of employees) **and ownership are used as control variables**. 3 groups of companies of different size were established (1=50-99 FTEs, 2=100-249 FTEs and 3>=250 FTEs). Tables 23 summarizes the values of eta-squared which measure the strength of association between the indicators in the model and company size.

	Company size	
	Eta-squared	Sig.
F1_AllTools	**0,0629**	**,008**
F2_ITinnov	0,0343	,171
F3_Frequency	**0,0653**	**,002**
F4a_External	0,0127	,455
F4b_Nonfinancial	0,0083	,607
F4c_Future	**0,0422**	**,035**
F5_1P_ReliableData	0,0190	,184
F5_1N_AddedValue	0,0060	,586
F6_1P_Decision	0,0099	,413
F7_1P_Coinvolve	**0,0618**	**,004**
F7_1N_DataProv	**0,0446**	**,017**

23. Table: Associations between indicators and company size

Although the strength of the relationship is weak-to-medium, **bigger companies definitely tend to apply MC tools more intensively, issue reports more frequently and tend to be more future-oriented**. Companies with over 250 FTEs (Group 3) apply IT tools more intensively, but this tendency is not reflected in the mean values of Group 1 and 2. Therefore, the overall association with F2_ITinnov is not significant.

Both the data provision and the consultant role of controllers is significantly related to company size, but inversely. While the **role of data provision is less typical in companies with 50-99 FTEs** (mean value of F7_1N_DataProv is 0,3111 in Group 1), the **consultant role** has the lowest mean value (-0,835) in Group 3, consisting of companies

with over 250FTEs, and the **highest** (-0,2378) **in Group 1 consisting of companies with FTEs between 50 and 99.**

As company size is inversely related to the independents (F1, F2, F3, F4c) and the dependent variable F7_1P_Coinvolve, the relationships previously proved cannot be confounded by the company size.

3 types of major owner were defined (1= Hungarian state, 2= Hungarian private, 3=Foreign owner). Ownership categories and size categories are not independent from each other in the sample (p-value of Pearson Chi-square test equals 0,000). Companies owned by the Hungarian state are typically bigger companies and Hungarian privately owned companies are typically smaller (64,8% of them have between 50 and 99 FTE). Merging Group 1 and 2 made it possible to isolate the size effect from ownership and focus on the differences between foreign and Hungarian owners.

The mean values of the indicators did not differ significantly across groups of companies: no indicators in the model are influenced by whether the company is Hungarian or foreign-owned. Therefore, the existence of the third variable problem related to ownership can also be excluded.

6.4 Discussion

Based on the role-variables, companies were earlier clustered and profiled. Calculated from the role variables, two roles (data provider and consultant) were linked with the attributes of MCS design, and path-coefficients were calculated to assess the size effects.

These attributes of MCS design can be analysed among clusters as well in order to gain a better understanding about the diverse groups. Table 24 (an extended version of Table 14) shows the mean values of variables involved in the LVPLS model in each cluster. As variables are measured on different scales, the tables should only be read and interpreted row by row. The highest values in each row are marked in grey.

	Clusters			
	1	2	3	4
	Strong controller	No controller	Involved controller	Data provider
F1_AllTools	,5822	,2444	,4998	,4860
F2_ITinnov	2,0709	1,3711	1,8065	2,0625
F3_Frequency	2,1743	1,5344	1,8257	2,2822
F4a_External	,3074	,3115	,4111	,2750
F4b_Nonfinancial	,5382	,3977	,5376	,4164
F4c_Future	,5897	,4044	,5296	,5055
F5_1P_ReliableData	,0924	,0581	,1409	,4251
F5_1N_AddedValue	-,0854	-,3454	-,1539	-,9242
F6_1P_Decision	,4391	,6374	,5943	1,5165

24. Table: Mean values of explanatory variables per cluster

As discussed in Chapter 6.1.2, **Cluster 2** companies are not only **weak in terms of the controller's function** but are also very poorly equipped with tools and infrequently issue reports. Controllers of **Cluster 4 companies are the data providers**. Among all clusters, the data providers most frequently report and can be proud of having the highest value in terms of data reliability. Although the data they provide is actively used in decision making, the providers themselves are not perceived to generate further value. Therefore, they place low emphasis on management services.

The controllers in **Cluster 3 companies are the involved controllers.** They are not perceived as being strong with data provision, but as individuals they are accepted as having added value; consequently, they are involved in business processes. There is only one task at which they are the best: having an external focus. Instead of frequently issuing internal company data, these controllers represent the outward-looking perspective. This outward-looking view allows the involved controllers to serve as managerial guides.

Cluster 1 companies are not only champions in terms of the fact that they report high values for all types of controlling functions, but they also intensively use both MC and IT tools, they are good at information provision and their controllers are perceived to be generating added-value, beyond the data. After Sathe (1983), these controllers are called **strong controllers**: strong at both data provision and proposal making.

But what do these roles really mean? Subsequent to the statistical analysis, the executive interviews and focus group sessions were designed to help with understanding the nature of the identified roles and typical situation of companies in the four clusters.

The essence of the data provider role is **supplying numbers**. One of the executives expressed his expectations in this regard as follows: "*I expect that everything that can be measured should be measured. What cannot be measured should be made measurable.*"

In the opinion of executives, the substance of controllers as consultants involves '**thinking together**'. But what does 'thinking together' exactly mean? Namely, how far does the competence of controllers reach, and what remains in the hands of managers? Which issues can typically benefit from consultation with a controller, and which not? *"I do not expect them to solve problems instead of us. Irrespective of this, they have real power to intervene in the case of maintaining the budgets. ... They can see whether there is any numerical variance and if so, can start to challenge those who are responsible for it [asking] when will you settle this, how will you solve it?"*

Thinking together starts with the raising of questions and drawing attention to specific issues. The controller alerts and gives signals about budget overruns and brings individuals to book, although the real power to intervene remains with the managers of the business units. "*My controller approaches me if we exceed the budget. But this problem can be solved only with the plant manager*."

Executives expect to receive proposals from controllers, typically about structural issues. *"How should something be built up: cost structures, revenue structures? How can we optimize things to obtain better tax conditions?*"

A further task of controllers as it relates to thinking together is **enforcing company-level economic concerns** as they can bring production- and economic-related considerations to the table for discussion with sales people who are launching a new product to market. Or, vice versa, they can argue from a sales/finance perspective during a discussion with plant managers. For this, a minimum level of knowledge about business processes is required. This role is created by the need to be able to **respond to executives about almost every concern**. *"You are the controller. You should know almost everything here. I do not want to talk to three people about this issue."* – a controller recalled the words of a top executive.

Having knowledge about business processes which overlap several units means that controllers may be able to clearly see relationships and correspondence while not being deeply engaged in any specific areas of business. This combined business knowledge and relative independence makes it possible for them to become trustworthy consultants for executives. Accordingly, the consultant role can be interpreted as acting as **an impartial, unconcerned arbitrator**.

While this proposal-making role requires a certain level of knowledge about core business, the absence of this knowledge leaves controllers in the role of uninvolved data provider. *"Our finance staff is a little bit distant from real processes. Not only geographically, but in their minds and ways of thinking ... this is why I push colleagues to visit our plant in the country. They should have at least a rough picture about the work that happens there…"*

Hypotheses H1a and H1b about the role of controllers were built on the concept of role maturity. According to this concept, a controller may play the role of consultant if they are mature in their traditional role and perform well in terms of data provision. Despite the fact that hypotheses H1a and H1b proved to be valid (the data provider role still dominates consultancy), the four types of role they have been identified to play contradict the concept of role maturity.

Executives from the Cluster 3 companies rated the role of involvement higher than the role of data provider: these executives consult controllers even if they are poor at data provision. With respect to size and ownership variables, Cluster 3 companies do not significantly differ from other cases in the sample. Yet why do the leaders of these companies report that their controllers behave in contrast to expectations? What situation are they facing? Why are controllers not perceived as data providers but only as a proposal makers or consultants?

As the survey could not provide answers to these questions, these were raised with executives and controllers during the focus group and individual interviews. Focus group participants often reported that they feel that they fulfil both of these roles. However, the daily routine of data provision is often **not witnessed and not appreciated by top executives**. "*There is a powerful amount of data. And executives are not interested in this anymore. They are eager to have controllers who steer their thoughts. ... But of course*

the processing of all data is behind this, because they need it in order to obtain something that can be put down on the table."

In this case, data provision is actually occurring, but is simply not visible to top executives. More typically, middle-level managers are much more interested in the details of controllers' data-related work. They might even require data to be analysed cell by cell, at a formula-level.

The data provider role can be filled completed by other actors as well. These actors can include the financial accounting department, which is traditionally strong in a company. *"They went to the accountants if they needed actual data. It took a long time until I recently reached my goal that reports are 'controlling' reports and budget numbers are the points of reference."*

In certain cases, the data-providing role of controllers may be thought to have been partly abolished by the use of IT systems. Controllers are no longer expected to 'have the right numbers', because these are supplied by the system. *"Because we have a system for that."* Executives may perceive that data is being provided by IT systems and that such data can be accessed by anybody who has the authority. This explanation would suggest that data provision is automated and executed by well-established systems, and that actors who are involved in processing data are no longer called controllers. But this kind of capability involves a professional staff of data handlers with a specific IT focus (often called data engineers), and is far more common in the case of big companies.

The below-average values for the data provider role in Cluster 3 cannot be fully explained by the above-mentioned trend. Companies in Cluster 3 do not have high IT intensity and are not typically large companies.

In the case of smaller organizations the absence or shortcomings of supporting systems can place more emphasis on the role of controllers as proposal makers. *"There is no 'apparatus' behind him/her, but he/she is the utility man. This is a one-man show."* In this case, the role of data provider is not fulfilled by other actors or systems and may not be perceived because it is weak. Even the collection of basic revenue and cost data in a structure differing from financial accounts raises difficulties in the presence of a primitive MCS. Because the MCS is rudimentary, a controller cannot be strong in their role as providers of data. However, executives may still rely on the knowledge of the controller,

perhaps even because of the absence of easily accessible data. This shifts the controller into the role of consultant, although their responsibility for data provision is limited.

Although more explanations may be offered, Cluster 3 controllers may be seen as atypical. The focus group participants agreed that the concept of role maturity is valid for the majority of the companies. The controllers who were regarded as being successful in the long run were those who could become established in their companies as 'together thinking' consultants, alongside (not instead of) their roles as data providers.

Performing well in data provision (and proceeding to higher-level roles) has a very important pre-condition: ownership of reliable data. *"Let's have unbiased data. If it [the data] is OK, many things can be done. But nothing until then."*

This often-mentioned pre-condition is absolutely in line with the results of statistical analyses. Based on the LVPLS model, the perceived reliability of the data is an important explanatory factor of the data provider role (see the later discussion in this chapter about data reliability).

According to hypotheses H3a and H3b, informational aspects of MCS (reporting frequency and a broad scope of information) explain the roles. The LVPLS model showed which factors support which roles to which extent. In line with the assumptions, non-financial and externally focused information in MCS supports the role of controllers as consultants. The same relationship could not be proved for future orientation, although executives agreed that this aspect is at least as important in this respect as the other two informational aspects of MCS.

A weak, but positive route exists between future orientation and the role of controllers as data providers. What exactly does this future orientation mean? Sophisticated planning and budgeting seems to play a secondary role. "*Future orientation should be about business development. For this, I expect data from the controller. He/she should validate from a financial point of view what colleagues say*." Having a future orientation is linked with the data providing role, as controllers are expected to support forward-thinking with their data.

All the same, the main reason for the missing link between future orientation and consultant role may be the operationalization of the notion 'future orientation'. The variable measured the expansiveness of plans, budgets and pre-calculations and could not capture the quality of forward looking and forward thinking. This suspicion is confirmed

by the fact that future orientation is positively linked with IT intensity: the variable operationalized the existence of reports filled with budget numbers, not the quality of the future orientation.

The path coefficient between IT intensity and non-financial information and the path coefficient between IT intensity and external focus are negative. The reason for this is that the collection of this information is still mainly not supported by ERP systems and medium-size companies still do not have IT systems that systematically collect and process non-financial and externally focused information. This type of information is typically manually collected and analysed in an ad-hoc way through campaigns. *"I have this piece of paper in front of me. I wrote it while sitting at a conference some days ago. I collected the GDP development data about our potential markets, the neighboring countries. Who has grown, by how much? But I do not do this every year."*

The other reason for manual processing is that the required non-financial and external information is much more company-specific than financial information. Automatic processing of this information would require (in many cases) customized developments; 'off the shelf' systems are less able to fulfil these needs. "*These [blocks of data] remain Excel data masses."*

A main component of internally focused, non-financial information relates to operation-related quantities like waste products, standard times, and capacities. This is of a very different nature to rarely collected non-financial data (e.g. about satisfaction). Operation-related quantities are typically maintained daily and comprise essential parts of ERP systems or at least (in the case of an absence of an integrated system) they are processed and managed during production planning and scheduling system. Their importance was expressed by the top executive of a Hungarian production subsidiary of a German group as follows: "*It is already bad if I realise from the financial data that something is wrong. This [the data]… relates to the past. Production-related data about efficiency and quality is able to show what will be reported in our monthly profit and loss statement [in advance]."*

As these types of quantities are used as base units for cost allocation, they are involved in controllers' reports at least indirectly. At the same time, reports that focus only on operation-related data (i.e. utilized capacities, product quality measures) are typically issued by operational / plant managers, not by controllers.

Respondents from interviewed companies reported that the collection and maintenance of other internally focused, non-financial data (i.e. employee satisfaction) and external data is typically not the responsibility of their controllers either. "*I think that generating reports related to the profit and loss statement and balance sheet is 'controlling'. 'Controlling' delivers information retrievable from SAP. Other information is collected by business units, but might be received by the controller who uses it as background information."*

Thus, often it is the sales and marketing department who collects data related to competitors (i.e. using the annual reports of competitors) and information about customers (i.e. by buying market research data). From all externally focused information, controllers are typically involved in processing general financial data such as exchange rates or energy prices.

Consequently, **non-financial and external information is not typically collected by controllers** at many companies. Most of this data is used by controllers in multi-aspect analyses. Therefore, the provision of non-financial and external information in MC reports does not support the controllers' role as data provider, but rather their role as consultants.

Based on hypotheses H4a, H4b and H4c, executives' perceptions about MC reports mediate between MCS design and the role of controllers. But, in contrast to these prior expectations, variables measuring the 'goodness' of the MC reports could not be classified and reduced. The four variables form two bipolar factors: they measure two different aspects of reporting, and both aspects consist of two opposing factors.

One of these sources of opposition is the contrast between the user-friendliness of the report and its ability to incorporate all the information that is required. This existence of this opposition was validated by the focus group participants: reports are either short and striking, or they incorporate everything possible. "*As we developed reports, we were asked to provide reports that were easy to read. We went there with a short and easy-to-read report. … Later on we added lot of things as asked for by the manager. In the end it [the report] expanded so that it contained everything but wasn't easy to read."*

Variables contained in the other bipolar factor relate to what generates added-value in reports: the data itself, because of its high reliability and accuracy, or the personal contributions of controllers. In contrast to the former bipolar factor, this opposition does

not involve a trade-off between the variables but much more concerns what the focus of the report is. One of the senior controllers gave an example of a **controller's personal contribution** in a situation where data accuracy was not an issue at all. In a company with 1000 FTE, the controller realized that water consumption was unreasonably high: 168 litres of drinking water per FTE was being consumed. Nobody had formerly monitored this indicator and no standard value existed for water consumption. The controller made a comment about this to the responsible manager and asked him to have measurements made to examine whether and where water was leaking. After exploration and troubleshooting, water consumption was reduced by two-thirds.

Another similar example of controllers' personal added-value is an example of a cost reduction achieved after a simple change was made to the employee's data request form. In a company employing repairmen, the controller realized that employees were reporting more and more paid overtime every year. As the controller wanted to understand the reason for the increase in overtime, he supplemented the template which was being used for overtime reports with one row asking respondents to explain in writing why overtime was needed. Immediately, from the following month, reported (and paid) overtime dropped by half.

The main reason for the non-correspondence between the two variables (the reliable, accurate data and added-value of controllers) potentially lies in the interpretation of the variables by the executives. The reliability of the data is an issue of a numerical nature; it relates to the validity of the numbers. Whether the personal contribution of the controllers is perceived and valued or not might concern the confidence executives have in the data.

Without doubt, controllers are personally involved in producing reliable data. IT systems are not able to eliminate mistakes made with data entry (this also provides an explanation for the significant missing path from IT intensity to data reliability). Such data-related mistakes are filtered out by controllers who correct erroneous (accounting) data. "*The controller cuts lateral shoots*."

Interestingly, numerical reliability can also become a question of trust. "*I received it [the data] from Robi, it is good*."- replied one of the managers when he was asked under what conditions he thinks that the data contained in his reports are reliable. A good long-term relationship can become a basis for confidence: data can become increasingly

personalized and identified with an individual data provider. The perceived reliability of the data may thus be determined by the person who prepared the report.

If, after all, both data reliability and the controller's added-value are issues of a confidential nature, why are they negatively correlated? As mentioned above, the reason for such a negative correlation is the focus of use of the data, or "*how managers use 'controlling'* ". As one of the controllers remarked: "*Only those are continuously engaged in data quality issues, who do not work together with me.*"

This implies that the data prepared by those controllers who are not deeply involved in the business and who do not closely cooperate with the managers are more likely to be queried. It is also important to note that the path analysis used data quality as an explanatory factor of the role of controllers, but the arguments above indicate more of a bidirectional relationship.

One of the shortcomings of the LVPLS model is that it does not explain what makes data reliable in the eyes of executives. Based on the feedback from controllers, managers perceive data as reliable if the numbers meet their expectations. "*He has a number in his head. You should shape it [the data] until you get that number. ... He has a feeling about where we should be at. If the number does not correspond with his feelings, then it is disbelieved*."

The 'Reliable data' variable is not strongly linked with any of the preceding variables in the path model. A positive but very weak path coefficient could be identified both from reporting frequency and from IT intensity to data reliability. Frequency per se does not enhance data reliability: erroneous data can be reported frequently as well. The low path coefficient between IT intensity and data reliability can be explained by the fact that it is not the intensive use of innovative IT solutions that makes data good. Innovative IT instead supports easy access to data. **Data quality is ensured rather by the level of integration** between the implemented IT solutions**,** which situation was not measured through this variable.

One of the executives summarized his opinion about data reliability as follows: "*We have our whole operation in SAP. I lose my mind if somebody prepares his/her own Excel sheets outside of SAP. If I go there [to talk to them], of course I listen to them, but to be honest, I am not interested in it [their opinion]*." A similar response from a controller was expressed as follows: *"The most substantial value in our company is found in data*

correspondence. … One of the business units gives a number to our CEO that is derived from their own system. Of course, the systems do not communicate with each other… Controllers have their own numbers and if the numbers do not match, then the controllers' numbers are wrong."

The question most often raised with respect to IT systems and controllers' work is **whether IT can substitute any of the roles of controllers**. This was earlier raised as a potential explanation for the existence of Cluster 3. But this does not really relate to substitution, but merely to the fact that management does not recognise this type of work by controllers, tending to think only in terms of IT solutions when it comes to data provision.

A good IT background can significantly unburden controllers. In the case of standard queries, many executives report to being able to serve themselves. "*I have shortcuts on my desktop. I click on them every day and check what I am interested in.*" **A certain level of self-service** meets controllers' expectations as well: "*If he needs a standard report every Monday, this should not be a task for 'controlling'. He can push the same button as us."*

This type of self-service occurs mainly with daily and weekly reports typically containing operation-related quantities like turnover or production capacity. Monthly reports that include financial data such as cost analyses are still the territory of controllers and executives cannot usually serve themselves with monthly reports.

Even in the case of self-service data, the role of controllers is present. The structure of underlying data cannot be determined and maintained by IT tools themselves; it requires a certain level of contribution from controllers. Their filtering function is of a similar nature. Even when a tool is well-implemented, if the quality of the data entry is poor, data retrieved from the system will not be reliable. The shortcomings of data entry show up at the stage of data retrieval. A controller has to filter these shortcomings using his/her prior experience and knowledge. "*How can it be that somebody registered 240% working hours for himself and nobody realized this? If I see this kind of data problem in the business review, I throw it back to 'controlling*'."

While expected to provide the numbers, controllers are not expected to generate data; they are located the end of this data-creation process. Nevertheless, because of their role in improving data quality, data cleaning is in their interest. Controllers also need to get

the beginning of the process right, which manifests itself in making an effort to persuade the organization to get everything into the system at the right time and in the right quality. Thus, in many cases it is the controller who shows the business units how things should be coded, what should be registered where, what should be accounted for, and how material withdrawals should be recorded, etc.

This process is how the regulation of data entry and system usage processes becomes a self-imposed part of controllers' work, enriching their role of data provider. This process-regulating role is seen by the executives as an inherent part of the work of controllers. "*It should not be the case that everybody opens a project and orders numbers willy-nilly. This is why controllers should have their hands on this process*."

Intensive use of IT solutions enhances the importance of this process-regulating role. Consequently, it might also increase the required capacity. A further consequence of higher IT intensity in MCS is that IT knowledge is necessarily also located in the controlling department. A senior controller working at a big company reported about why and how their controlling unit had grown recently: "*IT professionals have appeared at our place as latent controllers. We look for them like this, and stow all these people away from the IT department."*

Currently, executives may look to employ software-developers in their 'controlling' units in order to substitute for their weaknesses with IT. IT-related developments may take the IT unit a month, but if controllers' unit have their own IT staff (distributed among the controllers) this time can be shortened to a day.

To sum up, **IT does not substitute the data providing role of controllers but it does change the focus.** More emphasis is put on the system-based creation, definition and maintenance of the data structure of standard reports, and on regulating data entry processes. Accordingly, less time is then required for serving managers with data in the form of standard reports.

After discussing the impact of the factors involved in the model, one question remains: What are those other variables that might impact controllers' roles? **What factors can be identified that are accountable for the variance in role variables not explained by the model?**

"*The reason for the non-pyramidal [style of] operating lurks in the broader environment.*" This summary was given by a senior controller while discussing the role-pyramid. The broader environment involves features that are not an inherent part of MCS, but which can still have an impact on the role of controllers and on how executives perceive MCS and controllers.

One of the most often mentioned features of the broader environment was the executives themselves: their qualification, experience, personality and style of leadership. The qualifications of the managers were most often mentioned in relation to the data reliability and controllers' added-value. Managers with technical qualifications were seen as men of numbers. These individuals are very interested in data quality, but they are often not acquainted with how numbers are produced. *"Our executives with technical qualifications do not see all the work behind them [the numbers]"*. Therefore, they do not acknowledge and consistently underestimate the personal contributions of controllers, in contrast to managers with an economic background with whom "*controllers speak a common language*".

Consequently, executives with different backgrounds might have different expectations toward and perceptions about controllers' roles, even if the underlying MCS is very similar. Focus group participants agreed that executives with an economic background more typically expect a controller to play a consultant role. Sales managers, irrespective of their qualifications, claimed to be open to this kind of contribution from controllers as they need to continuously deal with pricing and revenue issues.

Both executives and controllers complained about their cooperation with technical managers when it gets to 'controlling' issues. *"Technical managers typically strive for technical perfection. Controllers 'make a mess' of their things. Technicians plan the perfect components, the perfect forms of production, and then controllers come along with their numbers."*

If the MCS is newly developed, resistance can be traced back to a desire to strive for transparency in a field that was primarily considered open to the technically privileged. "*I received a mail from one of our plant managers saying that if I really thought so [a certain way], I should be the plant manager by tomorrow. And he would prove to me that production would collapse within a week if this happened*."

Requests for data and the regulation of data entries might be perceived as an offensive questioning of the work of such managers, explaining why controllers are not accepted even in their role as data providers. Acceptance can be established among these managers if controllers can successfully prove to them that a MCS can be useful to them, and that increased levels of transparency can support their work. But even if these managers cooperate with controllers as data providers, establishing for controllers a role as proposal makers appears to be rather unrealistic. One of the controllers recalled what he had often heard from management: "*The data is there, OK, but do not chip in on what I want to do with it. Because I know it better*."

Another important factor not involved in the model but which influences the role of controllers is the leadership style. The controller can never be a cooperative partner of an autocratic leader, not even if informational aspects of MCS would in theory support this. However, a democratic leader who strived for cooperation and the involvement of colleagues might support a consultant role for controllers, even if the MCS is far from perfect. Teamwork is frequently used by executives and enhances the bringing in of several different points of view to a decision, in which controllers should represent the economic considerations. "*What is very exciting is product development. It concerns all of us. If a good controller is not present and cannot enforce the company's financial considerations, then this is not good*."

Additionally, executives from different companies are faced with different incentive systems. Incentive systems direct the attention of managers towards the use of diverse types of information. Consequently, incentive systems influence the informational features of MCS and might modify the link between MCS and the role of controllers.

A lot of research about roles stresses the relevance of the competences of controllers and investigates the skills, capabilities and the knowledge that controllers own. Although these issues were outside the scope of this research, a recurring topic discussed both at the individual and focus group interviews was that **different roles require different personalities, and different skills**. The consultant role requires a controller who is capable of overseeing operations, and who not only has analytical skills, but is able to think forward and in terms of relationships.

Can the same individual be suitable for fulfilling multiple roles? The research is based on the assumption that the answer is yes, although the model does not explain the variation

in the role-variables according to skills and personalities, but by using MCS-related variables. By not denying the impact and limits of the controllers individual personalities and skill sets, my position is that individuals might be capable to cope with fulfilling more roles, either simultaneously or sequentially.

One main reason for this is that, in a company with some hundreds of FTE, the controllers' unit is simply not big enough to allow clear differentiation of multiple roles. *"Smaller firms cannot afford it. The controller needs to do everything as a one-man-band: they have to retrieve data from the system, communicate with the business units and think together with them."*

A role change was reported by the controllers, typically apropos of changes in the workplace: "*I would have tried without success to continue at the new place based on my prior experience. But that new firm was lagging behind by at least 15 years. I needed to go back to the bottom of the pyramid, simply because there was no reliable data*."

This citation not only provides an example of the multi-role concept, but also supports the directionality of relationships that is assumed in the LVPLS model. According to this proposition, the features of the MCS influence the role of controllers. A controller who is a successful proposal maker at one company may be forced to occupy another role because of the shortcomings of the MCS at another.

At the same time, one of the most challenging tasks for a controller is to build up an MC system from scratch. The 'builder', of course, has a major impact on all the aforementioned features of the MCS, which in turn influences executives' perceptions about the utility of MCS and the contribution of controllers. The impact of a newly adopted MCS on the controllers' role was interpreted by one of the executives as follows: "*Here we have smart guys. We have everything to establish a 'thinking controlling'. The question is, how long does it take to reach [a reliable level of] data accuracy, and then we will have time for analysis and conclusions."* Consequently, my positions is, the more 'mature' the MCS of a company, the stronger the impact of the MCS on the controllers' role.

7 CONCLUSIONS

Prior research has identified several factors relevant to the design of MCS and controllers' roles. In my research model, support was derived for the existence of multiple, simultaneous relationships between a selected set of factors, along with an explanation of which factors affect which role. Both the roles and the effects were discussed and interpreted with practitioners; a process which helped to create alternative explanations. In this closing chapter the results are summarized and are contrasted with the results found in the literature. Moreover, the limitations of the research and directions for future research are presented.

7.1 Main scientific contribution of the research

This paper investigated the nature of controllers' roles and their relationship with management control systems. It provided evidence that the role of controllers can be measured using at least two different dimensions: level of involvement and level of analysis, which are two orthogonal (independent) components of controllers' roles. While the level of involvement refers to the classical typology of controllers as data providers or proposal makers (consultants), the level of analysis refers to the analytical component: either their strategic or operative function.

With respect to the first dimension, the data supported Hypothesis (H1a) that involved controllers are present in noticeable proportions in contemporary organisations, but the majority of executives still perceive them as being mere number providers. Controllers' involvement in strategic processes was found to have the same character: although an active role for controllers in strategy development and implementation is identifiable, this is only characteristic of a minority of controllers (H1b). Controllers' involvement in operative decision making is not perceived differently than their involvement in strategy development and implementation.

The disappearance of controllers' **traditional role as providers of data** has often been claimed, although this study indicates that the role is alive. This is still the most widely perceived role of controllers, and, more importantly, it is **richer than ever**. The broad adoption of IT solutions removes various data-related burdens from the work of controllers but does not imply that their role as providers of data has vanished. MCS embedded in IT systems generate new types of work for data-providing controllers. In

order to create data reliability, controllers become process regulators. Data entries executed by business units come under their supervision.

Controllers who perform well with data provision may 'move forward' and engage more deeply in analytical processes and proposal making. The assumption of **role-maturity** is valid for many companies, but statistical analysis reveals a group of cases where the proposal maker and consultant role of controllers appear to have no antecedent. While some explanatory factors have already been discussed, the conclusion is that behavioural and perceptional factors play a role. Consequently, more involved roles for controllers may replace traditional roles (in the perceptions of top executives), but more typically, involved roles complete more traditional roles.

While the data suggest that the role of data provider has become enriched, the **consulting role of controllers was found to be limited**: the real fields of consultancy offered by controllers are narrower than usually claimed; controllers are not expected to come up with their own answers to questions that arise about operational issues, but are mainly expected to represent the economic common-sense perspective from a position of relative neutrality.

Among all features, the intensity of use of diverse **MC instruments** was found to be a key predictor of how well a company MCS is developed (H2a, H2b). The **concept of expanding** was established to propose that only those companies which adopt advanced techniques are intensive users of traditional tools. At the same time, companies that intensively use traditional tools do not necessarily go further – simply because they do not need more advanced techniques, they feel that they are well-served by traditional ones. IT intensity has a significant positive effect on reporting frequency (H2c), but it does not highly impact informational aspects of MCS per se (H2d). In this respect, the integrity of the implemented systems seems to be more important than their level of innovation.

The study focused on how roles are linked to the design of the MCSs applied in business corporations. My research findings provide evidence that "*formal, information-based routines and procedures*" – as Simons (1994, p.5.) defined MCS – are related to these roles of controllers. Statistical analysis revealed that this relationship between roles and MCS is of a different nature in the case of different roles: different roles are linked to diverse components of MCS, and diverse strengths of link to formal MCS are present

with different roles. While the role of data provider is more intensively linked with some aspects of formal management control systems, the role of consultant is only weakly affected by some other aspects of formal MCS (H3a, H3b). Provision of non-financial and external data may either directly or indirectly be linked to the consultant role (the strength of the relationships was significant, but weak). Evidence also suggests that this type of data is often not collected and maintained by controllers who may only use it for analytical purposes. The weak relationship between broad-scope information can be partly rationalized by this fact.

The impact of MCS has been emphasized as a mediating factor that enhances the relationship between MCS design and roles (H4a, H4b, H4c). The research suggests that (a) top executives rated the personal contributions of controllers as the worst performing part of their reporting system, and (b) a 'good reporting system' is consisted of partly independent and partly contradictory elements. The 'heart of the report' and the 'formal features of the report' describe independent dimensions. The opposing variables of 'formal features' reveal that the user-friendliness of reports partly contrasts with content-related requirements. The 'soul of the reports' lies either in the data itself (i.e. the provision of reliable, accurate data) or in the controller themselves (personal added-value). While the opposing variables of the former dimension represent a trade-off, the later opposition between the variables can be rationalized by the diverse focus of the executives.

With respect to their relationship with roles, the dimension of 'soul of the report' seems to be more relevant. Reliability of data is the key antecedent for the role of data provider: higher reliability with data means that executives are more likely to use such information in decision making and corporate performance evaluation. Similarly, frequent reporting enhances the likelihood that the information will be used, which in turn strengthens the data providing role of controllers.

The perceived added-value generated by the controller mediates between the provision of externally focused data and the controllers' involved role. Having an external focus could not be directly linked with the role of controllers as consultants, but it was shown that incorporating externally focused information into their analysis enables controllers to add extra value. As a next step, this perceived added value supports their role as consultants. The perceived added-value of controllers might be influenced by other factors only partly incorporated into the model. The intensity of use of MC instruments is a supporting factor

within the model: controllers who use more MC tools are perceived to be able to generate more added-value in reports.

The study incorporated a rarely emphasized organizational feature of controllers' work: their placement within the overall hierarchy. While the relationship between the hierarchical level of the controllers' unit and controllers' perceived role is not significant, it was proved that this is an important moderating factor. The positioning of the controllers' department at a lower hierarchic levels hinders their active involvement (H5) and also hinders their role in data provision. This moderating effect can be explained by the fact that roles were measured using the perceptions of CEOs. If controllers are located far from top management in the hierarchy, top executives may not see and appreciate their work, irrespective of their roles.

The research was designed to provide deeper understanding about the role of controllers; more concretely, about the involvement of controllers. Variables investigated within the statistical model account for 57% of the variance of the role of controllers as consultants. Other factors not incorporated in the path analysis account for the remaining 43% of the variance. Concluding from the focus group sessions and interviews, outside-the-model factors (e.g. leadership styles, skills, and competences) are often of a 'soft' nature and also influence the behaviour of controllers and executives.

7.2 Research findings in light of the literature

In the literature, researchers are preoccupied with investigating pre-existing systems (Choudhury, 1988). So are MC researchers, who focus on the presence of MCS, while less attention is directed to situations in which MCS and / or controllers are absent. However, organisational absences (like the lack of a formal MCS or controller/s) can also be informative.

Cluster 2 companies represent 'organisational absences': their executives report that they are controller-less and they are very poorly equipped with MC and IT tools. The absence of management accounting systems was rationalized by Choudhury (1988) and later on by Taipaleenmäkii (2014) in several ways. The absence of management accounting and formal management control systems may be either 'pathological' (a result of managerial failure), or deliberate (a result of conscious decision-making). Both pathological and deliberate absences may be explained in several ways. The existence of

Cluster 2 companies can be rationalized by a need-based pathological non-presence, by a possibility-based non-presence, or by an absence due to trust or constructive ambivalence. Need-based non-presence means that a CEO does not feel that employing a controller is necessary because of the smaller size and lower complexity of their company. Even if CEOs feel that having one is important, economic and functional factors (such as relative costs or a lack of knowledge in the organisation) may hinder the employment of a controller (possibility based non-presence). However, companies of these types often have some controlling-like activities performed by other employees, often called 'finance staff'.

By deliberately not introducing formal systems, managers of Cluster 2 companies might be consciously focusing on creating flexibility while facing a turbulent environment ('absence as constructive ambivalence') or think that a formal MCS would be an attack on the trustworthiness of subordinates ('absence as trust'). In these cases, human-related factors such as the personality of the CEO play a crucial rule, and a lack of formal management control is often replaced by other types of control. As Taipaleenmäkii (2014) stresses, the positive absence of a MC not only requires other, replacement control mechanisms, but also the existence of management accounting-based thinking in the absence of calculations.

As a counterpart to Cluster 2 companies, Cluster 1 companies intensively apply both MC and IT tools and frequently report broad-scope information to their management Their executives report high values for all role-related variables.

Previous research into the role of controllers has identified several role types. None of these typologies were adopted, but roles were identified as a result of factor analysis. The first factor representing the involvement of controllers was further analysed with the addition of two potential roles for data provider and consultant. Many attempts were made in the second (focus groups) and third phase (individual interviews) of the research to understand the two roles of data provision and consultancy. Findings about the widening of the data provider role are in line with the concept of 'hybridization'. Granlund (2011) claimed that controllers become hybrids as they need additional expertise in IT. While this IT expertise is often ensured through employing IT professionals within the controllers' unit, process regulation is necessarily undertaken by the controllers themselves and become an inherent part of the data provider role.

I argue that the role for controllers as consultants is typically focused only on some areas of business support. This finding is in line with prior research about this issue that showed that controllers can significantly contribute to raising the cost-awareness of managers (e.g. during new product development) and to resource allocation and monitoring issues (Wolf, Weißenberger, Wehner, & Kabst, 2015). The involved role of controllers creates a shift in intra-organizational power relations but does not directly relate to solving business-related problems. Controllers do not deliver compact solutions for underlying business-related problems. Their role rather concerns "*giving managers throughout the organization discretion and confidence to be acting in line with company goals*" (Windeck, Weber, & Strauss, 2013, p. 620).

This implies that controllers have limited responsibilities compared to those usually emphasized. Controllers can be partners in management decision making, but partnering refers only to the above mentioned fields. This limited level of involvement corresponds more to the role of 'attention-directing' than to 'problem-solving' (using the typology used by Simon et al. (1954)).

Cluster 1 company executives place strong emphasis on all roles. The controllers in this cluster are rationalized by Sathe (1983) as **strong controllers**, and as 'hybrid' controllers by Burns and Baldvinsdottir (2005): they are involved both in control-oriented and in business-support-oriented types of activities. It has often been argued that the independent role of a data provider and the involved role of a consultant are mutually exclusive (Granlund & Lukka, 1998b; Maas & Matějka, 2009; Loo et al., 2011). Cluster 1, representing 35% of the sample, indicates that these two types of roles can happily coexist in an organisation.

The question remains: Are data provision and consultant roles occupied by the same controller(s), or do Cluster 1 companies employ task and role separation at an individual level ('split controllers', using Sathe's terminology)? Roles can be separated on an individual level only if more controllers are employed; this is typically a feature of larger companies. Although most large-size companies (44%) can be found in Cluster 1, 80% of all companies in Cluster 1 are medium-sized, often employing only one controller. This fact provides evidence for the existence of strong controllers who not only support business domains with data, but who think together with business strategy makers. They "*retain their independence and even while actively contributing to business decisions*" (Sathe, 1983, p. 1).

A strong controller not only supports business areas with data, but he or she lives and thinks together with the business. This means that a role as consultant is played in addition to the traditional role of data provision. This concept of an increase in responsibility (instead of a changing field of responsibility) is also supported by a recent study by an American financial professional association (Desroches & Lawson, 2013).

My path model which was developed to explain the diverse roles of controllers has two independent variables: the intensity of use of MC and IT tools. MC and IT tools were applied as independent factors, directly affecting the frequency and nature of the information provided. In line with the previous research into the interplay between IT and MCS, the strength of association was found to be limited (Scapens & Jazayeri, 2003; Teittinen et al., 2013). The main rationale for this is that the research had a focus on medium-size companies which are still wrestling with effectively processing and providing internal financial information to managers.

With respect to MC tools, researchers willingly report that an increasing emphasis is being placed on the use of newer tools alongside traditional ones (J. Hyvönen, 2005). My research findings do not support this claim. The reported rates of use of MC tools are very similar both for traditional and advanced practices, more so than those reported earlier based on the previous survey (conducted in 2009) of the 'Competing the World' program (c.f. Wimmer and Csesznák, 2012). Even the use of the file-closer Balanced Scorecard has dropped in popularity (from 22.1% to 16.9%).

A similar decline in adoption rates at the end of the 1990s was rationalized by Dankó and Kiss (2006) as the learning effect of Hungarian companies. I believe that many medium-size companies simply do not need advanced techniques, as they are well served by traditional ones. A small production company, finding that the majority of its costs are related to the creation of the physical product, might be well served with a simple product cost calculation, without the need to introduce ABC. This proposition is more evidence for the theory of the need-based absence of MCS, as theorized by Choudhury (1988).

Bodnár (1999), Dankó and Kiss (2006) claimed that company size significantly influences the MC toolkit of companies (defined as the number of MC tools in use, frequency of reporting, intensity of budgeting and planning). The current research results show that the significance of this size effect is eroding. Several intensity variables that measure diverse aspects of MCS still significantly differ among companies of different

size, although the difference is small and cannot be experienced with all components of MCS.

The intensive use of advanced MC tools strongly affects all information-related features of MCS: companies well equipped with advanced tools are more likely to be better at providing broad-scope information. One might well ask, why does a perfect fit not exist? I believe that it is nearly impossible to incorporate all the potential sources of influence into such a study, even if they might have an effect on the dependent construct. Besides the external contingencies often investigated, I would like to stress one very important internal factor of influence: the managers themselves. Namely, what do they *want* to be reported and how often do they want it reported? If no need emerges to frequently report externally focused, non-financial information, controllers will not report it, even if they have a toolkit at hand.

Chenhall (2003), the author of numerous contingency studies into MCs, drew attention to the problematic of researching outcome-related variables related to the characteristics of MCS such as information provided, or tools in use. Organisational members, and even entire organisations such as subsidiaries, may be forced to use certain MC tools and to provide certain information, even though they find it of little use.

Besides measuring the frequency of tool use, actual utility (i.e. the benefits that are derived from the adoption of specific tools) could be the subject of further analysis. Information about their reported benefits may help with understanding how emphasis is placed on a certain MC tool / information. High adoption rates and the low ranking of benefits may indicate that a tool is becoming outdated, or was not able to meet the expectations of users (P. L. Joshi, 2001; CIMA, 2009b).

However, research only into the adoption rates of tools and the information they provide is not without its use. As Gerdin (2005) has stated: *"It is logical to describe the MASs (Management Accounting Systems) in terms of what is actually supplied to managers. After all, only information that is available can help managers to achieve organizational goals."*(Gerdin, 2005, p. 113). Instead of studying the perceived utility of information (as rated by CFOs in the survey), the model incorporated answers from CEOs at this point.

Low path coefficients leading from information-related variables (MCS design) to the consultants' role may exist for various reasons. First, the model omits several factors that might have an influence on role (see the limitations described in the next chapter).

Second, there might be a discrepancy between the responses provided by the CFOs about MCS design and the responses provided by the CEOs about controllers' perceived roles. This existence of this discrepancy is supported by one of the latest reports of IMA and is explained by a lack of understanding and a lack of communication about the contribution of controllers to business (Desroches & Lawson, 2013).

The current research focused on finding evidence about whether and how MCSs influence the role of controllers. A crucial validity-related issue in my model is whether this **directional relationship** is dominant in one direction. Does the MCS system influence the controllers' role more heavily, or does the controllers' role have a greater effect on shaping the system? Undisputedly, both directions are reasonable and evidence has been provided in prior research for both. A recently published study shows that involved controllers "*are able to enhance the quality of the provided financial information*" (Wolf et al., 2015, p. 39). And, that alterations in MCS design can influence the role of controllers.

Interviews conducted after the statistical analysis confirmed that this effect of role on the MCS is more typical of the initial phase of MCS development. A stable MCS is more liable to influence its 'operator's' perceived role. Consequently, the effects have a cyclical nature, and, depending on the company's actual situation, either can be dominant. Unfortunately, path-models at this stage can describe only one-directional paths so a single study can identify only one path of directionality, not more.

The outcome of the debate about directionality also depends on the researchers' approach; namely, whether they are functionalist or interpretivist. I applied a functionalist role model in assuming that role originates from position, not from individuals. Consequently, the study did not focus on how individuals (controllers) change their roles (organisational norms). This other direction is more the focus of emerging theory-led papers that provide evidence about how the redefinition of the role of controllers can later on lead to changes in the underlying MCS (see, for example, Goretzki et al., 2013).

This research contributes to the literature in several ways.

It engaged with the most typical issues that currently confront the debate about the controllers' function in organizations. Based on a CIMA-report (2009b), three main topics most concern practitioners: the IT support of MCS, the quality of the information provided, and understanding the contribution that controllers can make. The current

research was designed to link these components of controllers' work and to explain the relationship between them by simultaneously assessing the effects of several factors on the identified role types.

The research is designed to contribute to better understanding of the functioning of controllers within their organisational context, and had a focus on analysing roles in terms of (1) the extent to which controllers are involved in the business processes, (2) the extent to which MCSs impact business activities, and (3) the organisational placement of controllers.

It confirmed several relationships formerly hypothesized in international literature and revealed and explained some others which were either not the focus of prior research or about which contradictory findings exist. As the main scientific contribution, I developed a complex model to assess the simultaneous effects of several factors on controllers' roles to replace a fragmented analysis of these effects.

Academics from all fields of organization and management studies are engaged in the discussion about whether practice relevance is required in academic research. Analysis and argumentation with a strong theoretical basis seems to be reconcilable with the requirement that it should be applicable to daily organisational practice only with great difficulty. This is why academic research work and publications should be distinguished from practice-oriented publications (Balaton, 2013). However, management is a practice-driven discipline so scholars should endeavour to establish the practice relevance of their academic research to a certain extent.

The relationship between theory and practice is a topic of significant discussion in management control. It is usually claimed that the findings of MC academic research should be able to be used to develop and support practice, although research findings are often hard to translate into practical guidance (Baldvinsdottir et al., 2010).

The current dissertation aspired to maintain the link to practice. It focused on issues that concern practitioners, and these issues were discussed with practitioners using relevant theory and pre-existing and newly-generated research findings to explain the phenomena of management control.

7.3 Limitations and directions for further research

The current research has several limitations that should be considered.

First, the survey was conducted among Hungarian companies with a strong focus on medium-size processing firms. New technology-based (high-tech) companies might have other MCS designs (Löfsten & Lindelöf, 2005) and other types of management problems which impact controllers' functions. Results can be generalized only in a limited way for companies in the high tech sector and for companies of other regions. Accordingly, the results presented here can be more easily generalized to traditional industries in CEE countries with similarities in the development path of the controllers' profession.

Second, the focus of the study was formal MC systems wherein frequency of reporting and a broad scope of information provision are valued positively. This occurs if targets are precise and frequently monitored (tight control) and communicated to all employees formally (formal control). But this approach represents only one method of control in an organisation. The model does not assess the existence of loose, informal types of control in which targets are informally communicated and infrequently monitored. This research deliberately focuses only on specific elements of control; namely the elements that are expected to be built up and operated by controllers.

Third, albeit the LVPLS model developed in this research is quite expansive, several factors that influence both MCS design and the role of controllers could not be incorporated into it. Some of the omitted factors were previously investigated. Evidence has already been provided that controllers of independent companies are more involved in strategy making and business processes than controllers of dependent companies (i.e. those which are part of a group) (Yazdifar & Tsamenyi, 2005). An unstable market environment and a greater need for financial information also increase the likelihood of controllers' involvement (Sathe, 1982).

Less research has been undertaken into certain factors that are less easy to quantify: namely, behavioural aspects. A German study has filled this gap by investigating two important factors that influence the role of controllers: the personal willingness (attitude) of controllers to become business partners, and the expectations of managers. The findings showed that the expectations of managers have a greater impact on the behaviour of controllers than controllers' personal attitudes. The actual behaviour of controllers is

positively associated with their contribution, as it is perceived by managers (Wolf et al., 2015).

The low path coefficients in my model also indicate that these under-investigated behavioural influences play a crucial role and need further analysis. Beyond attitudes and norms, the influence of personal relationships could reasonably be investigated in later research.

Future research can extend the work described herein in several dimensions. Variables in the model can be supplemented or even partly replaced by other variables which measure the behavioural and personal features of both managers and controllers. Research of a more qualitative nature could uncover further relevant influencing forces. A longitudinal case study may be able to reinforce the findings described here by explaining the relationship between changes in MCS and changes in controllers' roles in an organisation.

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9 APPENDICES

9.1 Management control in the reviewed literature

Source of all tables in this chapter: Author's own construction

Authors	Robert N. Anthony, Vijay Govindarajan	Kenneth Merchant, Wim Van der Stede	Ray Garrison, Eric Noreen, Peter Brewer	Charles T. Horngren, Gary L. Sundem, Jeff O. Schatzberg, Dave Burgstahler	Charles T. Horngren, Srikant M. Datar, Madhav V. Rajan
Title	Management Control Systems	Management Control Systems: Performance Measurement, Evaluation and Incentives	Managerial Accounting	Introduction to Management Accounting	Cost Accounting: A Managerial emphasis
Main points of discussion	**The Management Control Environment** Understanding Strategies, Behaviour in Organizations Responsibility Centres Transfer Pricing **The Management Control Process:** Planning and Budgeting Analyzing Financial Performance Performance Measurement Compensation, Incentives **Variations in Management Control**	**Management Control alternatives and their effects** **Financial Results Control Systems:** Financial Responsibility Centres Planning and Budgeting Incentive Systems **Performance measurement issues and their effect:** Financial Performance Measures and their Effects Combinations of Measures and Other Remedies to the Myopia Problem Using Financial Results Control in the Presence of Uncontrollable Factors Corporate Governance, important control-related roles and ethics Situational influences on management control systems	Job-Order **Costing,** Process Costing, Cost-Volume-Profit Relationships, Activity-Based Costing Variable Costing and Segment **Reporting**: Tools for Management Profit **Planning** Flexible **Budgets** and Performance Analysis Standard Costs and Variances **Performance Measurement** in Decentralized Organizations Differential Analysis, Capital Budgeting Decisions, Statement of Cash Flows, Financial Statement Analysis	**Focus on Decision Making:** Cost Behaviour ,Cost-Volume Relationships Cost Management Systems and Activity-Based Costing Relevant Information for Decision Making with a Focus on Pricing Decisions Relevant Information for Decision Making with a Focus on Operative Decisions **Accounting for Planning and Control:** Master Budgets, Flexible Budgets and Variance Analysis Management Control Systems and Responsibility Accounting **Capital Budgeting** **Product Costing:** Cost Allocation, Accounting for Overhead Costs Job-Costing and Process-Costing Systems	Cost—Volume—Profit Analysis, Job **Costing** , Activity-Based Costing Master **Budget** and Responsibility Accounting, Flexible Budgets and Cost Variances Inventory Costing and Capacity Analysis Determining How Costs Behave, Decision Making and Relevant Information Strategy, Balanced Scorecard, and Strategic Profitability Analysis Pricing Decisions, Cost Allocation, Customer-Profitability Analysis, Sales-Variance Analysis, Diverse cost allocation methods, Process Costing Transfer Pricing, Multinational Considerations **Performance Measurement, Compensation**
Most recently published edition	12th edition, 2006; Special European Edition published in 2014	3rd edition, 2011	15th edition, 2014	16th edition, 2013	15th edition, 2014

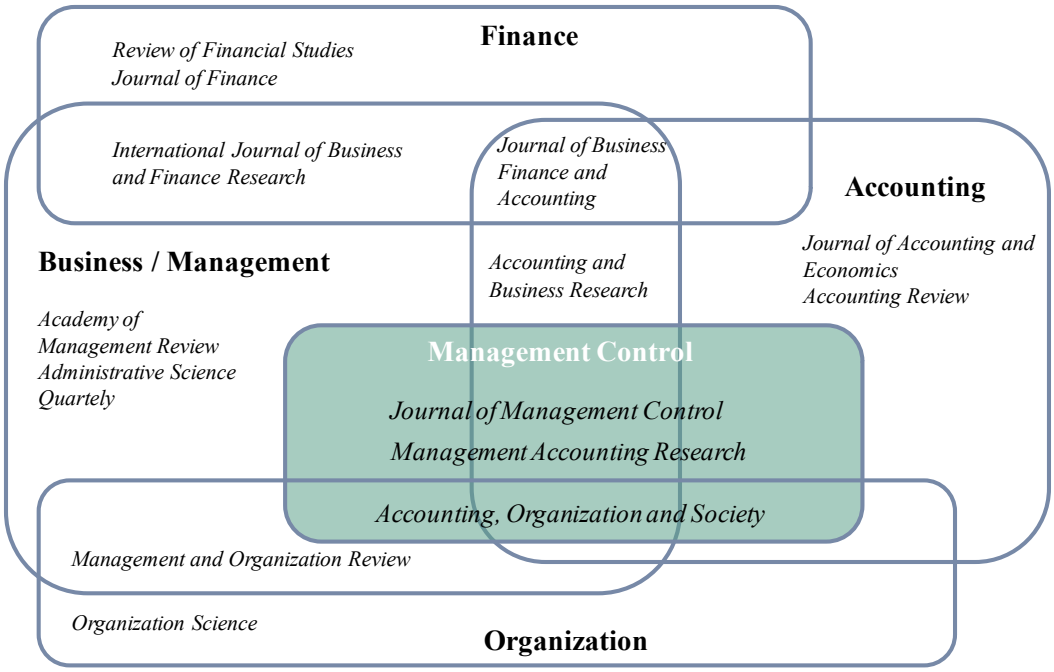
25. Table: Management control and related issues in Anglo-Saxon textbooks

Authors	Horváth, Péter	Küpper, Hans-Ulrich; Friedl, Gunther; Hofmann, Christian and Hofmann, Yvette	Weber, Jürgen and Schäffer, Utz	Jung, Hans	Reichmann, Thomas; Hoffjan, Andreas; Kißler, Martin and Palloks-Kahlen, Monika
Original Title / English translation	Controlling	Controlling: Konzeption, Aufgaben, Instrumente / Controlling: Concept, Tasks, Tools	Einführung in das Controlling / Introduction to Controlling	Controlling	Controlling mit Kennzahlen / Controlling with Measures
Main point of discussion	**Concept of "controlling":** The origins of "controlling", definition and distinction of basic terms **"Controlling" system in corporations** **Coordination of planning and control systems** **Coordination of information provision systems** **Coordination of IT systems** **Corporate Governance** **Organization of "controlling":** Controllers' department in the organization Requirements toward controllers	**Foundation of "controlling" concept:** Subject of "controlling" "Controlling", Corporate Governance and Compliance Theory of "Controlling" **Tasks and tools of "controlling":** Coordination in planning Coordination of the information system Coordination of control with planning and information system Coordination of people Coordination of the organization with other management subsystems **Overall coordination systems of "controlling**": Budgeting, KPIs, Transfer pricing **Tasks and tools of function-specific "controlling":** Marketing, Logistics, HR, Investment, University "controlling" **Organization of "controlling"**	**Introduction:** Controller, Controllership and „Controlling" Context of controllers **Information provision**: External accounting; Costing and profit calculation, Measures and measurement systems Transfer pricing Reporting **Planning and Control**: Operational, tactical and strategic planning **Construction of Controllership**: Controllers' department in the organization Roles and competencies of controllers Controllers' success factors	**Basics of "Controlling"** Development, tasks and organization of "controlling" Future trends **Basic tools of "controlling"** Cost and profit accounting Strategic cost management Investment and economic calculations Reporting **Strategic and operative "controlling"** Development and importance of strategy Strategic success factors Strategic "controlling" Operative "controlling" **"Controlling" of functional areas** Marketing "controlling" Research and Development "controlling" Procurement "controlling" Logistics "controlling" Production "controlling" Finance "controlling" HR "controlling" IT "controlling" **Project controlling**	**Foundation of "controlling" concept** **Theoretical background of KPI systems as "controlling" tools** **Cost and profit "controlling"** Finance "controlling", Investment "controlling" Procurement "controlling" Production "controlling" Logistics "controlling" Marketing "controlling" Information processing "controlling" IT support of "controlling" Strategic "controlling" Risk "controlling" Corporate Governance and "controlling" Value oriented "controlling" of company groups "Controlling" of international subsidiaries
Most recently published edition	12th edition, 2011	6th edition, 2013	14th edition, 2014	3rd edition, 2011	8th edition, 2011

26. Table: Management control and related issues in German textbooks

Authors	Bodnár, Viktória; Dobák, Miklós; Lázár, László	Controlling Portál www.controllingportal.hu	Boda, György; Szlávik Péter	Körmendi, Lajos; Tóth, Antal	Hanyecz, Lajos; Kristóf, Péter	Hágen, István; Kondorosi Ferencné	Sinkovics Alfréd
Original Title / English translation	MKR kurzustematika / MCS Master Course syllabus at the Corvinus University of Budapest	Tematikus könyvtár/ Thematic library (most discussed issues related to MC, in order of frequency)	Kontrolling rendszerek / Controlling systems	A controlling alapjai / Basics of controlling	Modern vezetői controlling / Modern managerial controlling	Kontrolling:Kezdőknek és haladóknak / Controlling: for beginners and experienced	Költség- és pénzügyi kontrolling / Cost and financial controlling
Main points of discussion	Elements of formal management control systems: Strategic planning Budgeting Management accounting (cost accounting and economic appraisal) Management Reporting Performance measurement and evaluation Responsibility centres (including internal transfer pricing) Role and organisational placement of controllers	Role definitions of controllers Key performance indicators, reporting and control systems Strategy and Balanced Scorecard Management accounting IT support of controlling Business planning Controlling processes Budgeting, beyond budgeting	Controlling concept (including organisation of controlling) Basic knowledge about controlling (including financial accounting terms and Balanced Scorecard) Tools of controlling: Management accounting Cost management Cost planning methods Further developments and tasks to be solved (including IT support of controlling)	Philosophy, approach and orientation of controlling systems Functioning of controlling system: planning, variance analysis and information handling Tools of controlling: Management accounting, IT support Subsystem of strategic controlling Subsystem of operative controlling Relationship of the strategic and operative controlling subsystems Tasks of controlling system implementation	Theoretical foundations Management accounting Model of the planning system Decision making, decision support Complex decision model of business systems Strategic planning and strategic controlling Business and operative planning Information systems, information provision IT support of controlling	Basic terms of the controlling system The controlling organization The controller The approach of controlling Time-dimensions of controlling: Strategic controlling, operative controlling (incl. financial controlling) Controlling reporting systems Balanced Scorecard Controlling of small and medium sized enterprises (SMEs)	Controlling what for ? Controlling and management accounting Basic cost accounting methods; Cost planning and budgeting methods; Cost management Financial controlling in general Goals of financial controlling Methods of controlling the shareholder value Financial planning, Monitoring of the financial activity, Financial audit and diagnostics Expected value appraisal, reports and recommendations
Latest published edition	Autumn semester 2014/15	Online refreshed monthly	2005	2011	2011	2011	Unchanged reprint of the 1st edition, 2012

27. Table: Management control and related issues in Hungarian higher education and underlying textbooks



29. Figure: Management control in the map of academic journals

(with only some examples of English-speaking journals in each category)

Source: Author's own construction

9.2 Competing the World Research Program, 2013 Survey

The research program is coordinated by the Competitiveness Research Center, founded in 1999 and directed by Attila Chikán, D. Sc., Professor at the Corvinus University of Budapest.

Selected questions from the CEO questionnaire

V63. Where are the responsible leaders of the undermentioned functions placed in the organisational hierarchy of your company? Please specify the position with the right number before the function.

1 – chief executive / managing director 2 – deputy chief executive / director ; 3 – head of general department; 4 – head of department 5- group manager (middle manager)

a)	Marketing	b)	Logistics
c)	Research and Development	d)	Human Resource Management(HRM)
e)	Production	f)	Finance
g)	Sales	h)	Quality Assurance
i)	CSR	j)	Environmental Protection
k)	Controlling	l)	Procurement

v103. Please typify the role(s) acted out by controllers in the managerial decision support of your company!

(1- not characteristic at all, 5- very characteristic)

a)Controlling provides numerical data: they collect and provide cost and income data.	1	2	3	4	5
b)Controlling analyses the data and provide explanations.	1	2	3	4	5
c)Controlling gives proposals for enhancing corporate performance.	1	2	3	4	5
d)Controlling takes part in the decision making as a consulting partner of managers.	1	2	3	4	5

V104. To what extent can the control system support strategy development and implementation beyond the support of day-to-day operationss? Please rate the undermentioned statements in reference to your company! “Controlling...”

(1- not characteristic, 5- very characteristic)

a)ensures provision of data as an input for strategy development.	1	2	3	4	5
b)analyses the feasibility and the financing needs of the strategy.	1	2	3	4	5
c)appraises the fulfilment of strategic goals.	1	2	3	4	5
d)warns in case of deviation from target values.	1	2	3	4	5
e)gives proposal about strategy reviews.	1	2	3	4	5

V105. The undermentioned statements refer to the controlling reporting system. Please rate how characteristic these are for your company!

(1- not characteristic, 5- very characteristic)

a)Current controlling reports meet the information requirements of managers.	1	2	3	4	5
b)Data provided in the controlling reports is reliable and accurate.	1	2	3	4	5
c)Controlling reports are user-friendly and easy to interpret.	1	2	3	4	5
d)The majority of controlling reports are standard reports; ad-hoc reports are rarely required.	1	2	3	4	5
e)Controller(s) has(ve) a large (beyond data) added-value in the reports.	1	2	3	4	5

V106. To what extent can the information systems of your company support the undermentioned activities?

(1 – not at all useable; 2 – barely useable; 3 – sufficiently useable; 4 – supports the activity; 5 - –supports the activity very well)

a)making strategic decisions	1	2	3	4	5
b)making operative decisions	1	2	3	4	5
c)communication, information sharing within the company	1	2	3	4	5
d)communication, information sharing with business partners	1	2	3	4	5
e)corporate performance evaluation	1	2	3	4	5
f)performance evaluation of business partners	1	2	3	4	5
g)performance evaluation of employees	1	2	3	4	5
h)keeping track of changes in customer satisfaction	1	2	3	4	5
i)keeping track of changes in employee satisfaction	1	2	3	4	5
j)processing employees' claims and complaints	1	2	3	4	5
k)development of cooperation with strategic partners	1	2	3	4	5
l)decision support in business development	1	2	3	4	5
m)decision support in corporate social responsibility related activities	1	2	3	4	5

Selected questions from the CFO questionnaire

P1. a) Does your company regularly use the undermentioned analytical methods?

b) How useful are / would be the application of these methods?

(1-not at all useful, 5-extremely useful)

	a) Usage	b) Usefulness
a) cash-flow analysis	□ yes □ no	1 2 3 4 5
b) fix/variable cost differentiation	□ yes □ no	1 2 3 4 5
c) breakeven analysis	□ yes □ no	1 2 3 4 5
d) cost sensitivity analysis	□ yes □ no	1 2 3 4 5
e) activity-based costing	□ yes □ no	1 2 3 4 5

f) target costing	□ yes □ no	1 2 3 4 5
g) cost based supplier evaluation (e.g. TCO - total cost of ownership)	□ yes □ no	1 2 3 4 5
h) analysis of inventory turnover ratio	□ yes □ no	1 2 3 4 5
i) analysis of customer turnover ratio	□ yes □ no	1 2 3 4 5
j) analysis of supplier turnover ratio	□ yes □ no	1 2 3 4 5
k) cash concersion cycle	□ yes □ no	1 2 3 4 5
l) Balanced Scorecard	□ yes □ no	1 2 3 4 5
m) capital cost analysis of investments	□ yes □ no	1 2 3 4 5
n) analysis of financial indicators	□ yes □ no	1 2 3 4 5
o) analysis of economic value added (EVA) or other residual indicators	□ yes □ no	1 2 3 4 5
p) analysis of cash-flow based indicators	□ yes □ no	1 2 3 4 5
q) analysis of market value indicators	□ yes □ no	1 2 3 4 5

P2. To what extent can the information systems of your company support the undermentioned activities?

(1 – not at all useable; 2 – barely useable; 3 – sufficiently useable; 4 – supports the activity; 5 - –supports the activity very well)

a) planning	1 2 3 4 5
b) control and reporting	1 2 3 4 5
c) investment decisions	1 2 3 4 5
d) pricing decisions (setting internal transfer prices)	1 2 3 4 5
e) product development decisions	1 2 3 4 5
f) “make or buy” and outsourcing decisions	1 2 3 4 5
g) exploring cost reduction possibilities	1 2 3 4 5
h) product profitability calculations	1 2 3 4 5
i) performance evaluation of suppliers, subcontractors	1 2 3 4 5
j) profitability evaluation of customers	1 2 3 4 5
k) profitability evaluation of sales channels	1 2 3 4 5
l) inventory management	1 2 3 4 5
m) shareholder value based management	1 2 3 4 5
n) corporate social responsible decision making	1 2 3 4 5
o) knowledge management	1 2 3 4 5

P5. What kind of plans are prepared for what time period?

Type of plan	a) Use	b) Time period
a) Corporate strategy plan	yes - no	.....
b) Marketing plan	yes - no	.....
c) Production plan	yes – no	.....
d) Inventory plan	yes – no	.....
e) Project plan	yes – no	.....
f) Research and Development plan	yes – no	.....
g) Financial investment plan	yes – no	.....
h) Cash-flow plan	yes – no	.....
i) Liquidity plan	yes - no	.....

P6. Do you prepare economic precalculations for the undermentioned activities?

a) launching new product	□ yes	□ no
b) development project	□ yes	□ no
c) investment project	□ yes	□ no
d) launching new sales / distribution channels	□ yes	□ no
e) others	□ yes	□ no

P7. a) Do you regularly prepare controlling reports for management?

□ yes □ no

b) If yes, how often and to whom are controlling reports provided? Beyond the provision of numerical data, do the reports include an assessment with a text and / or proposals for action? Please indicate in the table below:

Frequency (1-at least monthly, 2-quarterly 3-yearly 4-more rarely)

	Frequency	Includes assessment in text	Includes proposal for action
a) top management	1 2 3 4	□ yes □ no	□ yes □ no
b) sales / marketing	1 2 3 4	□ yes □ no	□ yes □ no
c) research and development	1 2 3 4	□ yes □ no	□ yes □ no
d) human resources management	1 2 3 4	□ yes □ no	□ yes □ no
e) logistics	1 2 3 4	□ yes □ no	□ yes □ no
f) informatics	1 2 3 4	□ yes □ no	□ yes □ no
g) production	1 2 3 4	□ yes □ no	□ yes □ no
h) finance	1 2 3 4	□ yes □ no	□ yes □ no

P8. a) Please indicate whether the undermentioned information types are included in the controlling reports and rate their importance according to their relevance to corporate decision making! (1-not at all important, 5-very important)

		a) Included	b) Importance
a)	financial accounting data	□ yes □ no	1 2 3 4 5
b)	financial indicators	□ yes □ no	1 2 3 4 5
c)	cost analysis (e.g. margin analysis)	□ yes □ no	1 2 3 4 5
d)	information related to sales amounts	□ yes □ no	1 2 3 4 5
e)	information about the service / product quality	□ yes □ no	1 2 3 4 5
f)	service time	□ yes □ no	1 2 3 4 5
g)	timeliness of order delivery	□ yes □ no	1 2 3 4 5
h)	performance related to the plan (norms)	□ yes □ no	1 2 3 4 5
i)	resource utilization	□ yes □ no	1 2 3 4 5
j)	customer satisfaction	□ yes □ no	1 2 3 4 5
k)	information about the suppliers' performance	□ yes □ no	1 2 3 4 5
l)	information about competitors	□ yes □ no	1 2 3 4 5
m)	information about product profitability	□ yes □ no	1 2 3 4 5
n)	information about customer profitability	□ yes □ no	1 2 3 4 5
o)	information about sales channel profitability	□ yes □ no	1 2 3 4 5
p)	information about employee performance	□ yes □ no	1 2 3 4 5
q)	change in elements of corporate knowledge property	□ yes □ no	1 2 3 4 5
r)	forecasts about the external environment	□ yes □ no	1 2 3 4 5
s)	deviation between the forecasted and actual data about the external environment	□ yes □ no	1 2 3 4 5

b) Please indicate whether information from the undermentioned sources are included in controlling reports! Please rate the importance of the source according to its relevance to corporate decision making!

(1- not at all important, 5-very important)

		a) Included	b) Importance
a)	corporate financial reports	□ yes □ no	1 2 3 4 5
b)	non-financial data for the corporate information system	□ yes □ no	1 2 3 4 5
c)	information based on employees' opinions	□ yes □ no	1 2 3 4 5
d)	actual data from external sources (e.g.statistics)	□ yes □ no	1 2 3 4 5
e)	analysis, reports from external sources	□ yes □ no	1 2 3 4 5
f)	information based on customers' opinions	□ yes □ no	1 2 3 4 5
g)	information from suppliers	□ yes □ no	1 2 3 4 5
h)	information based on the opinions of other stakeholders (e.g. local communities)	□ yes □ no	1 2 3 4 5

P9. Please provide the following information about your company:

	2009	2012
Net sales	.....thHUF	.....thHUF
out of: export sales:	.....thHUF	.....thHUF
Personal expenses	.....thHUF	.....thHUF
Material expenses	.....thHUF	.....thHUF
Depreciation	.....thHUF	.....thHUF
Operating profit (loss).....	.....thHUF	.....thHUF
Financial profit (loss).....	.....thHUF	.....thHUF
Extraordinary profit (loss)	.....thHUF	.....thHUF
After tax profit (loss)	.....thHUF	.....thHUF
Net profit (loss)	.....thHUF	.....thHUF

Total Assets	.....thHUF	.....thHUF
Owners' equity.....	.....thHUF	.....thHUF
Long-term liabilities	.....thHUF	.....thHUF
Current liabilities.....	.....thHUF	.....thHUF
out of: accounts payable	.....thHUF	.....thHUF
out of: short-term loans……..	.....thHUF	.....thHUF
Invested assets	.....thHUF	.....thHUF
out of: intangible assets.....	.....thHUF	.....thHUF
out of: tangible assets.....	.....thHUF	.....thHUF
out of: financial assets	.....thHUF	.....thHUF
Current assets	.....thHUF	.....thHUF
out of: inventories.....	.....thHUF	.....thHUF
out of: accounts receivable	.....thHUF	.....thHUF

Average number full time employees	.....	.....

Selected questions from the COO questionnaire

T45. Do you use the undermentioned innovative IT solutions? If not, do you plan to implement them within two years?

		Already used	Currently implemen-ting	Planned within 2 years	Not planned
a)	Server virtualization	1	2	3	4
b)	Open cloud	1	2	3	4
c)	Use of mobile / tablet used for IT applications	1	2	3	4
d)	Open source system	1	2	3	4
e)	Enterprise Resource Planning (ERP) system	1	2	3	4
f)	Customer Relationship Management (CRM) system	1	2	3	4
g)	Supply Chain Management(SCM) system	1	2	3	4
h)	Business Intelligence	1	2	3	4
i)	Collaboration tool (workflow, groupware)	1	2	3	4
j)	Document management system	1	2	3	4
k)	Expert (knowledge based) system	1	2	3	4
l)	Geographical information system	1	2	3	4
m)	Advanced use of web-portal (e.g. webshop)	1	2	3	4
n)	Business use of social media	1	2	3	4

9.3 Outputs of multivariate statistical analysis

28. Table: Missing value analysis by variables for 268 observations

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
v103a	233	3,64	1,282	35	13,1	0	0
v103b	232	3,28	1,318	36	13,4	36	0
v103c	229	3,02	1,338	39	14,6	0	0
v103d	229	2,93	1,344	39	14,6	0	0
v104a	226	3,67	1,200	42	15,7	0	0
v104b	227	3,27	1,274	41	15,3	35	0
v104c	227	3,26	1,275	41	15,3	35	0
v104d	226	3,23	1,314	42	15,7	0	0
v104e	226	3,00	1,345	42	15,7	0	0
v105a	229	3,76	1,144	39	14,6	0	0
v105b	228	3,90	1,185	40	14,9	0	0
v105c	228	3,73	1,197	40	14,9	0	0
v105e	226	3,35	1,316	42	15,7	0	0
v106a	243	3,55	,886	25	9,3	6	0
v106b	243	3,83	,855	25	9,3	5	0
v106c	243	3,74	,900	25	9,3	4	0
v106d	244	3,45	,957	24	9,0	7	0
v106e	245	3,78	,877	23	8,6	3	0
v106f	243	3,25	1,108	25	9,3	21	0
v106g	244	3,45	1,078	24	9,0	14	0
v106h	244	3,39	1,173	24	9,0	22	0
v106i	244	3,09	1,208	24	9,0	0	0
v106j	244	3,19	1,229	24	9,0	0	0
v106k	243	3,29	1,147	25	9,3	21	0
v106l	242	3,43	1,057	26	9,7	17	0
v106m	248	2,81	2,238	20	7,5	11	0
v63k	154	2,77	1,113	114	42,5	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

29. Table: Missing value analysis by cases for 268 observations

Tabulated Patterns																													
Number of Cases	Missing Patterns[a]																												Complete if ...[b]
	v106m	v106l	v106a	v106b	v106d	v106e	v106g	v106h	v106i	v106j	v106f	v106c	v106k	v104b	v104a	v104d	v104e	v104c	v105e	v105c	v105b	v105a	v103a	v103b	v103c	v103d	v63k	
131																													131
80																												X	211
4	X																												135
4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			144
6		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	248
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	268
14														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	236
Patterns with less than 1% cases (3 or fewer) are not displayed.																													
a. Variables are sorted on missing patterns.																													
b. Number of complete cases if variables missing in that pattern (marked with X) are not used.																													

30. Table: Missing value analysis by variables for 221 observartions

Univariate Statistics

	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
v103a	221	3,67	1,269	0	,0	0	0
v103b	220	3,32	1,313	1	,5	32	0
v103c	218	3,06	1,327	3	1,4	0	0
v103d	218	2,95	1,340	3	1,4	0	0
v104a	221	3,70	1,185	0	,0	0	0
v104b	221	3,31	1,260	0	,0	32	0
v104c	221	3,29	1,260	0	,0	32	0
v104d	221	3,26	1,297	0	,0	33	0
v104e	221	3,03	1,336	0	,0	0	0
v105a	220	3,77	1,129	1	,5	0	0
v105b	220	3,92	1,162	1	,5	0	0
v105c	220	3,75	1,169	1	,5	0	0
v105e	220	3,36	1,308	1	,5	0	0
v106a	221	3,58	,879	0	,0	5	0
v106b	221	3,85	,853	0	,0	5	0
v106c	221	3,73	,919	0	,0	4	0
v106d	221	3,44	,950	0	,0	6	0
v106e	221	3,81	,867	0	,0	2	0
v106f	220	3,27	1,096	1	,5	17	0
v106g	221	3,47	1,068	0	,0	12	0
v106h	221	3,39	1,180	0	,0	19	0
v106i	221	3,06	1,193	0	,0	0	0
v106j	221	3,16	1,220	0	,0	0	0
v106k	221	3,30	1,157	0	,0	19	0
v106l	221	3,43	1,079	0	,0	16	0
v106m	217	3,24	1,211	4	1,8	29	0
v63k	137	2,78	1,096	84	38,0	0	0

a. Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

31. Table: Pearson correlation coefficients of the variables related to the role of controllers

Correlations

		V103A center	V103B center	V103C center	V103D center	V104A center	V104B center	V104C center	V104D center	V104E center
V103Acenter	Pearson Correlation	1	-,107	-,447**	-,330**	,493**	-,240**	-,116	-,344**	-,410**
	Sig. (2-tailed)		,153	,000	,000	,000	,001	,120	,000	,000
	N	181	181	179	179	181	181	181	181	181
V103Bcenter	Pearson Correlation	-,107	1	,034	-,108	-,110	-,019	-,082	-,218**	-,393**
	Sig. (2-tailed)	,153		,656	,151	,140	,801	,273	,003	,000
	N	181	181	179	179	181	181	181	181	181
V103Ccenter	Pearson Correlation	-,447**	,034	1	,293**	-,556**	-,153*	-,239**	-,012	,175*
	Sig. (2-tailed)	,000	,656		,000	,000	,041	,001	,868	,019
	N	179	179	179	178	179	179	179	179	179
V103Dcenter	Pearson Correlation	-,330**	-,108	,293**	1	-,432**	-,111	-,421**	-,131	,230**
	Sig. (2-tailed)	,000	,151	,000		,000	,140	,000	,080	,002
	N	179	179	178	179	179	179	179	179	179
V104Acenter	Pearson Correlation	,493**	-,110	-,556**	-,432**	1	-,090	,076	-,236**	-,432**
	Sig. (2-tailed)	,000	,140	,000	,000		,228	,311	,001	,000
	N	181	181	179	179	181	181	181	181	181
V104Bcenter	Pearson Correlation	-,240**	-,019	-,153*	-,111	-,090	1	,004	-,044	-,089
	Sig. (2-tailed)	,001	,801	,041	,140	,228		,957	,553	,231
	N	181	181	179	179	181	181	181	181	181
V104Ccenter	Pearson Correlation	-,116	-,082	-,239**	-,421**	,076	,004	1	,080	-,102
	Sig. (2-tailed)	,120	,273	,001	,000	,311	,957		,285	,171
	N	181	181	179	179	181	181	181	181	181
V104Dcenter	Pearson Correlation	-,344**	-,218**	-,012	-,131	-,236**	-,044	,080	1	,246**
	Sig. (2-tailed)	,000	,003	,868	,080	,001	,553	,285		,001
	N	181	181	179	179	181	181	181	181	181
V104Ecenter	Pearson Correlation	-,410**	-,393**	,175*	,230**	-,432**	-,089	-,102	,246**	1
	Sig. (2-tailed)	,000	,000	,019	,002	,000	,231	,171	,001	
	N	181	181	179	179	181	181	181	181	181

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

32. Table: F test for standardized variables contributing to cluster separation

ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
Zv103a	33,536	3	,449	174	74,721	,000
Zv103b	35,913	3	,388	174	92,516	,000
Zv103c	41,652	3	,303	174	137,688	,000
Zv103d	37,321	3	,367	174	101,688	,000
Zv104a	37,934	3	,338	174	112,262	,000
Zv104b	36,192	3	,379	174	95,467	,000
Zv104c	38,722	3	,336	174	115,179	,000
Zv104d	40,740	3	,301	174	135,151	,000
Zv104e	42,528	3	,275	174	154,424	,000

.

33. Table: Crosstabulation and chi-square test for size and cluster membership variables

Crosstab

			Cluster Number of Case				Total
			1	2	3	4	
FTE	50-99	Count	33	14	37	13	97
		% within Cluster Number of Case	53,2%	60,9%	59,7%	41,9%	54,5%
	100-249	Count	17	8	17	12	54
		% within Cluster Number of Case	27,4%	34,8%	27,4%	38,7%	30,3%
	Above 250	Count	12	1	8	6	27
		% within Cluster Number of Case	19,4%	4,3%	12,9%	19,4%	15,2%
Total		Count	62	23	62	31	178
		% within Cluster Number of Case	100,0%	100,0%	100,0%	100,0%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5,666[a]	6	,462
Likelihood Ratio	6,303	6	,390
Linear-by-Linear Association	,046	1	,830
N of Valid Cases	178		

34. Table: Crosstabulation and chi-square test for ownership and cluster membership variables

Crosstab

			Cluster Number of Case				Total
			1	2	3	4	
Main owner	Hungarian state	Count	6	0	4	4	14
		% within Cluster Number of Case	9,7%	0,0%	6,5%	12,9%	7,9%
	Hungarian private	Count	38	22	42	23	125
		% within Cluster Number of Case	61,3%	95,7%	67,7%	74,2%	70,2%
	Foreign	Count	18	1	16	4	39
		% within Cluster Number of Case	29,0%	4,3%	25,8%	12,9%	21,9%
Total		Count	62	23	62	31	178
		% within Cluster Number of Case	100,0%	100,0%	100,0%	100,0%	100,0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12,423[a]	6	,053
Likelihood Ratio	15,524	6	,017
Linear-by-Linear Association	1,198	1	,274
N of Valid Cases	178		

35. Table: Frequency and valid percent of usage rates for each formal MC tool

	CF		FC_VC		Breakeven		Cost_sens		ABC		TC	
	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc
0= not used	37	21,4	49	28,5	77	44,5	87	51,2	79	47,0	102	60,7
1= in use	136	78,6	123	71,5	96	55,5	83	48,8	89	53,0	66	39,3
Total	173	100,0	172	100,0	173	100,0	170	100,0	168	100,0	168	100,0
Miss val	8		9		8		11		13		13	
Total	181		181		181		181		181		181	

	TCO		Ivent_turn		Cust_turn		Suppl_turn		Cash_conv		BSC	
	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc
0= not used	113	67,3	55	32,2	68	39,5	75	44,4	129	77,7	138	83,1
1= in use	55	32,7	116	67,8	104	60,5	94	55,6	37	22,3	28	16,9
Total	168	100,0	171	100,0	172	100,0	169	100,0	166	100,0	166	100,0
Miss val	13		10		9		12		15		15	
Total	181		181		181		181		181		181	

	Capital_cost		Fin_indic		EVA		CF_indic		Market_val	
	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc	Freq	Val Perc
0= not used	77	45,6	30	17,4	117	69,6	76	45,2	103	60,9
1= in use	92	54,4	142	82,6	51	30,4	92	54,8	66	39,1
Total	169	100,0	172	100,0	168	100,0	168	100,0	169	100,0
Miss val	12		9		13		13		12	
Total	181		181		181		181		181	

36. Table: Outputs of PCA for variables related to MC tools

KMO and Bartlett's Test

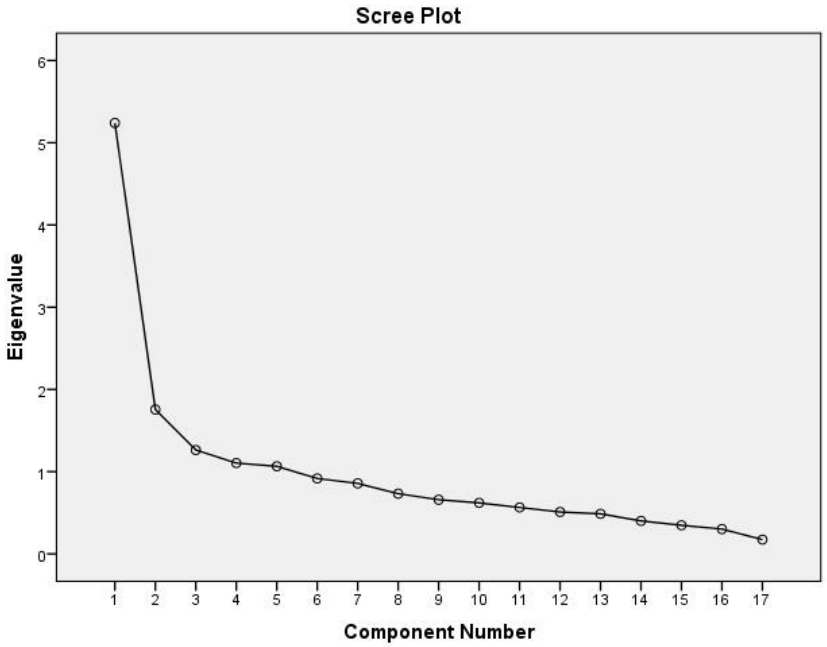
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,809
Bartlett's Test of Sphericity	Approx. Chi-Square	825,837
	df	136
	Sig.	,000

Component Matrix[a]

	Component
	1
CF	,444
FC_VC	,572
Breakeven	,597
Cost_sens	,586
ABC	,454
TC	,502
TCO	,523
Inv_turn	,430
Cust_turn	,526
Suppl_turn	,530
Cash_conv	,636
BSC	,547
Capital_cost	,611
Fin_indic	,536
EVA	,546
CF_indic	,645
Market_value	,682

Extraction Method: Principal Component Analysis.

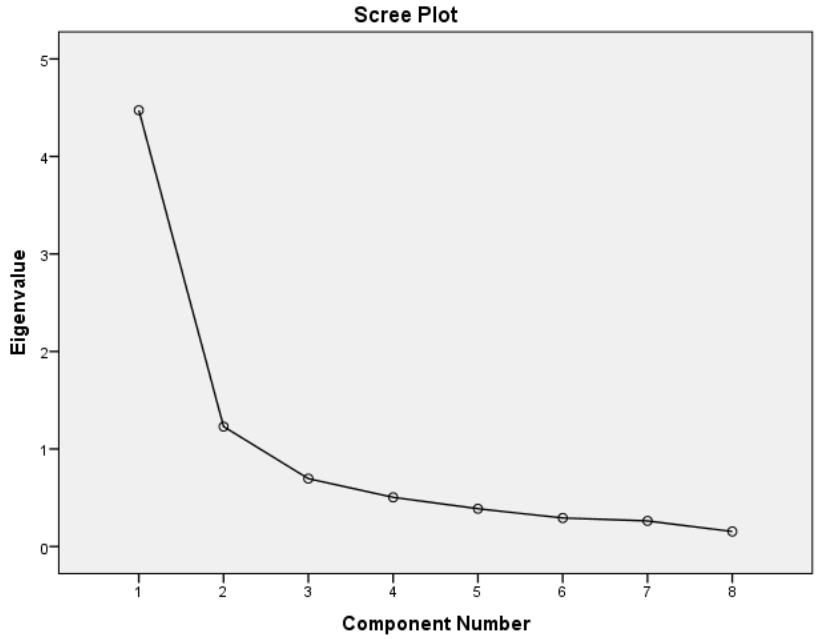
a. 1 components extracted.



37. Table: Outputs of PCA for variables related to reporting frequency

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,845
Bartlett's Test of Sphericity	Approx. Chi-Square	834,899
	df	28
	Sig.	,000



38. Table: Outputs of PCA for variables related to external orientation

KMO and Bartlett's Test

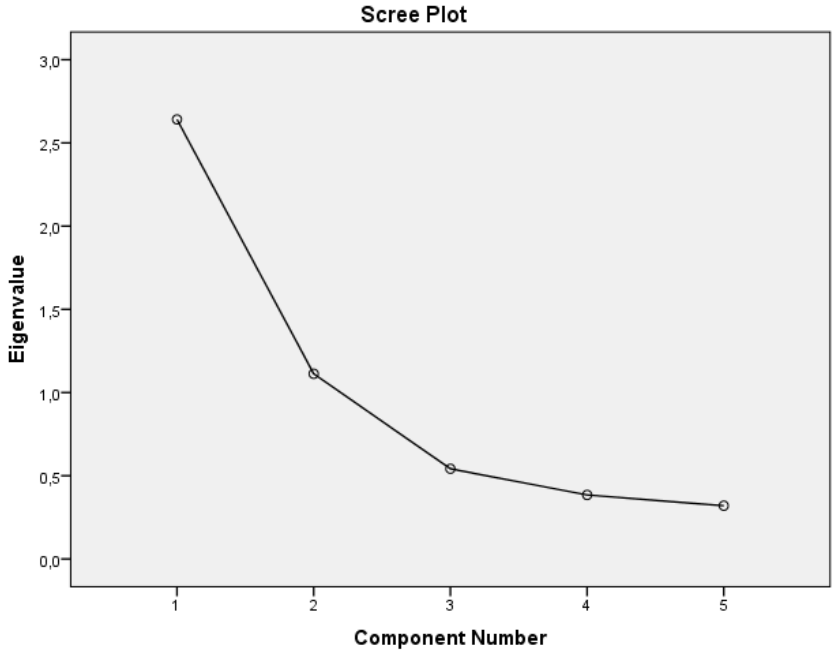
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,700
Bartlett's Test of Sphericity	Approx. Chi-Square	199,750
	df	10
	Sig.	,000

Component Matrix[a]

	Component
	1
p8bda_recode	,648
p8bea_recode	,687
p8bfa_recode	,771
p8bga_recode	,806
p8bha_recode	,711

Extraction Method: Principal Component Analysis.

a. 1 components extracted.



39. Table: Outputs of PCA for variables related to non-financial information

KMO and Bartlett's Test

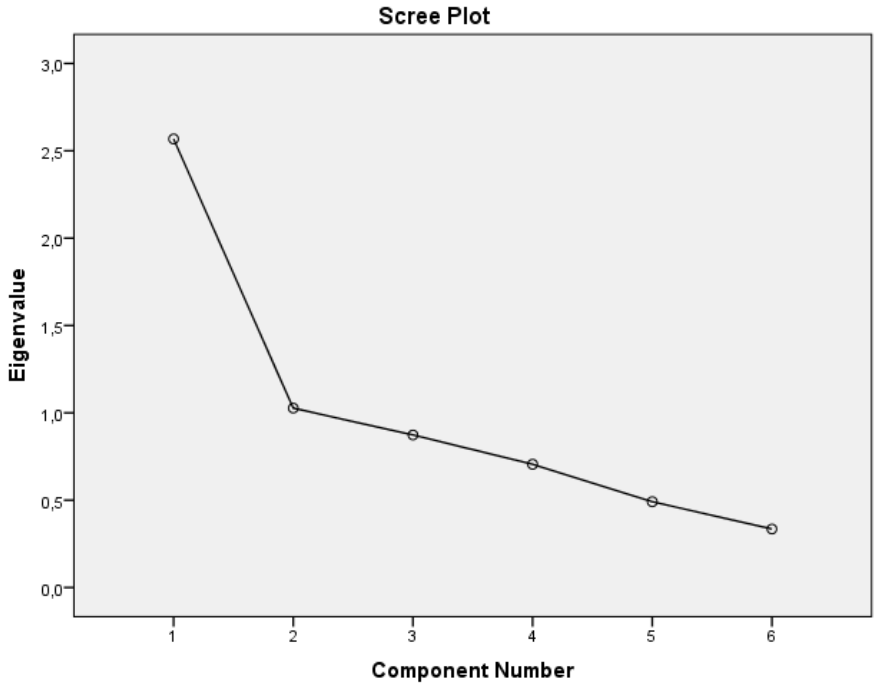
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,703
Bartlett's Test of Sphericity	Approx. Chi-Square	157,109
	df	15
	Sig.	,000

Component Matrix[a]

	Component
	1
p8ada_recode	,451
p8aea_recode	,816
p8afa_recode	,732
p8aga_recode	,793
p8aia_recode	,547
p8aja_recod	,484

Extraction Method: Principal Component Analysis.

a. 1 components extracted.



40. Table: Outputs of PCA for variables related to future orientation

KMO and Bartlett's Test

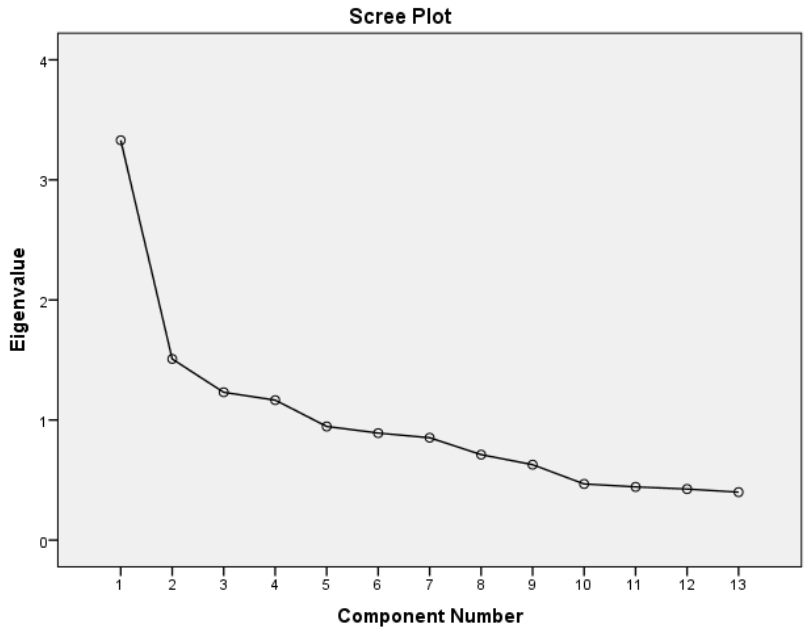
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,724
Bartlett's Test of Sphericity	Approx. Chi-Square	383,370
	df	78
	Sig.	,000

Component Matrix[a]

	Component
	1
p5aa	,485
p5ba	,526
p5ca	,372
p5da	,537
p5ea	,479
p5fa	,406
p5ga	,419
p5ha	,453
p5ia	,582
p6a	,641
p6b	,605
p6c	,478
p6d	,522

Extraction Method: Principal Component Analysis.

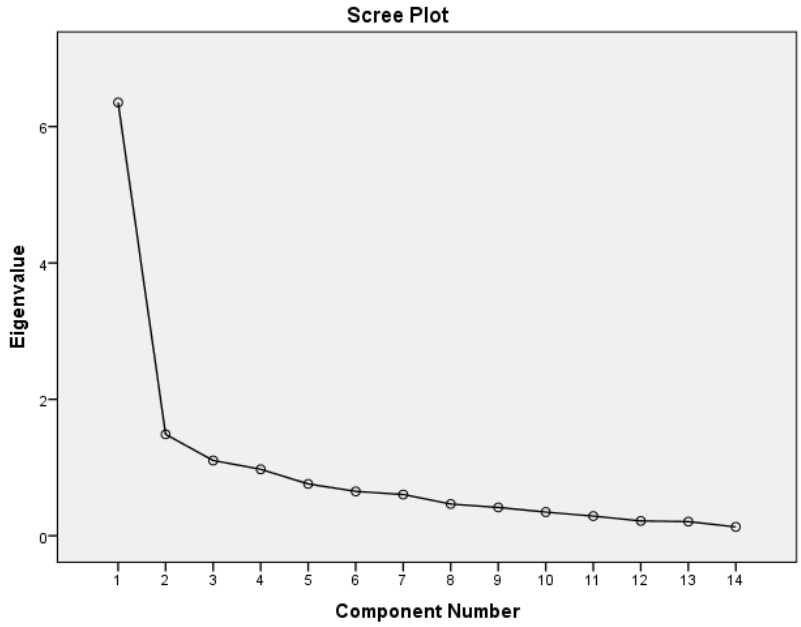
a. 1 components extracted.



41. Table: Outputs of PCA for variables related to IT intensity

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,851
Bartlett's Test of Sphericity	Approx. Chi-Square	778,779
	df	91
	Sig.	,000



Component Matrix[a]

	Component
	1
t45a_recode	,669
t45b_recode	,392
t45c_recode	,574
t45d_recode	,539
t45e_recode	,605
t45f_recode	,776
t45g_recode	,690
t45h_recode	,772
t45i_recode	,718
t45j_recode	,805
t45k_recode	,850
t45l_recode	,758
t45m_recode	,549
t45n_recode	,576

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

42. Table: Correlation coefficients of latent variables involved in the LVPLS model

Correlations

		F1_AllTools	F2_ITinnov	F3_Frequency	F4a_External	F4b_Nonfinancial	F4c_Future	F5_1P_ReliableData	F5_1N_AddedValue	F6_1P_Decision	F7_1P_Coinvolve	F7_1N_DataProv
F1_AllTools	Pearson Correlation	1	,391**	,339**	,421**	,313**	,574**	-,040	,160*	-,033	-,028	-,052
	Sig. (2-tailed)		,000	,000	,000	,001	,000	,627	,050	,690	,732	,528
	N	152	83	152	105	106	136	151	151	152	149	152
F2_ITinnov	Pearson Correlation	,391**	1	,289**	,074	,047	,343**	-,084	,083	-,024	-,241*	,032
	Sig. (2-tailed)	,000		,003	,556	,708	,001	,401	,402	,810	,015	,745
	N	83	104	104	66	66	89	103	103	104	102	104
F3_Frequency	Pearson Correlation	,339**	,289**	1	,093	-,018	,399**	,026	-,091	,141	-,303**	,149*
	Sig. (2-tailed)	,000	,003		,301	,840	,000	,726	,222	,058	,000	,046
	N	152	104	181	126	123	159	180	180	181	178	181
F4a_External	Pearson Correlation	,421**	,074	,093	1	,477**	,256**	-,206*	,224*	-,084	,111	-,151
	Sig. (2-tailed)	,000	,556	,301		,000	,006	,021	,012	,351	,220	,091
	N	105	66	126	126	118	113	125	125	126	124	126
F4b_Nonfinancial	Pearson Correlation	,313**	,047	-,018	,477**	1	,212*	-,146	,174	-,141	,186*	-,184*
	Sig. (2-tailed)	,001	,708	,840	,000		,026	,109	,055	,119	,041	,042
	N	106	66	123	118	123	110	122	122	123	121	123
F4c_Future	Pearson Correlation	,574**	,343**	,399**	,256**	,212*	1	-,034	,074	-,036	-,116	,019
	Sig. (2-tailed)	,000	,001	,000	,006	,026		,670	,353	,649	,151	,812
	N	136	89	159	113	110	159	158	158	159	156	159
F5_1P_ReliableData	Pearson Correlation	-,040	-,084	,026	-,206*	-,146	-,034	1	-,564**	,209**	-,361**	,439**
	Sig. (2-tailed)	,627	,401	,726	,021	,109	,670		,000	,005	,000	,000
	N	151	103	180	125	122	158	180	180	180	177	180
F5_1N_AddedValue	Pearson Correlation	,160*	,083	-,091	,224*	,174	,074	-,564**	1	-,224**	,457**	-,511**
	Sig. (2-tailed)	,050	,402	,222	,012	,055	,353	,000		,002	,000	,000
	N	151	103	180	125	122	158	180	180	180	177	180
F6_1P_Decision	Pearson Correlation	-,033	-,024	,141	-,084	-,141	-,036	,209**	-,224**	1	-,375**	,372**
	Sig. (2-tailed)	,690	,810	,058	,351	,119	,649	,005	,002		,000	,000
	N	152	104	181	126	123	159	180	180	181	178	181
F7_1P_Coinvolve	Pearson Correlation	-,028	-,241*	-,303**	,111	,186*	-,116	-,361**	,457**	-,375**	1	-,714**
	Sig. (2-tailed)	,732	,015	,000	,220	,041	,151	,000	,000	,000		,000
	N	149	102	178	124	121	156	177	177	178	178	178
F7_1N_DataProv	Pearson Correlation	-,052	,032	,149*	-,151	-,184*	,019	,439**	-,511**	,372**	-,714**	1
	Sig. (2-tailed)	,528	,745	,046	,091	,042	,812	,000	,000	,000	,000	
	N	152	104	181	126	123	159	180	180	181	178	181

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

9.4 Scenario of the group and individual interviews

9.4.1 Scenarios of the focus group sessions

1. Presentation of the goals and proceedings of the research (5 min)
2. Presentation of the research results from the statistical analysis with a focus on the LVPLS model (15-20 min)
3. Free discussion with the participants with leading questions as follows (90-120 min):
    - Is the maturity concept of controllers' role valid in your company / in your personal carrier?
    - Do you see other roles not mentioned here?
    - What makes the data reliable? What makes the data reliable for the managers?
    - How can you, as a controller generate added-value? What can be seen as added-value?
    - Are these two factors, added-value and reliable data linked with each other?
    - Can IT challenge or terminate any of your tasks? What consequences does this have for the roles?
    - Do you collect and report externally focused and non-financial data? If not, who's responsibility is it?
    - Do you think, that the direction of the arrows in the model are dominant? Can you provide explanation for other causal relationships among these factors?
4. Summary and saying thank you to the participants (2 min)

9.4.2 Questions of semi-structured top executive interviews

1. Presentation of the goals and proceedings of the research (5 min)
2. Discussion with the interviewee along leading questions as follows (40-70 min):
    - What do you expect from a controller?
    - Do you think that other managers in the company have the same expectations?

- How can a controller generate added-value? What do you see as an added-value?
- Are the MC tools / techniques applied by the controller important in this respect?
- What makes the data reliable for you?
- Who collects and reports externally focused and non-financial data? Are these involved in the controllers' reports? If these are not collected, why not?
- How do you see the increasing role of IT played in an efficient MC system? Can IT challenge or terminate any of the MC related tasks? What consequences does this have for the roles of controllers?

3. Presentation of the research results from the statistical analysis with a focus on the LVPLS model and reflections from the interviewee (10-30 min):
   - Do you think, that the direction of the arrows in the model are dominant?
   - Can you provide explanation for other causal relationships among these factors?
4. Summary and saying thank you to interviewee (2 min)

9.4.3 List of participants

43. Table: List of participants of focus groups and interviews

No.	Company profile	Company size (FTE)	Current position	Work experience as controller (number of years)
Participants of focus group sessions				
1.	Energy industry	7900	Controlling groupleader	13
2.	Building industry	231	Controlling leader	12
3.	Logistics	5000	Controlling groupleader	9
4.	Real estate development	75	Controlling leader	12
5.	Food processing	290	Finance, Accounting and Controlling Manager	10
6.	Postal services	30000	Controlling leader	8
7.	Aviation	730	Corporate Controlling groupleader	15
8.	Chemical industry	120	Controlling leader	20
9.	Plastic processing	710	Business development group leader	20
10.	Health care	110	Finance director	7
11.	Facility management	107	Finance director	10
12.	Public transport	1500	Projectmonitoring leader	25
13.	Consulting	10	Consultant	20
14.	Paper industry	450	Financial director	20
15.	Building industry	300	Finance-controlling director	23
16.	Holding company with diversified profile	600	Controller manager	25
17.	Food industry	1200	Corporate controlling manager	15
18.	Higher education	500	Chancellor	20
19.	Consulting / financial services	1	Consultant	10
20.	IT (ERP implementation and operation)	10	Executive director	25
Individual interviews				
1.	Food processing	290	Executive director	10
2.	Industrial engineering and construction	1000	Vice President of Strategy, Sales and Marketing	0
3.	Production of diecasting parts	900	Vice President of Project Management, Controlling and IT	0,5
4.	Software development	80	CEO, owner	0
5.	Textile industry, dressmaking	600	CEO	0

9.5 List of publications

Publications in Hungarian language:

Peer reviewed journal articles:

Szukits Ágnes (2014): A controlling szervezeti jelentősége a magyar vállalatoknál, Vezetéstudomány 45 (9) pp. 12-25.

Conference lectures and papers:

Szukits Ágnes (2016): A menedzsmentkontroll rendszerek hatása a controllerek üzleti folyamatokba történő bevonására, Magyar Tudományos Akadémia Tudománynapi Konferencia, Budapest, 15th November 2016

Szukits Ágnes (2014): A controlling szervezeti jelentősége felsővezetői szemszögből, Tavaszi Szél Konferencia, Doktoranduszok Országos Szövetsége, Debrecen, 21-23rd March 2014

Other publications:

Szukits Ágnes (2014): A globalizációból származó előnyök eloszlása. Mit tanulhatunk az értéklánc elemzésből? – in: Czakó Erzsébet (szerk.): Fejezetek a nemzetközi üzleti gazdaságtanból 6., 155. sz. műhelytanulmány, Budapesti Corvinus Egyetem, Vállalatgazdaságtani Intézet, HU ISSN 1786-3031

Szukits Ágnes (2014): A teljesítmény és a stratégia kapcsolata – Esettanulmány és oktatói segédlet Teljesítménymenedzsment tantárgyhoz; Tananyagfejlesztés

Szukits Ágnes (2014): Teljesítményindikátorok– Esettanulmány és oktatói segédlet Teljesítménymenedzsment tantárgyhoz; Tananyagfejlesztés

Szukits Ágnes (2014): Teljesítménymérés és beszámolás – Háttéranyag-szöveggyűjtemény Menedzsmentkontroll tantárgyhoz; Tananyagfejlesztés

Publications in foreign languages:

Bookchapter:

Matos Zoltán, Székely Ákos, Szukits Ágnes (2008): Reporting Factory – Service Center Bei E.ON Hungária, in: Ronald Gleich, Péter Horváth, Uwe Michael: Management Reporting – Grundlagen, Praxis und Perspektiven, Haufe Mediengruppe, München, p. 249-268

Peer reviewed journal articles:

Szukits Ágnes (2017 – in press): Management control system design: the effect of tools in use on the information provided, Vezetéstudomány/ Budapest Management Review

Szukits Ágnes (2015): The relationship between the role of controlling and corporate performance, TAYLOR Gazdálkodás- és szervezéstudományi folyóirat. A Virtuális Intézet Közép-Európa Kutatására Közleményei 7 (1-2) pp. 21-28.

Conference lectures and papers:

Szukits Ágnes (2014): The relationship between the role of controlling and corporate performance, Budapesti Corvinus Egyetem, 3rd PhD Student Conference, Budapest, 23rd June, 2014.

Bodnár Viktória, Horváth Gábor, Pokol Gábor, Szukits Ágnes, Tanács Zoltán (2004): Creating a change driving performance management system at TEMIC Hungary, in: Andy Neely, Mike Kennerly, Angela Walters: Performance Measurement and Management: Public and Private. pp. 1177-1180. Konferencia helye, ideje: Edinburgh, Egyesült Királyság / Anglia, 2004.07.28-2004.07.30. Cranfield University, Cranfield School of Management, Centre for Business Performance.