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Doctoral School of Management and  
Business Administration**



Theses of the Doctoral (PhD) dissertation

***Innovation opportunities of the  
IT methodology of controlling***

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## TABLE OF CONTENTS

1. Timeliness and objectives of the topic.....	4
2. The methodology, subject and justification of the research.....	7
3. Research results .....	8
4. Conclusions and recommendations .....	12
5 Scientific publications on the topic of the dissertation .....	14

## 1. Timeliness and objectives of the topic

In my dissertation, the research and development experience that has emerged in the past 30 years resulting from about 200 controlling and management accounting information requirements and demands is presented. The examination and the theses aim to draw conclusions from the information technology implementation of a wide range of accounting content on the methods of developing controlling and management accountancy information requirements and, in general, on the organizational methodology and the necessary procedures of business organisations.

Experience has shown that it is not enough to deal with the general lessons and conclusions of introducing information systems, but the emphasized, important and timely management information needs must be met, which arise from the basic properties and thinking of Controlling and Management Accounting (hereinafter referred to as CMA). At the same time, however, it is not possible to circumvent the question of how the accounting information system, as a single entity, should be consistent and easy to operate and economical when it comes to the two latter requirements of the integration of the information system.

The subject period of the research is the period following the economic transition and the interval after the crisis in 2008, which has raised and set demands for the management of economic organizations. The protracted consequences of the 2008 crisis continue to be burdensome for management. Growing management was a constraint on the use of controlling tools during the research period. Due to management constraints, management information needs have increased and specialized; the organizational-methodological tools whose research and development is presented in the dissertation are necessary to accomplish. The deduction of possible lessons may help to advance organization technology.

The applied Controlling and Managerial Accounting methodology started in the 1980's and has grown steadily over the last 40 years due to the use of the expanding IT capabilities and last, but not least, in order to meet the growing demand. Some methodological tools are easier to access, embedded into business intelligence, allowing them to spread more widely, such as to small and medium-sized businesses. For the time being, specific activities and situations, as well as special information needs for services, remain. The objective of my dissertation is **to develop the methodology for creating and maintaining organizational BIS (Business Intelligence Standard)**. The issue of maintenance and development is particularly relevant to the application of controlling, which is typically a special business intelligence element.

In order to reach the objective of the dissertation, 5 research hypotheses were set up: 2 static and 3 dynamic ones. H1-H2: are "static" hypotheses, i.e. on accounting information systems, they can be found in any state of their development without transformation.

H1: Hypothesis of Individuality: I suppose that the accounting systems of business organizations have unique, specific information technology features. Specialties are given by the properties of the Controlling and Management Accounting (hereinafter referred to as CMA) system parts.

The main point of the hypothesis is the difference in special accounting information technology (hereinafter referred to as AIT) between reports on the one hand, and information systems supporting CMA reports, on the other. On the one hand, every business unit prepares - according to its size and accounting liabilities - its Report. Record-keeping and listing tools that are standardized in AIT are available for preparing this report. At the same time, the part of the organizational AIT that solves the CMA tasks may vary from a technological point of view to each business entity relative to each other. With these, we expect and implement the integration of information systems, so the entire accounting information systems have unique, specific information technology features that are different from one company to another.

**H2 Hypothesis of FUNDAMENTALITY: The accounting information system of the business organizations has a crucial part at any time, which is extremely important for the profitability of the business. This fundamental part reflects the current management information needs, as it ensures the managerial prerequisites of the organization's management and environmental compliance. It may change in a timely manner which accounting information provider part of an organization is a cornerstone.**

The main part of the hypothesis is that in the case of business entities with different activities (and with their unique properties), the course of management is influenced by a number of factors, so even the very important and the actual, as well as fundamental information needs of similarly profiled organizations are constantly changing and can significantly differ from time to time.

H3-H4-H5 are "dynamic" hypotheses that characterize accounting information systems during their design and development.

**H3: 3 \* M SYNDROME hypothesis: When converting accounting information systems, 3 types of data models and the corresponding 3 types of accounting methods are present during the introduction / organizational work: 1. the data model used so far and now being replaced; 2. a data model targeted at the accounting strategy and the IT strategy implementing it; and 3. the data model included in the program to be implemented.**

IT transformation and investment can cause serious problems especially in CMA information supply if this syndrome is unknown; and it may happen that the data model that is targeted in the accounting strategy and then developed in the IT strategy is not implemented. Generally unrecognized by the development research experience is the coexistence of the data model 3 with the AIT transformations.

**H4: DATA STRUCTURE STANDARD hypothesis: When purchasing computer accounting software packages, the software user is purchasing a COMPLETE ACCOUNT PLATE, which is determined by the data model of the program package. Users must be aware of this in deciding how to set up their own accounting system.**

If an organization detects problems in the CMA information supply, then it may decide to develop AIT, or replace, develop and supplement its financial management software. However, during the migration / development process, an accounting settlement system is purchased integrated into the software's data model. This, and the deviation of the organization's accounting order, may result in conflicts, different losses and inconveniences.

**H5: RULES OF REPORTING SYSTEMS Hypothesis: Optimum implementations of Controlling and Management Accounting (CMA) information systems are provided by reporting systems, whose AIT essence is the automatic availability and updating of information for managers, online access and thus the optimal support of managerial and decision -making activity.**

The reporting / accounting system is part of the integrated online information system, works in accordance with it and is the main management tool for management. The reporting / accounting system is in dynamic equilibrium with data mining: new information needs are developed through data mining and then systematized.

## **The methodology, subject and justification of the research**

As a research method, I used primary and secondary research in the dissertation. During my **primary research**, I had the opportunity to study the Controlling and Management Information (CMI) needs of companies and other organizations thoroughly, through any deep interviews, with a minimum of 6 months and a maximum of 10 years spent at research organizations. During the research / development I took the lead or participated in the development of AIT, i.e. information systems that provide CMA information requirements. Among the various information needs of different structure involved in the developments, I developed and analysed **the requirements of 201 CMA** in the dissertation, and I compiled the models described in the dissertation for their implementation. **The models used to justify the hypotheses are partly abstractions created by a comparative analysis of case studies in primary research and partly by some of the scientific relationships found in secondary research.** In the primary research section, by means of statistical analysis I found that the selection of organizations producing CMA 201 data was not typical of the size and the activity of the organizations.

**Secondary research** - as I have explained in the dissertation - does not in itself provide a useful methodology for the implementation of integrated and, at the same time, specific CMA requirements for AIT because it does not start from satisfying these needs. Exceptions to this would be the use of general information system organizational methodologies (e.g. SSADM), but they are devoted to the development of unique specialized information systems (so-called greenfield investment). In today's AIT contexts, individual enhancements are considered expensive and take up a lot of time, so they may only be justified in exceptional cases.

**The justification for the proposed development system** is twofold:

- Built-in ERP systems (AITs) handle business systems as templates and do not take into account the uniqueness and pragmatic nature of CMA needs. They offer AIT solutions that can be used by everyone and / or do not properly inform management systems (Users) of the AIT system design tasks that are absolutely necessary for the CVS subsystems and their accounting policy implications,
- Data mining systems designed and built to meet individual / fundamental needs do not provide integrated solutions as they only start from the existing data structure, and therefore their problem is that they are based on basic research (and not application).

In examining the hypotheses described, I took into consideration the models and the implementation experience. From these I compiled the Hypothesis examination, which resulted in 4 hypotheses completely accepted and one partially justified.

## Research results

The conclusion of my investigation is that all the information requirements examined in detail are different and unique. The deepest and most detailed description of a business organization's information system is when CMA information needs are handled with the comparative analysis methodology of case studies and, based on this; the organizational methodology necessary for the development of the information system is elaborated.

An important result of the research is that the required accounting information technology (AIT), which can provide the organization's management information supply, should be determined in accordance with circumstances and specialty details and re-converted and reorganized in the accounting systems if necessary.

Ignoring the specific factors of the enterprise, such as organizational, management, market, etc. can lead to managing problems, as well as additional costs and resulting in an increase in the response time of the organization. Research results also demonstrated that the content and structural requirements of CMA information needs are constantly changing, and these changes need to be followed by information technology instruments. **The most convenient organizational methodology is the integration of business intelligence (BI) into the reporting / accounting system** by dynamically aligning the data mining methods and the reporting / accounting systems, if these specialties are also taken into account; this is the **BIS method**. With continuous BIS development, we can integrate the management implications of environmental adaptation into corporate strategy.

**H1 → T1: Evaluation of Hypothesis 1 - SINGULARITY; this hypothesis was accepted in its entirety:**

**Integrated accounting information systems have unique, special features in economic organizations. These special features are provided by the specialties of Controlling and Management Accounting.**

Secondary Research Approach: In this approach, I examined the statement with the help of models based on the literature, and it was possible to ascertain that organizations have their activity, size, ownership structure, etc. according to their own management accounting requirements. As a result of this and the integration of information systems, the entire accounting information system will be unique to organizations. Primary research also supports the hypothesis as the 201 Controlling and Management Accounting (CMA) Accounting Information Technology (AIT) and data structure are different from each other in the information systems analysed by a comparative analysis of case studies.



**H2 → T2: Evaluation of hypothesis 2 - FUNDAMENTALITY - this hypothesis was accepted in its entirety:**

**Primary research confirms that there are one or some very important Controlling and Management Accounting Information Requests for each organization and every period. It can also be seen that these needs are not the same for business organizations of similar scale or size and change with the change of management conditions.**

Primary research shows that every business organization has a very important problem at a given time, and even this problem / task to be solved is updated with changes in its circumstances and conditions, and at the same time the most important management tasks change. The organization also needs information when it does not have its own internal accounting (most small businesses), but even if they have an integrated ERP system that does not meet these requirements.

Dynamic theses work in the organization and renewal of information systems:

**H3 → T3: Evaluation of hypothesis 3 - 3 \* M SYNDROME:**

**This hypothesis is accepted because it is supported by system design professional materials and primary research confirms that special attention should be paid to the innovation and development of IT support for the needs of the CVS in relation to the accounting system and the data model that fits in with it in order to meet the management information requirements and the information system should be maximally integrated as much as possible.**

In the course of development transformations, harmonising the data model and accounting system with AIT-1 (template-solving) solutions does not pose a problem, AIT-2 technologies need to take into consideration the CMA features, while in the case of AIT-3, i.e. CMA elements special care should be taken. The aim is to maximize the value of the data model (accounting system) (3.M) and the new data model (2.M) of the software present at the organizational development at the time of its reorganization (1.M) so the more recent accounting system order is to be implemented in the integrated computer system.

**H4 → T4: Evaluation of hypothesis 4 - DATA STRUCTURE STANDARD:**

**I accept this hypothesis only in part, taking into account the research and literature. Ready-made (ERP) systems incorporate a kind of accounting system that can be marketed in the form of "business intelligence (BI)" but this does not cover the entire accounting system but only part of the purchased software of the organisation.**

Since organizational and development transformations are now largely solved by software investment, it is important to know that the software is based on a pre-made data structure plan. When applying the purchased software, the company's accounting system is set up from this data model. Partially rejecting the hypothesis is necessary because it is apparent from the analysis of secondary research and all the information needs of the research that manually organized and conducted information processing cannot be completely excluded from management information practice. The accounting system purchased in the data models of ERP systems therefore does not cover the accounting policy of the entire management system. Ultimately, the persistence of the manual parts of development work is that, due to market / environmental changes, corporate reporting systems need to be transformed from time to

time. The way of transformation is the reporting system with data mining, which primarily requires manual organizational development work.

#### **H5 → T5: Evaluation of hypothesis 5 - RULES OF REPORTING SYSTEMS:**

**Reporting systems form the most important and most effective part of CMA information. This statement is accepted on the basis of secondary research, previously accepted theses and realized development examples. In the research and development practice where the reporting systems were introduced and maintained, they helped lead to the adaptation and sustainability of the enterprise system.**

As stated in primary research, maintaining an adaptability, target orientation and pro-activity of economic organizations requires an information system that is able to move along with the capabilities listed in the secondary research models in the way that it can ensure the management of variable CMA satisfying their needs. This requirement is best served by reporting systems by requiring data mining and the necessary data structure and technology tasks for their reorganization.

#### **Evaluation of new research results**

##### **Evaluation of the developments resulting from the research:**

###### **Organizational-information specialties**

The uniqueness of the organizations' management information systems, i.e. their differing nature and the different emphasis of the economic organizations, result in diverse accounting information systems that reflect and assist the management and the important management / leadership needs based on it (H1 → T1, H2 → T2). Organizations cannot therefore be reflected in accounting systems of the same or similar structure.

###### **The purchased ERP software has a built-in data model - data structure.**

Regarding the deployment of computer systems, it is clear from the system engineering literature that programs and software perform accounting operations using data connections (relationships) by master data; data entry (accounting), settlement and listing reports, as well as all planning, accounting, listing operations and processes. More specifically, as software systems generally do not cover the whole of an accounting system, depending on the computerized accounting structure of the organization, a certain part of the data structure of the program affects the accounting settlement system. As this relationship is clear in terms of the software mathematical model, it is also clear that each software contains a built-in data structure that defines a (partial, but) specific accounting system. This does not mean that you do not have to buy software, but need to count on the built-in data model, which means that you may have a limited liability account with ERP.

### **The data structure is closely related to the accounting system**

The equivalent of the accounting system is therefore the data structure and data structure of the computerized accounting (ERP + CMA) system. From the accounting system, the computer system covers the area covered by planning and accounting which are incorporated into the functionality of the software. This part of the built-in business intelligence of the accounting system, as a technical implementation, should play a subordinate, realistic role in the accounting policy of the entity.

### **From the back to the front or from the top to the bottom**

The organization of a complex accounting and CMA system may take place backwards, which follows the same as the logic of SSADM (Structured Systems Analysis and Design Method) and does not conflict with the logic of controlling. The organization of controlling must precede the complete construction of accounting for two reasons that can be traced through the research examples:

- For planning priority reasons, planning must be the first structure
- Smaller companies usually have external accounts when the first CMA information needs are displayed.

Examples can be provided for which of the 201 CMA information requirements the controlling system was first built before the complete internal accounting system had been established. This is a novel feature in contrast with classical theories which state that the entire accounting system should be developed first, and then it may be possible to deal with controlling in the enterprise system.

## **Conclusions and recommendations**

In the course of the research work it was discovered in companies where a long cooperative relationship has been established that **controlling philosophy management systems are not put to an end; they only start with the introduction of the IT system.** Interesting and valuable examples from the point of view of the research were the organizations where after the introduction of the CMA information systems, a further 5 to 10 years of working relationship was maintained, and the growth of their business intelligence was monitored.

### **3 M syndrome in development**

In the development and implementation of systems, care should be taken on the presence of a total of 3 types of data models, that is, the accounting system, and the intention to implement the intended accounting system with the greatest system integration possible.

### **Standardization for ERP systems**

In an accounting system establishing what is standard reporting / accounting information such as information service, part of the CMA, partly in one ERP system; and what needs to be transformed, developed or left out of the system is a novel feature. An important aspect of standard compilation is the classification of AIT (AT-1, 2, 3) into modules, lists of ERP systems, and the CMA information system. **Built-in information technology forms the business intelligence solutions of the business system.**

### **Description and characterization of the BIS method**

It has already been mentioned as typical of the accounting systems, but it also holds true for a wider, full range of CMA data service that there is a need for slowly changing elements and stable management information in addition to the data content that are reproducible and reflects economic events. Stability can be ensured by the relative stability of the display structure of the previously mentioned data model (= accounting system), so that the manager can evaluate the changes in the content of the data.

### **Rules of CMA within the internal organization**

The reproducibility and quality of the management information systems are similar to those of an enterprise with its own technical, technological or proprietary copyright enhancements:

- Precise specifications of CMA systems cannot be formulated due to company specialties;
- Some general rules and standards can be adopted, listed in the aforementioned points;
- Specific rules should be recorded and taken care of as internal regulations.

The latter is in line with the fact that the content, the way in which the internal reporting system operates, and the rules of its operation can be and have to be documented and required, which can lead to a kind of "baffling" effect of IT systems, such as a predetermined path as it was described when defining reporting systems, and which can supervise and control the work of middle managers and subordinates.

### **Operation and development**

Another feature is that the management reporting system needs to be continuously operated and monitored, its development and "maintenance" require constant managerial intervention, which is a good opportunity to develop and rethink the management accounting itself, as well. This continuity of tracking and development can partly be the case in the way that the management work is primarily carried out through the ManInfo / Controlling information channel, that is: the system is used. The new demands and the resulting development requirements are thus reflected in the analysis of the data of the ManInfo / Controlling systems.

## 1. Scientific publications on the topic of the dissertation

### Publications in Hungarian

#### Books and book chapters

1. **Fabricius Ferke György:** A controlling és a vezetői számvitel információ-technológiája. CompLex kiadó 2011. Kézikönyv, e-könyv formában is. 393 oldal. Önálló szerző. ISBN 978 963 295 143 0. YOVI223.
2. MCE Magyar Controlling Egyesület: **Controlling esettanulmányok 2014. Fabricius Ferke György** – társ-szerző (21-31, 125-127. oldal). ISBN 978-963-638-457-9.

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2. **Ferke György:** „Integrált alapadat-rendszerek kiépítése egy kis-közepes méretű műanyagipari vállalkozás controllingrendszerének bevezetéséhez.” Gyakorlati Controlling. Magyarországi vállalkozások és intézmények Controlling kézikönyve. RAABE kiadó, 2003. június; szakcikk, 5/16 fejezet. Szakcikk, önálló szerző. ISBN 963 85920 5 2
3. **Ferke György:** „Egy kht. vezetői információs és controlling rendszereinek informatikai kiépítése, kiépítési tapasztalatai.” Gyakorlati Controlling. RAABE kiadó, 2003. június – 2005. január: 5/19, 5/20, 5/21, 5/22 és 5/24 fejezetek, 5 szakcikk, Szakcikk-sorozat, önálló szerző. ISBN 963 85920 5 2.
4. **Ferke György:** „A controllingirányítás informatikai és megvalósítása költségvetési szervezetenél. A Controller. Ecovit Kiadó Kft, 9 db szakcikk, 25 oldal: 2007. 01, 02, 04, 05, 06, 07-08, 10, 11 és 12 havi számokban. ISSN 1787-3983. Szakcikk-sorozat, önálló szerző.
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8. **Ferke György:** „A kötelezettségvállalás controllingjának kivitelezése.” 1-2. rész. A Controller. Ecovit Kiadó Kft, 2010. 05. és 09. szám, 2 szakcikk; 9 oldal. ISSN 1787-3983. Szakcikkek. Önálló szerző.
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14. **Ferke György:** Pénzügyi controlling operatív támogatása, a kintlevőségek és tartozások időstruktúrájának kezelésénél. Controller Info Szakmai folyóirat, bemutató szám, 2013. I./2. pp 23-27. ISSN 2063-9303.
15. **Ferke György:** Miért van szükségünk az operatív controllingra? Controller Info Szakmai folyóirat, 2013. I./8. pp 6-9. ISSN 2063-9303.
16. **Ferke György:** A 3-M szindróma, mint a számviteli adatmodellek hármastudathasadása. Controller Info Szakmai folyóirat (2013) I./12., pp 3-6. ISSN 2063-9303.
17. **Ferke György:** Controlling utókalkulációs rendszer bevezetési tapasztalatai egy ipari szolgáltató cég bér munkáinak költség- és nyereség elemzésénél. Controller Info Szakmai folyóirat (2014) II./1. negyedév, pp 36-41. ISSN 2063-9303.
18. **Ferke György:** Kibermatika – A Controlling irányítási rendszer, mint vállalati erőforrás. Controller Info Szakmai folyóirat, 1. és 2. rész (2014) II./2. és 4. negyedév, pp 6-11., pp. 46-48. ISSN 2063-9303.
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20. **Fabricius-Ferke György:** A tökéletes mesterséges intelligencia – közel a Controllinghoz. Controller Info Szakmai folyóirat (2016) IV./3. negyedév, pp 2-4. ISSN 2063-9303.
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### Conference publications in Hungarian

1. **Ferke György:** „Lehet-e bekötött szemmel vezetni?” Számítógépes Vezetői Információs Rendszer alkalmazásának elméleti és gyakorlati kérdései Pénzügyi-Számviteli Integrált Rendszerek példáján. Neumann János Számítógép-tudományi Társaság IV. országos kongresszusa 1995. május; előadási anyag.
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3. **Ferke György:** 3.M szindróma a vállalati irányítási rendszerekben. VIII. Soproni Pénzügyi Napok - Nyugat-magyarországi Egyetem Közgazdaságtudományi Kar konferenciája: „Befektetések – Pénzügyek – Minőség”, Pénzügyi, adózási és számviteli szakmai konferencia; MCE COM szekció 2014. október 2.
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### Copyright

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### Other publications

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## **Publications in English**

### **Book chapter in English**

1. Zéman Zoltán ed.: **Book of the Controller Info Studies, Fabricius Ferke György** – társ-szerző (64-68. pp.). Bp. ISBN: 978-963-08-9751-8, Budapest: Copy & Consulting Kft. 2014.

### **Journal articles and conference publications in English**

23. György Fabricius-Ferke: How to improve your ERP system? „Challenges in Economic and Technological Development”, University of Miskolc, ISBN 978-963-358-100-1. PHD Session 15-16. October 2015. Lillafüred.
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