

THESIS ON ECONOMICS AND BUSINESS ADMINISTRATION H47

**The Full Costing Model and  
Its Implementation at Universities:  
The Case of Tallinn University of Technology**

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**TUT**  
PRESS

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**Dissertation was accepted for the defence of the degree of Doctor of Philosophy in Business Administration on 28 July 2015.**

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Declaration:

*Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology has not been submitted for any academic degree.*

Katrin Toompuu



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ISSN 1406-4782  
ISBN 978-9949-23-834-7 (publication)  
ISBN 978-9949-23-835-4 (PDF)

MAJANDUS H47

# **Täiskuluarvestuse mudel ja selle rakendamine ülikoolides (Tallinna Tehnikaülikooli näitel)**

KATRIN TOOMPUU



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## ABBREVIATIONS

7FP	Seventh Framework Programme
ABC	Activity-based costing
AO	Accounting object
ASU	Administrative and support units
CAQ	Costing questionnaire
CD	Cost driver
CIMA	Chartered Institute of Management Accountants
CPDE	Conditions and Procedure for Determining the Eligibility or Non-eligibility of Structural Support Expenses for Aid in the Period 2007-2013
DC <sub>P</sub>	Direct cost of project
EAA	Estonian Academy of Arts
EAMT	Estonian Academy of Music and Theatre
ECTS	European Credit Transfer and Accumulation System
EE	Enterprise Estonia
EIN	Environmental investment centre
ERC	Estonian Research Council
EUA	European University Association
EULS	Estonian University of Life Sciences
FC/FCA	Full costing
FC <sub>P</sub>	Full cost of project
FC <sub>SU</sub>	Full cost of structural unit
FEC	Full economic costing
FTE	Full time equivalent
FTE <sub>P</sub>	Full time equivalent of personnel
FTE <sub>R</sub>	Full time equivalent of research personnel
FTE <sub>T</sub>	Full time equivalent of teaching personnel
GRSA	General rules for state accounting
IC	Indirect cost
IC <sub>C</sub>	Indirect cost of university (central indirect cost)
IC <sub>F</sub>	Indirect cost of faculty or institution
IC <sub>SU</sub>	Indirect cost of structural unit of faculty or institution
IFAC	The International Federation of Accountants
IIA	The Institute of Internal Auditors
IT	Information technology
MER	Ministry of Education and Research
NP	Number of personnel
N <sub>ST</sub>	Number of students
OS <sub>M</sub> <sup>2</sup>	Office space in square metres
RCUK	Research Councils of the United Kingdom
R <sub>IC</sub>	Rate of indirect cost
RQ	Research question



RWP	Recommended work performance
SIS	Study information system
SSC	Shared Service Centre
SUAS	Structural unit of administrative and support structure
SUIC	Structural unit of institutions or college
SUF	Structural unit of faculty
TAP	Transaction proceeded
TC	Traditional costing
TDABC	Time-driven activity-based costing
TRAC	Transparent Approach to Costing
TRC	Transparent costing
TU	Tallinn University
TUT	Tallinn University of Technology
UA	Universities Act
UT	University of Tartu
UUK	Universities of the United Kingdom
UvA	University of Amsterdam

## **SYMBOLS**

A	Faculty of Power Engineering
B	Tallinn College of TUT
E	Faculty of Civil Engineering
H	Faculty of Social Sciences
I	Faculty of Information Technology
K	Faculty of Chemical and Materials Technology
LIB	Library building
M	Faculty of Mechanical Engineering
MSI	Marine Systems Institute
NAV	Accounting software of TUT- Microsoft Dynamics NAV
ND	Technomedicum of TUT
NG	Institute of Geology
NRG	Power engineering building
NT	Tartu College of TUT
NY	Institute of Cybernetics
S	Kuressaare College of TUT
SCI	Building of natural sciences
SOC	Tallinn School of Economics and Business Administration, and Faculty of Social Sciences building
T	Tallinn School of Economics and Business Administration
Y	Faculty of Science

## DEFINITIONS

Accountability	The obligation of public sector entities to the citizens and other stakeholders to account, and be answerable, for their policies, decisions, and actions, particularly in relation to public finances.
Activity-based costing	A special costing methodology that identifies activities in an organisation and uses several cost drivers to assign indirect costs to these activities.
Economical	Doing things at a low price, minimising the cost of resources.
Efficiency	Doing things the right way, performing tasks with reasonable effort.
Effectiveness	Doing the right things, the extent to which aims are met.
Direct cost	A cost directly attributable to an activity or a cost object.
Full costing	The ability to identify and calculate all the direct and indirect costs per activity and/or project that need to be considered to accomplish these activities.
Indirect costs	Costs that have been incurred for activities or cost objects, but which cannot be identified and charged directly to each individual activity or cost object.
Costing	A technique or method used to identify project, process etc. related costs.
Costing system	A framework used for costing, incl. cost measurement and cost accumulation methods, scope and techniques of cost allocation, procedures and elements of costing system.
Costing theory	A set of various costing concepts, incl. approaches to classification of costing systems and its elements and procedures, etc.
Cost allocation	The assignment of indirect cost to particular cost object.
Cost assignment	Tracing direct costs to a cost object and allocating indirect costs to a cost object.
Cost accumulation	The collection of cost data in some organized way by means of an accounting system.
Objects of combined costs	Objects which consist of direct and indirect costs.

## INTRODUCTION

Full costing is a topical issue both worldwide and for Estonian universities; it is a comprehensive, interesting and wide-ranging subject and needs to be investigated further. University costing issues have been widely discussed at the EUA and European universities level since 2008, and just the implementation of full costing in universities has been the most popular university costing topic in recent years. Already in 2008, the EUA (European University Association) advised universities to start with this accounting method, giving a kind of basic concept, named as a roadmap to full costing (see Appendix I), for methodology development (EUA, 2008). In general, full costing is seen as an instrument for universities that helps provide a better input to the decision-making process; to ensure a more systematic analysis of activities and expenses; to provide a better opportunity for negotiations and support price formation; ensure more efficient distribution of inner resources; enable comparisons, etc.

The organisations that unite and represent universities perceive full costing as an instrument to achieve financial sustainability (EUA, 2008; RCUK/UUK, 2009). Full costing will assist universities in their efforts to become more efficient and spend their money on primary processes such as teaching and research (EUA, 2008). Hence, full costing enables to achieve several aims and therefore universities benefit from this in multiple ways. However, every university might have its own specific aims when implementing full costing.

According to the EUA, the full costing situation in Europe is as follows: the most advanced systems are in the United Kingdom, Ireland, Finland, Norway, Sweden and the Netherlands; advanced but diverse systems are used in some universities in Austria, Belgium, Germany and France; and no systemwide progress is detected and the system is used only in few universities in Portugal, Croatia, Turkey and etc. (Estermann, 2013).

The EUA has also pointed out that European universities have no uniform costing model either and the terminology is understood differently (EUA, 2008). The full costing methodology has developed and grown uniform since 2008 and today it is a subject to be explored in order to find common features in university costing in Europe and to suggest a model for university costing. It is possible to perform full costing in different ways, i.e. using different costing techniques, costing components (activities, cost drivers, cost objects, etc.), allocation mechanisms, etc. The focus in full costing and in this dissertation is just on accounting of **indirect costs**, allocating them to cost objects and converting into direct costs.

Indirect costs may also be regarded as one of the most widely and longest discussed topic ever in the field of costing, including the field of university costing.

The author of the dissertation has found in literature that the first known discussion of indirect costs (research grants) was held in the US government in 1958 (Ratnatunga & Waldmann, 2010) and the studies and writings in the field

are known to date back to 1923 (see for example the work of J. M. Clark “Studies in the economics in overhead costs”) and even earlier.

In Estonia also opinions have been expressed that full costing is inevitable in order to objectively assess universities’ teaching, research and other activities related expenses (Haldma, 2012) and the topic of indirect costs today is regarded as the most important issue in financial management of Estonian universities (Raudla et al., 2014).

Currently, full costing is not consistently performed in Estonian public universities. Since 2009, the University of Tartu has carried out projects to calculate full costs in universities based on the UK’s experience and the methods used there, known as a transparent approach to costing (TRAC) (Haldma, 2012).

The research **topic** of this doctoral dissertation is **full costing**, including the **model** and its **design and implementation**.

The basic research questions are: what to study? why to study? and how to study?, and that issue is explained next.

**The aim of this research is to elaborate a model of full costing for universities to better understand in-depth the issues of costing, which can be communicated internally and externally for universities’ aims.**

A conceptual framework in this dissertation brings together a number of related concepts to explain full costing. It gives a broader understanding of full costing, incl. costing techniques, elements of the costing system (resource expenses, activities, cost drivers, etc.) and other design, process and implementation issues. The conceptual framework of full costing offers managers a useful way to analyse the implementation and design of full costing, it demonstrates and explains the process and related issues. The research creates knowledge and understanding that would help to improve management. This model can be communicated to finance providers as well as internally in universities and this model can be used by managers. The finance providers are concerned to be aware of costing models. The need to explain and demonstrate the costing models in order to increase awareness of expenses and to increase transparency of using indirect costs is a topical issue.

This research may help in both the demonstration of full costing and in improving actual processes. This research attempts to help organisations improve the application of full costing by proposing a conceptual framework that might improve full costing practice and assist managers.

The main research question is formulated as follows: **What** is the full-costing methodology and a model representing it for universities and **what** are the factors that affect its design and implementation?

The reasons **why** full costing research is important are the following:

- full costing is a topical issue both worldwide and for Estonian universities;
- universities benefit from full costing in multiple ways;
- full costing is a practical problem for universities, etc.

The aim of this research was initiated by practical needs. In brief, the practical need was induced by the finance providers' requirement or concern to be aware of the costing methodology used at universities. The finance providers' concern is primarily the indirect costing methods. The universities' concern and interest is that the expenses (full costs) of all activities (projects) should be covered.

On the other hand, considering the limited financial resources and the need to ensure financial sustainability, expenses within an organisation should be allocated so that all projects (activities) cover both direct costs and the related indirect costs. Hence, considering the finance providers' and universities' requirements, concerns and interests, universities need a **methodology** that could be communicated to finance providers as well as internally, which could be used in financial management.

A question may arise **why** investigate this subject.

Costing theory offers several alternative ways of constructing a costing methodology; however, a question arises which specific costing techniques, cost drivers and other system elements to use. Additionally, the author of the dissertation had the question what the factors that influence costing methodology were and which factors influenced the implementation of the method.

The author of this dissertation believes that both internal and external processes should be managed in the best possible way, which in this context means that the costing methodology should be justified and tested on the basis of contemporary values.

To achieve the aim of the research, the author of the dissertation has investigated the costing theory along with the contingency theory and the concept of "success or failure factors", and based on this, has tried to develop a model for full costing for a university combining theoretical knowledge and practical experience.

In brief, to achieve the aim of the research the author studied the research topic through theory and practice and it is observable through the five chapters that explain **how** the research was conducted.

**The first chapter** describes the aim of research and the research questions and covers the philosophical assumptions and methodology of research in general and in parallel, as well as philosophical assumptions and methodology presented in this dissertation.

The topical issues in this chapter are the **aim of** research and the **research questions**.

To achieve the aim of research and to answer to the research question, which is: What is the full-costing methodology and a model representing it for universities and what are the factors that affect its design and implementation?, the research sub-questions were formulated as:

- What is the theoretical framework of costing that supports the creation of full costing methodology and a full costing model?

- What are universities' costing practices today and what can be learnt from this information when developing full costing methodology and a full costing model?
- What are the university specific factors that influence the design of a costing model and its implementation?
- What are the indirect cost rates based on the proposed FC model?

To better understand the aim of research and why these research questions are important, more explanations are presented in Chapters 1.1 and 1.2.

**The philosophical assumptions** of the dissertation are presented in Chapter 1.3.

Quantitative **methods** of research are used in the dissertation, the research methodology is presented in Chapter 1.4.

**The second chapter** investigates the conceptual framework of costing, including:

- aims of costing, aims of the university as public sector costing;
- costing techniques, including those used by universities;
- procedures of creating a costing system and elements of a costing system;
- design of a costing system and the factors that influence the implementation of the system.

The main output of the second chapter is a description of a conceptual costing model for universities created by the author.

Traditionally absorption costing is referred to as full costing method. The cost of a unit of product under the absorption costing method consists of direct materials, direct labor and both variable and fixed overhead. In this dissertation **the meaning of full costing differs from its traditional meaning**. By full costing of universities the author means the ability to identify and calculate all direct and indirect costs per activity and/or project that need to be considered to carry out these activities.

The aims of full costing in this dissertation are discussed as follows: prove the accountability (efficiency, effectiveness, economy); transparency and financial awareness; input to the decision-making process (e.g. prices of services or projects); method for distributing internal resources.

The costing technique adopted is activity-based costing (ABC), whereas the choice was made after analysing the traditional costing (TC) and time-driven activity-based costing (TDABC) as alternative techniques.

In this chapter, the author of the dissertation determines also the other essential elements for the model through costing theory.

While creating a costing system, one has to take into consideration the specific features of the particular institution (in that case a university), and certain conditions should be provided in order for the system realisation to be successful. The author of the dissertation analyses the development of a costing system by the means of contingency theory and the implementation of the system via success and failure factors.

**The third chapter** presents the empirical research of the dissertation. Two research projects which were conducted within the framework of the empirical research, are “The worldwide research: the costing practices in universities” and “The costing of TUT”. The detailed results of empirical research are presented in Chapters 3.1 and 3.2. These projects are supplemented by an overview of the full costing methods used by the University of Amsterdam (Appendix VII). This overview is relevant because the full costing method of the University of Amsterdam has been accepted by the European Commission.

The first research project (“The worldwide research: the costing practices in universities”) was targeted at costing practices in universities worldwide; the questionnaire (referred to as “The costing questionnaire (CAQ)”) was used for communicating information. The sample was formed of approximately 860 universities represented in the QS World University Rankings 2012. The questionnaire contained questions about the respondent’s environment (e.g. number of students, total expenses, etc.), autonomy, accounting.

The second research project (“The costing of TUT”) concerned TUT as the environment of the costing phenomenon under study. The research was based on the contingency theory concept and TUT statistics were examined in the following sections: structure and size; external environment; culture; technology; strategy.

**The fourth chapter** concerns specifically the costing model creation for TUT. The costing model creation process is described in detail. The indirect cost rate is actually calculated for TUT. The indirect cost rates for all other Estonian public universities are presented in this chapter.

**The fifth chapter** summarises the research findings. The issues in this chapter are also the research contributions and limitations of research. The ideas for future research are also identified in this chapter.

The research contribution is a topical issue in this chapter, to sum up the contribution. Based on the previous researches there is a lack of evidence about public universities’ costing systems and there is an opinion that assessment of the factors that influence successful implementation of costing system is an important research area. Based on the previous conceptual framework as a new approach for research was used. The conceptual framework covers costing theory, contingency theory and the concept of success and failure factors and public universities’ approach was also added. In the dissertation the author analysed and proposed a clear conceptual framework for costing, first theoretically and then it was tested and developed in practice.

The framework of research is an important issue, it is a guidance for the researcher and it is used to check, explain and interpret the findings. The general framework of the dissertation, which includes the structure, results and discussions, is presented in the figure 1.

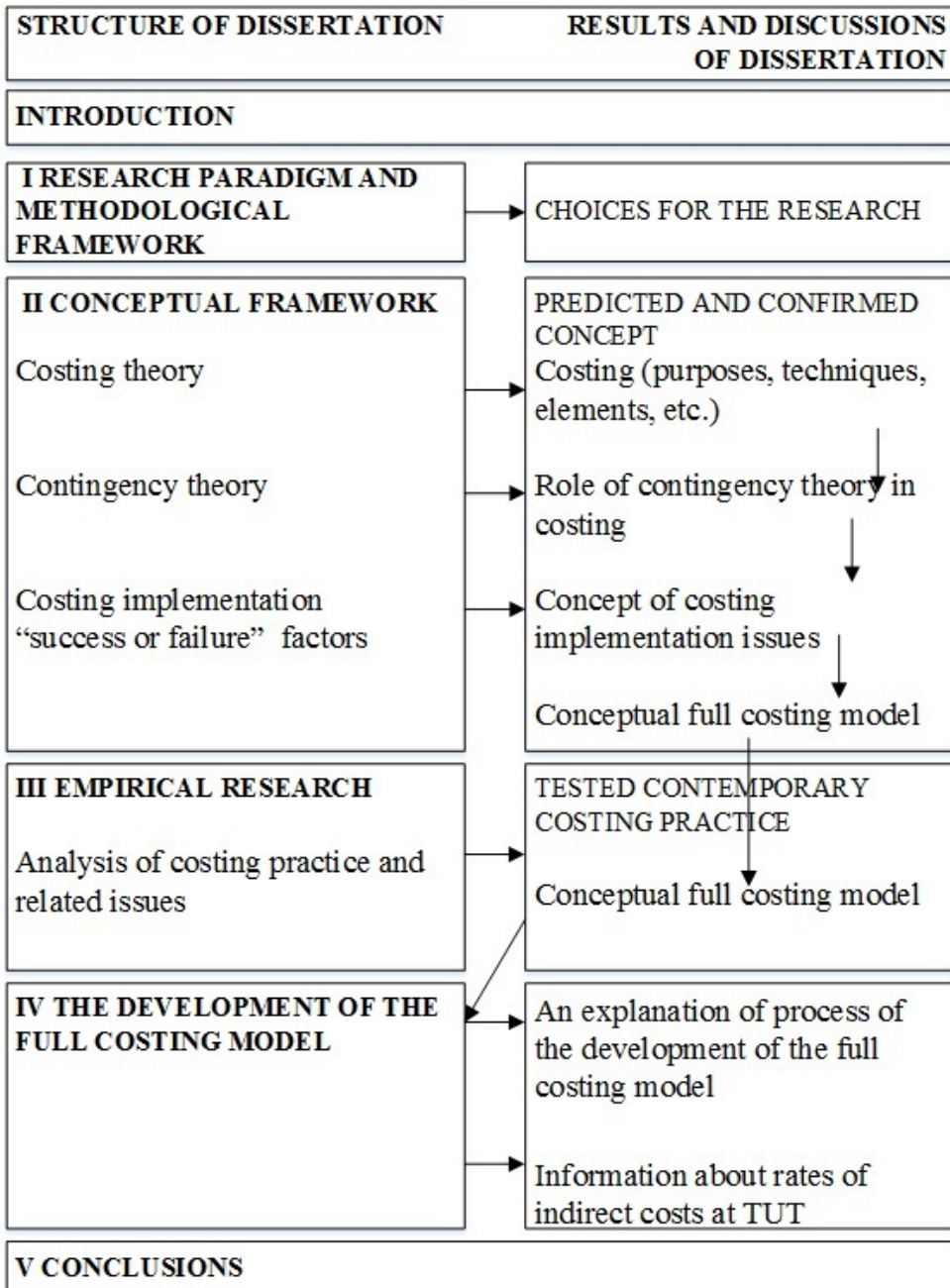


Figure 1. General framework of the dissertation  
 Source: (Compiled by the author)

Imenda claims, “without ‘theory’ research would lack direction – and this explains why in every research, one is expected to present one’s ‘theoretical’



framework” (Imenda, 2014, p. 186). In the second chapter the detailed view of the theoretical framework of this dissertation is presented.

The framework in this dissertation is conceptual, the related concepts are costing theory, contingency theory and “success and failure” factors of costing implementation, and a conceptual model used to represent a conceptual framework. The conceptual framework brings together a number of related concepts and gives a broader understanding of the phenomenon.

The validity of the conceptual model was tested by the author by investigating everyday practices of world universities.

To sum up, as a result of the research a conceptual full costing model is proposed, which is generally usable and can be communicated externally and internally for universities’ aims and provides a better understanding of costing.

The dissertation is based on the practical need that is examined through conceptual frameworks, is tested in research, as a result getting an elaborated model that would be implemented in practice.

# 1 RESEARCH PARADIGM AND METHODOLOGICAL FRAMEWORK

In the first chapter of the dissertation the author describes and discusses the special features of research, the aim of the research, the research questions, the philosophical assumptions and research methodology.

## 1.1 The aim of research

**The aim of this research is to elaborate a model of full costing for universities to better understand in-depth the issues of costing, which can be communicated internally and externally for universities' aims.** The aim of this research was initiated by practical needs (see below).

Broadly, the accounting systems may be classified as: financial accounting and management accounting, which both include costing. The focus in this dissertation is on costing, which is a component of management accounting and on that generally costing is completely in the discretion of the organisation. Communication is one role of management accounting (see, for example, Sunarni, 2013) and it plays a significant role in costing; there are interest groups inside and outside the organisation.

Generally, it is necessary to communicate both the costing methodology and the model representing it and cost information. In this dissertation the communication focuses on principles, i.e. methodology and model.

Traditionally, management accounting is oriented to internal processes, but today it deals also with some external processes, for example, policies (e.g., structural funds policies). Finance providers presume that universities have worked out methodologies for costing (e.g. CPDE, rules of 7FP).

The general practical problem for universities is how to demonstrate and communicate indirect costs, because for many projects and structural fund measures indirect cost covering is:

- not eligible;
- partly eligible; or
- it is too resource intensive to collect indirect costs and it is therefore given up.

The attitude toward covering indirect costs of business contracts has also been negative. Researchers have pointed out that firms often do not want to cover indirect costs, and also in contracts with ministries, the contracting authorities are increasingly less willing to reimburse indirect costs (Raudla et al., 2014).

Often, the problem is that universities are not aware of and do not calculate indirect costs of projects and activities, and these are not explained, demonstrated and used in the internal decision-making process either. Hence, the university projects and activities do not cover supplementary direct and indirect costs, “full costs”, threatening the financial sustainability of the university. The research in

the costing area creates knowledge and understanding that would help to improve management. In organisations there are many different users with different backgrounds, varying information needs, aims and the full-costing methodology and model representing **it helps to make things more transparent and creates understanding.**

It is important to elaborate **the model of full costing** that is verified and proven through theory and practice, and communicate it **to finance providers and to internal users.** This verified model is more credible. Therefore it is important to examine, what the costing methodology and the model representing it for universities is. There are various possibilities for costing, but is there a common one for universities?

Based on Bailey Chua states, accounting often becomes a “sacred” language that is publicly acceptable (Chua, 1986). What is a “sacred” language that is publicly acceptable in costing in the field of management accounting? Can the author determine the methodology that is generally acceptable?

Full costing is a topical issue both worldwide and for Estonian universities; it is a comprehensive, interesting and wide-ranging subject and that specific method is advised for universities by EUA. According to EUA, full costing methodologies become an essential tool of university management (Estermann & Claeys-Kulik, 2013). Based on that fact, the focus in this dissertation is on full costing methodology and the full costing model.

The idea of the previous question is to study the issues of full costing and ultimately provide a full costing methodology and a model representing it, which are verified and proven through theory and practice and suit universities in general.

The author of the dissertation determines the essential elements for the model through costing theory and practice. In this dissertation, the costing theory is defined as a set of various costing concepts, incl. approaches to classification of costing systems and its elements and procedures, etc.

The focus of full costing generally as well as this dissertation is just on **indirect costs**; the reasons are discussed below.

At first, it is common belief that the stress and complicity of full costing are just on indirect cost allocation. Secondly, the indirect costs of Estonian public universities are not covered by projects and something has to be changed. Thirdly, the finance providers are concerned to be aware of indirect costs and it requires relevant methodologies and models. Fourth, the need to explain and demonstrate the indirect costs and relevant methodologies in order to increase awareness of these costs and to increase transparency of using indirect costs is a topical issue. Indirect costs account for a considerable proportion of universities’ expenses today; there is constant pressure for indirect cost growth (e.g. arising from legislation, inflation, employees’ expectations) and it is extremely important to keep these costs under control and become aware of them.

There are factors in addition to those related to design of the full-costing methodology and model, and these factors are studied through contingency

theory. Why that theory? Contingency factors (e.g. competition, governmental policy, organisational culture, organisational structure, etc.) were found to be important influences in the implementation of ABC, the contingency theory has been used since the 1970s and is still in use (see Kongchan, 2013). The author's concern in relation to that question is: What are these factors and what role do these factors have in costing of universities and are they topical in the university context? That issue will be analysed in the dissertation.

Full costing is seen as a means of achieving economic sustainability, explaining and demonstrating expenses, including indirect costs.

It is essential to determine the full costing methodology and the respective model for universities. The methodology should be based on theory and practical solutions, and be acceptable as "sacred" language.

Such methodology and/or model is needed in order to communicate, create transparency and understanding to finance providers as well as to managers and employees.

In general, use of full costing promises benefits; but are all universities actually employing it? How important is the costing information for universities and are there any exceptions for costing of public universities? That issue is analysed in Chapter 2.1.1.

What are the issues in implementing costing in universities? The author of this dissertation studied this issue through success and failure concepts, which are presented and analysed in the following chapters.

Assessment of the factors that influence successful implementation of ABC is recognized as an important research area (see e.g. Fei & Isa, 2010).

The next chapter elaborates on the research questions of the dissertation by the research sub-questions and sub-sub-questions.

## **1.2 The research questions**

The research questions and/or hypotheses are critical components of a dissertation. There are three types of research questions defined: descriptive, relationship and difference type of questions.

The author classifies the current research based on research questions primarily as research with descriptive research questions. A descriptive question asks what a phenomenon is like and answers to that type of questions are received by the means of interviews, questionnaires, surveys or document analysis.

The main research question is formulated as follows:

**RQ: What is the full-costing methodology and the model representing it for universities and what are the factors that affect its design and implementation?**

Universities need to make sure they are sustainable and one way to do that is to use costing methods that provide a correct input to the decision-making process,

support pricing of projects, contracts and services, satisfy the requirements of finance providers and provide a more transparent overview of the university's activities. The recommended (e.g. by EUA) costing method that would ensure sustainability and appropriate input to the decision-making process is full costing. To better understand the content of the research question see more explanations in the previous chapter.

The research sub-questions and sub-sub-questions are formulated as follows:

**RQ<sub>1</sub>:** What is the theoretical framework of costing that supports creation of full costing methodology and a full costing model?

The first research sub-question is to study the theoretical framework of costing and build up a theoretical framework based model for university costing. There are alternative choices in full costing and in creating the respective systems, including costing techniques, costing procedures, costing elements, etc., to design a theoretical framework (methodology) of full costing and construct a theory based model that describes the main costing relationships for universities.

**RQ<sub>2</sub>:** What are universities' costing practices today and what can be learnt from this information when developing full costing methodology and a full costing model?

**RQ<sub>2.1</sub>:** What are the most frequently used cost drivers and how many cost drivers should be used by the university?

**RQ<sub>2.2</sub>:** What are the most frequently used activities?

**RQ<sub>2.3</sub>:** What are the most frequently used cost objects and other factors?

The objective of the second research sub-question is to study costing models used by other universities to identify the common practices that would provide input to the newly designed costing model. Universities' costing systems contain some common elements which design a typical costing model for universities, and which is generally acceptable.

**RQ<sub>3</sub>:** What are the university specific factors that influence the design of a costing model and its implementation?

The third research sub-question is to study factors that influence the design and implementation of costing. A costing system should be created taking into consideration the specific features of the particular institution, in our case university, and in order for the system implementation to be successful, certain conditions should be guaranteed.

Different organisations have different needs for costing systems and the design of costing systems is influenced by different factors.

Costing is clearly organisation specific, depending on certain factors. These factors generally are organisation's structure and size, environment and technology (Waterhouse & Tiessen, 1978; Otley, 1980), culture (Harrison and McKinnon 1999), and strategy (Langfield-Smith 2006).

Researchers have focused attention on factors that influence the implementation of costing methods. Next, some newest research papers that investigate impact of different factors on costing are presented.

Al-Omiri and Drury studied the factors that influence the complexity of a costing system: importance of cost information, product diversity, cost structure, intensity of the competitive environment, size of the organisation, the quality of information technology, etc. (Al-Omiri & Drury, 2007). Rbaba`h has examined the relationship between company characteristics such as industry type, number of employees, number of products, level of overheads and ABC implementation (Rbaba`h, 2013). An aim of Mansor et al. was to find out how managers feel about costing, especially how useful they believe it is in providing information and in helping them to make better decisions (Mansor et al., 2012).

Elhamma and Fei studied the relationship of ABC with business strategy (Elhamma & Fei, 2013). Charaf and Bescos investigated organisational (importance of costs for decision-making, complexity/diversity of business unit, proportion of indirect costs) and cultural (outcome orientation, innovation, team orientation, attention to detail) factors as affecting costing (Charaf & Bescos, 2013). Baird et al. studied the relationship of organisational structure and organisational strategy in connection with ABC implementation as well as the size of organisation, utilisation of cost information in the decision-making, and culture (Baird et al., 2004).

Why some organisations adopt and others not, or why some organisations are successful in implementing costing methods and others less successful – this topic has been studied, and Maurice Gosselin, professor of management accounting, has formulated the respective paradox.

Many research papers and articles (Gosselin, 1997; Fladkjær & Jensen, 2011; Kennedy & Affleck-Graves, 2001; Fawzi, 2008; Wnuk-Pel, 2010; Moisello, 2012; Charaf & Bescos, 2013) address the paradox formulated by Gosselin, which although correctly formulated in the context of ABC, is applicable also in a broader context, including other costing methods. ABC paradox – if ABC has demonstrated benefits, why are more firms not actually employing it? (Gosselin, 1997, p. 105).

To explain the paradox, various organisational factors have been investigated by researchers (Shield, 1995; Fei & Isa, 2010, 2010a; Velmurugan, 2010; Căpuşneanu et al., 2011; Fawzi, 2008; Hasan & Akter, 2010; Abdallah & Li, 2008; Baird et al., 2004; Khozein & Dankoob, 2011; Askarany & Yazdifar, 2007; Cotton et al., 2003; Salim & Alhabshi, 2012; Byrne et al., 2007; etc.).

Based on the above, the factors that influence costing practices, raising the research question **RQ<sub>3</sub>** are analysed.

**RQ<sub>4</sub>:** What are the indirect cost rates based on the proposed FC model?

The objective of the fourth research sub-question is to study what the real rates of indirect costs are.

Today, the problem is that most of the finance providers have established an equal rate or limit for indirect costs to the extent of which, or under which conditions, indirect costs can be covered. Is the rate established by finance providers sufficient to cover the university's indirect costs? TUT has not calculated the general indirect cost rates so far. The fourth research question has been formulated with the aim to answer the question whether the established indirect cost rates cover the university's indirect costs.

The relationship between the data collection and the research questions is expressed in the figure 2.

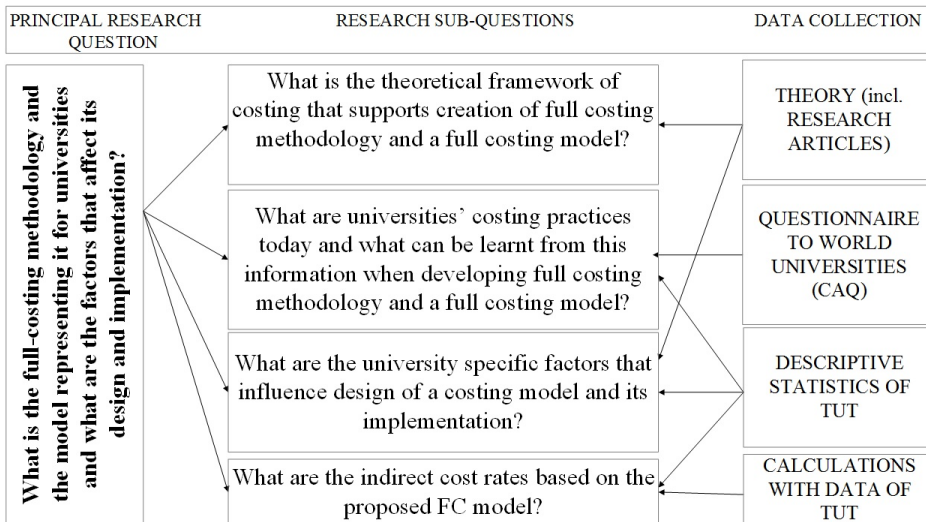


Figure 2. Linking data collection methods to the research question

Source: (Compiled by the author)

The research questions and the data collection methods are important components of the dissertation. Figure 2 shows how the research questions and the data collection are related.

The topical features of research are also philosophical assumptions. The next chapter of the dissertation describes the philosophical assumptions.

### 1.3 Philosophical assumptions

Generally, a philosophy is the analysis of general and fundamental problems, for example such, which connect with reality, existence, knowledge, values, etc.

A research philosophy includes a belief about the way in which data relating to a phenomenon should be gathered, analysed and used.

The term paradigm in this dissertation is understood as a set of linked assumptions, including philosophical assumptions, concepts and the common language about the way the world works (set of basic beliefs) in terms of this dissertation. Many researchers, see for example Guba and Lincoln, or Burrell and

Morgan, have used the term paradigm, in connection with ontological, epistemological and methodological assumptions or when speaking about social theories (Guba & Lincoln, 1994; Burrell & Morgan, 1979).

It is crucial for researchers to select an appropriate paradigmatic framework because a paradigm provides us with the world of views that defines the nature of the world as well as the range of possibilities for its holders in relation to reality (Guba & Lincoln, 1994).

It has been argued that “to be located in a particular paradigm is to view the world in a particular way” (Burrell & Morgan, 1979, p. 24). Every researcher has her/his own inner beliefs and understandings, as our choices are related to what we are (identity), where we come from (background), what our values are, or how we perceive the world around us. This chapter seeks to describe the philosophical assumptions of this dissertation and the author’s viewpoints in that issue.

According to Lukka, “Many researchers are probably not conscious of the philosophical assumptions which they have implicitly adopted in their own research, and unaware of the wide range of methodological approaches that they could apply” (Lukka, 2010, p. 111). Therefore it is relevant to analyse the assumptions of the research and possible theoretical choices between different paradigms, which enables us to detect the newest development trends in the field and make better and more diversified choices when deciding the research methods.

The philosophical choices of this dissertation are presented and analysed and philosophical assumptions are made as follows.

There exist two sets of assumptions: about social science and about society, and the social science assumptions include assumptions about the *ontology* (realism versus nominalism), *epistemology* (positivism versus antipositivism), *human nature* (determinism versus voluntarism) and *methodology* (nomothetic versus ideographic) (Chua, 1986, p. 603).

Ontology studies the existence, or being as such, and the ways of existing, determining the research assumptions, which serve as the basis for giving meaning to the social world, or ontology poses a question about the nature of reality.

Epistemology is understood as a science of methods or knowledge, including the study of the origin, nature and limits of human knowledge, determining the ways of gaining knowledge about the social world.

Human nature is interpreted as the way of acting, thinking and reacting to the environment.

Methodological assumptions indicate the research methods deemed appropriate for the gathering of valid evidence, or methodology is focused on how researchers can gain knowledge from the world.

There are two assumptions about society, one linked with regulation, order and stability and the second one linked with the fundamental divisions of interest, conflicts and unequal distributions of what provide the potential for “radical change” (Hopper & Powell, 1985, p. 432).



To sum up. Developing a philosophical perspective requires that the researcher make several core assumptions concerning two dimensions: the nature of society and the nature of science (Burrell and Morgan, 1979). The society may be described through dimensions, regulation versus radical change, and the social science may be described through objectivity versus subjectivity, and ontology, epistemology, human nature and methodology.

There are a number of paradigms that have influenced research in social sciences, including positivism, constructivism, pragmatism, critical theory, critical realism, realism (Chua, 1986; Guba & Lincoln, 1994).

The positive and constructive paradigms have typically been popular among researchers as two main approaches to scientifically investigate issues of life and social sciences (Asghar, 2013).

The most popular in social sciences is the classification of paradigm by Burrell and Morgan. They have said that all potential ways of interpreting and investigating the world may be conditionally described through dimensions: objectivity versus subjectivity, and regulation versus radical change, and within four paradigms: radical humanism, radical structuralism, interpretive and functionalism (Burrell & Morgan, 1979; Hopper & Powell, 1985). The position of this dissertation in this framework is shown in the figure 3.

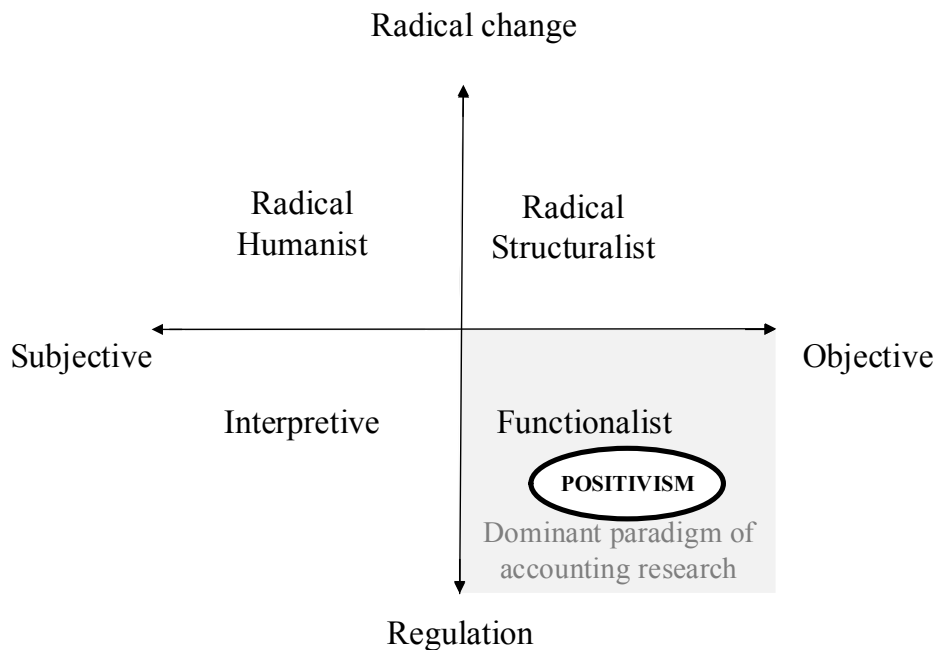


Figure 3. Burrell and Morgan's (1979, p.29–30); Hopper and Powell's (1985, p. 432) paradigm framework and positioning of this dissertation in this framework  
Source: (author's modification)

The topic of this dissertation focuses on the field of accounting.

Accounting is currently a multi-paradigmatic discipline, but one paradigm (the functionalist/positivist mainstream) is dominating (Hopper & Powell, 1985; Merchant & Otley, 2007; Vaivio, 2006; Lukka, 2010). The assumptions of the functionalist paradigm tend to be realist, positivist, determinist and nomothetic. Positivism strives for objectivity, measurability, predictability, controllability, patterning, the construction of laws and rules of behaviour, and the ascription of causality. Hence, one possible choice for this dissertation and generally most usable paradigm in accounting research is the positivist paradigm. The alternative paradigm for this dissertation and accounting research is interpretive paradigm and according to Cohen et al., the interpretive paradigms strive to understand and interpret the world in terms of its actors (Cohen et al., 2007). Of course, there exist more alternative choices for a paradigm.

For Burrell and Morgan, the major alternatives to the functionalist paradigm (which corresponds to the mainstream accounting research, seeking to provide essentially rational explanations to social phenomena, based on objectivism) are the interpretive paradigm and the critical paradigm(s) (Lukka, 2010, p.112). Critical theory stresses the importance of considering context and values, it assumes that there is a “reality” that is apprehendable and a reality is created and shaped by social, political, cultural, economic, gender-based or etc. factors that are taken to be real. In this dissertation mainly, the positivist and interpretive paradigms have been analysed.

Ontologically, mainstream accounting research is dominated by a belief in physical realism – the claim that there is a world of objective reality that exists independently of human beings and that has a determinate nature or essence that is knowable (Chua, 1986, p. 606).

According to Päril, the functionalist paradigm-based ontology assumes that an organisation’s social system consists of concrete, empirical phenomena that exist independently of its managers and employees. Organisations are treated as stable empirical phenomena that have, or should have, unitary goals, normally profit maximization. This ontology assumes that knowledge can be acquired through observation and can be built piecemeal. Human nature is taken to be calculative and instrumentally rational, but essentially passive (Päril, 2012, p. 23). Generally, the functionalist paradigm possesses a pragmatic orientation, it means that paradigm concerns to understand society in a way that generates knowledge which can be put to use (practice) (see e.g. Burrell & Morgan, 1979; Hassard, 1991).

The positivist paradigm presumes that science is objective and free of values and empirics confirms the theory. Positivism means everything (things, phenomena) that exist in reality and that can be possibly perceived (primarily with senses) and identified by humans. It is often problem-oriented in approach, concerned to provide practical solutions. However, the positivist approach in accounting research has also been criticised; according to Lukka, it seeks primarily to discover law-like regularities that are testable with empirical data sets

and ignores unique phenomena, which are regarded as uninteresting noise (Lukka, 2010, p. 112).

The constructivist/interpretive paradigm is based on the conception that society is socially constructed and the social phenomena are studied through individuals themselves; new theories can be developed based on research results.

An interpretive methodology attempts to describe, understand and interpret the meanings that human actors apply to the symbols and structures within the settings in which they find themselves (Senik, 2009, p. 7) and the interpretive science does not seek to control empirical phenomena. The aim of the interpretive scientist is to enrich people's understanding of the meanings of their actions, thus increasing the possibility of mutual communication and influence.

Overall, the accounting model in this dissertation should take into account the generally accepted approaches and achieve approval from different stakeholder groups. An attempt is made to construct a full costing model based on best practices, a model that would be generally accepted and applicable by universities in general. The model will be constructed at the example of one university, using the universities' worldwide practices and theories.

Based on the results of analyses and the aim of the dissertation, the best assumption of the dissertation was chosen – the positivist paradigm. The main reasons for choosing the positivist paradigm are described as follows:

- 1) The aim of this dissertation is to find out what the best practices of using costing for universities are (discover the regularities) and in these circumstances, the positivist paradigm is appropriate.
- 2) The costing practice in this dissertation was studied by CAQ and it was impossible to take into account the individuals' impact. This means, the facts are regarded as the truth and the individuals' impact is not considered. This approach suggests the positivist paradigm.
- 3) The accounting model in this dissertation is expected to provide a solution to be implemented in practice. That is the view of the positivist paradigm.
- 4) There are more reasons, for example, the general acceptance (dominating paradigm), etc. for choosing the positivist paradigm.

Additionally, to answer the research questions a research methodology is needed. There are several methodologies available, the issue of what methodology to choose for this dissertation is discussed by the author in the next chapter.

## **1.4 Research methodology**

Research is the process of collecting, analysing, and interpreting data in order to understand a phenomenon. The three common approaches to conducting research are the quantitative, qualitative and mixed method.

Specific instruments for data collecting (for example: interviews; questionnaires; observation; tests; accounts; biographies and case studies; role-playing; simulations; personal constructs) and methodologies (for example:

survey; experiment; in-depth ethnography; action research; case study; testing and assessment) are described (Cohen, 2007).

Based on the aim of the dissertation and on the research question, quantitative methods of research are used in this dissertation. Quantitative research usually is one of two types, experimental or descriptive. This research is descriptive. Quantitative research is of better use when looking for general features. The research question is what universities' costing practices are today and what can be learnt from this information when developing full costing methodology and a full costing model? (the aim was to discover the regularities).

The positivist perspective is traditionally associated with quantitative methods of data analysis. As this dissertation focuses on the positivist philosophical perspective, which is related to the functionalist approach of social science, it provides rational explanations to social phenomena based on objectivism, and that indicates the quantitative approach.

The basic characteristics of quantitative research methods are presented in Table 1, and this research is characterized by quantitative factors which are presented in this table.

According to Creswell (2003), the methodology of quantitative research maintains the assumption of an empiricist paradigm. The research itself is independent of the researcher. As a result, data is used to measure reality objectively. Quantitative research creates meaning through objectivity uncovered in the collected data. The findings from quantitative research can be predictive, explanatory, and confirming. (Williams, 2007, p. 66)

In this dissertation the research question is "what is?". Descriptive research attempts to describe, explain and interpret conditions of the present i.e. "what is/exist" (Best, 1970; Cohen et al., 2007; Williams, 2007). The research projects were targeted at costing practices in universities worldwide and TUT.

The aim of descriptive research is to examine a phenomenon that occurs. A descriptive research is concerned with conditions, practices, structures, differences or relationships that exist, opinions held, processes that are going on, or trends that are evident. The following descriptive research methods, for example, are described: case study, document analysis and analytical method.

Descriptive case study research involves describing and interpreting events, conditions, circumstances or situations that occur in the present. In this dissertation the aim is to find out what the contemporary costing practice is in universities worldwide.

The documentary analysis was used in this dissertation, and the documentary analysis is related with the study of existing documents.

The analytical method involves the identification and interpretation of data already existing in documents, pictures, etc. and it offers understanding of the existing/available data, and the analytical method was used in this dissertation.

Contextual information is very essential for an accurate interpretation of phenomena.

Table 1. Basic characteristics of research methods

	Quantitative	Qualitative
Aim of research	<ul style="list-style-type: none"> <li>▪ Explain and predict</li> <li>▪ Confirm and prove</li> <li>▪ Verify the theory</li> </ul>	<ul style="list-style-type: none"> <li>▪ Describe and explain</li> <li>▪ Explain and interpret</li> <li>▪ Create a theory</li> </ul>
Nature of research process	<ul style="list-style-type: none"> <li>▪ focused</li> <li>▪ variables known</li> <li>▪ certain limits</li> <li>▪ fixed design</li> <li>▪ context free</li> <li>▪ biased view</li> </ul>	<ul style="list-style-type: none"> <li>▪ holistic</li> <li>▪ variables unknown</li> <li>▪ flexibility</li> <li>▪ developing design</li> <li>▪ context related</li> <li>▪ subjective view</li> </ul>
Methods of data collection	<ul style="list-style-type: none"> <li>▪ large representative sample</li> <li>▪ standardised instruments</li> <li>▪ researcher needs to be objective</li> </ul>	<ul style="list-style-type: none"> <li>▪ small informative sample</li> <li>▪ non-standardised instruments</li> <li>▪ objectivity harder to gain</li> </ul>
Presentation of results	<ul style="list-style-type: none"> <li>▪ numbers</li> <li>▪ statistical indicators</li> <li>▪ graphs, charts</li> </ul>	<ul style="list-style-type: none"> <li>▪ words</li> <li>▪ descriptions, citations</li> <li>▪ videos, photos, illustrations</li> </ul>

Source: (Compiled by the author on the basis of Taylor & Trumbull 2005; Niglas 1999; etc.)

The first data collection method used by the author was the survey method consisting of questionnaire. The questionnaire (CAQ) was formulated as a structured questionnaire with close-ended questions. The respondents were given an opportunity to comment on their answers in their own words or supplement the multiple-choice answers. Quantitative research investigates mainly how often/much a phenomenon, characteristic or property occurs. The questionnaires were sent by e-mail. Data processing was organised graphically, in diagrams and tables. For presenting data, descriptive statistics was used: numbers, percentages, etc. The questionnaires were sent to all universities represented in the QS World University ranking<sup>1</sup> list. A more detailed description of this research will be presented in Chapter 3.1, where supplementary reasoning of why just this ranking list was chosen, is provided.

The second data collection method used was descriptive research, which involves identification of attributes of a particular phenomenon on an observational basis (Williams, 2007). The phenomenon, costing of TUT, was analysed by the means of legislation and other documents.

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<sup>1</sup> The QS World University Rankings are annual university rankings published by British Quacquarelli Symonds.

## 2 THE CONCEPTUAL FRAMEWORK

The topic of this dissertation is the **full costing model** and its **implementation in universities**. The aim of the research is to elaborate a model of full costing for universities to better understand in-depth the issues of costing, which can be communicated internally and externally for universities' aims.

According to the topic and to the aim, the dissertation is specifically focused on full costing in universities as **public sector** institutions and on the design and implementation of the respective systems.

This chapter analyses the alternative choices in full costing and in creating the respective systems, including costing techniques, costing procedures, costing elements, etc. The aim is to design a conceptual framework of full costing and construct a conceptual model that describes the main costing relationships for universities. A costing system should be created taking into consideration the specific features of the particular institution, in our case university, and in order for the system implementation to be successful, certain conditions should be guaranteed.

In this dissertation, the creation of costing system is analysed by the means of **contingency theory** and the system implementation by the means of **success and failure factors** and the dissertation focuses on **universities**. The general conceptual framework of the dissertation is presented in Figure 4.

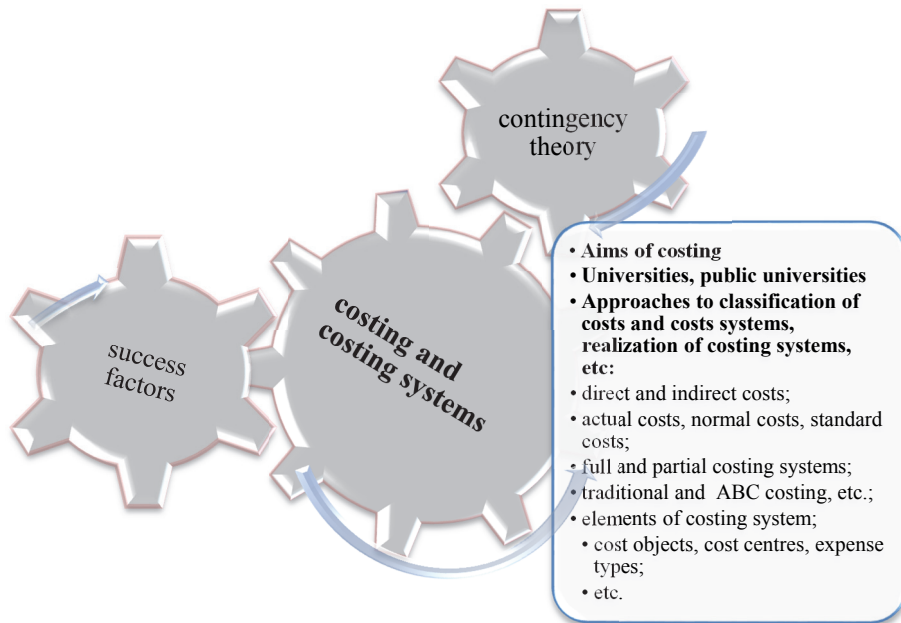


Figure 4. General conceptual framework of the dissertation

Source: (Compiled by the author)

Since the emphasis and complicity of full costing is just on indirect costs and their allocation, the specific focus in this dissertation is on **indirect costs**. Allocation of indirect costs and the selection of appropriate accounting techniques is one of the most challenging tasks in cost allocation in an organisation.

The first research question is what the theoretical framework of costing that supports creation of full costing methodology and a full costing model is. The idea of the research is to study issues of full costing and ultimately provide a full costing methodology and a model representing it, which are tested through theory and practice and suit universities in general. The conceptual framework plays a significant role in the dissertation and therefore the framework is analysed and discussed extensively, and the reasons for choosing the framework are presented below.

The first research sub-question (RQ<sub>1</sub>) was to study the theoretical framework of costing and build up a theoretical framework based model for university costing. There are alternative choices in full costing and in creating the respective systems, including the aims of full costing, costing techniques, costing procedures, costing elements, etc. to design a theoretical framework (methodology) of full costing and construct a theory based model that describes the main costing relationships for universities and these alternative choices are analysed in this chapter.

The objective of the sub-question (RQ<sub>3</sub>) was to study the theoretical framework of contingency theory and find out the factors that influence the design of costing. The aim of the research was also to study the “success and failure” concepts and find out the factors that influence the implementation of costing. Among other issues, the public universities’ approach was covered.

Many researchers have drawn attention to the importance of the aims of costing, and therefore it is relevant to discuss this topic. The author discusses the topic in the following chapter.

## 2.1 Aims of costing

By a costing system the author means the framework used for costing, including e.g. **the measurement and accumulation methods, the scope and techniques of allocation, the procedures and elements** of a costing system.

In 1923, Clark came up with the idea of “different costs for different purposes” (Clark, 1923, p. 175). This idea conveys the opinion that depending on the aim of costing, or what data users need, different costs are counted, for example, fixed and variable, direct and indirect, controllable and uncontrollable, administrative costs, etc., and therefore the costing systems are also different. Hence, the first task in determining a costing system is to define the aim of costing, what we need our costing system for.

Many researchers have attempted to define the **aim** of costing, for example, Sharma & Ratnatunga (1997), Haldma & Karu (1999), Khozein & Dankoob (2011), etc., and the aims are generally related with the reimbursement, price,

efficiency, decision-making, assessment of an entity's performance, planning, standard setting, identification, reporting of the quantity of resources and control over cost aims (Sharma & Ratnatunga, 1997; Haldma & Karu, 1999; Khozein & Dankoob, 2011).

Cherington, Hubard and Luthy (1985) have proposed a possible classification of costs, which is presented in Table 2 (Perčević & Lutilsky, 2008).

Table 2. Cost classification

Cost classification	Major sub-classifications
Time period	Historical costs, budgeted costs
Management function	Manufacturing costs, selling costs, administrative costs
Accounting treatment	Product costs, period costs
Traceability to product	Direct costs, indirect costs
Cost behaviour	Variable costs, fixed costs
Decision significance	Relevant costs, irrelevant costs
Managerial control	Controllable costs, uncontrollable costs

Source: (adopted from Perčević & Lutilsky, 2008)

Costing involves cost allocation (application, distribution), cost assignment as well as cost accumulation. One of the most important and most challenging activities in cost determination is definitely **cost allocation**, which researchers discuss in the context of **indirect costs**.

For the aim of cost allocation, the relevant cost classifications are: traceability to product; management function; accounting treatment (Perčević & Lutilsky, 2008), this dissertation focuses on traceability to product.

This dissertation concentrates on **cost allocation** and costs are classified based on their relationship with cost objects as **direct** and **indirect costs**.

Researchers have pronounced that **one costing system is not enough** for an enterprise to fulfil all costing aims (e.g. Kaplan, 1988; Brierley et al., 2001).

Financial costing is regulated by international standards, meaning that the generated information is comparable across different entities and countries, and such accounting is obligatory. The costing information generated for financial accounting is sufficient, for instance, for auditors. It could not be sufficient, for instance, for enterprise management, since it does not provide information about micro-level costs and sufficient input to the decision-making process either. Some researchers have also pointed this out (see e.g. Cooper & Kaplan, 1991; Granof et al., 2000). Hence, a university needs at least two costing systems: one for estimating reserves for financial accounting, and another one to satisfy the management accounting needs by generating information at the university's micro-level, including activities, services, projects, etc., and to provide correct



input to the decision-making process. Correct input in this context is input that gives the best possible result, considering the aim of costing.

No international standards have been established for management (managerial) accounting and enterprises are free to choose the costing methods. Some countries have established their national costing standards, e.g. the UK.

It is important to emphasise that the first step is to establish the aims of costing, and then create a relevant costing system according to the aim. The topic of the dissertation – full costing – and its definition dictates certain rules to the costing system, for example, classification of costs as **direct and indirect costs**. The main emphasis in full costing is just on **indirect cost allocation**. As the aim of costing dictates certain conditions to the costing system, and considering the significance of the aim in the costing system development, next the author specifies the aims of universities' costing and analyses the aims of costing for universities as public sector organisations. The relevant issue is, how important the costing and costing information is for public universities and if there are any exceptions for costing of public universities (that issue is analysed in Chapter 2.1.1).

### 2.1.1 Aims of costing in the public sector

In general terms, the public sector consists of governments and all publicly controlled or publicly funded agencies, enterprises, and other entities that deliver public programmes, goods, or services (IIA<sup>2</sup>, 2011). The composition of the public sector varies by country, but in most countries the **public sector** includes, for example, such services as health care and **education**.

In Estonia all public universities are in the public sector – public sector entities are legal persons in public law and universities the activities of which are regulated by the Universities Act, are legal persons in public law (GRSA<sup>3</sup>, 2003; UA<sup>4</sup>, 1995).

In the business sector, activities are directed to profit earning and maximisation, in the public sector, the aims of different activities are provision of public services, maximal national welfare and development. IFAC<sup>5</sup> has defined the aim of the public sector as “Generally, the main aim of public sector entities is to achieve outcomes – enhancing or maintaining the well-being of citizens – rather than generating profits”.

The government implements its policies through the public sector and its services and considering the unique role of the public sector in carrying out national policies and its role in providing well-being of its citizens, there have been different attitudes toward costing in this sector.

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<sup>2</sup> The Institute of Internal Auditors (2011). Supplemental Guidance: Public Sector Definition.

<sup>3</sup> General rules for state accounting (Riigi raamatupidamise üldeeskiri).

<sup>4</sup> Universities Act (Ülikooliseadus).

<sup>5</sup> The International Federation of Accountants (2013). Good Governance in the Public Sector—Consultation Draft for an International Framework.

It can be argued that the costing of public services is not important considering the special importance and status of the public sector. According to Türk et al., more important than efficiency is to ensure equal opportunities and fair dealing (Türk et al., 2011, p. 7).

However, today it is not important, which sector an enterprise belongs to and in general, it is believed that activities of a successful organisation should be effective, economical and the organisation should be able to eliminate the activities that incur losses (Krishnan, 2006; Melese et al., 2004). Universities should prove their effectiveness, efficiency of using resources and compatibility of activities and a university's future depends on how its internal processes can be adapted to the changing external environment (Santiago et al., 2006). The efficiency, effectiveness and economy are also known as "the three Es" concept (see, for example, Valderrama & Sanchez, 2006). Some researchers, for example, Hardy, have pointed out that weaker projects should be abandoned also in the public sector (Hardy, 1990). At the same time, other researchers have argued that it is very difficult to achieve this kind of behaviour in the public sector, for example, in universities. Because universities are more decentralised than private enterprises, with specialised areas and sophisticated decision-making processes and they depend on government financing and regulations, and academic freedom. (Kase, 2013)

According to Haldre et al., the efficiency of services and results can be measured above all by public approval and satisfaction of needs (Haldre et al., 2005). However, in parallel with the provision of services, one must take into consideration the economic side of the provision of services. Although the aim of the public sector cannot be only financial (saving money), it still has to consider increasingly more the costs of providing services, meaning that resources in the provision of services must be used efficiently, effectively and economically.

Public sector finance in the main part concerns the state budget, and therefore the transparency of using resources is underlined when speaking about public sector institutions.

According to Reich and Abraham, public sector stakeholders often want to know that the funds they provide have been wisely used (Reich and Abraham, 2006). The need to explain and demonstrate the use of indirect costs in order to increase awareness of these costs and to increase the transparency of using indirect costs has been underlined also by Estonian researchers (Raudla et al., 2014).

Efficiency, effectiveness, transparency, and financial awareness of the public sector are also stressed by ideologists of the New Public Management (NPM) and New Public Financial Management (NPFM).

Researchers have underlined that the New Public Management (NPM) framework should encourage the public sector to apply the management principles used in the business sector, including monitor efficiency and effectiveness of services provided, and evaluate outcomes of management decisions (e.g. Lapsley, 1999; Haldma & Meiesaar, 2002; Türk et al., 2011).

Haldre et al. and Türk et al. link components of NPM to transparency of management, management practices of the business sector, cost control, measurement of results and output control, and NPFM (New Public Financial Management) to managerial outcome responsibility and financial awareness (Haldre et al., 2004; Türk et al., 2011).

To sum up, it can be said that the changes that have occurred have led to decentralisation of the decision-making power and a university is responsible for its performance, including costs. Public service providers are expected to be effective, efficient, economical and transparent. Costing is seen as a precondition for attaining efficiency, effectiveness and economy, and costing is appreciated in the public sector. Financial awareness and how to increase it in the decision-makers is the key issue of management and sustainability today.

Financial awareness is important in pricing as well as in negotiating project finance. There is competition also for public sector organisations and between them, and therefore price formation and project cost calculation have turned important in own revenue raising as well as in negotiations with finance providers.

Finance providers presume, for one thing, that public sector institutions have worked out methods for costing (CPDE<sup>6</sup>, 2007).

Clark lists among the principles of determining overhead (indirect) costs, for example the ability to pay, casual responsibility, benefit or use (Clark, 1923, p. 32). Indirect costs should be allocated to structural units as well as products according to how the structural unit or service has consumed resources, signifying a fairer basis of allocation.

Considering the public sector developments, the aims of the public sector costing, including university's costing, and the aims discussed specifically in this dissertation are defined by the author as follows:

- Prove the **accountability** – increase performance efficiency, effectiveness, economy and ensure **sustainability**;
- Provide greater **transparency** of the activities and increase an institution's internal **financial awareness**;
- Provide a better **input to the decision-making process**, including, for example, prices of services or project negotiations with finance providers, and offer the finance providers a **costing methodology**;
- Methodology for **internal resource (indirect costs) allocation**.

The aims of costing provided in this chapter are similar with the aims provided by the EUA (see below).

In general and according to EUA, the aim of full costing is seen: to provide a better input to the decision-making process; to ensure a more systematic analysis

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<sup>6</sup> Conditions and Procedure for Determining the Eligibility or Non-eligibility of Structural Support Expenses for Aid in the Period 2007-2013 (Perioodi 2007–2013 struktuuritoetuse kulude abikõlblikkuse või mitteabikõlblikkuse määramise tingimused ja kord).

of activities and costs; to provide a better opportunity for negotiations and support price formation; ensure a more efficient distribution of inner resources; enable comparisons, etc.

The relevant issue is what the costing situation in universities is and that issue is analysed in Chapter 2.1.2.

### 2.1.2 Costing at universities

Implementation of costing at universities and the related issues have been discussed by many researchers, for example, Goddard and Ooi, 1998; Tatikonda and Tatikonda, 2001; Cropper and Cook, 2000; Granof et al., 2000; Dražić-Lutilsky and Dragija, 2012; Amir et al., 2012; Valderrama and Sanchez, 2006; Kuchta and Parkitna, 2011; Krisnhan, 2006; Haldma, 2012; Greiling and Kirchhoff-Kestel, 2014; etc.

Since 2008, full costing has been widely discussed at the EUA and European universities level as a suitable costing method for universities. Considering the topicality of costing, full costing is investigated in greater detail in this dissertation.

Full costing is seen as an instrument that for universities helps provide a better input to the decision-making process, to ensure a more systematic analysis of activities and costs; to provide a better opportunity for negotiations and support price formation, ensure more effective distribution of inner resources, and enable comparisons.

Traditionally absorption costing is referred as the full costing method. The cost of a unit of product under the absorption costing method consists of direct materials, direct labor and both variable and fixed overhead. Absorption costing allocates a portion of fixed manufacturing overhead cost to each unit of product, along with the variable manufacturing cost. **In this disseratation the meaning of full costing is different.** By full costing of universities the author means the ability to identify and calculate **all direct and indirect costs** per activity and/or project that need to be considered to carry out these activities.

Universities use different approaches to full costing implementation with certain common features. It has also been pointed out that full costing models are different and depend on certain factors in a particular university, including for instance mission, profile, financing and management structure (EUA, 2008). There are some general principles what to take into account in implementing full costing. The common features of university's costing are described in the Figure 5.

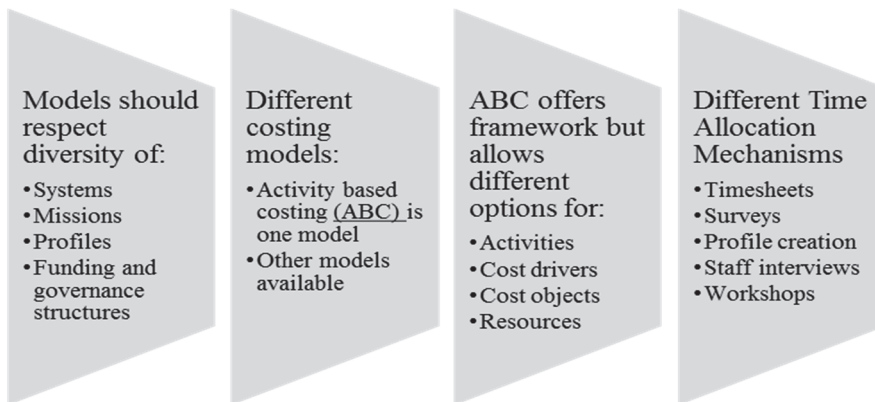


Figure 5. Common options for costing  
Source: (Estermann, 2013)

In general, full costing is based on ABC, but other options are possible. Full costing systems presume assigning of all costs, direct and indirect costs, to cost objects.

Direct (traceable) costs are directly related to the activity, cost centre, or cost object, and it is not hard to trace them to the activity, cost centre or cost object. See, for example, a statement by Clark, “Direct costs, as we have seen, are costs visibly traceable to a given job order or class of business without the need of difficult studies or allocations, but merely by watching the process” (Clark, 1923, p 56).

The critical role of costing is to assess the costs of products and services and all costing models seek to find the “true” cost of a particular product, service, segment or entity (Chiang, 2013).

It is well known, that costing systems try to count and allocate costs according to consumption by cost objects as accurately as possible, find for indirect costs just the “fair share” to assign to this cost object and to avoid over- and undercosting.

Since 2008, attempts have been made to design a common understanding of costing and its elements suitable for universities. By 2014, a common understanding has been reached with respect to concepts used in costing, a costing techniques and costing system elements (see Figure 5). However, there is a large number of different names denoting costing systems, which are described below.

The costing techniques used in universities today are known by various names, for example, transparency approach to costing (TRAC), full economic costing (FEC), transparent costing (TRC) or full costing (FC) (McChlery, McKendrick, & Rolfe, 2007; Dražić-Lutilsky & Dragija, 2012; Ratnatunga & Waldmann, 2010).

In the UK, for example, TRAC (Transparent Approach to Costing) has been a standard methodology for universities since 2000, implemented as a full costing method, which is an activity-based costing methodology to identify the cost of research and teaching developed by universities in the UK aimed at

accommodating formal cost reporting requirements and facilitating the development of improved management information (Estermann & Pruvot, 2011; McChlery et al., 2007; EUA, 2008; Estermann & Claeys-Kulik, 2013).

FEC is calculated on a transparent basis using an extension of the TRAC methodology and is kind of activity-based costing which will capture the full economic cost of teaching, research and other activities.

TRC is a framework for determining the full indirect costs and thereby the full costs (FC) of Australian Competitive Grant research projects (Ratnatunga & Waldmann, 2010).

FC is a framework for determining a full cost throughout the organisation in the University of Amsterdam (Aartsen, 2013).

As given in this chapter, universities use different approaches to full costing implementation with certain common features. At the same time, it has been pointed out that costing techniques with the same name may be quite different in terms of content.

EUA has described a universal model for university costing (see Figure 5), which embraces techniques (ABC versus other techniques), costing system elements (activities, cost objects, resources, cost drivers). The costing model described by EUA is quite universal. In this dissertation, the universal model suggested by EUA is detailed based on theory, on the one hand, and practices, on the other hand. To accomplish the above task, the costing techniques used by universities and costing theory will be analysed.

## 2.2 Determination of costing systems

In general, costing systems **can be classified based on cost measurement, cost accumulation methods, the scope and technique** of cost allocation.

In **terms of cost measurement**, costing systems are divided into: **actual costing system**; normal costing system; standard costing system.

In many cases, finance providers demand basing on actual costs. The Estonian legislation also supports that kind of approach. The accounting methodology used for project overhead must be unbiased, justified and based on actual costs (CPDE, 2007<sup>7</sup>; EUA, 2008; Estermann & Claeys-Kulik, 2013). Usually also managers prefer to use actual costs to determine the unit cost of an object, because these costs are directly based on reality, they have a link with the general ledger, hence they are more credible (Ratnatunga et al., 2012). The costing techniques used by universities today also are based on real financial reports, see for example TRAC (TRAC, 2014).

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<sup>7</sup> Conditions and Procedure for Determining the Eligibility or Non-eligibility of Structural Support Expenses for Aid in the Period 2007-2013 (Perioodi 2007–2013 struktuuritoetuse kulude abikõlblikkuse või mitteabikõlblikkuse määramise tingimused ja kord).

Based on the cost accumulation method, researchers distinguish job-order costing (where the cost object is a job or an order), process costing (where costs are assigned to a department or a process, and further to analogous services).

According to professor H. U. Küpper<sup>8</sup> and professor S. Yükcü, based on the scope of cost assignment, costing systems can be classified as **full costing systems** (traditional and activity-based costing) and partial costing systems (e.g. variable costing). Partial costing is explained by the Yükcü as a situation where not all expenses are taken into account in the prepared reports, and only variables, which have direct property or which can be controlled are taken into account (see e.g. Yükcü, 2006).

The most talked about concepts of costing are **traditional costing** and **activity based costing** and both of these systems are full costing systems.

Based on theory the actual costing system is the preferred costing system, and the main reasons are the following: credibility, usability and the requirements of finance providers (see the TRAC concept).

The actual costs can be found from financial statements (revenue-expenses statements). It means that cost data are collected based on the same principles as financial accounting information, and it is comparable to other universities.

The **full costing system** is discussed according to the topic of dissertation, it dictates specific costing techniques. In the next chapters of the dissertation the author analyses which costing techniques are appropriate for full costing. There are three appropriate techniques available – TC (traditional costing), ABC (activity-based costing) and TDABC (time-driven activity-based costing). The aim of the analysis is to propose one costing technique for a conceptual full costing model. The appropriate costing technique will be selected based on researchers' opinions (see Chapters 2.2.1–2.2.3) represented in the literature.

### 2.2.1 Traditional costing

Mogyorosy and Smith claimed based on researchers' opinions (e.g. Vance, Horngren, Ridderstolpe, and Zelman) that decision makers should carefully weight the benefits and costs before opting for a more sophisticated system (Mogyorosy & Smith, 2005). Traditional costing (TC) is a costing technique where costs are calculated to cost objects, whereas by volume based allocation base, usually one (e.g. direct labour hours), is used for the allocation of indirect costs to a cost object.

There are three basic steps of TC: accumulate costs within a production or nonproduction department; allocate nonproduction department costs to production departments; and allocate the resulting (revised) production department costs to various cost objects and, the traditional view of costing is that cost objects consume resources.

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<sup>8</sup> Professor H. U. Küpper – Accounting of Universities in Europe.

Such volume based cost allocation has been criticised by many researchers (see e.g. Cooper & Kaplan, 1991; Khozein & Dankoob, 2011; etc.), because it distorts costs. The distortion of product costs means that too much overhead costs is allocated to some products or products are charged for resources that they did not use. It is logical to allocate indirect costs to the cost objects based on a cause and effect relationship, but TC does not consider it.

The TC is appropriate when the services provided are similar, indirect and overhead costs are low, processes and clients, and their demands homogeneous. TC is a sound device for collecting and accumulating costs, but not for converting these costs into useful managerial information (Manalo, 2004).

According to Khozein and Dankoob, the TC methods were designed around the 1870–1920s when industry was labour intensive and there was no automation, the product variety was small and the overhead costs in companies were generally very low. In the 1960s and particularly 1980s, this changed rapidly (Khozein & Dankoob, 2011; Rasiah 2011). The change in the environment also was a reason for searching new methods for costing and at the end of 1980, Kaplan and Cooper introduced the ABC, which had to be a solution to TC weaknesses.

TC also has its strengths, which mostly relate to that it is simple, comprehensively understood, cheaper to execute and could provide reasonably good estimates especially in organisations with few types of services. However, the author of the dissertation is of the opinion that the above-named strengths do not outweigh its weaknesses, which primarily are related to the accuracy and diversity of information.

Considering that TC does not provide sufficient input to the decision-making process and distorts product or service costs, and that the contemporary operating environment has drastically changed, for example, indirect costs have increased remarkably, services are more diversified and competition has increased, which presumes greater precision in costing. It may be argued that today TC is not the most suitable technique of costing.

### **2.2.2 Activity-based costing**

Since the TC was considered to be a distortive accounting method, which provided inaccurate information about the costs, and ultimately led to not the most appropriate decisions, and as an accounting method it did not provide sufficient information about the costs and their origin in the organisation, a search for new and more efficient allocation methods was initiated in order to prove the functional usefulness of the accounting information. Hence the activity based costing (ABC) was developed. (Sharma & Ratnatunga, 1997; Raz & Elnathan, 1999; Needy & Bopaya, 2000)

ABC is a private sector innovation, which has been successfully implemented and used also in the public sector (Paulus et al., 2002) and universities (Cropper & Cook, 2000; Dražić-Lutilsky & Dragija, 2012). It seems, that ABC is the most



applicable costing technique used in universities (see, e.g. Dražić-Lutilsky & Dragija, 2012; Estermann & Claeys- Kulik, 2013; etc.).

Many research papers describe models of ABC in universities, for faculties, study programmes, degrees as well as for a university as a whole, for example, Tatikonda and Tatikonda (see Figure 6), Amir et al., Granof et al., Cropper and Cook, etc. (Tatikonda & Tatikonda, 2001; Amir et al., 2011; Granof et al., 2000; Cropper & Cook, 2000).

In general, the ABC system first accumulates overhead costs for each organisational activity, and then allocates the expenses of the activities to the products, services, or customers (cost objects) causing that activity.

The model of Tatikonda and Tatikonda allocates expenses of resources to cost objects (degree programs, which are a collection of courses) in two stages, in first the expenses of support functions are allocated to the departments then to the degree. The expenses of support functions (called sometimes as shared expenses or shared services), e.g. administration, facilities maintenance, teaching services and labs are added to the expenses of the degree.

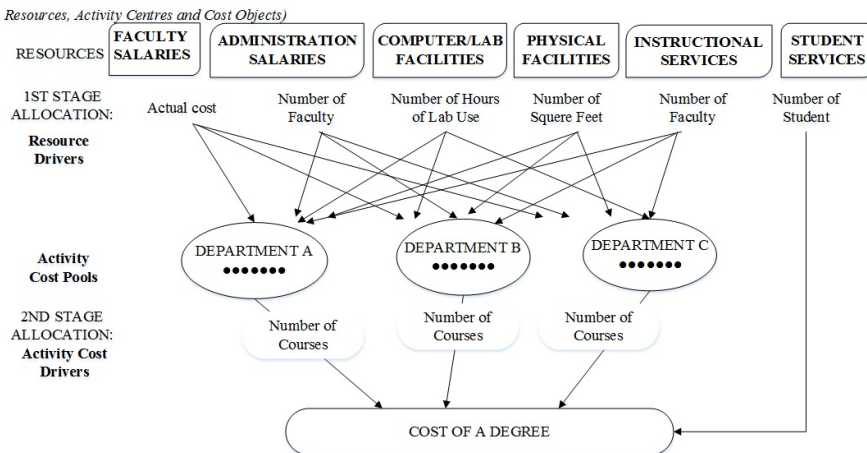


Figure 6. Example of an ABC model proposed by Tatikonda and Tatikonda for application in higher education

Source: (Tatikonda & Tatikonda, 2001)

Management accounting literature suggests that ABC is the most talked about technique of past three decades (Al-Omiri & Drury, 2007; Baird, Harrison & Reeve, 2004; Major & Hopper, 2005), also several doctoral dissertations have been defended on ABC (see e.g. Chongruksut, 2002; Aldukhil, 2012; Kongchan, 2013; Fawzi, 2008; Rababah, 2012).

Why to prefer ABC in universities? Many research papers describe the reasons why to implement ABC, including in universities, and its benefits (see e.g. Cooper, 1991; Clarke & Bellis-Jones, 1996; Al-Basteki & Ramadan, 1998; Vokurka & Lummus, 2001; Taba, 2005; Fawzi, 2008; Mansor et al., 2012; CIMA,

2001; Bacsich et al., 2001; Khozein & Dankoob, 2011; Granof et al., 2000; Amir et al., 2012). The reasons and benefits are the following:

- increased costs and diversity of services;
- high share of indirect costs and uneven consumption of resources by cost objects and/or activities;
- ABC helps organisations, including universities, improve their competitiveness by enabling those to make better decisions based on better understanding of their expense structure and it contributes to better management;
- it is able to clearly portray expenses and nonfinancial information;
- ABC provides information that makes estimate more precise and reliable
- more accurate pricing and determination of the minimum order size; less time, money and effort spent on the wrong products.

To sum up, universities provide very diverse services and the amount of their indirect costs has increased substantially and just ABC is seen as an instrument to be used to accurately assess diverse and large indirect costs of education. It should encourage thinking more rationally and reduce expenses.

Based on various research papers and articles, ABC provides more precise and more abundant information, including non-financial information. The literature contains sufficient proof by various researchers that ABC is suitable for university costing as well as enough examples of universities successfully using ABC as a costing technique (see e.g. TRAC in the UK). Hence, the author concludes, ABC is a suitable full costing system for universities and for the aims of the dissertation.

### **2.2.3 Time-driven activity-based costing**

The ABC technique has been criticised for the long implementation process, complicated and expensive system creation and maintenance (see Kaplan & Anderson, 2004). An alternative to ABC – time-driven activity-based costing (TDABC) model – was developed by Kaplan and Anderson and it is presented as a fully new approach, “method in its own right” (Gervais et al., 2010, p. 1), which is based on equivalences (Ratnatunga & Waldmann, 2010; Gervais et al., 2010).

Time is used as a cost driver in TDABC (Siguenza-Guzman, 2013). The most important attribute of TDABC is regarded to be just its simplicity, as only two types of parameters are needed: the unit cost of supplying capacity and the time required to perform a transaction or an activity (Kaplan & Anderson, 2003; Siguenza-Guzman et al., 2013; Pernot et al. 2007).

The second parameter – time required for performing a work task is found, for example, by either direct observation or an interview. The required time to perform the work task is a standard, which can be revised when the conditions change.

According to Ratnatunga et al., the concept of TDABC is largely ignored in the literature and only a few articles and a few case studies appear to address the issue (Ratnatunga et al., 2012). However, several researchers have pointed out that

TDABC is used in many business as well as non-profit organisations, but there are only few examples of universities. Ratnatunga's and Waldmann's study associated with understanding of university research activities in order to allocate operating expenses to cost objects and some examples of university structures (e.g. libraries or university restaurant) (Pernot et al., 2007; Ratnatunga & Waldmann, 2010; Stouthuysen et al. 2010; Everaert et al., 2012; Siguenza-Guzman et al., 2013; Kont, 2014).

Based on most recent research (e.g. Siguenza-Guzman et al., 2013), examples of universities using and/or implementing TDABC in their whole activities are not available.

Some main advantages and shortcomings of TDABC are described below.

According to literature, the advantages of TDABC are that it is less expensive, more simple and much more powerful than the traditional ABC method (Kaplan & Anderson, 2004, 2007; Pernot et al., 2007; Stout & Propri, 2011), meaning, for example, that:

- 1) it is not necessary to conduct regular surveys, which are costly and time-consuming;
- 2) the number of activities is reduced and analysis is carried out at the level of departments and the need to collect information is limited because of the use of standards;
- 3) only two parameters are used;
- 4) the model is easy to update.

The shortcomings of TDABC are described as:

- 1) TDABC may be nothing other than a traditional costing method based on standards and equivalence coefficients (Gervais et al., 2010);
- 2) problems with estimating time consumption (overcosting) and defective equations (Cardinaels & Labro, 2008);
- 3) continually a considerable amount of data is needed (Varila et al., 2007);
- 4) TDABC requires a precise and elaborated analysis, making the starting more lengthy and costly (Gervais et al., 2010);
- 5) continually a regular maintenance is required (*ibid*);
- 6) TDABC is highly recommended for repetitive activities, but it is not clear whether TDABC suits for non-routine tasks (Siguenza-Guzman et al., 2013).

Since it is not clear whether universities have successfully and extensively used TDABC as a suitable costing technique for calculating their whole costs and the literature has not presented TDABC as one, it is a subject that needs to be investigated in future. Secondly, universities' activities are diverse and it is not clear where routine work is done and where not, meaning that universities' activities should be analysed from the aspect of routine, and it has also been pronounced that TDABC may be not suitable at all for non-routine activities. There are also doubts about the accuracy of TDABC, if to consider that it is based

on standards. A question still arises about continual updating of data and system maintenance.

In order to formulate an opinion about the suitability of TDABC it is necessary to go deeper into this subject, which could be a topic for future research, but not yet sufficiently studied for the aims of this dissertation.

After examining the costing techniques, ABC was selected as the costing technique for this dissertation. In the next chapter, the author analyses theoretical choices in order to find the procedures and elements of costing system.

### 2.3 Procedures and elements of the costing system

The costing system development encompasses procedures and costing is carried out by the means of costing system elements.

Generally, the view that a costing system might be simple rather than sophisticated is underlined. See, for example, Khozein and Dankoob, who have stated that in general the ABC works better if it is kept simple (Khozein & Dankoob, 2011).

The researchers (e.g. Khozein & Dankoob, 2011; Amir et al., 2012; Taba, 2005; Cropper & Cook, 2000) pointed out the implementation procedures of costing systems through the approaches by Garrison and Noreen, Amir et al., Roztock, Valenzuela, Porter, Monk and Needy, Cropper and Cook. The author of this dissertation analysed the previous approaches and found that the most typical procedures in implementing costing are tracing costs to activities and/or cost objects; identifying resource expenses and/or costs; identifying activities; identifying cost drivers; identifying cost objects; making reports, incl. for decision-making; calculating costs; assigning costs to cost objects; designing of allocation method; establish objectives and requirements; calculating activity rates.

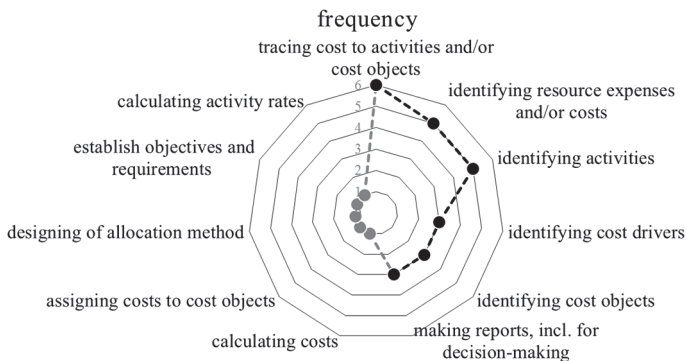


Figure 7. The costing system implementation procedures by step  
Source: (Compiled by the author)

The author of the dissertation has analysed the literature and the viewpoints of researchers (e.g. Haldma & Karu, 1999; Fawzi, 2008; Estermann, 2013; etc.) and has found that the frequently occurring elements of a costing system are cost objects, activities, resource expenses and/or costs, activity and cost centres, cost, activity or resource drivers. More costing system elements were named in literature, such as cost type, activity cost pool and cost element. The author grouped these elements and the summary of the analysis is presented in Figure 8. The frequency (f) in Figure 8 is the number of times the element occurs per analysis.

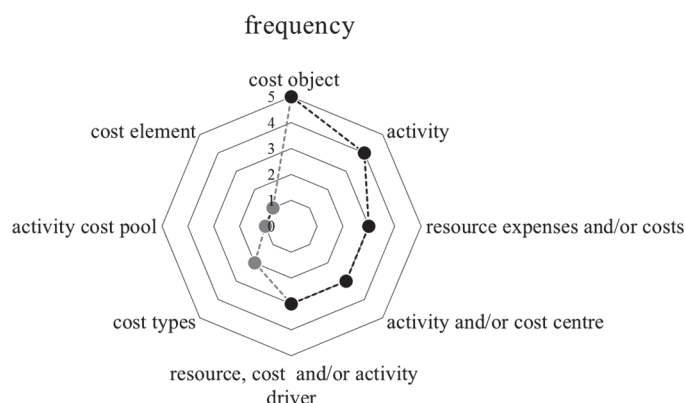


Figure 8. Elements of the costing system

Source: (Compiled by the author)

Based on the authors' analysis presented in this chapter, the most typical elements of a costing system are cost objects, activities, resource expenses, cost centres, and cost drivers. Hence, these elements are appropriate for the conceptual full costing model, and to confirm that argument in the next chapters (2.3.1–2.3.4) these elements are analysed and discussed.

### 2.3.1 Cost objects

Cost object is regarded as an item for which the costs are measured and reported separately.

Based on the literature (e.g. Cropper & Cook, 2000; TRAC, 2014; Aartsen, 2013; etc.) the frequently occurring cost objects are products, services or their groups, clients, projects, processes, courses or modules, etc. and typical cost objects for universities, for instance, are activities, structural units, projects, etc.

As an example, the cost objects used at the University of Amsterdam are presented in Appendix VII.

The cost objects are important research aims. There are various possibilities for cost objects, but is there a common one for universities? In the dissertation also one of the research sub-questions is associated with cost objects. This is “what

are the most frequently used cost objects?”. Based on literature the author claims that for universities typical cost objects are activities, structural units, projects.

### **2.3.2 Activities**

The importance of ABC design is the identification of the major activities that take place in a firm (activity analysis) (Gosselin, 1997). Generally, activity analysis consists of reviewing the activities and the procedures carried out to convert resources (e.g. material, labour, etc.) into outputs.

Activity analysis should be based on the organisational structure. Turney states that in order to identify activities with functional decomposition, start with an organisation chart for the company (Fawzi, 2008).

Michalska and Szewieczek recommend to divide activity costs into as many details as possible, starting first from the more general activities and then going deeper, to more detailed aspects (Siguenza-Guzman et al., 2013). For example, TRAC groups activities into teaching, research, other and support activities. Support activities are attributed to the three core activities – teaching, research and other. Additionally, activities are classified based on the type of funding provider: state financed or other sources. Other activities are defined, for example, as commercial activities, residences, conferences, etc. Support activities are defined as preparation, proposal writing and administration, etc. As an example, Cropper and Cook presented the model of an academic department, that model groups activities into teaching, research, scholarly activity, consultancy, faculty administration and statutory compliance (Cropper & Cook, 2000).

Activities used in university costing should be identified by conducting respective research. The author of this dissertation claims it reasonable to perform costing first with general (core) activities and, if necessary, move on to more detailed activities.

To sum up, the aspect of detail of activities to be used in the costing process is an issue of critical importance. Contemporary costing systems are implemented through accounting of activities (see, for example, principles of TRAC). Activities are associated with the organisational structure, and the structure is the basis to determine activities.

### **2.3.3 Harmonization of terms and resource expenses and/or costs**

Alika and Aibieyi based on Koubek claimed that business resources are material (machinery, equipment, and energy), finance, information and human (Alika & Aibieyi, 2014).

Resources are required to create an output and in costing resources are translated into the resource expenses, which have to be assigned to output (cost object), for example, to determine the full cost of output.

Several accounting terms, e.g. costs and expenses, are often used interchangeably. The author is interested in how public or state entities, including

universities, use accounting terms in reality and how the terms are set up in legal acts. By studying legal acts, annual statements of universities and by consulting specialists the author found that there exists a multiple set of terms and classifications, and a short overview of the study is given as follows.

UT's<sup>9</sup> financial statement is termed as the statement of financial performance. TUT's<sup>10</sup> financial report is termed as the revenue and expenses statement. AU's<sup>11</sup> financial statement is termed as the income statement, KTH<sup>12</sup> presents in its financial statement the revenues and costs. Costs are e.g. staff costs, costs for premises, other operational costs, financial costs and depreciation. UCB<sup>13</sup> terms its statement as the statement of revenues, expenses and changes in net position and the expenses are classified e.g. salaries and wages; retiree health benefits; other employee benefits; scholarships and fellowships; utilities; supplies and materials; depreciation and amortisation; campus foundation grants; other operating expenses.

Universities in the UK present financial data (expenditures and income), which are reported in the consolidated financial statements, and according to UC<sup>14</sup> financial statement, it is termed as financial performance for the year. Expenditures are classified as staff costs, other operating expenses, depreciation, interest and other finance costs.

According to the Estonian Accounting Act, the typical expenses in the income statement are, e.g. goods, raw materials and services; other operating expenses; staff costs (wages and salaries, social security costs and pension expenses); depreciation and impairment of fixed assets; other operating charges.

TUT's statement terms expenses as scholarships and study allowances, personnel expenses, depreciation, amortisation and impairment loss, other operating expenses.

GRSA<sup>15</sup> terms the result of the year as financial performance, the term is not clearly explained in legal acts.

According to IPSAS<sup>16</sup>, a complete set of financial statements comprises the statement of financial position, statement of financial performance, statement changes in net assets/equity, cash flow statement.

According to IPSAS and IFAC<sup>17</sup>, in the public sector the "income statement" is termed as a **statement of financial performance** and illustrative expenses in

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<sup>9</sup> UT – University of Tartu.

<sup>10</sup> TUT – Tallinn University of Technology.

<sup>11</sup> AU – Aalto University.

<sup>12</sup> KTH – Royal Institute of Technology in Stockholm.

<sup>13</sup> UCB – University of California, Berkeley.

<sup>14</sup> UC – University of Cambridge.

<sup>15</sup> GRSA – General rules for state accounting (the Estonian legal act).

<sup>16</sup> IPSAS – International Public Sector Accounting Standards.

<sup>17</sup> IFAC – International Federation of Accountants.

the statement are, e.g. bulk purchases of water and electricity; employee costs; depreciation and amortisation expense; repairs and maintenance; contracted services; general expenses; finance costs.

In ABC literature, the expenses of resources are termed e.g. salaries, utilities and depreciation (Tatikonda & Taticonda, 2001), emoluments (salaries and fringe benefit), non-emoluments (travelling, maintenance, communication and material) and depreciation (Amir et al., 2012).

As it is seen previously, the terms and classifications in financial statements and special literature are not harmonized.

Several researchers have pointed out that it is important to use right terms in accounting and in general it is a problematic issue, there is no clarity and there is not rigor (see e.g. Alver, 2010).

Accounting, especially financial statements are a target of harmonization (see e.g. Pocrnjić and Pervan, 2013). It is important to discuss that issue in-depth in this dissertation, it is important to build up a framework of terms to clarify and create understanding.

The framework of the terms expenditure, expense and cost, is presented below.

In the dissertation, the author uses a framework of terms, which is presented by Jaan Alver, professor of Tallinn University of Technology<sup>18, 19</sup> and IPSAS.

The term expenditure is related to capital assets, which are characterized by longevity and large financial size. The term expense is used in the context of a statement of financial performance, which includes expired costs.

The term cost is generally used in the context of a statement of financial position (balance sheet), which includes unexpired costs. Exceptionally, the term cost is used in the context of a statement of financial performance (e.g. cost of goods sold). In the context of the statement of financial performance costs for a period are presented.

The idea of full costing in this dissertation is to assign all expenses, direct and indirect costs of a period to cost objects.

Direct costs (or traceable costs, sometimes the term prime costs is used) are directly related to the activity, cost centre, or cost object, and it is not hard to trace them to the activity, cost centre or cost object. See, for example, a statement by Clark: "Direct costs, as we have seen, are costs visibly traceable to a given job order or class of business without the need of difficult studies or allocations, but merely by watching the process" (Clark, 1923, p 56).

Common costs (costs which support core activities and are common for several services, etc.), joint costs (costs which are allocated by services) and overhead (e.g. administration overheads), costs can be termed as indirect costs. Sometimes overhead costs and indirect costs are used synonymously, but it is not quite right,

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<sup>18</sup> Alver, J., & Reinberg, L. (2002). *Juhtimisarvestus*. Tallinn: Deebet.

<sup>19</sup> Toots, A., & Alver, J. (2008). *Dictionary of Accounting Terms*. Tallinn: Deebet.



because the term indirect cost is much broader as it was shown previously. In accounting literature the term shared services (see e.g. Reich and Abraham, 2006) is used, shared services can be termed as indirect costs.

The traditional view of costing is that the database of costing provides information for financial and management accounting, costing is called as the common share of financial and management accounting.

In general, in management accounting all costing principles and statements, which help to make better decisions, are allowable.

For harmonization in the field of management accounting in connection of full costing some steps are taken. EUA presented common options for costing and through regular workshops and shared practice an understanding of full costing is growing step by step. In several countries, the costing of universities is harmonized, e.g. in the UK the TRAC concept.

The previous examples of harmonization can be described as *de jure* (formal) and *de facto* (actual practice) harmonization.

Still, there exist differences in aims of costing and sometimes indirect costs are not calculated as project (cost object) expense, e.g. depreciation.

Haldma has underlined that the TRAC concepts used in the EU and the UK are different. For example, the aim of full costing in the UK is to ensure the sustainable activity of the universities, meaning that the university's total costs (direct costs and indirect costs) are covered and investments into infrastructure ensure implementation of the strategic plans. In TRAC, expenses are calculated based on annual reports in which certain adaptations are made. One of the most significant adaptations is related to fixed assets. The charge should be based on the full replacement cost (not depreciated) of their infrastructure.

In the EU, the aim is to calculate all direct and indirect costs of the project financed by the EU, not to calculate full costs. It means that depreciation is not included in the calculations (Haldma, 2012).

According to CPDE<sup>20</sup>, depreciation is not an eligible and it stipulates that if the depreciation cannot be directly and unambiguously traced to the project it may not be included among eligible expense.

Clark pointed out a price paradox, "If any business that would pay its own particular costs is refused because it will not pay its share of overhead, there is a loss." (Clark, 1923, p. 23).

Consequently, universities have to choose either to give up the project or be flexible with indirect costs.

Clark discussed overhead charges as "discriminating" and wrote, "The overhead costs must be levied on such parts of the business as will stand the burden, while other parts of the business, which cannot otherwise be had at all,

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<sup>20</sup> CPDE "Conditions and Procedure for Determining the Eligibility or non-eligibility of Structural Support Expenses for Aid in the Period 2007-2013".

are charged whatever they can pay, regardless of overhead costs.” (Clark, 1923, p. 23).

To sum up this chapter. The main terms used in the dissertation are **expenses**, direct costs and **indirect costs** and the meanings of these terms are explained. Expenses are classified as direct and indirect costs, direct costs are **traced** and indirect costs are **allocated** by the means of cost drivers to the cost objects. Actual practices and regulations have an influence on costing methodology. It means that the external environment has an influence on a costing system through policies, regulation, etc (e.g., according to CPDE, depreciation is not an eligible). Universities need to be flexible, including in establishing various indirect cost rates.

#### 2.3.4 Cost drivers

Generally, a cost driver is any factor, index, event or coefficient that causes a change in the costs and which is the basis for cost allocation. Many researchers, for example, Estermann and Claeys-Kulik, Babad and Balachandran, Răvaş and Monea and Sheng have formulated more specific definitions of cost drivers (Estermann & Claeys-Kulik, 2013; Babad & Balachandran, 1993; Răvaş & Monea, 2009; Sheng, 2009).

Geri and Ronen, as well as other researchers have pointed out the importance of the costing system and cost drivers and that the prime difference between the TC and ABC is the number and type of allocation bases, and in the ABC terminology researchers understand the term allocation base as a cost driver (Geri & Ronen, 2005; Cokins & Căpuşneanu, 2010; Rasiah, 2011).

The most relevant drivers can often be determined by interviewing those employees who are most familiar with the activity to indicate which factor causes an increase or decrease in the time and effort they spend on the activity (Lin et al., 2001).

According to Sheng, there are three selection methods of cost drivers: the empirical method, which is based on the managers' experience to reasonably determine and estimate the cost drivers to be selected; the mathematical method for selecting cost drivers, referred to as the regression method and analytic hierarchy process (Sheng, 2009).

The decisions on what type of cost driver to choose, and how many of them to select in order to allocate indirect costs accurately to the cost object are of crucial significance.

According to Sheng, a cost driver has some specific characteristics: concealment; relevance; applicability; accountability (Sheng, 2009).

A cost driver should have a causality relation with the activity and its cost; it should be measurable; it should anticipate and explain the use of the resources that were consumed during an activity, based on a resource capacity to support an activity.

The greater degree of accuracy, degree of product diversity, degree of volume diversity (size, e.g. activities) and using imperfectly correlated cost drivers means that a larger number of cost drivers are needed and the number of cost drivers depends on the type of organisation (Ahmed, 2005).

According to Turney, in general terms, the number of cost drivers should vary between ten and thirty, although in rare cases the number can range from two to a hundred and if a suitable cost driver is not included in the database, or an appropriate cost driver is unavailable, an alternative cost driver can be used (*ibid*).

Cost drivers have been classified and categorised in various ways. For example, Cooper and Kaplan, Miller and Vollman, Shank and Govindarajan describe two main categories of cost drivers: volume based (traditional) and non-volume based cost drivers (*ibid*). Of course, there are some more categories of cost drivers: activity-based cost drivers; structural or strategic cost drivers; executional cost drivers (Sheng, 2009; Ahn, 1998).

Goddard and Ooi have classified the cost drivers as the first stage cost drivers and the second stage cost drivers. The first stage drivers are used to distribute costs from service provider activity cost pools to service user activity cost pools; the second stage drivers are used to allocate the costs in the service user activity cost pools to the academic faculties and departments. (Goddard & Ooi, 1998)

In terms of the level of allocation of indirect costs, there are three types of cost drivers: resource cost driver; activity cost driver and cost object driver (Cokins & Căpuşneanu, 2010; Cokins, 2006).

Universities use different cost drivers for cost allocation, e.g. number of students, staff number, number of invoices processed, work stations, number of academic staff, square metres, number of faculties, lab use hours, etc. (Tatikonda & Tatikonda, 2001; Estermann & Claeys-Kulik, 2013).

In general cost drivers can be identified **if relevant specialists are asked** and the **number of cost drivers should not be very large**. However, in case changes are made to cost drivers or their proportions, this has a direct effect on the result. The level of automation and information technology and labour intensity have to be taken also into account in the selection of cost drivers.

The importance of estimating academic time is underlined and the issue is very important in the full costing process. For example, the University of Amsterdam has declared that time recording is the most important part of full costing (see Aartsen, 2013).

Some researchers have implied that it is not possible to achieve the utmost precision in everything. Estermann and Claeys-Kulik stated, "It needs to be acknowledged that not everything be measured precisely." (Estermann & Claeys-Kulik, 2013, p. 29).

Different methods of time recording are used, for example: timesheets, surveys, profile creation, staff interviews, workshops. An academic activity survey presumes that all academics at the university are asked to complete a weekly (or some other period) timesheet once per academic year (or some other period). Each week, academics are divided into randomly selected groups. They

should fill in the timesheet by indicating hours spent on each activity. The results are extrapolated to total activity.

It is considered important to select a method that characterises the environment of the university in the best possible way. The method should not be very sophisticated and the information technology solutions should support the time recording method. It is also important that the academic staff members support and understand the need to do that.

## 2.4 Costing in contingency theory framework

Different institutions have different costing systems, including different system elements and one of the theories to identify differences in costing systems is contingency theory.

Based on contingency theory, the unique characteristics of an appropriate accounting system depend upon the specific circumstances, the so-called contingencies, in which an organisation finds itself.

The contingency theory based treatment of costing has been used by many researchers, for example, Anderson; Anderson and Young; Baird et al.; Innes and Mitchell; Gosselin (Anderson, 1995; Anderson & Young, 1999; Baird et al., 2004; Innes & Michell, 1995; Gosselin, 1997; Kongchan, 2013). There are some contingencies named, such as traditional “hard” contingencies: environment, size and structure of organisation, and technology (Waterhouse & Tiessen, 1978; Otley, 1980) and newer, the so-called “soft” contingencies, such as culture (Harrison & McKinnon, 1999) and strategy (Langfield-Smith, 2006).

The factors that have recently been separately pointed out in activity-based costing research are competition and government policies (see Kongchan, 2013), which intrinsically can be treated as part of the external environment. The alternative contingency factors are presented in Figure 9.

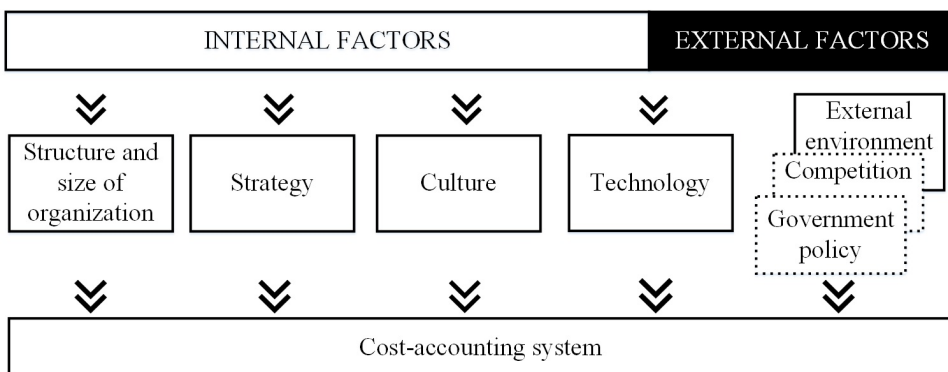


Figure 9. Classification of contingencies that are related to accounting system design

Source: (Compiled by the author)

Haldma and Lääts classified the contingencies into two groups: external (business environment and accounting environment) and internal factors (organisational aspects, technology and strategy) (Haldma & Lääts, 2002). According to Kongchan, technology can be defined both as an internal and external factor (Kongchan, 2013, p. 31). According to some researchers, internal contingencies are identified as size, organisational capacity to learn, and technology (Libby & Waterhouse, 1996; Hyvonen, 2007).

Al-Omiri and Drury studied the factors that influence the complexity of a costing system: importance of cost information, product diversity, cost structure, intensity of the competitive environment, size of the organisation, the quality of information technology, etc. (Al-Omiri & Drury, 2007).

Rbaba'h has examined the relationship between company characteristics such as industry type, number of employees, number of products, level of overheads and ABC implementation (Rbaba'h, 2013).

The aim of Mansor et al. was to find out how managers feel about costing, especially how useful they believe it is in providing information and in helping them to make better decisions (Mansor et al., 2012).

Elhamma and Fei studied the relationship of ABC with business strategy (Elhamma & Fei, 2013).

Charaf and Bescos investigated organisational (importance of costs for decision-making, complexity/diversity of business unit, proportion of indirect costs) and cultural (outcome orientation, innovation, team orientation, attention to detail) factors as affecting costing (Charaf & Bescos, 2013).

Cultural impacts on different aspects of accounting have been investigated by several researchers, for example, Baird et al., 2004; Fei & Isa, 2010; Gray, 1988; Amat et al., 2000; etc.

Baird et al. studied the relationship of organisational structure and organisational strategy in connection with ABC implementation as well as the size of organisation, utilisation of cost information in the decision-making, and culture (Baird et al., 2004).

The unique characteristics of an appropriate accounting system depend upon the specific circumstances in which an organisation finds itself. There are some factors named in theory, but these factors are organisation specific. The author's concern in relation to that issue is: what are these factors and what role do these factors have in costing of universities, and which of these are topical in the university context? The issue of what these factors are, will be analysed in the next chapters. The results of this analysis will be used for research of TUT (see Chapter 3.2); the TUT research concern is what the role of these factors in costing of universities is and which of these are topical in the university context. The related research question was formulated as: what are the university specific factors that influence the design of a costing model and its implementation?

To study the costing system, the author classifies the contingencies into two general groups: related to elements of a costing system (e.g., costing techniques, cost objects, activities, cost drivers, etc.) and contingencies related to costing

information (e.g., accuracy, timeliness, importance of cost information, cost measurement, etc.).

Issues of cost information are added because one of the main aims managers expect from information systems is that important information should be available on time.

#### **2.4.1 Structure and size of organisation**

According to Salim and Abdullah, organisational structure consists of allocation of tasks, coordination and supervision with all levels of management, and decision-making in the organisation (Salim & Alhabshi, 2012). Activities associate with the organisational structure, and the structure is the basis to determine activities (see more in Chapter 2.3.2).

Fei and Isa discuss structure from the aspect of centralisation and decentralisation, and formalisation (Fei & Isa, 2010). The author argues that the organisational structure consists of different cost allocation levels.

According to Babad and Balachandran, Sharman and Turney, the number of cost drivers depends on the type, size, number of activities and the diversity of organisation. The greater degree of product and volume diversity means that a larger number of cost drivers is needed. (Ahmed, 2005)

Pierce (2004) writes that ABC is not appropriate for all organisations, including, for example, organisations with a small product list (Shaik, 2010).

It has also been pointed out that ABC probably has been implemented more just by large organisations than small organisations because the large ones have more resources, contacts, channels of communication, etc.

Traditional costing is financially cheaper and in terms of other resources (e.g. human resource), also easier to perform (Askarany & Yazdifar, 2007).

It has been argued that the size of the company usually explains the rate of adoption of sophisticated costing systems; in general, larger size increases complexity and usually requires greater accounting resources. Cinquini et al. find that a firm's size and adopting costing are not related (Brierley, 2011).

Baird et al. studied implementing costing methods in the context of the number of employees in a business unit and they find that there exist no associations (Baird et al., 2004).

Structure decides the cost centres, activities as well as other allocation levels. The structure plays a significant role in costing, it determines elements of a costing system.

The size of the organisation associated with volume factors (e.g. the number of services provided, diversity of services), the greater volume means that a larger number of cost drivers, activities, etc. are needed. The size of the organisation explains the rate of adoption of sophisticated costing systems, in general it requires also greater resources.

To sum up, the structure and size of an organisation influence the costing system through costing techniques, allocation levels (cost or activity centres, cost

objects, activities) and also resources and size are related, organisations with bigger resources (finance, employees, knowledge, etc.) probably have more opportunities to develop and implement newer and sophisticated systems.

The number of cost drivers is related to the number of activities; hence, more activities means that a larger number of cost drivers are needed.

The structure and size of an organisation influence the costing system through complexity.

## 2.4.2 Strategy

Several studies, for example, Bisbe and Otley, Cagwin and Bouwman, Simons, Govindarajan have found evidence that management accounting practices help satisfy the demands for information created by different strategies and operations (Bisbe & Otley, 2004; Cagwin & Bouwman, 2002; Simons, 1987; Govindarajan, 1988).

The literature names various strategies, for example low price or low cost strategy, flexibility strategy, customer service strategy, etc. The general idea of these strategies is described below.

Successful enterprises with a “low cost” strategy must be extremely cost effective in order to offer their products or services at relatively lower prices than their rivals. For example, if a firm uses a low-cost strategy in competition, the ABC system will prepare **precise assessments** of product or process costs for designers to know the costs of customisation.

The companies that have adopted costing adjusted to modern conditions of business operations in terms of accurate cost information can gain a competitive advantage over their market rivals (Kaličanin & Knežević, 2013).

Firms with a flexibility strategy strive to differentiate their products or services through continual innovation and flexibility. Flexible companies need to be able to adapt to changing product and demand characteristics.

Firms with a customer service strategy differentiate themselves by trying to deliver what individual customers want. The focus is on satisfying customer needs with high quality products and services, reliable delivery, effective post-sales support, and customized design features. In the focus of customer service satisfaction is also **lowering of costs**. Costing in customer service-oriented firms has to offer maximum **understanding of costs and measure costs at different service levels**; they have to find a compromise between the level of service and costs.

The aims of full costing are, e.g. accountability, sustainability, transparency, financial awareness, etc. The costing system should help to achieve these aims of an organisation. All activities should cover the costs incurred by them, and the costing for one thing should **measure the costs of diverse activities**.

### 2.4.3 Culture

Based on the literature (Kongchan, 2013; Fei & Isa, 2010; Gray, 1988; Borker, 2012; Young, 2013; etc) the author claims that cultural factors are related to costing. In general, culture represents shared values, attitudes, knowledge, beliefs, behaviour, etc. Culture is seen in people's doings, e.g. what they do and how they do it. The author claims that culture can be seen through laws, rules, etc. Accounting is shaped by the environment in which it operates; there are many factors such as values, religion or politics (Young, 2013).

Organisations have different culture and value systems, so their accounting systems will have more or less different. Organisational culture influences the organisation's ability to adapt to change. It is extremely difficult to change the organisational culture.

In the context of accounting such cultural factors as individualism and collectivism, power distance, uncertainty avoidance, masculinity and femininity, known as Hofstede's cultural dimensions, are investigated. These dimensions, for example, influence the use of accounting information in decision-making and implementation of the techniques of costing.

Organisational culture, according to Salim and Alhabshi, shows the organisation's behaviour and the role of top management in the decision-making (Salim & Alhabshi, 2012). The personal characteristics of managers influence the use of accounting information in decision-making (Doinea et al., 2011).

Gray underlines four factors that influence accounting: professionalism versus statutory control; uniformity versus flexibility; conservatism versus optimism; secrecy versus transparency (Gray, 1988).

Costing research, in the context of culture, has also discussed such factors as outcome orientation, team orientation, attention to detail and innovation (Fei & Isa, 2010). Outcome-oriented firms emphasise accomplishment, results, and action as important values. Business entities with the outcome-oriented culture are likely to use methods that enable them to improve the processes and enhance the outcome and competitiveness. Team oriented firms with the team-oriented culture emphasise cooperation and collaboration among employees. Companies with the detail-oriented culture pay attention to details and emphasise precision.

Baird et al. investigated the culture of a business unit through the dimensions such as innovation, outcome orientation and tight versus loose control (Baird et al., 2004). Innovation is discussed as openness to changes, meaning how changes are accepted and inclination to experimentation. Business entities with greater innovation culture are likely to experiment with new practices. Dimension, tight versus loose control, is cost control, and its rates. Tight control culture means that there is extremely high cost awareness.

The author concludes that there are certain cultural factors, and these factors are relevant in the context of costing. The implementation of costing techniques is related e.g. to uncertainty avoidance and innovation. Culture is seen in people's doings, e.g. if the decisions are made based on costing information. The other



factors related to costing are accuracy (detail-oriented culture), cost control (tight versus loose), decision-making, transparency, etc. These factors affect the design of a costing system. The greater degree of accuracy means that a larger number of cost drivers are needed.

#### **2.4.4 Technology**

Technology is defined as a group of techniques or set of work methods used in the organisation of work to provide products or services (e.g. unit, mass and process production) and as information technology (IT). Technology is described both as an internal and external factor. (Kongchan, 2013)

The literature points out that technology has an influence on a management accounting system through specificity, routine or non-routine tasks (see e.g. Haldma & Lääts, 2002).

Granof et al., 2000 found a number of problems with ABC and one of them is: the teaching staff do not work a standard number of hours per week, therefore it was difficult to calculate the time that they dedicated to each of the defined activities (Valderrama and Sanchez, 2006, p. 253).

Based on researches (e.g. Shil & Parmanik, 2012) the author can say that the traditional costing is appropriate when processes and services are homogeneous.

Users of ABC definitely need better IT considering the amount of required information and diversity of information. The level of automation and information technology have to be also taken into account in the selection of cost drivers.

#### **2.4.5 External environment**

Changes in the environment affect the costing. It has been separately underlined that the external environmental factors that have effects on costing technique adoption are competition and government policies (see Kongchan, 2013).

In a competitive environment, reliable information is of utmost importance; accounting mistakes may be used to the advantage of rivals (Cooper & Kaplan, 1988).

According to Velmurugan, the new competitive conditions challenge the validity of conventional costing systems, the companies that face intense competition are more likely to adopt ABC than companies that face less competition (Al-Omiri & Drury, 2007; Velmurugan, 2010; Kongchan, 2013).

In addition, Reich and Abraham pointed out that until the universities operate in a relatively non-competitive environment, they pay little attention to accurate cost information (Reich & Abraham, 2006). For example, about the University of Dresden, it has been argued that transition to full costing was induced by increasing competition in the internal and external market and that the university management regarded it necessary to reform the university management methods (Estermann & Claeys-Kulik, 2013).

Governments can influence organisations' accounting activities by establishing laws/regulations and imposing sanctions (Kongchan, 2013). The best-known example here is the UK where costing of universities is regulated by the state.

At the European level, the design of costing is affected by the regulations concerning state subsidies (Greiling & Kirchhoff-Kestel, 2014).

In general, costing, which is a component of management accounting, is completely in the discretion of the organisation, but governments can influence organisations' accounting activities by establishing regulations.

The author concludes, there exist certain factors in the external environment over which an organisation has no or little control. These factors are economic, political and/or legal, and these factors have an impact on costing. For example, in Estonia costing is affected by the rules of structural funds.

To sum up, the external environment influences a costing system through costing techniques (e.g., policies dermine rules). It influences the information of costing through importance, accuracy and timeliness.

#### **2.4.6 Relationships between contingency factors and elements of a costing system**

The costing techniques depend on the organisation's size and homogeneity; TC is appropriate when the services provided are similar, indirect and/or overhead costs are low, processes and clients, and their demands homogeneous. ABC probably has been implemented more just by large organisations, because large organisations have more resources (incl. knowledge), contacts, channels of communication, etc. The elements of costing systems (e.g. the number of cost drivers) depend on the type, size, number of activities and the diversity of the organisation. ABC, for example, provides precise information and non-financial information. The need for better management and decisions are the reasons why to implement accurate costing systems.

The first contingency factor that is related to costing is the size and the structure of an organisation. The size and structure of an organisation are discussed and explained next.

**The size of an organisation** is expressed through factors such as the number of activities and services; diversity; homogeneity; level or proportion of overheads; etc. It explains the adoption of a sophisticated costing system. The greater degree of product diversity, volume diversity and using of imperfectly correlated cost drivers means that a larger number of cost drivers is needed. The number of cost drivers is related to the number of activities, meaning that more cost drivers are needed for a larger number and greater diversity of activities. As regards the size related resources, the organisations with bigger resources (finance, employees, knowledge, etc.) probably have more opportunities to develop and implement the ABC and sophisticated systems.

Increased costs, diversity of services, large overheads are the reasons for implementing ABC. The type and diversity of an organisation is related to the number of cost drivers. Also, the diversity of an organisation is related to the costing technique.

**The structure of an organisation** is expressed through factors such as allocation of tasks; coordination and supervision with all levels of management, and decision-making in the organisation; centralisation versus decentralisation; levels of management; cost structure, etc. It plays a significant role in costing. It determines the elements of the costing system, e.g. activities, costs pools, cost objects, etc. The importance of ABC design is the identification of the major activities that take place in a firm (activity analysis); the activity analysis should be based on the organisational structure. The number of activities is related to the number of cost drivers.

The second contingency factor that is related to costing is the strategy of an organisation, the factor is discussed and explained next.

**Strategy** is expressed through factors such as low cost strategy; flexibility strategy; service strategy; etc.. Overall, universities should contribute to effective operation (see also the concept of “Three Es”), financial awareness, transparency, etc. ABC should encourage thinking more rationally and save costs. The strategy influences costing information through precise assessments (accuracy), measurement of costs (e.g., costing should measure costs of diverse activities). One of the main aims managers expect from information systems is that important information should be available on time. The strategy influences the elements of a costing system through allocation levels, e.g. cost objects, diverse activities. The strategy of an organisation is related to the costing technique.

The third contingency factor that is related to costing is the culture. This factor is discussed and explained next.

**Culture** is expressed through factors such as the importance of costing information; organisational capacity to learn; how managers feel about costing; utilisation of cost information in the decision-making; outcome orientation; innovation; team orientation; attention to detail; uncertainty avoidance; statutory control; uniformity versus flexibility; transparency; etc.). The author concludes that there are certain cultural factors which are relevant in the context of costing. The implementation of costing techniques relates to uncertainty avoidance and innovation. Culture is seen in people’s doings, e.g. if the decisions are made based on costing information, how we measure costs, etc. The other factors related to costing are accuracy (detail-oriented culture), cost control (tight versus loose), transparency, etc. These factors affect **the design of a costing system**. The greater degree of accuracy means that more cost drivers are needed. However, in the context of accounting, there are also the behavioural factors such as uncertainty, unwillingness, etc., and these factors affect **the implementation of costing**. Both are relevant in the context of costing.

The fourth contingency factor that is related to costing is the technology, the factor is discussed and explained next.

**Technology** is expressed through factors such as the quality of information technology, routine or non-routine work tasks, etc. The contemporary costing requires better IT, because it uses a large amount and diverse information, including non-financial information (e.g. cost drivers). It means, the level of IT should be taken into account while selecting costing techniques and elements of a costing system. The literature points out that technology has an influence on a management accounting system through routine or non-routine activities. TDABC may not be suitable at all for non-routine activities.

The fifth contingency factor that is related to costing is the external environment, the factor is discussed and explained next.

**External environment** is expressed through factors such as competition, government policy, etc. The external environment influences elements of a costing system through costing techniques (e.g. policies). There are rules of structural funds, regulations concerning state subsidies, rules of 7FP, etc.

The external environment influences the information of costing through importance, accuracy, timeliness, etc. The companies that face intense competition are more likely to adopt ABC. In a competitive environment, reliable and accurate information is of utmost importance.

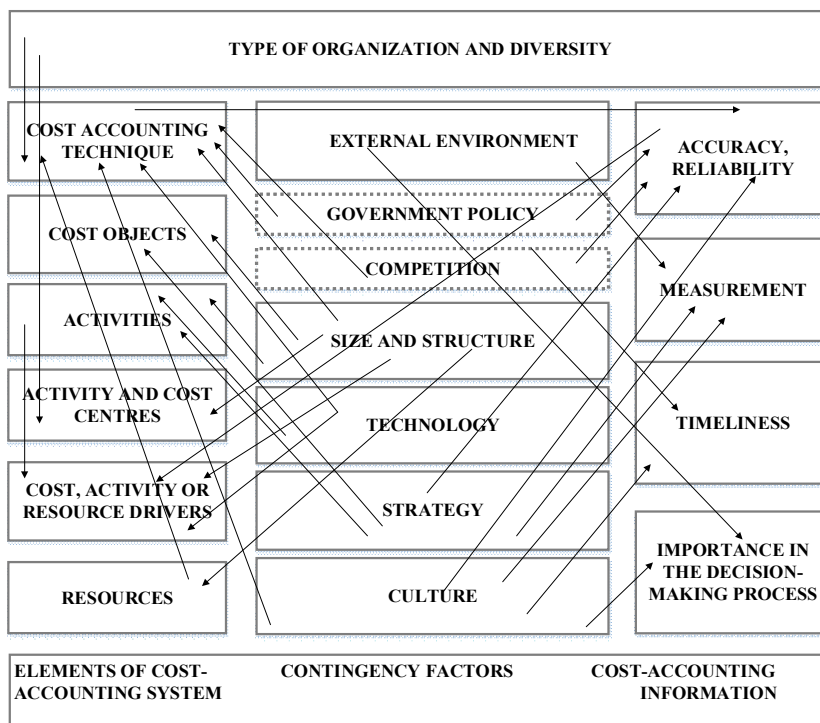


Figure 10. The detailed view of contingency factors related to costing system and information

Source: Compiled by the author)

The contingency factors have been analysed on the basis of literature and the relationship between the contingency factors and costing is explained by Figure 10. The results of this analysis will be used for research of TUT. The author's concern in relation to that research is what the role of these factors is in costing of universities and if they are topical in the university context. That issue will be analysed in Chapter 3.2.

The next related concept is the concept of success and it is discussed in the following chapter.

## **2.5 Implementation of costing. Why do some organisations adopt and others do not?**

Issues of implementation of costing have been studied by several researchers. It is an important research area, an overview of researchers and researches is given next.

Why do some organisations adopt and others do not, or why are some organisations successful in implementing costing methods and others less successful?

Many research papers and articles (Gosselin, 1997; Fladkjær & Jensen, 2011; Kennedy & Affleck-Graves, 2001; Fawzi, 2008; Wnuk-Pel, 2010; Moisello, 2012; Charaf & Bescos, 2013) address the paradox formulated by Gosselin, which although correctly formulated in the context of ABC is applicable also in a broader context, including other costing methods: "ABC paradox – if ABC has demonstrated benefits, why are more firms not actually employing it?" (Gosselin, 1997, p. 105). To explain the paradox, different organisational factors have been investigated by different researchers (Shields, 1995; Fei & Isa, 2010, 2010a; Velmurugan, 2010; Căpuşneanu et al., 2011; Fawzi, 2008; Hasan & Akter, 2010; Abdallah & Li, 2008; Baird et al., 2004; Khozein & Dankoob, 2011; Askarany & Yazdifar, 2007; Cotton et al., 2003; Salim & Alhabshi, 2012; Byrne et al., 2007; etc.).

Velmurugan argues that ABC is generally believed to be useful; however, actually various researchers have witnessed also the failure of adopting ABC and some organisations have not benefitted as much as promised. He points out that although the technical characteristics of ABC are generally comprehensible, some organisations still face difficulties when implementing ABC and that fact is an issue of general debate (Velmurugan, 2010).

Assessment of the factors that influence successful implementation of ABC is recognized as an important research area (see e.g., Fei & Isa, 2010). The fact that one accounting technique is successfully adopted in one country does not mean it can be a success in another country, and Anderson has stated, the factors influencing implementation are context-specific (Anderson, 1995).

The author of this dissertation claims that different environments accept accounting techniques differently and therefore research in the context of a specific country or organisation is needed.

The literature also argues what researchers mean by “ABC success”, some possible approaches to the concept of success can be pointed out: top management not rejecting it; an implementation of ABC per se; use of ABC information by non-accountants; gaining competitive advantage and providing additional profits (Mansor et al., 2012).

According to literature (e.g. Mansor, 2012; Velmurugan, 2010; Fei & Isa, 2010; Cobb et al., 1992; Rundora & Selesho, 2014; Khozein & Dankoob, 2011; Shaikh, 2010; Fawzi, 2008; Abdallah & Li, 2008; Askarany & Yazdifar, 2007; Hasan & Akter, 2010) ) there exist factors that influence the successful or non-successful implementation of costing and based on the researches the author concludes that in general these factors are technical, cultural, organisational (e.g. behavioural or structural).

There is an opinion that the successful implementation of ABC does not depend only on technical resources. Technical factors are not regarded as sufficient to explain the successful implementation of costing and it is argued that many problems in implementing costing are caused by that enterprises pay too much attention to technical factors (Fei & Isa, 2010).

Technical factors include the choice of activities, the choice of cost drivers and data collection.

The author of the dissertation analysed and grouped the technical, cultural and organisational factors as internal and external factors and the internal factors are grouped into factors related to human resources and to other internal issues. The analysis, **a concept of success and failure factors**, is presented below:

- 1) *Internal success or failure factors*
  - a. **Human resources:** top management support; adequate employee resources, incl. non-accounting employees; adequate training and education; knowledge; employees’ resistance to changes; the user denial; staff time and amount of work needed; initiators and consultants needed; performance evaluation and compensation; etc.
  - b. **Other internal issues:** IT resources; higher priority of other events; technical data collection, identifying and maintaining (e.g. activities, cost drivers); clarity of the aims; linkage to competitive strategies; communication; poor ABC model design; uncertainty of ABC benefits; satisfaction with current systems; etc.
- 2) *External success or failure factors:* external financial or cost accounting standards or practices.

The author concludes that most of these factors are related to the internal environment of an organisation and specifically to human resources.

At first, the support by top management to projects is extremely important. The role of top management is seen primarily through three factors: they ensure relevant resources, link to strategy and the communicating process. The importance of top management was expressed already in Henry Fayol’s work “14

Principles of Management”. Managers in hierarchies (or chain of command) are part of a chain like authority scale (scalar chain). In case of universities, the rector holding the most authority (power); the head of a structural unit (the management level above non-management workers) the least. It means that the rector’s support is extremely important for changes. Secondly, resources here are employees who have relevant knowledge and are able to carry out the process, as well as other employees because they need to use it later. It is important that consultants would be available. Training opportunities are of great importance and affect design, implementation as well as the use stage. Thirdly, it is extremely important that aims should be clear and these aims should be communicated to employees. The management are responsible for communication, who for one thing have formal competence. Non-accounting specialists are extremely important in the process, because just they help identify the enterprise’s activities and cost drivers. The successful implementation of ABC usually requires participation by managers from non-accounting functions, such as production and marketing, because ABC focuses on activities, and activities often cut across departments and functional areas, ABC can improve lines of communication and cooperation within the company. It is important to ensure employees’ concern and the employees are more interested if they benefit from the process. Appendix XI introduces some more concepts of the success and failure of implementing costing.

Why do some organisations adopt and others do not, or why are some organisations successful in implementing costing methods and others less successful? This is a difficult question, and there is no simple answer. There exist factors that influence successful implementation of costing, and these factors are mostly related to human resources and other internal issues (see the explanations presented above). These factors are country and organisation specific.

In the author’s opinion, the problem of employees’ resistance plays a significant role in the implementation of costing. According to Malmi, most problems affecting ABC implementation success come from resistance within the organisation (Malmi, 1997). A reason for resistance may be also that some knowledge has been acquired and people are not sure they can learn new things. Resistance in general is regarded as a force that tends to oppose or retard changes, or then eliminate them completely. Resistance has been studied in the literature and a number of reasons have been pointed out why people are against changes: people simply do not like changes; uncertainty of what a change involves; change is in conflict with the person’s/employee’s interests; they are not sure that change is needed (Self, 2007); extra work which will not bring the benefits (Velmurugan, 2010); etc. Two forms of resistance have been described based on works by Hultman: active and passive. Passive resistance is, for example, procrastinating (Self, 2007).

According to Barki and Huff, users are more satisfied with, and use more extensively, those decision support systems that bring positive change to their work environment (Byrne et al., 2007). Remuneration was also expressed in Fayol’s “14 Principles of Management”.

It is known that individuals within the same organisation may react differently to the implementation. ABC can be implemented when employees wish and are ready to work with the new system (Shaik, 2010). It means that a need for the implementation of a costing technique should be communicated and trainings for employees are essential.

## 2.6 Comprehensive discussion of conceptual framework

Based on costing theory, there are different possibilities to construct a costing system. The choice of a costing system depends on the **aims** for which the data generated by the system will be used.

In the past, costing in the public sector was sometimes not regarded as a priority because the aim of the public sector was to provide public services and national well-being; today, however, it is important to take into account, in parallel with the above-named aims, also the economic side of the services. Costing can help provide information about service prices and create preconditions for greater efficiency, effectiveness and economy.

Costs are counted for certain aims and costing systems are created **for that aim**. By a costing system the author means **system classification** issues (e.g. measurement, scope), methods and/or **techniques, procedures** (tracing costs to activities and/or cost objects; identifying cost objects, activities, resource expenses and cost drivers; generating reports), the **elements of costing system** (cost objects, activities, resource expenses, activity and cost centres, cost, activity or resource drivers) used for costing.

The topic of this dissertation – **full costing** – determines that full-costing systems are discussed here. Three costing **techniques** are available to choose from when creating a full-costing system: traditional costing (TC), activity-based costing (ABC) and time-driven activity-based costing (TDABC).

Researchers have criticised traditional costing and found that, for example, in the conditions where services are much more diversified, indirect costs have increased and processes are more sophisticated, the traditional costing does not provide accurate information sufficiently. **ABC** is a costing technique that takes account of environmental changes and in comparison with TC, provides more accurate information and important non-financial information. Considering that ABC has a solid history and that this technique is more accurate than TC, and ABC gives added value, the ABC technique may be regarded as a costing technique suitable for universities.

The choice of **cost drivers** is of critical importance in creating a costing system.. For cost allocation, cost drivers should be found which have a causality relation with the costs. It should be taken into consideration that any change in a cost driver immediately involves reallocation of costs between services and/or products and therefore the cost driver should be selected extremely carefully.



The choice of **activities** has been related to activity analysis and organisation chart and there are different concepts how detailed the activities should be determined. The issue is to what extent the routine work is done in universities.

The most relevant drivers **should be determined by interviewing employees**. Cost drivers and activities can be selected by investigating the general practices of universities as regards these elements.

Costs should be allocated to **cost centres** and/or **cost objects**, and cost objects are selected according to what kind of costs are necessary to measure separately.

The alternative costing system and descriptive model based on the conceptual framework is presented in Figure 11.

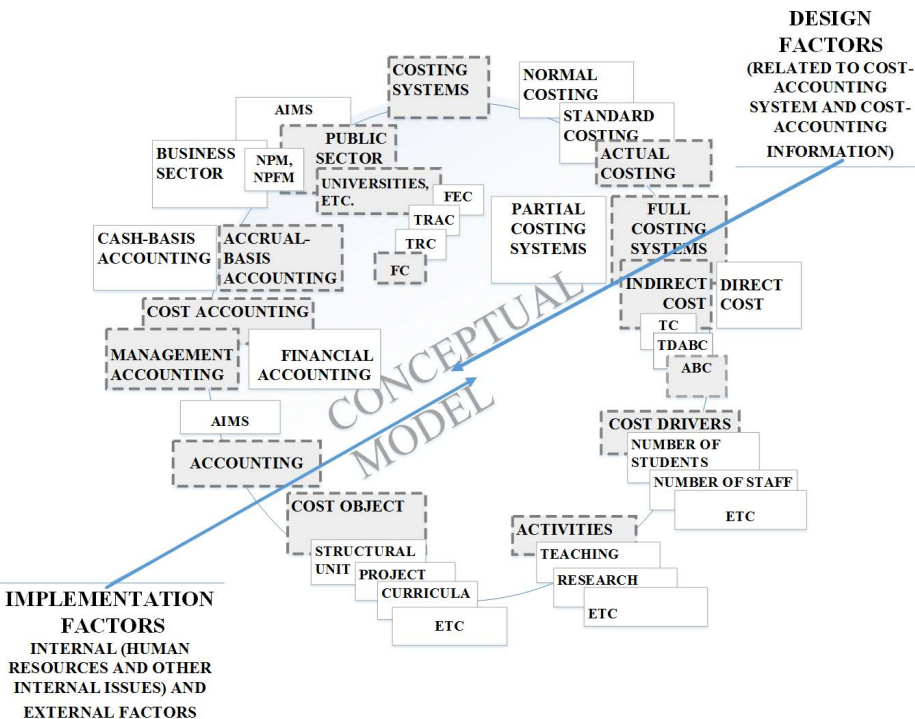


Figure 11. The conceptual costing model

Source: (Compiled by the author)

The boxes marked with - - - line (see Figure 11) denotes the classifications, techniques and elements of costing systems used in the conceptual model.

Based on the chapter on the framework, it should be underlined that the important indicators of a costing system are **flexibility, simplicity and utility** for the organisation.

Flexibility here means a possibility of not counting costs which are ineligible for finance providers, but flexibility also means adaptation to changes in the environment.

Simplicity means that the system should be comprehensible to finance providers, managers and employees. The system may not be unreasonably sophisticated. The construction of a costing system depends on the factors that characterise the organisation. The author classifies the contingencies into two general groups: related to the elements of a costing system (e.g., costing techniques, cost objects, activities, cost drivers, etc.) and contingencies related to costing information (e.g. accuracy, timeliness, importance of cost information, cost measurement, etc.).

According to contingency theory, the factors that influence the structure of a costing system are the structure and size of the organisation, the external environment, including competition, and government policies, culture, strategies and technologies. In the chapter on the framework in the dissertation, the theoretical approach to contingency theory is discussed, which in future should be analysed in the TUT context, as the full costing model is constructed and tested based on TUT.

The implementation of costing depends on certain factors, generally defined as technical, organisational and cultural. The author of the dissertation analysed and grouped these technical, cultural and organisational factors as internal and external factors and the internal factors are grouped as factors related to human resources and to other internal issues. In the author's opinion, most of these factors are related to the internal environment of an organisation and specifically to human resources. In the author's opinion, the problem of employees' resistance plays a significant role in the implementation of costing. Employees must want the new system, they should not feel themselves and their work exposed to risk. Managers have a significant role in communicating the need for changes. Moreover, information generated by the system should be usable. There are many human factor related nuances in the implementation of a costing system.

It is important to be aware and pay attention to all these factors throughout the implementation period, i.e. from the decision to implement the system to using the information.

### 3 EMPIRICAL RESEARCH

**This chapter links with practices**, the related research questions are RQ<sub>2</sub> and RQ<sub>3</sub> (RQ<sub>2</sub>: What are universities' costing practices today and what can be learnt from this information when developing full costing methodology and a full costing model?; RQ<sub>3</sub>: What are the university specific factors that influence the design of a costing model and its implementation?).

The second research aim (see RQ<sub>2</sub>) is to study costing models used by other universities to identify the common practices that would provide input to the designed costing model. Universities' costing contains some common elements which design a typical costing model for universities, and which is generally acceptable.

The third research aim (see RQ<sub>3</sub>) is to study factors that influence the design and implementation of costing. A costing system should be created taking into consideration the specific features of the particular institution, in our case a university, and in order for the system implementation to be successful, certain conditions should be guaranteed.

Two research projects were conducted within the framework of the research. The first research project was targeted at costing practices in universities worldwide (referred as "The worldwide research: the costing practices in universities"), the questionnaire form was used for communicating information (referred as "The costing questionnaire (CAQ)") and its results are presented in Chapter 3.1 and this research links with RQ<sub>2</sub>.

The second research project was targeted at costing issues of Tallinn University of Technology (referred as "The costing of TUT") and its results are presented in Chapter 3.2 and this research links with RQ<sub>2</sub> and RQ<sub>3</sub>.

#### **3.1 The worldwide research: the costing practices in universities and the results**

The survey questionnaires were sent out in May 2013 by e-mail and the invitation to complete the questionnaire was resent three times. The addressees were identified from the universities' websites. It means that, the choice to whom the questionnaire was addressed depended on the personnel data availability in the universities' websites and only one employee of the university got the questionnaire. The questionnaire was addressed:

- to the specific university pro-rector in the specific area; or
- to the director of finance; or
- financial manager or head of the related department.

The questionnaire was fitted with the request to complete the questionnaire or delegate, where necessary, the completion to a competent person. The questionnaire was designed at TUT, taking into consideration the TUT information requirements when choosing the costing method and working out a cost model, and based on some designs in EUA publications.

The sample was formed of approximately 860 universities represented in the QS World University Rankings 2012<sup>21</sup>. The response rate was 4%. The QS World University Ranking was used considering its worldwide reputation and the fact that Estonian universities are represented in the ranking list. This ranking is regarded as the most suitable also by other Estonian researchers. For example, Kase has based her research “Strategic Management of Universities” on this ranking (Kase, 2013).

The questionnaire contained general questions about the respondent’s environment (e.g. number of students, total costs etc.), autonomy, accounting. More detailed questions were asked about costing, including: What kind of methods are used and why? Are the methods accepted or not at the national level? How long did it take to implement the method? What are the activities and sub-activities for costing? What are the accounting objects? How often is the information updated? What are the levels of incurring indirect costs? Which are the cost drivers used and how are they related to the activities? Why were these cost drivers chosen? Which time recording methods are used? How important is the costing information for the university? What is the price formation based on? What is the internal support of the university to the implementation of costing methods? etc. Later questions, which arose when analysing the accounting systems at TUT were added, e.g. a question about direct and indirect costs allocated to one and the same object, and the methods used for separating them; how differences between faculties are calculated, etc. (see Appendix III).

In the end, the survey provides an overview of 34 universities in different countries, including Australia, Austria, Belgium, Canada, Cyprus, Finland, Germany, Hungary, Latvia, Lithuania, the Netherlands, Norway, Pakistan, Singapore, Spain, Sweden, England and the United States.

#### *General questions about the financial environment*

All universities prepare annual reports (comprising the balance sheet, revenue and expenses accounts, etc.), as a rule, using the accrual accounting method. One of the respondents uses the cash-basis or the so-called single entry method for annual reports (mentioned as the cameralistic method). All the respondent universities also draw up annual budgets, and most of the universities also make long-term budgets (22 respondents out of 34 declared drawing up long-term budgets). The period of long-term budgets varies from three to five years, and the most numerous are long-term budgets for five years: 10 respondents out of 34 make their long-term budget for five years; seven have the long-term budget for three years; five for four years, and 11 respondents have no long-term budget. The question “Does your university prepare long term and/or annual budget?” was answered by 33 universities.

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<sup>21</sup> <http://www.topuniversities.com/university-rankings>.

Budget performance is based on the accrual accounting in 26 cases and on the cash-basis one in 8 cases.

In managerial costing, the revenue-expenses statement is used in 14 cases, in three cases budget performance data are used and in 14 cases the revenue-expenses statement is used simultaneously with the budget performance information. That question was answered by 31 universities.

*Rates of indirect cost*

The calculations based on the CAQ data demonstrated that the average rate (calculated as arithmetic average) of indirect costs is *ca* 44% (see Figure 12a) and indirect cost rates are located in a very wide range, see Figure 12 and 12a.

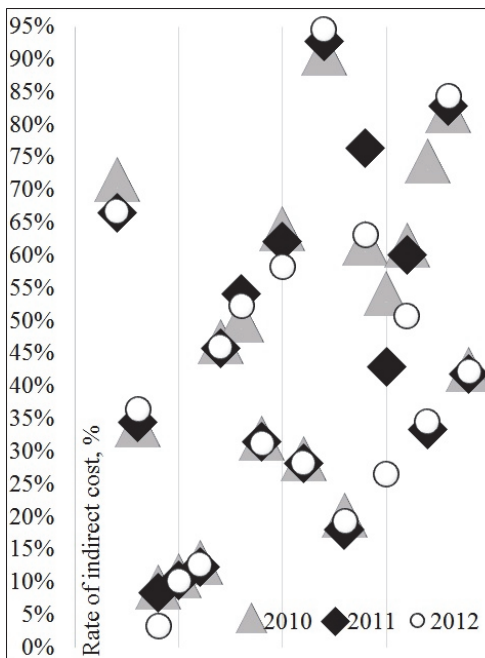


Figure 12. Rates of indirect costs in 2010-2012  
Source: (Compiled by the author, data based on CAQ)

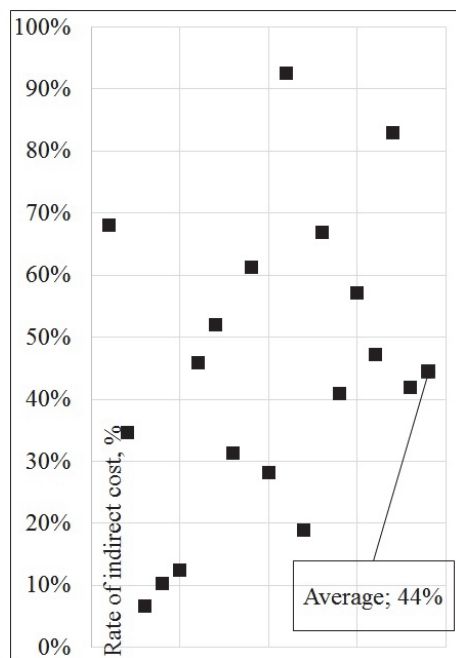


Figure 12a: Average rate of indirect costs  
Source: (Compiled by the author, data based on CAQ)

The indirect cost rates are calculated by the author of the dissertation based on the data of CAQ and the formula below was used:

$$\text{Rate of indirect costs} = \frac{\text{Indirect costs}}{\text{Direct costs}} \times 100\%$$

Figures 12 and 12a provide information about indirect cost rates. This information is needed for comparing that information with TUT's indirect cost rate.

The calculations based on the CAQ data demonstrated that the average rate of indirect cost is ca 44% and that rate is comparable with TUT's indirect cost rate which was 40.8% (see Chapter 4).

### *Costing method and implementation*

This block of the questionnaire included the following questions:

- what kind of costing method was used;
- what was the aim of applying this costing method;
- how much time did it take to work out this method;
- when was the method used for the first time and have there been any recent changes made to the costing method.

A detailed overview of the questionnaire survey results is presented in Appendix IV.

19 respondents declared use of full costing (FC) as the costing method; eight declared activity-based costing (ABC), five the transparent approach to costing (TRAC), in one case time-driven activity-based costing (TDABC) and in three cases another method was declared. The question which costing method they use was answered by 31 universities. Four of them declared more than one costing method. Several accounting methods are used, for example, by the UK universities. This may be due to that TRAC is based on activity-based costing and is used as the British (United Kingdom) version of full costing. A maximum of three methods were mentioned simultaneously. In three cases the answer was not available. Another method was selected in four cases, including cost performance accounting (KLR – Kosten- und Leistungsrechnung), OMB A-21 (Cost Principles for Educational Institutions), GASB (The Governmental Accounting Standards Board). Detailed information is given in Appendix IV, in Tables 15 and 16.

The second chapter indicates that most universities in Europe have decided to implement activity-based costing as a costing method called full costing and the current research confirms that.

To analyse the aim of using costing six clusters of the aims were formed as follows:

- Aims linked with internal decision-making processes;
- Aims linked with price, including a higher percentage of indirect costs, pricing, negotiations with providers of finance;
- Aims linked with reporting and accountability;
- Aims linked with the state or finance providers' obligations;
- Aims linked with European policies;
- Aims linked with benchmarking in the sector.

The answers are presented in Figure 13.

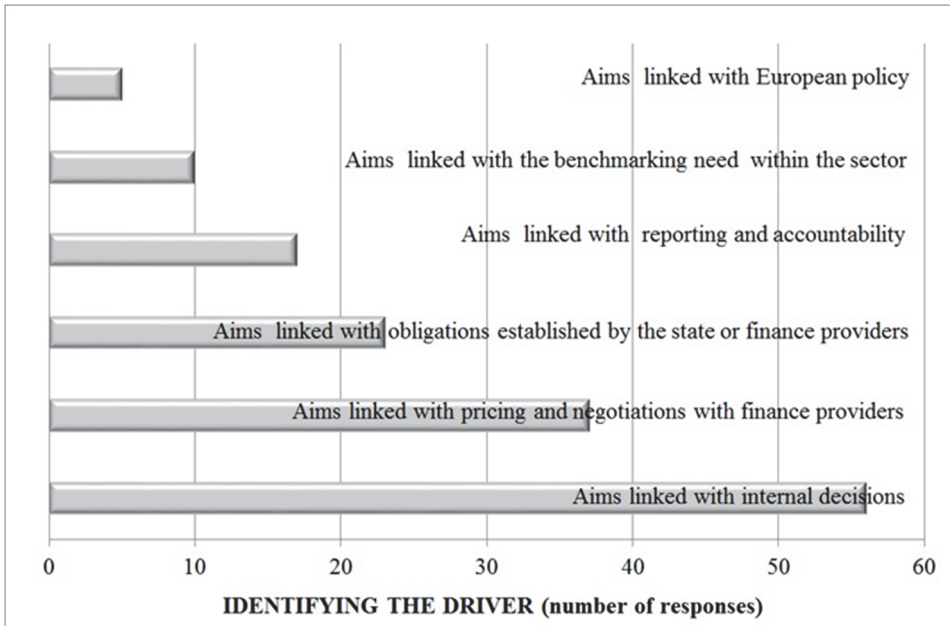


Figure 13. The aims of implementing ABC, FCA, TRAC or TDABC at the institution

Source: (Compiled by the author; source: CAQ)

The research has demonstrated that the dominating aim of using different costing methods is to satisfy the needs of the internal decision-making process, followed by the aim to negotiate with finance providers and the pricing related aim. The third aim of using costing concerns the state or finance providers' requirements.

The aims of full costing (e.g. accountability, sustainability, transparency, financial awareness; input to the decision-making process, including, for example, offering the finance providers a costing methodology; a methodology for internal resource (indirect costs) allocation, etc. (see Chapter 2.1.1)) discussed specifically in this dissertation occurred in the results of CAQ (see Figure 13).

The implementation of costing is a long process. The current research allows stating that the implementation takes one to three years in most cases. 5 respondents declared that the implementation took one to five years, 4 respondents declared that the implementation took one or less year and 1 respondent declare that the implementation took one to seven years. That question was answered by 33 universities.

The aspect of details of activities to be used in the costing process is an issue of critical importance. This research has demonstrated that there is a short list of activities used in universities.

In general, activities of universities are divided either into teaching and research, or into teaching, research and other activities. The detailed results of research are given in Table 3.

Table 3. Main activities to allocate costs in universities

Number of activities	Activities	Number of respondents
3 activities	Teaching, research and other	12
2 activities	Teaching and research	13
1 activity	Teaching	2
1 activity	Research	4
1 activity	Other	3

Source: (Compiled by the author; source: CAQ)

Other activities named were: administration including accommodation, IT, sports centre, projects. It was also mentioned that costs were allocated to projects and faculties and that activities were not involved.

In addition to mainstream activities, costs are allocated also to sub-activities. The sub-activities identified in the current research are described in Appendix IV, Table 17.

The sub-activities of teaching are e.g. adult education; teaching, including preparing the courses, coaching students, correcting exams, coaching and correcting theses; publicly funded teaching, non-publicly funded teaching; basic degree education; 1st level professional study (college) programmes, undergraduate studies (bachelor and professional studies), post-graduate studies (academic and professional master studies), doctoral (PhD) studies, continuing education courses; basic degree teaching; conduct workshops, field trips, project teaching.

The sub-activities of research are e.g. the institution's own funding, postgraduate research, research councils, other government departments, the European Union, UK-based charities, industry; postgraduate degree education, research; participation in scientific research, patents, publications, PhD theses; publicly funded, non-publicly funded, own funded research, post-graduate research degree courses; patents; writing papers, publications, participation in conferences; research with financing, research without financing.

Other activities are e.g. public services, guided teaching in training schools; real estate rental, movable property rental, services of experts; social services, support activities; undertaking consulting projects and providing administrative support; university management.

The most frequently mentioned cost object was a structural unit (in 27 cases); however, surprisingly only one university allocated costs to study curricula. The cost objects identified in the research are described in Figure 14.



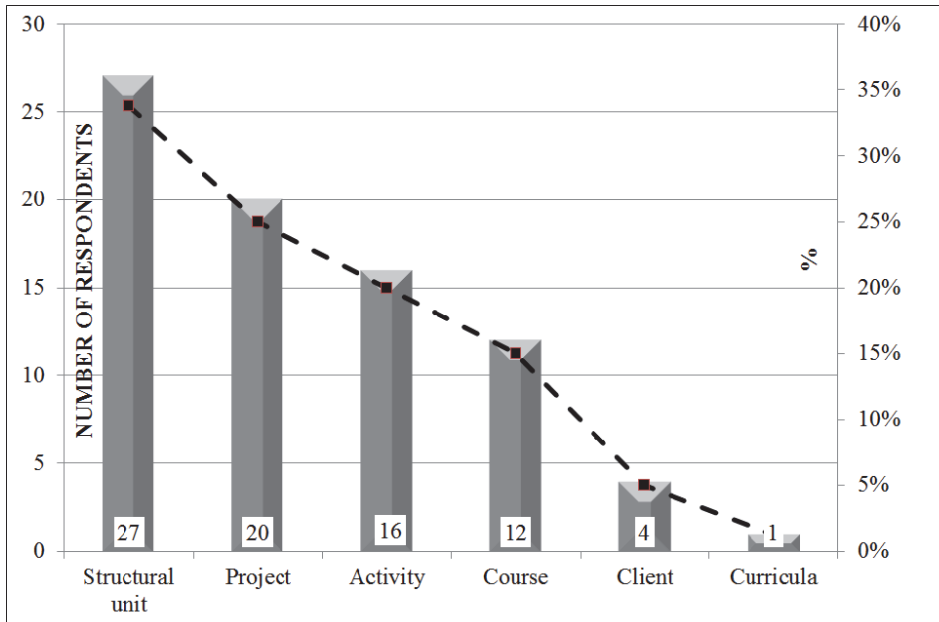


Figure 14. Cost objects used  
 Source: (Compiled by the author; source: CAQ)

Cost object in general is regarded as an item for which the costs are measured and reported separately. The other cost objects mentioned were project (in 20 cases), activity (in 16 cases), course (in 12 cases) and client (in 4 cases).

#### *Collecting and updating data*

Data are mostly gathered once a year (in 21 cases); not one respondent collects data for a longer period than one year. Two respondents collected data biannually and two respondents quarterly. Seven respondents declared that they had another period for collecting data, including five of them mentioned one-month period in the explanation, one respondent collected data permanently and 1 respondent, depending on the nature of data, either permanently, monthly or annually. That question was answered by 32 universities.

#### *Classification and separating costs*

Most universities (23 respondents) kept direct and indirect costs clearly separated. Ten universities kept direct and indirect costs to one and the same cost object. When direct and indirect costs were kept for the same cost object, the respondent universities used time recording, the nationally established rate or the rate fixed on the basis of the previous year's realisation to separate costs.

Indirect costs are classified differently. Most universities (16) classify indirect costs only at the university level and 10 universities classify them at the university,

faculty and unit level. A detailed overview of the indirect costs classifications by universities with the indication of the number of users (universities) is provided in Figure 15.

Number of users	16	10	1	1
Cost classification	Indirect cost of university	Indirect cost of university, faculty and unit	Indirect cost of university and faculty	Indirect cost of academic department
Number of users	2	2	1	1
Cost classification	Indirect costs of faculty	Indirect cost of project and unit	Indirect cost of university, faculty, unit, etc.	Indirect cost of university and academic department

Figure 15. Classification of indirect costs  
Source: (Compiled by the author; source: CAQ)

In TUT the indirect costs are classified at the university, faculty and structural unit level.

#### *Using cost drivers in cost allocation*

The most frequently used cost drivers in cost allocation were the time spent, square metres, the number of staff in FTE, and the number of students. A detailed overview of the research results is submitted in Appendix IV, Table 19.

There was also a question about a cost driver conforming to the specific cost. The relationships between the specific cost and utilisation of the cost driver are described in Appendix IV, Table 18.

To sum up, the most popular cost drivers used for allocating a specific activity cost are the following. The administrative expenses (e.g. expenses related to management, IT/computer services, finance service, marketing, legal activities, international relation activities, etc.) were allocated on the basis of FTE of the personnel. The real estate costs (incl. depreciation) were allocated on the basis of square metres. Library services were allocated based on the number of students. Membership fees were allocated based on income. In most cases, up to nine cost drivers were used (Table 4).

Table 4. The number of cost drivers used by universities in 2013

Number of cost drivers	Number of respondents	% of respondents
1 to 4	11	37
5 to 9	13	43
10 or more	6	20

Source: (Compiled by the author; source: CAQ)

The number of cost drivers should not be very large, in general terms, the number of cost drivers should vary between ten and thirty. The number of cost drivers depends on the size, type and complexity of organisation. In general universities use up to nine cost drivers.

### *Selecting cost drivers*

Theoretically the cost drivers should be selected based on causal relation, benefits received, reasonableness or fairness.

An overview of the reasons for selecting cost drivers is presented in Figure 16.

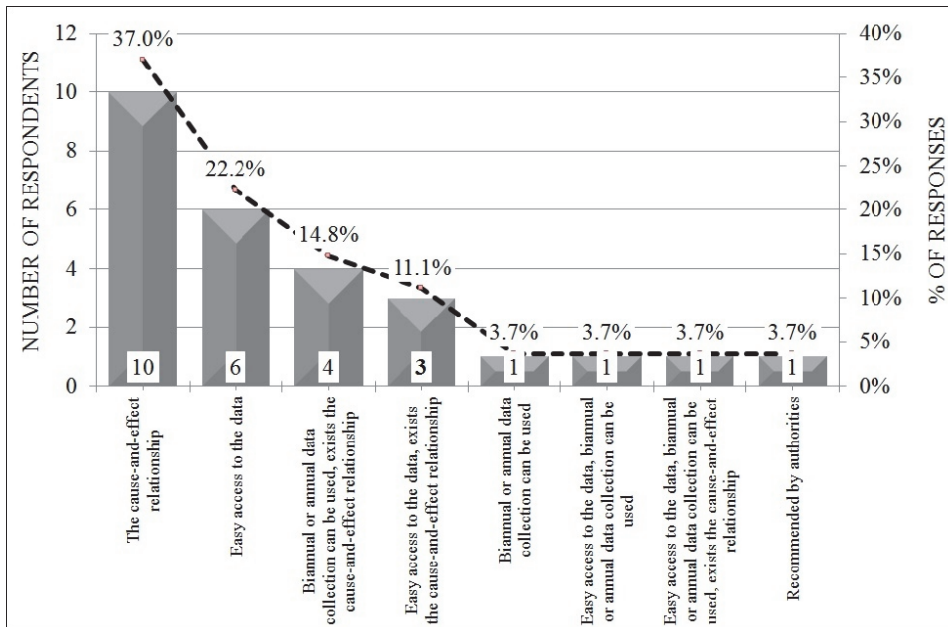


Figure 16. Reasons for selecting cost drivers

Source: (Compiled by the author; source: CAQ)

The most important factor for selecting cost drivers was the cause-effect relationship. That result of research confirms the theory. Access to data has also been considered important, e.g. 6 respondents declared that the reason for selecting cost drivers was easy access to the data .

There were other factors and several reasons for selecting cost drivers:

- biannual or annual data collection can be used, the cause-and-effect relationship (4 responses);
- easy access to the data, the cause-and-effect relationship (3 responses);
- biannual or annual data collection can be used (one response);

- easy access to the data, biannual or annual data collection can be used (one response);
- easy access to the data, biannual or annual data collection can be used, the cause-and-effect relationship (one response);
- recommended by authorities (one response).

#### *Implementing rates and taking differences into account*

In most universities differences between faculties are not taken into account and rates are not applied to smooth the differences either. Seven universities take the inter-faculty differences into account, but the majority of respondents (20 respondents) do not take them into account. One university calculates the overhead cost rate to technical disciplines.

The research did not identify specifically that different rates were used for faculties. Differentiation rather occurred on the basis of space types (For example, lab space is more expensive to occupy than standard office space) and the number of students.

#### *Time allocation methods*

Time recording was performed by the staff themselves. Time recording is the most topical part of full costing. The information of time recording methods is presented in Table 5. Two most popular time recording methods were the labour data report completed by employees and turned in weekly/monthly and periodic estimates of time spent on activities completed by employees.

Table 5. Time recording methods

Time recording method	Number of users
Labour data report completed by employees and turned in weekly or monthly	9
Periodic estimates of time spent on activities completed by employees	9
Periodic evaluations completed by someone other than an employee	7
Workload planning models	3
Proxies	3
In-year retrospective	2
Diaries	1
Labour data report completed and turned in biweekly	1

Source: (Compiled by the author; source CAQ)

Time recording is a topical issue in full costing (see e.g. Aartsen, 2013). Time recording was presented mostly in hours and, as a rule, on the basis of the main activities (see Figure 17).

YES		NO		YES		NO	
Is the time sheet refilled?				Does staff use percentages for workload allocation?			
13		7		7		11	
Does staff use hours and minutes for workload allocation?				The detail provided in timesheets			
14		4		11	7	1	
				main	less than 20	more than 50	

Figure 17. Time recording methods

Source: (Compiled by the author; source: CAQ)

Sometimes the time recording method is characterized as follows: more than the main activities (but less than 20) are presented and percentages are used in workload allocation (see detailed information in Figure 17).

Theoretically the number of activities depends on the size, type and complexity of organisation.

#### *The pricing bases*

Usually, pricing is based on full costing. Other pricing methods mentioned are those based on all costs of the university supplemented by an extra charge. The market price was mentioned on six occasions as the pricing principle (see Figure 18).

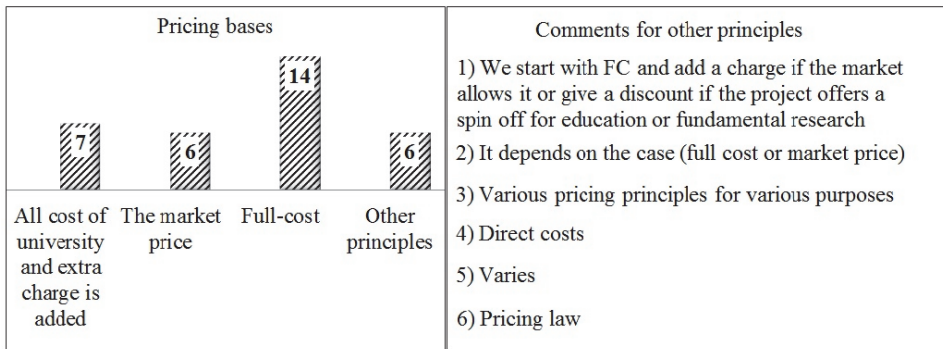


Figure 18. The pricing bases  
 Source: (Compiled by the author; source: CAQ)

By way of explanation, it was added that in general, where the market allows, the full costing was used.

*Management and managers' attitudes, training*

Usually, the importance of costing information is valued higher than five points on a ten-point scale. The managers' attitudes are expressed Figure 19.

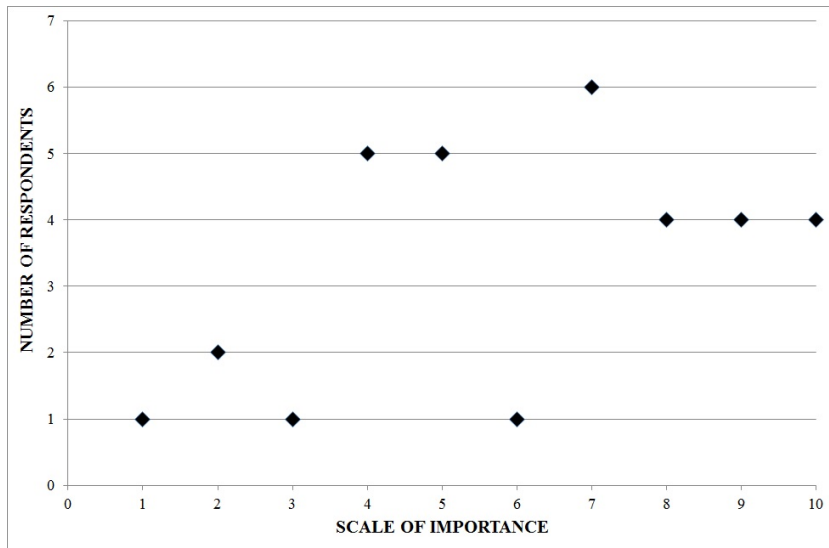


Figure 19. Importance of costing information  
 Source: (Compiled by the author; source: CAQ)

The importance of costing in a 10-point system has been assessed (see Figure 19) at an average of 6.3 points and on average 58.8% of the decisions are made based on costing information (see Figure 20). It varies in individual cases, i.e. in

some universities only 30% of the decisions are based on costing information and in some cases all of them are supported by costing information.

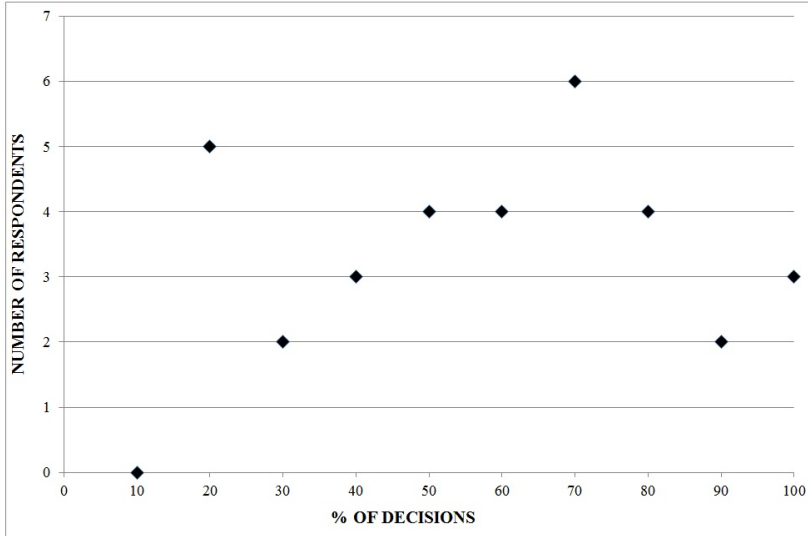


Figure 20. Supporting management decisions by costing information  
Source: (Compiled by author; source: CAQ)

Costing information does not support all decisions made by universities (see Figure 20). Assessments of top, middle and project management support to implement costing are presented in Figure 21.

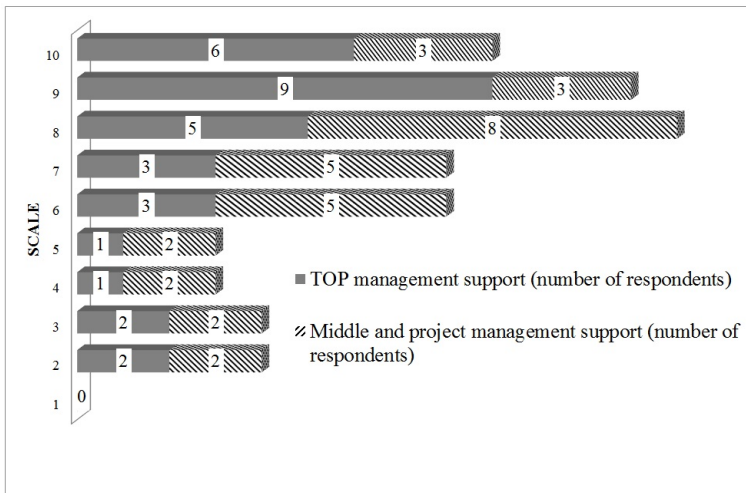


Figure 21. Assessments of top, middle and project management support to implement costing  
Source: (Compiled by the author; source: CAQ)

Support of top management to implementing costing was valued higher (at 7.5 points) than support of middle and project managers (an average of 6.7 points).

There was a question about providing trainings. The survey results implied that most of the universities provided as many training opportunities to their staff as possible. 22 universities replied that they offered training courses and 10 mentioned that they did not offer training courses. There was a question about providing cost information to stakeholders. 15 universities replied that they provided information to stakeholders, and 16 did not. Cost information provided to stakeholders includes annual reports, TRAC report to the government.

To sum up, feedback to the questionnaire was received from 34 universities. In general, the respondent universities classify their costing as full costing or activity-based costing. Only in one case, the time-driven activity-based costing was mentioned as the method of costing.

The costing methods used by universities today are relatively simple. Costing is based on accrual-basis reports – the revenue and expenses statement. Altogether, mainly two activities are distinguished in general, i.e. teaching and research. Sub-activities are identified based on the type of finance provider (public or non-public) or the level of studies (PhD, master or bachelor), etc.

In general, costs are assigned to structural units, projects or activities and collected annually. The most frequently used cost drivers are time recording data, square metres and the number of students or employees.

The author’s analysis has pointed out that usually universities use a maximum of up to 9 cost drivers. Hence, this dissertation confirms the finding by Cropper and Cook that most universities use up to 9 cost drivers (see Table 6).

Table 6. Usage of cost drivers

Number of cost drivers	Toompuu & Põlajeva, 2014		Cropper & Cook, 2000	
	Number of respondents	% of respondents	Number of respondents	% of respondents
1 to 4	11	37	8	40
5 to 9	13	43	10	50
10 or more	6	20	2	10

Source: (Compiled by the author: source: Toompuu & Põlajeva, 2014; Cropper & Cook, 2000)

It is generally agreed that cost drivers should be selected based on the cause-and-effect relationship, most universities select cost drivers based on the cause-and-effect relationship. However, data availability has also been mentioned as a reason for selecting cost drivers.



In general, different coefficients are not used for faculties. Different coefficients are used for different room types and, for instance, certain norms have been established for rooms.

Time recording as a rule is reported for mainstream activities, mostly teaching and research. Different time recording methods are used. Usually, the time recording method, where employees fill in the timesheet either weekly or monthly, is used, whereas in many cases the hours and percentages are used.

Issues which should be taken consideration when designing a costing model based on universities worldwide practices are presented in Figure 22.

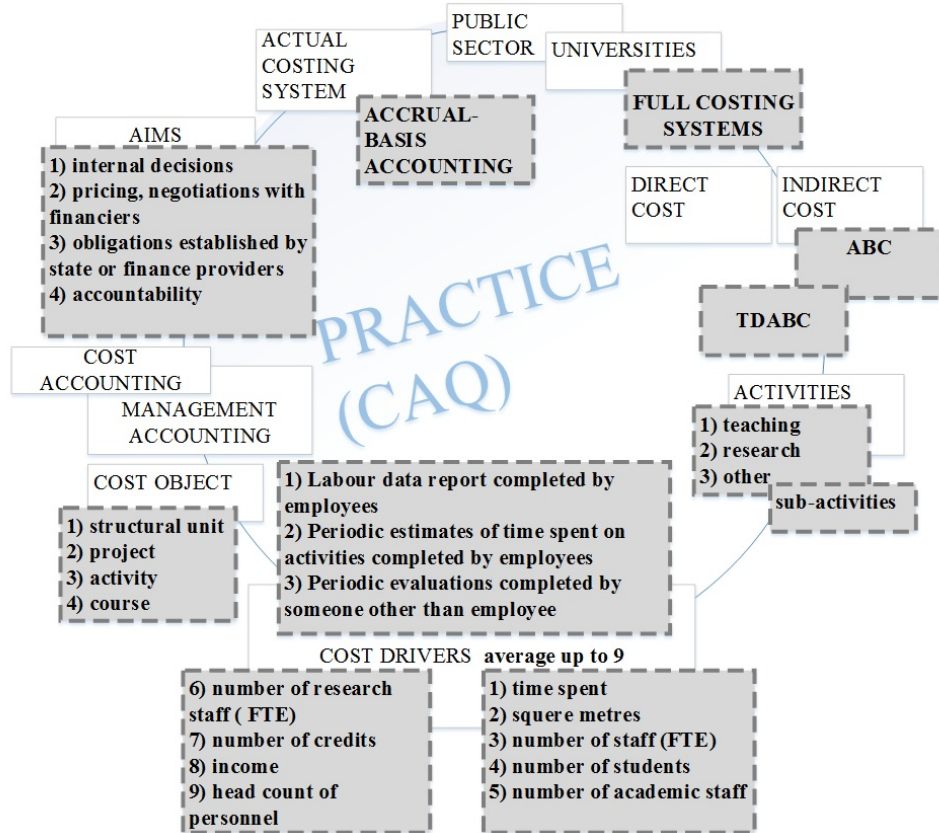


Figure 22. The full costing model based on practice  
Source: (Compiled by the author; source: CAQ)

The boxes marked with - - - line (see Figure 22) denotes input from CAQ.

The findings of this dissertation support the design of costing methodology for universities, including for TUT and assures that the methodology laid out by universities is in conformity with the widely used costing practices of universities.

### 3.2 The costing of TUT and research results

In this dissertation, an attempt is made to map the current detailed situation of costing of phenomena and investigate the related factors. Since every phenomenon is essentially different, it is important to outline the preconditions to create a costing system.

The TUT research concern is what the role of contingency factors is in costing of universities and which of these are topical in the university context.

The success and failure factors are studied in the TUT context. The related research question was formulated as: what are the university specific factors that influence the design of a costing model and its implementation. Such detailed information about a phenomenon may be attractive material for researchers who conduct their research in an analogous area.

The descriptive research observes the dependent variables named in contingency theory (see the design of research in Figure 23). Phenomena are studied based on legislation, research (e.g., the Research and Innovation Policy Monitoring Programme (TIPS Programme)<sup>22</sup>) and other documents.

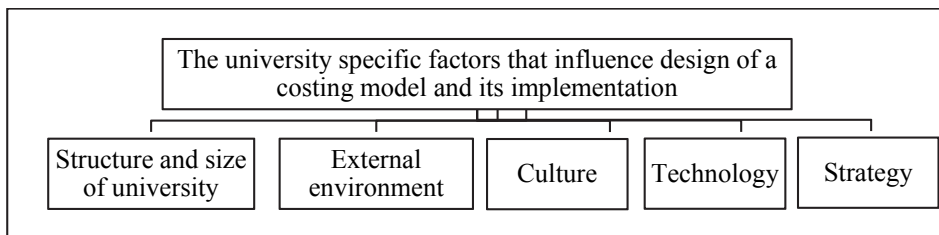


Figure 23. Design of TUT's research  
Source: (Compiled by the author)

Additional descriptive statistics of TUT (number of staff, number of students, personnel structure, etc.), which are not directly related with the costing area, but are related, for example, with culture, etc., are presented in Appendix VIII.

#### 3.2.1 Structure and size

Structure is typically analysed from the aspect of centralisation or decentralisation. An organisation's size can be analysed based on various factors: revenues, expenses, number of activities, etc.

TUT is a university with a decentralised structure, where most of the decision-making power, including revenues, expenses and pricing related decisions, is given to the structural units.

An overview of the structure by structural units is given in Appendix V.

<sup>22</sup> TIPS Programme <http://www.tips.ut.ee/eng/>

TUT comprised 82 structural units. Structural units can be discussed as accounting centres in a costing system. Every structural unit or accounting centre has its accounting objects, which give information about the revenues and expenses. The accounting centres in this dissertation are understandable as responsibility centres and the accounting objects are understandable as sub-responsibility centres in which revenues and cost information are collected and reported. The responsibility centre is headed by the manager of the structural unit, who is responsible for its activities and results. The sub-responsibility centres are headed by the sub-manager, who is responsible for activities and the results of accounting objects.

The well known types of responsibility centres are:

- cost centres (subunits that are responsible only for costs);
- revenue centres (subunits that are responsible only for revenues);
- profit centres (subunits that are responsible for revenues and costs);
- investing centres (subunits that are responsible for revenues, expenses and assets).

The accounting objects or sub-responsibility centres of TUT can be classified as profit centres. An accounting object is every object for which revenues and expenses are measured separately, including any kind of activity (for example, teaching), project, structural unit of TUT, etc. Accounting objects are classified based on the revenue earned into teaching, research and other activities.

There are approximately 1,200 accounting objects in TUT, including 83% connected with the academic structure.

Their distribution into academic structural subunits by sources of finance is depicted in Figure 24.

The TUT Management System Manual<sup>23</sup> describes the university's core processes (**activities**): teaching, research and development activity, and public-oriented services. In addition to the core processes, the Manual also names the support processes of the core process: marketing and communication management, personnel management, infrastructure management, IT management, creation of the legal environment, document management and record management.

It is necessary to determine the activity list of the university and therefore the above named documents were studied.

In addition to the above, information about activities can be obtained from the organisation chart of the university, and activities can be identified also based on university revenues.

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<sup>23</sup> TUT Management System Manual.

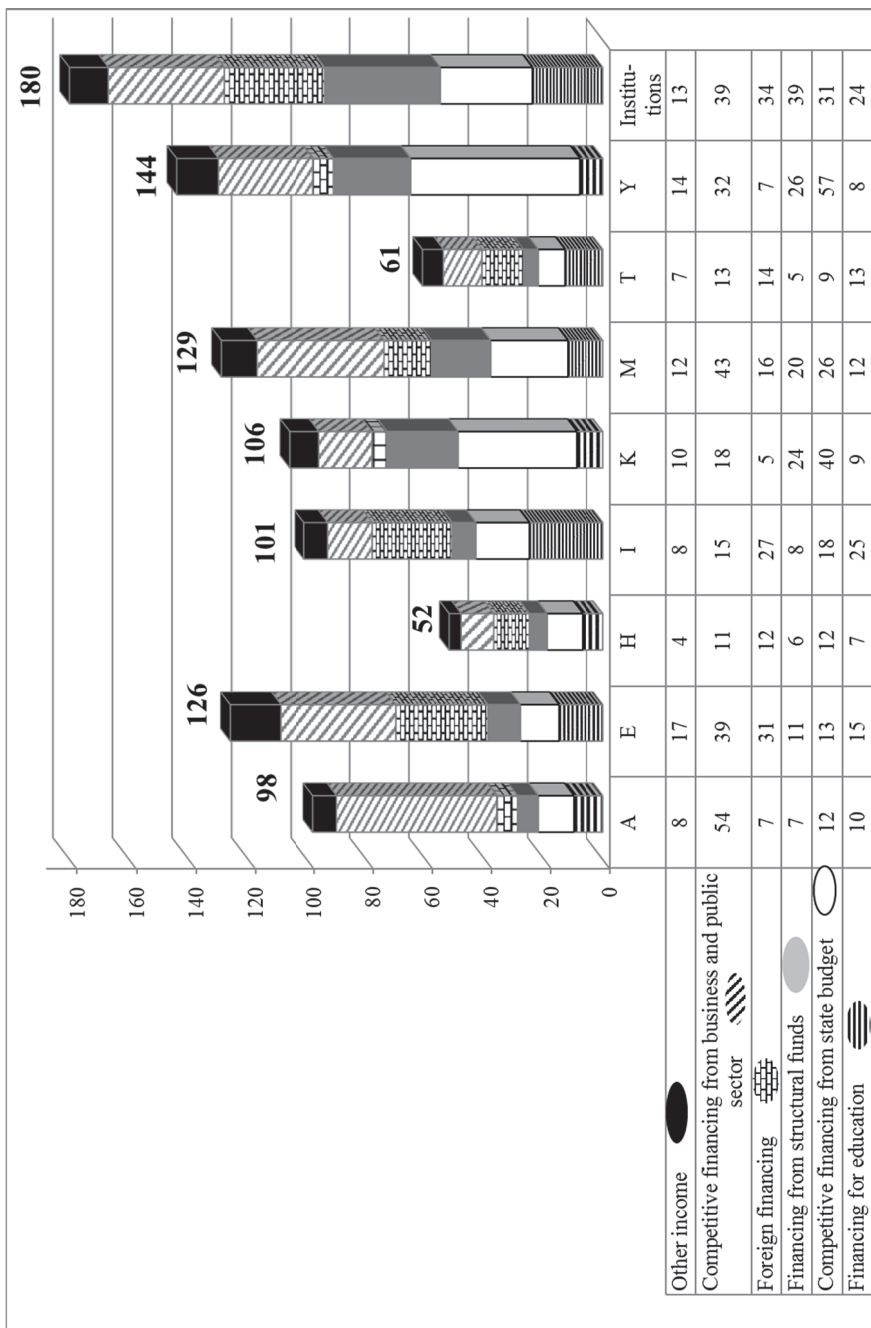


Figure 24. The number of accounting objects of academic structural units by financing types  
 Source: (Compiled by the author; source: annual report of research of TUT and NAV)

The capability of covering indirect costs is determined based on the finance provider. **Revenue analysis provides information about the university’s activities, autonomy of incurring finances and capability of recovering expenses.**

The revenue of a university is comprised of money allocated from the state budget, money received to reimburse study expenses (activity support), revenue from the provision of core activities related services for a charge, revenue from research and development activities and other revenue<sup>24</sup>. Hence, it may be said that the university has a lot of autonomy in earning revenue and the revenue of the university is diversified. Revenue from core activities is revenue from educational and research activities. Earning revenue is to a large extent decentralised, meaning that structural units themselves plan and search revenue. Revenues that can be centrally planned and then distributed include activity support, R&D baseline financing and infrastructure expenses covered through the budget of the Ministry of Education and Research.

The share of research higher than 50% has been set as a target in TUT’s strategic plan<sup>25</sup>.

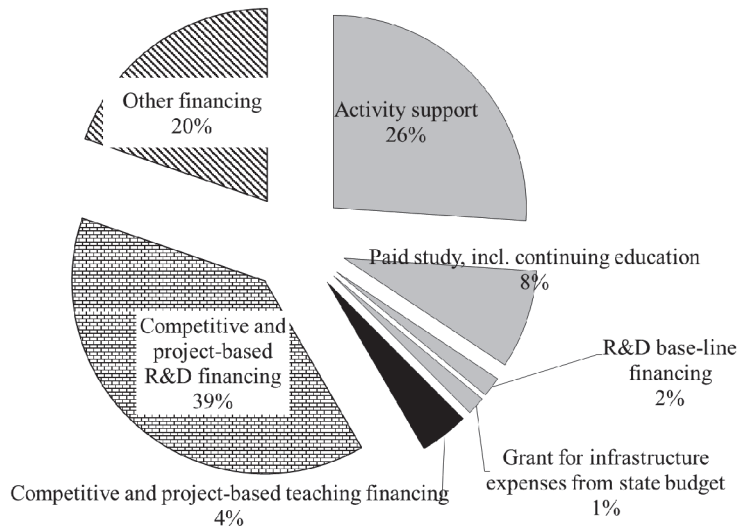


Figure 25. Budget performance in 2013

Source: (Compiled by the author; source: annual report of TUT)

In Figure 25, grey denotes financing for which TUT has the decision-making right. Education and research revenues are characterised by that the proportion of research is increasing in education and research revenues. The revenue structure varies across faculties (see Figure 26).

<sup>24</sup> Universities Act.

<sup>25</sup> Strategic Plan 2011–2015: Academic Quality.

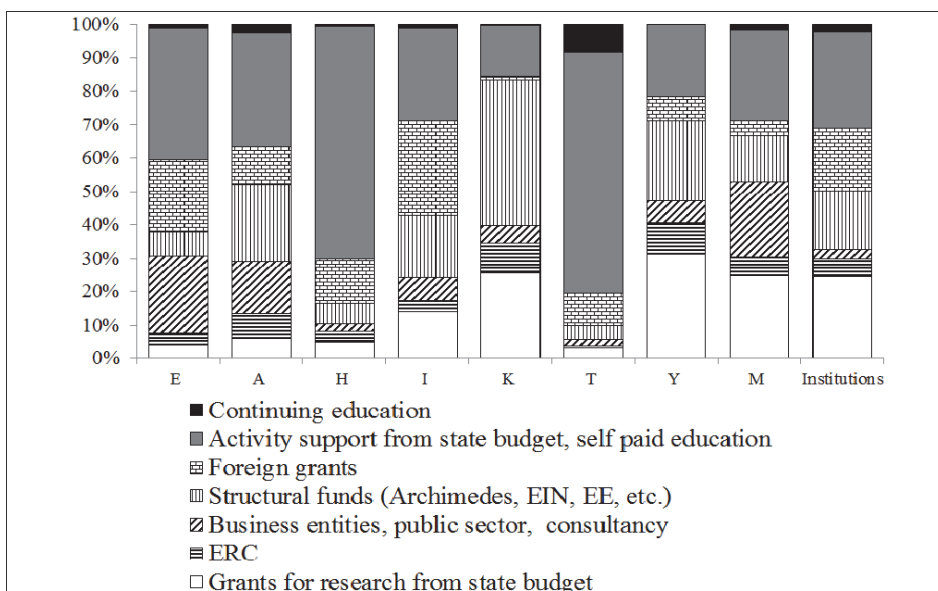


Figure 26. Financing of TUT by faculties and institutions

Source: (Compiled by the author; source: annual report of TUT and annual research report of TUT)

Revenue from formal education, revenue from teaching students is of especially high importance, since TUT enjoys the full decision-making power in this type of financing (freedom of use). TUT receives approximately 33% of its revenue from formal education.

The structural units which receive a large proportion of financing from formal education (activity support from the state budget and self-paid studies) and from continuing education have **greater decision-making power to use resources** and a smaller administrative burden in operating finances. These financing methods do not involve the resource-intensive application, auditing and reporting process. However, in TUT as a whole, competition or project based financing has increased substantially, which presumes greater administration of finances.

Project based financing is a trend that has been underlined by many researchers (e.g. EUA, 2008; de Dominicis et al., 2011; Conraths & Smidt, 2005; Lepori et al., 2007; etc.). Developments in Estonia have been largely similar to other countries (Masso & Ukrainski, 2009).

Project based financing (mostly structural funds) accounts for approximately 39% of TUT's revenue (on the basis of 2012 and 2013).

An advantage of project based financing consists in that the university has been able to develop the learning as well as research environment, simultaneously investing in facilities, equipment and developing curricula.

The weaknesses of project based financing are first of all that the university has very clear limits, rules and budgets for incurring costs, signifying the limited

decision-making power; project based financing, as a rule, cannot be used for covering indirect costs, and it does not ensure stability, either. Project funds are received ex post, during a longer period. Project based financing has been used to provide employees with competitive wages, but it should be taken into consideration that it is not permanent and sustainable financing.

Another indicator characterising project based financing is that it requires co-financing from the university, which varies from 5% to 50%, and it is more labour intensive and costly to administrate project based financing.

The special literature has discussed project based financing as “external” financing (see, e.g. Auranen & Nieminen 2010; Lepori et al., 2007, Raudla et al., 2014). They also talk about “internal” financing, which literally speaking is not internal financing, but financing where the university has considerable decision-making power. In the TUT context, the most important internal financing is for formal education.

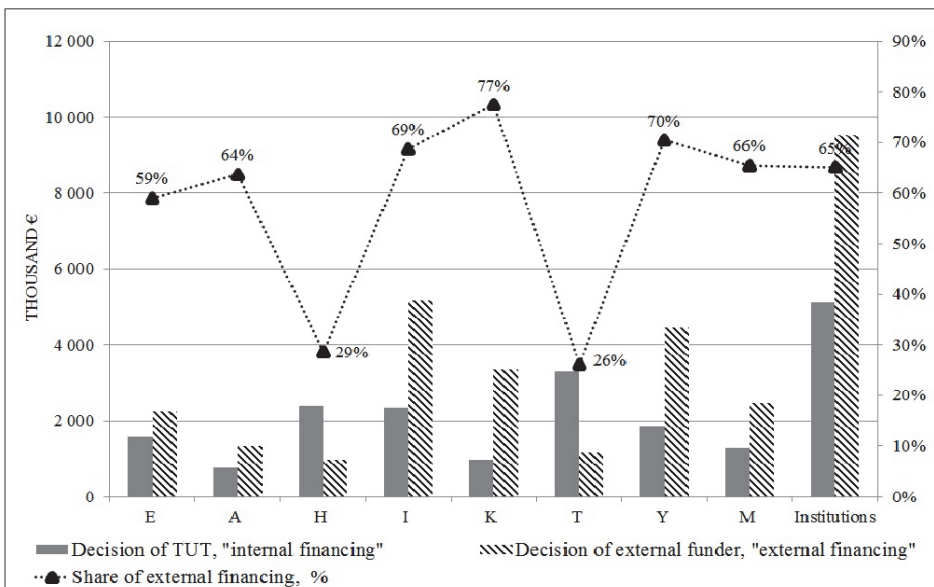


Figure 27. Proportions of structural units’ “internal” and “external” financing  
 Source: (Compiled by the author; sources: annual research report of TUT, annual budget performance)

From the cost covering aspect those faculties whose revenue is prevalently financing decided by TUT (see figure 27), or a specific structural unit, i.e. “internal financing”, are in a better position. TUT needs financing for which it has the decision-making power (such financing accounted for approximately 37% of TUT revenue. See figure 25), from which it can cover fixed costs, cover development expenditures and/or expenses, contribute to co-financing, etc.

Researchers have pointed out that the more successful a department and university as a whole is in obtaining project based financing and thereby

increasing the budget, the more the financial instability is growing and the bigger the need for “internal” financing is (Raudla et al., 2014).

Generally, different methods for covering indirect costs are used. For example, based on revenue (objects with higher revenue pay more); an object that is able to pay actually pays more; fair and/or equal allocation. Today, indirect costs at TUT are covered based on revenue. At the same time the revenue based method is simple, it is understandable for employees, it is historically rooted in TUT and a better method is not provided. But the revenue based method does not provide fairness.

Indirect cost covering by structural units at the university level is described in Figure 28.

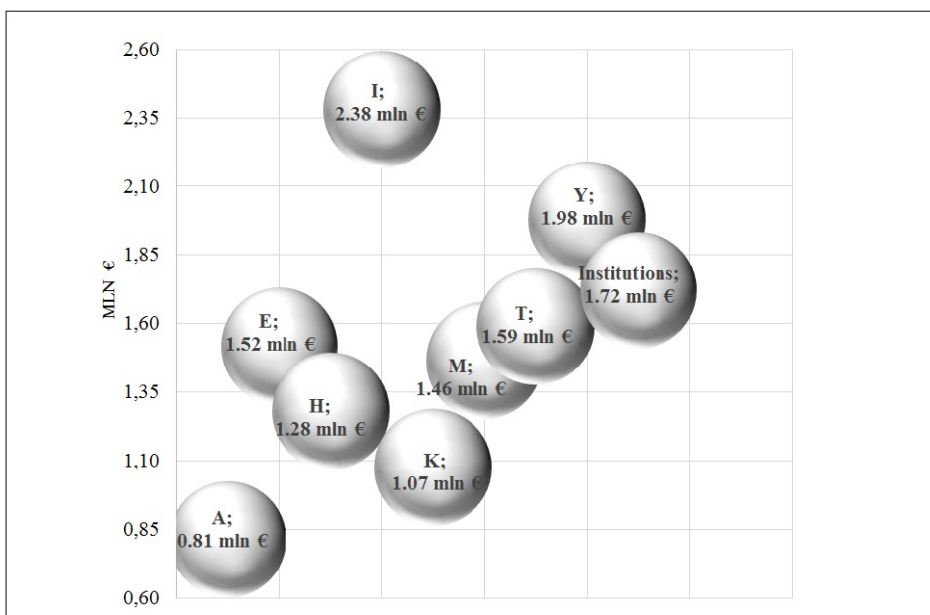


Figure 28. Indirect cost payment by faculties and institutions in mln € (includes all sources)

Source: (Compiled by the author; source: NAV)

The elements of the costing-system which are used by TUT are **expense types** (e.g. personnel expenses, transport costs, maintenance expenses, scholarships), accounting objects, accounting centres. In the context of university structure, the author can distinguish between the indirect costs of the university, a department or an institution, and a structural unit of a department.

The university level indirect costs are easy to identify, since they are traced to certain accounting objects. The university level indirect costs are presented in Figure 29.



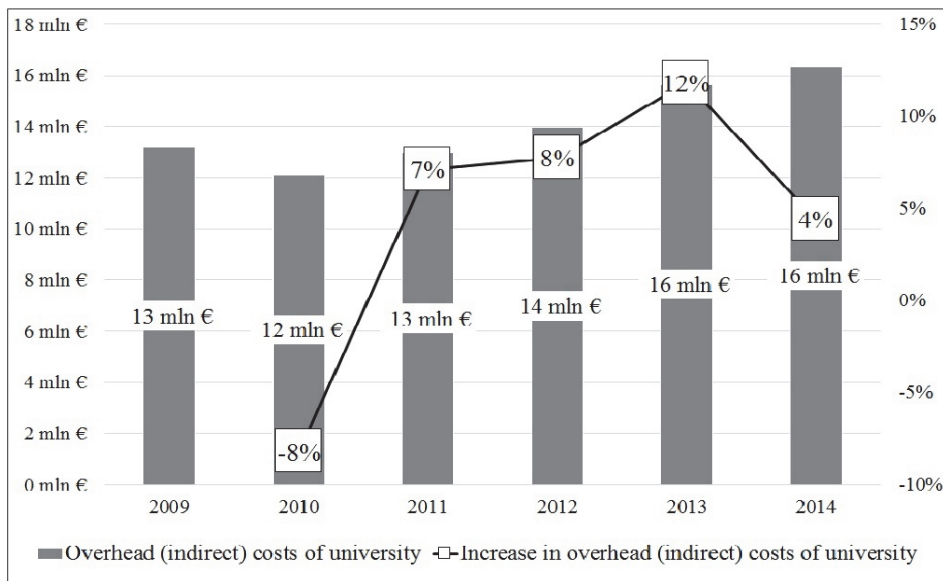


Figure 29. Amount of indirect costs at the university level  
Source: (Compiled by the author)

There is a constant pressure to increase the university's indirect costs, owing to legislation, project based financing, as well as the overall price rise and average salary rise in the country, etc. In addition, the growth in indirect costs is caused by the strategical decisions of the university.

Pursuant to legislation, the university has an obligation to fulfil other tasks, which presume that supplementary units are formed, or additional workforce hired to meet the legislative requirements. Whereas this is not extra financed by the state and in general terms, they represent indirect costs and their increase. To illustrate the above statement, an example may be the requirement to have an audit committee. The Auditors Activities Act<sup>26</sup> § 99 (1) stipulates that an audit committee shall be formed by a public interest entity, which according to § 12 of the same law, among other things, is a legal person in public law. Another example might be the obligation from the Packaging Act<sup>27</sup> to keep a record of packaging waste and submit respective information to the packaging register. Such examples of supplementary obligations imposed by legislation or the external environment which involve extra expenses but not extra financing, are numerous.

Other researches also have pointed out overhead increase due to legislation or the external environment. Expenses assigned to procurement and maintenance of quality control systems and employee training and improvement expenses are rising considerably, which is obviously the issue of overhead costs (Kaličanin & Knežević, 2013).

<sup>26</sup> Auditors Activities Act.

<sup>27</sup> Packaging Act.

Indirect costs are directly influenced by inflation (rise in prices) and the national minimum salary, and more indirectly by the average salary. The minimum salary requirement is obligatory for the university, and the national average salary rise brings on salary rise expectations. The university's strategic decisions, for example, regarding the space (university has increased the space in use) also increase indirect costs.

Price rises, including transition to the free market of electricity, and expansion of TUT in terms of space, has led to the situation where just funds the university allocates to maintenance works have been among the biggest risers (see Figure 30, the change in allocations in 2014 compared to 2009 72.5%).

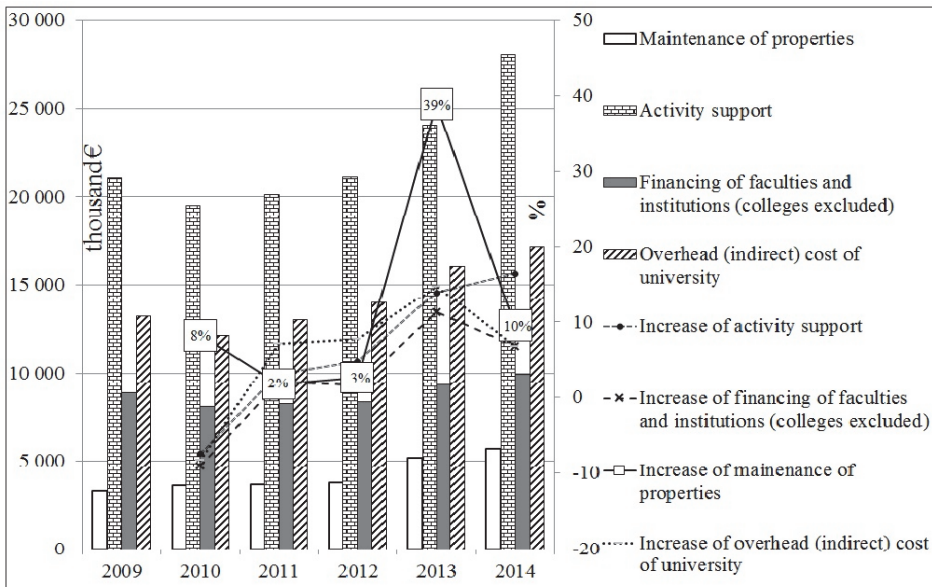


Figure 30. Annual change in financing and cost, 2009–2014

Source: (Compiled by the author; source: budget of TUT)

A detailed view of the university level indirect costs is presented in Figure 31.

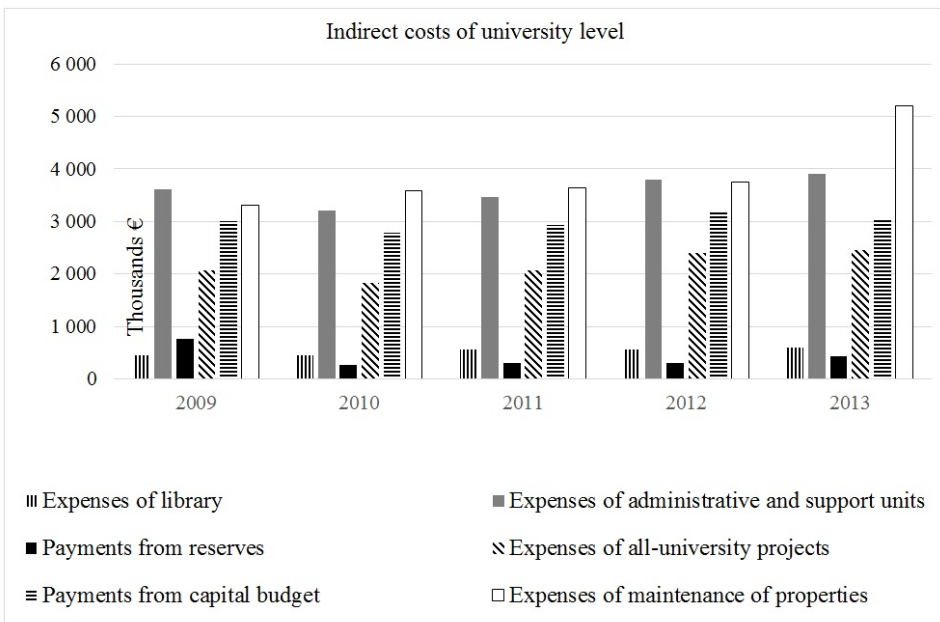


Figure 31. Detailed view of the indirect costs of the university  
Source: (Compiled by the author)

In addition to the university level, indirect costs are incurred at the level of faculties, institutions and structural units of faculties. Indirect costs of a faculty are the costs of the dean’s office associated with the faculty administration. Indirect costs of faculties are allocated to a separate accounting object and are planned as part of the dean’s office’s annual budget. Indirect costs of institutions and of the structural units of faculties and institutions are associated with the administration of these structural units and are kept in accounting objects with direct costs.

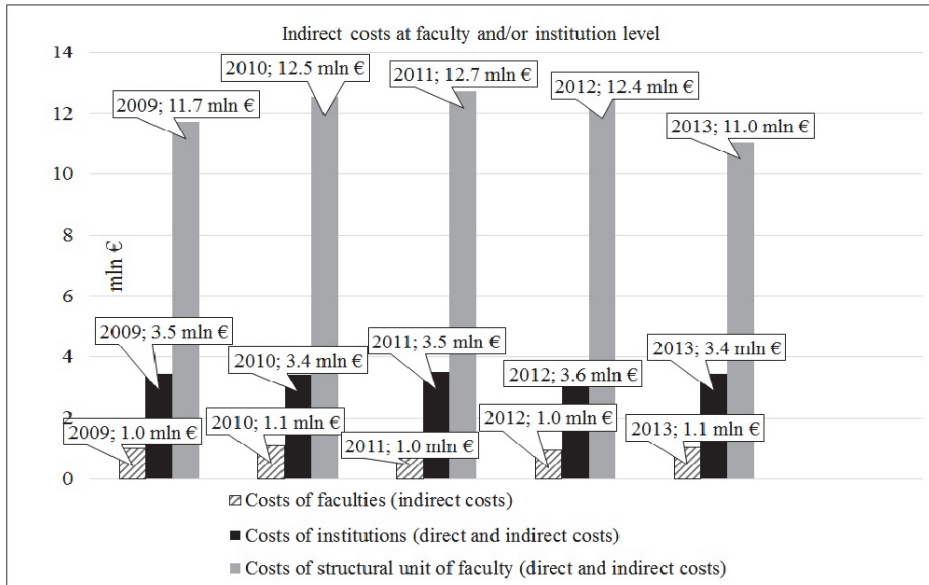


Figure 32. Direct and indirect costs of faculties, institutions and structural units of faculties

Source: (Compiled by the author)

A faculty's indirect costs are located in separate cost objects and are easy to identify. The amount of indirect costs of faculties and institutions is presented in Figure 32.

In an institution or structural unit of a faculty, direct and indirect costs are located (kept) in the same accounting object and it is not possible to identify indirect costs directly. Hence, a methodology should be worked out for identifying indirect costs at the level of an institution and a structural unit. Currently most of the university's accounting objects (82%) are objects that contain only direct costs, 7% of the accounting objects contain only indirect costs and 11% of the accounting objects contain combined costs.

To sum up, the university's **structure and size** have a visible effect on the structure of the costing system. The structure and size affect the costing system through e.g. **accounting centres, accounting objects, activities**, complexity. For example, the decentralisation rate prescribes more than 80 accounting centres and more than 1,200 accounting objects to the costing system.

Project based financing, which is a trend, has very clear limits, rules and budgets for incurring expenses; project based financing, as a rule, cannot be used for covering indirect costs, and it does not ensure stability either. The cost measurement requirements are stated by the finance providers' (e.g. structural funds).

The structural units differ from each other largely and have different **culture** in doings.

There is a constant pressure to increase the university's indirect costs, owing to legislation, project based financing, as well as the overall price rise and the average salary rise in the country, etc. The state and organisations have their own culture, legislation, value systems, rules, etc., so their culture will have more or less influence on TUT's costing. That issue will be analysed next.

### 3.2.2 External environment

Accounting at TUT includes accrual financial accounting, one output of which is the statement of revenue and expenses, and cash-based budget performance accounting (managerial costing) with the budget performance report as an output. Costing is carried out in both of these accounting formats; however, the accounting principles used are different. The managerial costing practice has been analogous since 2001.

The principles of financial accounting are provided in the legislation and standards (e.g. AA<sup>28</sup>, GRSA<sup>29</sup>, GEASB<sup>30</sup>, etc.). Budget preparation and reporting on its implementation is provided in the UA<sup>31</sup>, although detailed principles are in the competence of the university.

Differences between financial accounting and budget performance accounting in terms of expenses are described in Figure 33.

<p><b>FORMAT OF STATEMENT OF REVENUE AND EXPENSES</b></p> <ul style="list-style-type: none"> <li>• Operating expenses</li> <li>• Scholarships, study allowances</li> <li>• Personnel expenses</li> <li>• Depreciation and impairment loss</li> <li>• Other expenses</li> </ul>	<p><b>FORMAT OF BUDGET PERFORMANCE</b></p> <ul style="list-style-type: none"> <li>• Personnel expenses</li> <li>• Maintenance expenses</li> <li>• Business travel</li> <li>• Acquisitions of interior assets</li> <li>• Subcontracting services</li> <li>• Office expenses</li> <li>• Transport costs</li> <li>• Representation costs</li> <li>• Advertising costs</li> <li>• Investments</li> <li>• Personnel training</li> <li>• Scholarships</li> <li>• Other expenses</li> </ul>
<p><b>DIFFERENCES</b></p> <ul style="list-style-type: none"> <li>• Accrual method</li> <li>• Excludes purchases of fixed assets (expenses through depreciation)</li> <li>• Excludes payables to supplier</li> <li>• Excludes prepayments for services</li> </ul>	<p><b>DIFFERENCES</b></p> <ul style="list-style-type: none"> <li>• Cash basis method</li> <li>• Includes purchases of fixed assets (investments)</li> <li>• Includes payables to supplier</li> <li>• Includes prepayments for services</li> </ul>

Figure 33. Costing at TUT by expense types

Source: (Compiled by the author)

<sup>28</sup> Accounting Act.

<sup>29</sup> General rules for state accounting.

<sup>30</sup> Guidelines of Estonian Accounting Standards Board.

<sup>31</sup> Universities Act.

Costing in the case of accrual financial accounting and budget performance is similar and a difference is that certain expenses are counted in in the former case and in the latter case they are not (see Figure 33).

External rules of TUT have been established for certain financing – to what extent indirect costs can be reimbursed and the university has the right to decide the indirect cost recovery rate for some funds (see also Chapter 3.2.1). Most broadly, the principles of covering indirect costs may be classified as decisions by the university and decisions by external finance providers. The general principles of covering indirect costs and who set up the rules are summarised by the author in Appendix IX.

According to the current system, indirect costs are covered from formal, continuing education, ERC grants, etc. Transfers from activity support, baseline financing and infrastructure expenses are agreed upon during the budgeting process. Additionally, an amount of transfers to cover indirect costs is determined for faculties, the sources (contracts, projects and structural units) and methods of which are decided by the dean.

According to the rules of the university, the indirect cost rates are the following: for business contracts (e.g. business contracts, consultancy, continuing education) 17%, for self-paid education 30%, for the open university 20%, etc.

The general rule of structural funds (external finance providers e.g. EIN, EE, Archimedes), the indirect costs are eligible if they are named in the regulation, are based on real costs and are calculated based on the regulation<sup>32</sup>, and that rule reflects in Estonian legislation. The regulation also requires **methodology** for indirect costs recovery.

The principles of covering indirect costs are agreed upon at the project funding conditions for indirect costs recovery. TUT is facing a situation where most of the indirect costs are covered from the account of activity support (see Figures 34 and 35).

The Ministry of Education and Research reimburses the indirect costs of the infrastructure of research and development institutions, usually ca 28%. The Estonian Research Council reimburses the indirect costs 20%. In accordance with the rules of programme Horizon 2020, the flat rate is 25%.

Researchers have argued that universities have a key role in national economic development (e.g. Charles, 2003; Etzkowitz et al., 2000) and that active research and development (R&D) or collaboration between the business sector and R&D institutions will breathe new life into the private sector. At the same time, the researchers have also pointed out that often enterprises do not want to cover indirect costs (Raudla et al., 2014). This argument is also expressed in Appendix IX.

With the growth of project based funding, administrative activities and the respective expenses have also increased. Project based funding can be discussed

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<sup>32</sup> Conditions and Procedure for Determining the Eligibility or non-eligibility of Structural Support Expenses for Aid in the Period 2007–2013.

as competition based financing. Project funds shall be applied for and project funding allocation is decided between the applicants.

Expenses in project based funding must be actual, but identification of actual indirect costs involves substantial documentation and administration. Hence, it may be summed up that in project based funding indirect costs: 1) are not eligible; 2) are partly eligible; 3) identification of indirect costs as actual costs is resource intensive. An agreed and audited methodology for recovering indirect costs would help make indirect costs eligible also for projects, increase the university's capability of indirect cost recovery and would relieve the pressure of indirect costs on teaching funds.

Aspects of project based financing are discussed in greater detail in Chapter 3.2.1. Considering the principles of covering indirect costs agreed upon at the university and the project funding conditions for indirect costs recovery, Estonian universities are facing a situation where most of the indirect costs are covered from the account of activity support<sup>33</sup>. A detailed description of the sources of covering indirect costs is presented in Figures 34 and 35.

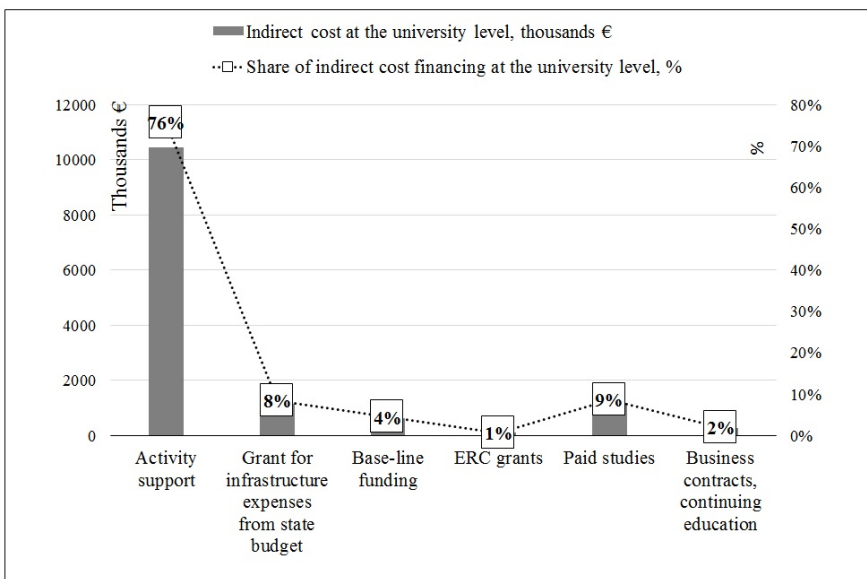


Figure 34. Cover of indirect costs of TUT in 2012  
Source: (Compiled by the author; source: budget of TUT)

<sup>33</sup> According to the Universities Act, the support received to the an educational institution from the Ministry of Education and Research for the provision of teaching at the level of higher education, the aim of which is to create equal possibilities for studying to all capable and motivated students and to ensure the financial resources necessary for an educational institution in order to achieve its mission, objective and functions.

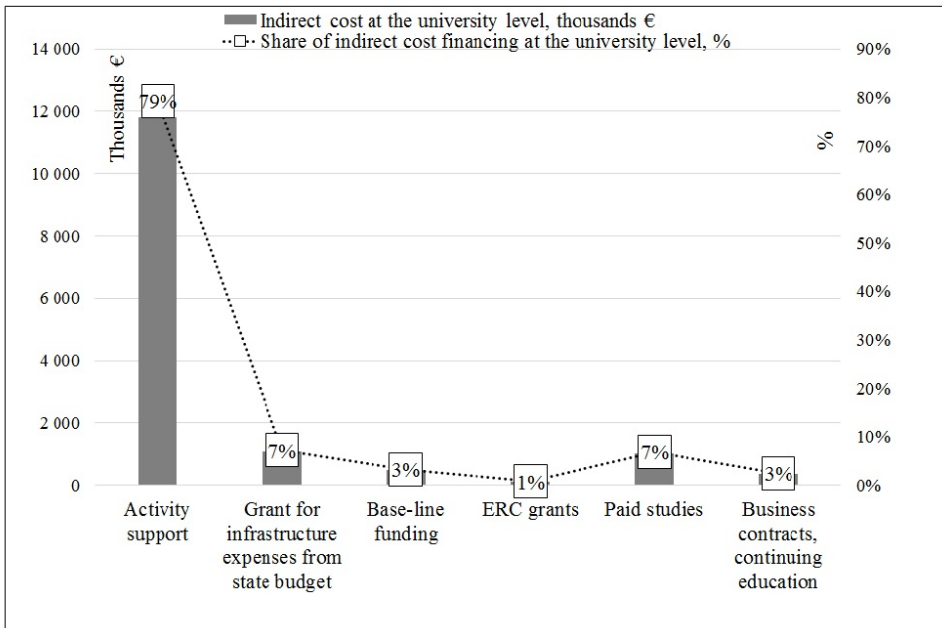


Figure 35. Cover of indirect costs of TUT in 2013  
 Source: (Compiled by the author; source: budget of TUT)

The cover of indirect costs in 2014 was similar with 2013.

Approximately up to 86% of the indirect costs are covered from the account of teaching funds (activity support and self-paid studies) and this is increasing. Considering that an aim is to reach a research proportion of more than 50% of teaching and research, it would be justified that indirect costs are covered in more equal proportions from the account of teaching and research activities. It would be fair that every project, in addition to direct costs, will cover the related indirect costs. In addition, it should be taken into consideration that the amount of indirect costs for research is usually bigger than for teaching. This argument is based on that the project based funding is classified mostly as research funding, and that the administration of project funds is more resource intensive, as described in previous chapters.

To sum up. Finance providers presume that universities have worked out methodologies for costing (e.g. CPDE). This presumption has not changed the current costing practice of TUT. TUT's costing practice has been analogous since 2001. It means that the rate of **innovation is low** and changes in costing are accepted slowly.

The business sector presumes transparency. The methodology creates the basis for financing indirect costs based on simplified methods. The cost allocation methodology would be extremely important in order to initiate at the state level a discussion for financing indirect costs based on simplified methods.

The accounting practice changes are directly associated with **attitudes** of finance providers. The researchers have also pointed out that often enterprises do



not want to cover indirect costs. A problem is the “low price” culture, where finance providers, incl. the state, do not wish to cover indirect costs.

### 3.2.3 Culture

By culture the author means the way people do something and culture can be seen by reviewing documents (e.g. laws, rules, etc).

Costing at TUT is presented in Figure 36; for the costing principles see also Figure 33. The description of expenses at TUT starts by identifying an expense account for a specific expense document and then the accounting object that the expense is related to will be added.

The identification code of an accounting object is linked to the identification code of the structural unit (accounting centre), which determines the position of the accounting object in the TUT structure. Hence, it may be summed up that the TUT revenue-expenses as well as the budget performance report are summed at the expense account level through the accounting object (indicated as AO in Figure 36) and the accounting centre.

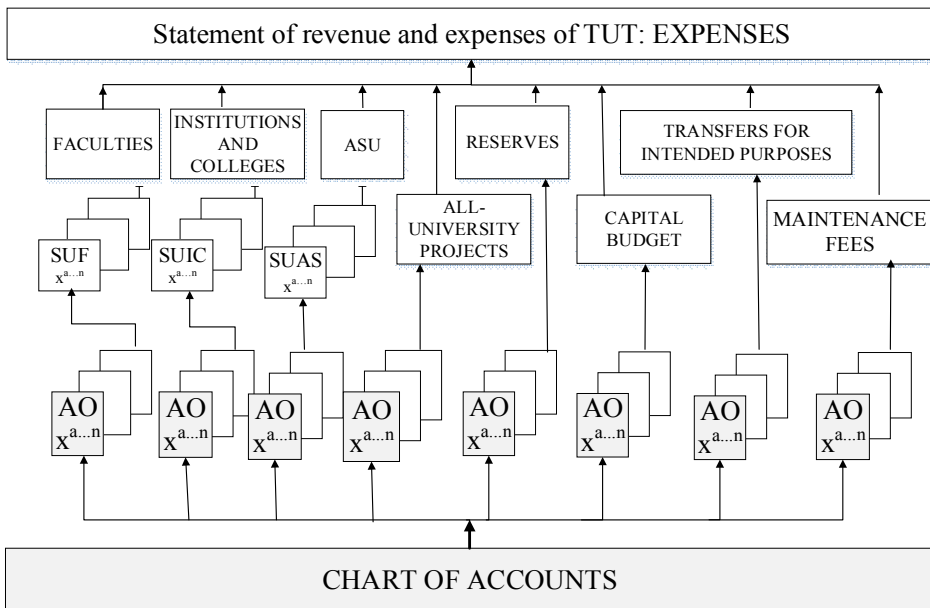


Figure 36. Current costing system of TUT

Source: (Compiled by the author)

Currently all indirect costs have not been kept separately at TUT. Indirect costs of the university are kept in separate accounting objects or in accounting objects together with direct costs. The university level indirect costs are agreed upon in the process of TUT annual budget drafting.

Duties, rights and responsibilities of TUT managers and other similar things are provided in the TUT budget policy. All budgets are subject to approval by the TUT Council and the structural units of TUT have the right to make expenses within the limits of their budget. It is assumed that all budgets are based on economic efficiency.

Tagoe, based on K. Lewin and his co-researchers, has described leadership styles as autocratic, democratic and free reign (Tagoe, 2012). Based on Lewin's classification of leadership styles, TUT in general has the preconditions for democratic management where consensus in the decision-making is assumed. At the faculty level, management is characterised by the "**free reign**" style, meaning that deans have delegated the decision-making power to respective departments, presuming that the department has relevant knowledge, skills and experience. However, since the adoption of the TUT Act, such a free reign style is tending toward autocratic management.

Pursuant to the TUT development plan, the role of faculties and colleges is underlined and it is declared that their obligations and responsibility in the university governance will be increased. However, there are few examples today where a faculty has taken the leading role and financial management is a faculty's duty or where a faculty is actually responsible.

Departments also have a "free reign" management, meaning that the decision-making power is delegated in many cases, for example, to a research group or project leader. Departments' independence is emphasised while speaking of them as "principalities" or "private firms", which deal with the financial affairs themselves and compensate to the university for indirect costs (Raudla et al., 2014).

The special literature (Al-Omiri and Drury, 2007) describes that a costing system can provide more **adequate data**, but this is of no use if these data are **not used in the decision-making** process. Hence, the **human factor** is most important in a costing system, including the behaviour and culture of managers and employees in making the decisions.

Appendix VIII contains some more information about the age and gender composition of TUT staff and examples of their work tasks and education. This appendix undoubtedly exhibits the university culture.

Expenses at TUT are managed via accounting objects and accounting centres, which are the structural units of TUT. Accounting objects are, for example, a project, a structural unit, an activity (teaching, base-line funding, etc.). Accounting objects and structural units are the objects of cost control at TUT.

The activity support is the main resource from which the university's indirect costs, co-financing, development expenditures and other expenses can be financed. It has led to the situation where academic structural units have minimal resources to cover direct teaching expenses. An overview about the assignment of activity support is given in Appendix VI. Faculties receive approximately 32% of the activity support, whereas on average approximately 20% of the activity support remains for teachers' remuneration.

One of the biggest amounts of indirect costs is immovable property maintenance cost. Since most of the structural units of TUT are logistically located in one building and its different parts cannot be measured separately, the link between immovable property expenses and those of particular structural units is weak.

Expense per employee is not analysed, neither are the activities behind the expenses.

In addition to annual reports, the drafting and accounting principles of which are provided in the law, TUT **has a form** for cost reporting. The reporting form gives the user an overview of the costs in the desired period by cost (accounting) objects and expense types (labour costs, subcontracts, business trips, etc.). The form is based on the accrual principles and has been adjusted to get a cash-basis result or current financial status. Other costing reports are not used and indirect cost rate is not calculated today on a regular basis.

Managers of structural units and projects are responsible for implementing the budgets of structural units and accounting objects. The relevant information has been provided for them online, via accounting software Navision at the homepage. In addition, deans and structural unit managers are informed quarterly of the structural units' and projects' budget net gain/loss.

The TUT budget rules establish structural units' obligations and rights for monitoring revenues and expenses. The approved annual budgets and their implementation reports for structural units and the university are public, supplemented by a letter of explanation, and are accessible to all employees over the TUT internal website. The annual report of TUT is also a public document.

The revenue and expenses of academic structural units are monitored by the head of the structural unit, or a person nominated by her/him. Heads of the structural units, deans and directors of the institutions have the right and duty to watch adherence to the approved budgets and get relevant information.

Research on Estonia has identified that overhead costs should be explicated and demonstrated (Raudla et al., 2014).

The cultural factors related to costing are accuracy (detail-oriented culture), cost control (tight versus loose), transparency, innovation, etc. In TUT the costing is characterized by “**free reign**” **management, low innovation, low cost awareness** (one form for cost reporting is not enough to build up awareness). Financial reports are available for public. The author did not find an evidence that managerial costing being important enough to require change in the current costing system.

### 3.2.4 Strategy

Although TUT has not formulated a specific strategy for cost saving or for customer service, TUT is a public sector institution and it is in public interests for TUT to be efficient, effective and economical in incurring expenses.

TUT is a provider of public services and participates in public procurement for provision of services as stipulated in the Public Procurement Act. The contracting authority tries to get the service at the maximum best price. It is logical that in the provision of services TUT needs accurate information of the costs on the basis of which to calculate the service prices. The reality is that the current procurement system, according to which the contract is concluded with the tenderer who asks for less money, has induced the universities to tender below the full price.

According to the strategic plan, TUT will develop its legal and financing environment in the direction where faculties had the means and support that would enable continuous analysis and development of the curricula, new courses and modules. This strategy presumes curriculum costing.

TUT's **strategy** influences the elements of a costing system through **accounting objects** (curriculum expenses). **The laws** (e.g. Public Procurement Act) **demotivates implementation of full costing**. The author did not find more relations between strategy and costing in TUT.

### 3.2.5 Technology

The Manual<sup>34</sup> describes the core processes and support processes of TUT in the provision of public services, as well as administrative and/or management processes of research, but does not describe the process of conducting research because every research is unique, i.e. its processes are non-routine. No detailed time measures have been established for research. Compared to research, teaching can be divided into activities and these activities with estimated working time and audited workload are provided in the TUT collective agreement<sup>35</sup>. The manual for evaluating the work performance of the academic personnel<sup>36</sup> recommends standard working time as a percentage for individual tasks and activities.

One indicator to take into consideration when choosing a costing system is routine; however, the author of this dissertation believes routine activities at universities cannot be calculated in many cases. Hence, the costing techniques that are suitable for costing in case of routine activities are less suitable techniques for universities.

Various IT solutions support the measurement and analysis of TUT indicators. They are summarised in Table 7.

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<sup>34</sup> TUT Management System Manual.

<sup>35</sup> The collective agreement of TUT.

<sup>36</sup> The manual for evaluating work performance of academic personnel (Akadeemilise personali töösoorituse hindamise juhised).

Table 7. Data provision systems of TUT

Data provision systems	Data needed for costing	Data availability
Study information system	Number of students	For authorized personnel
Accounting and personnel information system NAV	Revenues, costs/expenses, transactions proceeded, occupancy	For office of economics and finance; personnel office
Excel	Square meters	Facilities management services
Excel	Number of teaching and research personnel	Personnel office
TUT's own developments for data collection.	Occupancy, salaries by cost objects	For authorized personnel

Source: (Compiled by the author)

The weaknesses in the IT area can be described as follows: data cannot be requested at any time systemically; to get data, they must be separately requested from a structural unit or an inquiry should be made to the respective information system; basic indicators (cost drivers) should be available, today there are problems with that at the university.

### 3.2.6 Conclusions of the TUT research

Indirect costs have increased remarkably, more than the financial resources for covering indirect costs. Problems are the high proportion of project based financing in revenue and that project based financing is not sustainable and does not enable covering of indirect costs and long-period expenses.

Cost covering, including indirect costs of study and research contracts has been and still is an important issue in research institutions and in universities all over the world. **Hence, the full costing methodology would be extremely important in order to initiate a discussion for financing indirect costs based on simplified methods at the state level.**

Today, other activities, including research, are subsidised from teaching funds in TUT and the actual scope of subsidisation is not known.

The university structure is decentralised and academic structural units at TUT enjoy a great deal of autonomy, for example, when deciding expenses or participation in projects, etc. The decentralisation rate prescribes more than 80 accounting centres and more than 1,200 accounting objects to the costing system. Considering the classification of accounting objects as direct cost objects, indirect cost objects and combined cost objects, the author has to work out a methodology for identifying indirect and direct costs in combined cost objects.

The **structure and size** of a university **have a visible effect on the structure of the costing system**. The organisational chart serves as the basis for working out the costing structure, providing input to structural units and indirect costs and where these are incurred. The structure determines the accounting centres, accounting objects, activities, complexity.

The revenue structure enables to identify the university's activities (teaching, research and other) and the sources of revenue/finance providers enable to identify the university's autonomy and capability of indirect cost recovery.

Indirect cost covering at TUT is based on revenue, or who earns the biggest revenue, covers the biggest portion of indirect costs. Hence, resource use is not taken into consideration in indirect costs recovery today.

TUT's revenue structure clearly indicates that the share of "**external**" **financing** exceeds that of "internal" financing, which in turn brings up a question about the capability of recovering indirect costs.

There is constant pressure to increase indirect costs, meaning that detailed information should be available about incurring costs in order to ensure sustainability.

**The external environment** in many cases is seen through competition and policies. TUT is also operating in a competition based environment, which, however, has not yet led to changing the costing practice. The managerial costing practice has been analogous since 2001. In theory, the competitive environment requires reliable information.

In many cases, managers actually do not wish to add indirect costs to contracts because this would mean not getting the contract. For example, the current procurement system, according to which the contract is concluded with the tenderer who asks less money, has induced the universities to tender below the full price. The attitude of firms toward the indirect cost reimbursement also **demotivates the implementation of full costing**. On the other hand, through the legislation the state is also communicating the ideology that is not targeted at full cost compensation. Factors arising from the external environment are mostly not under the university's influence. Managerial costing has not been mandated at the state level.

One research question formulated was to calculate the actual indirect cost rate. The TUT based survey studied also the indirect cost rates established by finance providers, in order to compare them later with the actual indirect cost rates. The average indirect cost rates established by finance providers are within the limits of up to 30%.

A big part of TUT financing comes from structural funds, which have very strict rules. With respect to project based financing these stipulate that indirect costs: 1) are not eligible; 2) are partly eligible; 3) it is resource intensive to identify indirect costs as actual costs. Since special conditions have been established for financing that accounts for approximately 39% of the total revenue of the university which restrict recovering indirect costs, then the sources of revenue for

which there are no special conditions for indirect costs recovery (e.g. activity support) have a remarkably bigger burden on indirect costs recovery.

Past researches have also demonstrated that companies do not want to pay the full price. Finance providers' reluctance not to pay full costs may demotivate the implementation of full costing. Depending on the finance providers' attitude, their rules for cost covering may be perceived from the aspect of either success or failure.

Hence, the main success and failure factors of costing according to TUT's research are linked primarily to the finance providers' and employees' attitudes, management culture and laws. Also, IT is the area where improvements are needed.

**Culture** is an important factor that has an effect on the implementation and design of costing methods. Management culture is the factor that decides the way decisions are made, what kind of information is needed and for what purpose cost information is used.

To sum up, the most relevant contingency factors influencing the costing system of TUT are structure and size, external environment and culture (see Figure 37). The costing system and factors, such as technology and strategy are also related, but these factors are less relevant in case of TUT.

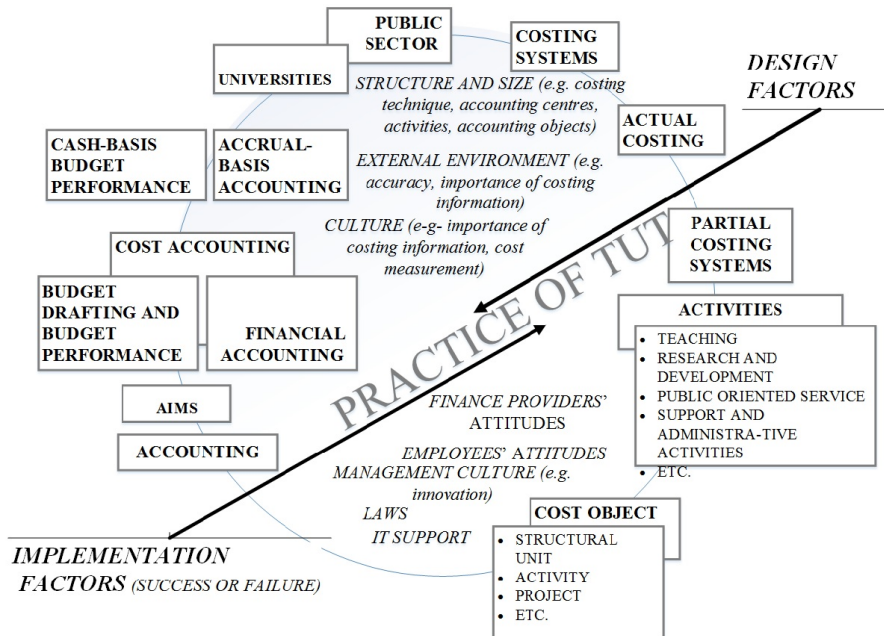


Figure 37. Current costing model of TUT, including the main implementation and design factors

Source: (Compiled by the author)

The author of the dissertation has created the concept of the success and failure factors and this concept determines external success or failure factors: external financial or cost accounting standards or practices.

The external success and failure factors of costing according to TUT's research are finance providers' attitudes and laws. There is no external or internal evidence that managerial costing being important enough to require change in the current costing system. The internal success and failure factors of costing according to TUT's research are employees' attitudes and management culture. Also, IT is the area where improvements are needed.

It may be said that the factors that ensure successful implementation of costing are communication, continuing education, IT advancement and management improvement.

The current costing practice of TUT is presented in Figure 37.



## 4 DEVELOPMENT OF THE FULL COSTING MODEL: THE EXAMPLE OF TUT

The main research question was formulated as follows: What is the full-costing methodology and the model representing it for universities and what are the factors that affect its design and implementation? Based on the conceptual framework of dissertation, universities' worldwide practices and the findings of TUT research the conceptual full costing model is presented in Figure 38.

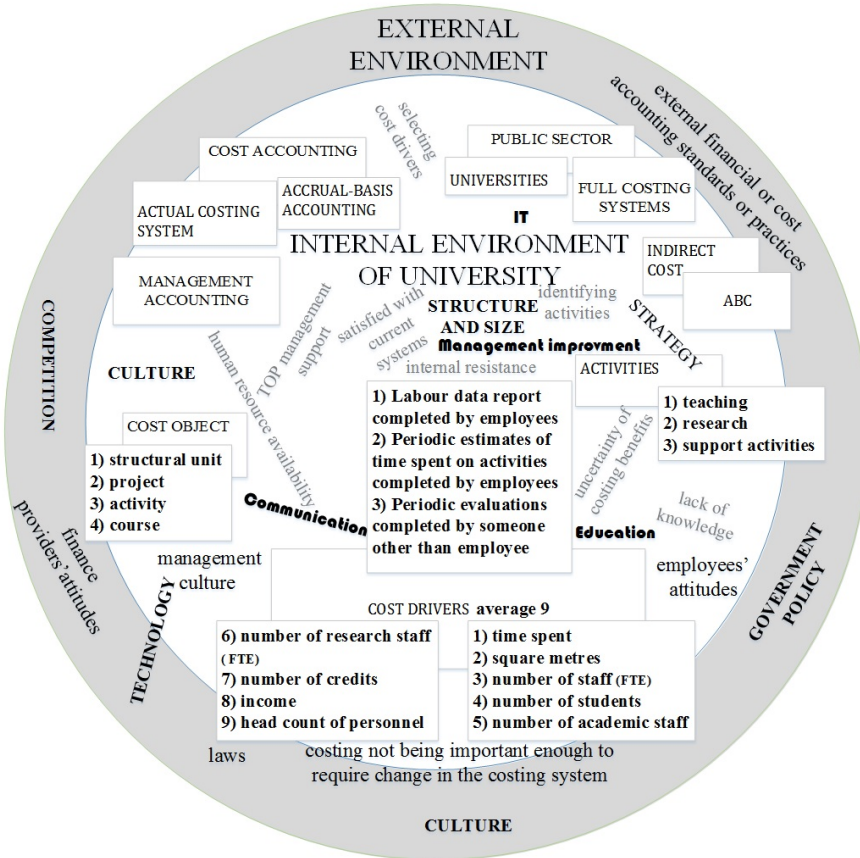


Figure 38. Conceptual full costing model

Source: (Compiled by the author)

Based on the conceptual model, next the creation of specified model of full costing is explained on the example of Tallinn University of Technology, and calculations of rates of indirect costs are provided.

## 4.1 Full costing method

In accordance with the full costing method costs are classified as direct and indirect costs and indirect costs are allocated to activities and accounting objects using cost drivers. TUT costs are classified as direct and indirect costs based on the revenue and expenses statement. Direct costs are directly traced to accounting objects and indirect costs are allocated through activities to accounting objects using cost drivers (see Figure 39).

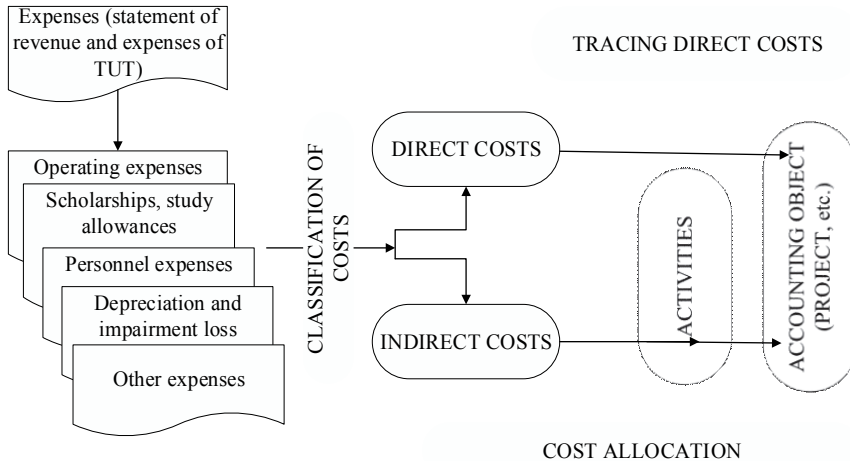


Figure 39. Chart of full costing  
Source: (Compiled by the author)

Based on the TUT specific study of cost allocation, it may be argued that the development of a full costing model starts by determining the methods for identifying indirect costs. Next, the activities through which costs are assigned, the cost drivers by the means of which costs are allocated, and the accounting objects (cost objects) to which costs are assigned should be selected. In this dissertation, the accounting object is a project, structural unit, activity (educational, research, development activities and other activities that have their own revenue base and that can be distinguished from other activities), as well as target financed investment<sup>37</sup>.

### 4.1.1 Determination of indirect cost

Indirect costs of TUT are formed at different levels of the university structure (see Figure 40) and may be classified as follows: indirect costs of the university; indirect costs of faculties/institutions; indirect costs of the academic structural units of a faculty.

<sup>37</sup> Budget regulation of TUT.

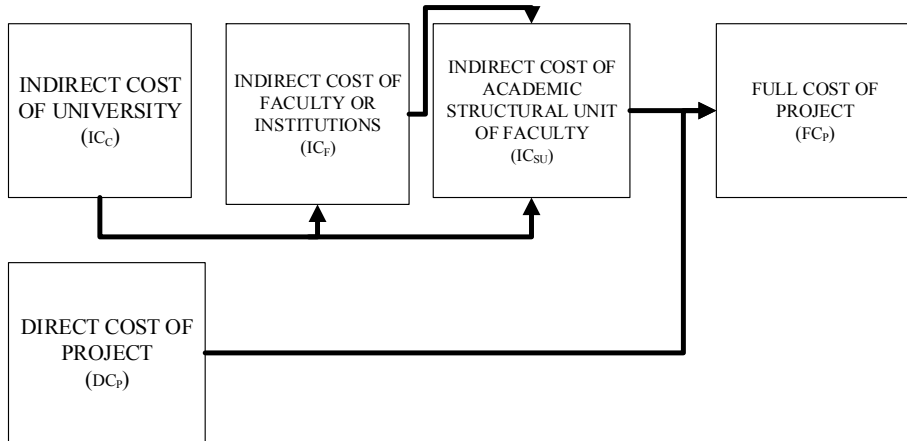


Figure 40. Allocation of indirect costs  
 Source: (Compiled by the author)

Discussing the indirect costing method, it should be mentioned that some institutions of TUT (see Figure 41) have their own accounting and they perform their financial accounting and managerial costing separately, taking into consideration the common practices of TUT. The indirect costs of these institutions are included in the indirect costs of TUT based on these institutions' reports.

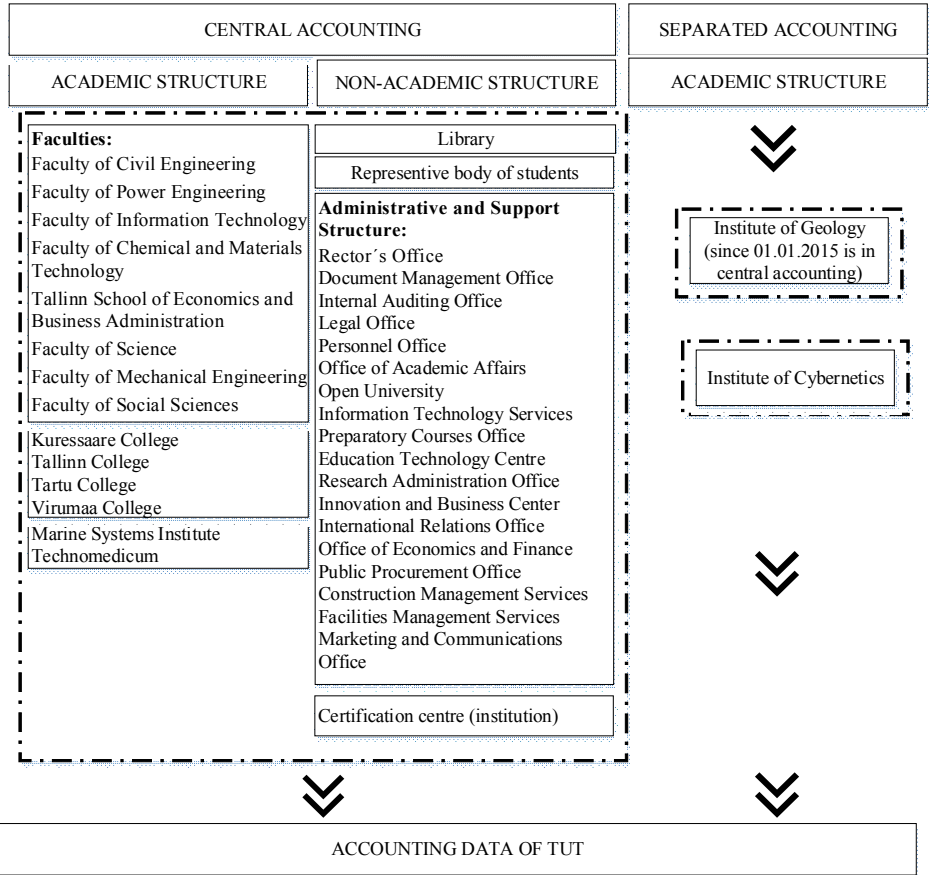


Figure 41. Accounting chart of TUT

Source: (Compiled by the author)

Indirect costs of the university can be described as:

$$IC = \sum_{i=C1}^n IC_i + \sum_{i=F1}^n IC_i + \sum_{i=SU1}^n IC_i,$$

where

n – total number of addends

i – amount of costs of the addend

IC – indirect costs (addends)

C – indirect costs at the university level (central indirect cost)

F – indirect costs at the faculty or institution level

SU – indirect cost of a structural unit of a faculty or institution.

Indirect costs are determined by summing up the costs of accounting objects which intrinsically are indirect costs.

TUT has approximately 1,200 accounting objects, which on the basis of the cost structure can be classified as follows:

- accounting objects to which direct costs are traced;
- accounting objects to which indirect costs are allocated;
- accounting objects to which direct and indirect costs, or combined costs are assigned.

The full cost of a project (termed as accounting object) includes the direct costs of the project, a share of indirect costs of the university, a share of indirect costs of the faculty or institution, a share of indirect cost of the structural unit.

$$FC_P = DC_P + IC_C + IC_F + IC_{SU}$$

Full costs of a structural unit include its direct costs, a share of indirect costs of the university, a share of indirect costs of the faculty or institution, indirect costs of the structural unit.

$$FC_{SU} = \sum_{i=AO1}^n DC_i + \sum_{i=C1}^n IC_i + \sum_{i=F1}^n IC_i + \sum_{i=SU1}^n IC_i,$$

where

n – total number of addends

i – amount of costs of the addend

DC – direct costs

IC – indirect costs

AO – accounting object

C – indirect costs at the university level (central indirect cost)

F – indirect costs at the faculty or institution level

SU – indirect cost of the structural unit of the faculty or institution.

Cost classification into direct and indirect costs is based on the TUT budget information, descriptions of the financial accounting system and expert opinions by accounting specialists. Costs of accounting objects which are indirect costs are added up into the respective level activity cost pool. In accounting objects that include direct and indirect costs (combined costs), direct and indirect costs are separated and indirect costs are added up into the respective level cost pool of activities. Indirect and direct costs are separated on the basis of the proportion of the administrative staff's labour cost in the structural unit's respective accounting object (IC<sub>F</sub> level) or on the basis of revenue proportion (IC<sub>C</sub> level).

#### 4.1.2 Indirect costs of the university level (IC<sub>C</sub>) and faculty level (IC<sub>F</sub>)

University level indirect costs or central indirect costs are associated with the university governance, maintenance of the administrative support structure, centralised real estate costs (including depreciation of buildings), public services

(library maintenance), payments from university reserves, costs of university-wide development projects and development expenses (see also Appendix II).

For allocating indirect costs of the university, activity cost pools are formed as described in Figure 42.

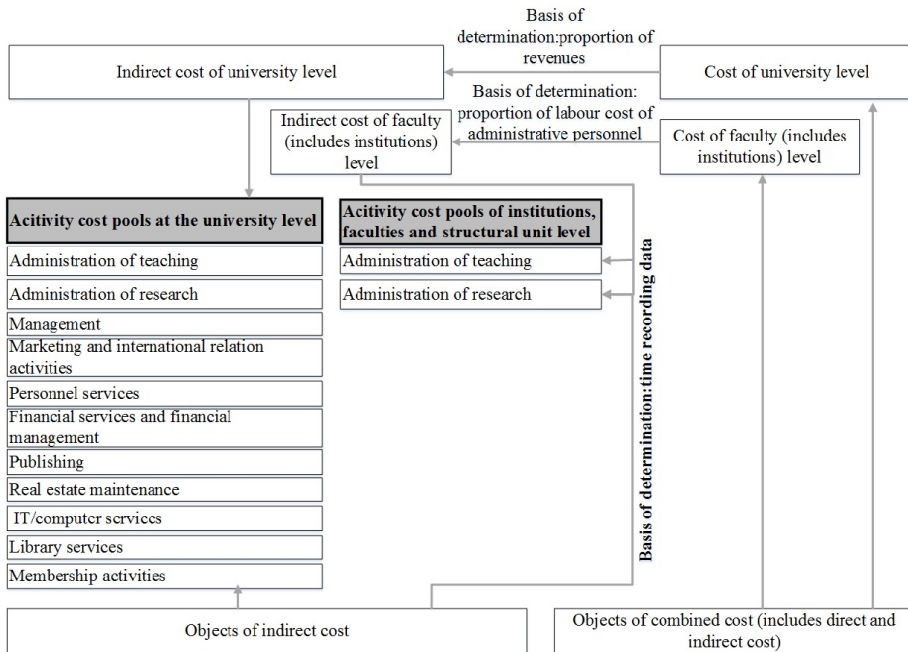


Figure 42. Activity cost pools of the university and faculty level

Source: (Compiled by the author)

Activity cost pooling has taken into account one aspect: which activities can be allocated based on the same cost driver.

From the cost pools of the university level activities costs are allocated (see Figure 43) to faculties, institutions and the academic units of faculties by the means of cost drivers.

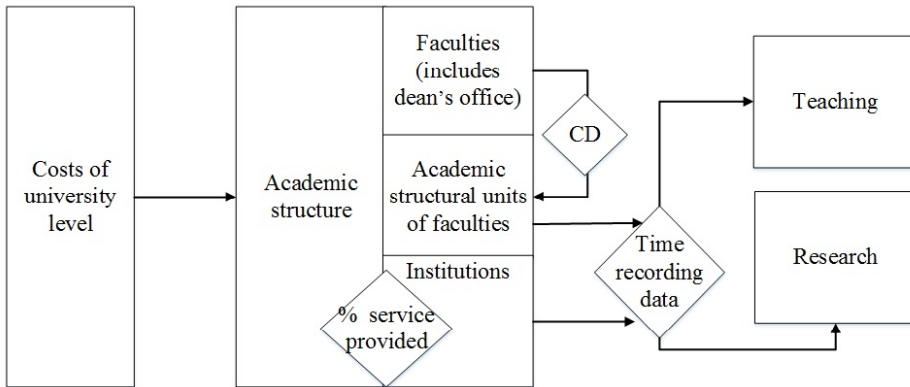


Figure 43. Chart of the university level activity cost allocation to academic structures

Source: (Compiled by the author)

At the faculty and dean's offices level, costs of allocating university level indirect costs are incurred from all activities named in the university level cost pool, with the exception of research administration and publishing. Since research administration and publishing costs are allocated using the number of teaching personnel and research personnel as the cost driver, and the teaching and research personnel are employed with the faculty's academic structural units, these costs are allocated directly to departments (academic structural units of faculties) and institutions.

Faculty level (including the dean's office) costs are allocated to the academic structural units of the respective faculty using the amount of costs of the academic structural unit.

University level indirect costs are allocated to structural units taking into consideration that TUT faculties and institutions do not use central services in equal amounts. In some cases the amounts of services provided to institutions are considerably smaller, concerning especially the regional colleges of TUT. According to specialists (managers and/or specialists of service providing departments), the consumption of central services by institutions (see also Figure 43) is divided as shown in Appendix VIII in Table 21.

Indirect costs of an institution and faculty, and their structural units are incurred from governance of these structural units, maintenance of the administrative personnel, etc.

Costs are allocated to institutions taking into account the amount of services the TUT administrative-support structure has rendered to the institution.

The total amount of indirect costs is derived from the accounting objects which contain indirect costs on the basis of the administrative personnel's salary cost proportional share. The proportion of the administrative staff in the dean's offices is 100%.

Total  $IC_F$  are allocated between teaching and research activities taking into consideration the time recording data.

Indirect costs are allocated by the means of cost drivers, while indirect costs initially allocated to the faculty and the respective dean's office are reallocated to academic structural units of the faculty at the next stage. Then, using the time recording data, costs are allocated between teaching and research activities.

Considering the allocation principles described previously, a general full costing model has been constructed as described in Figure 44.



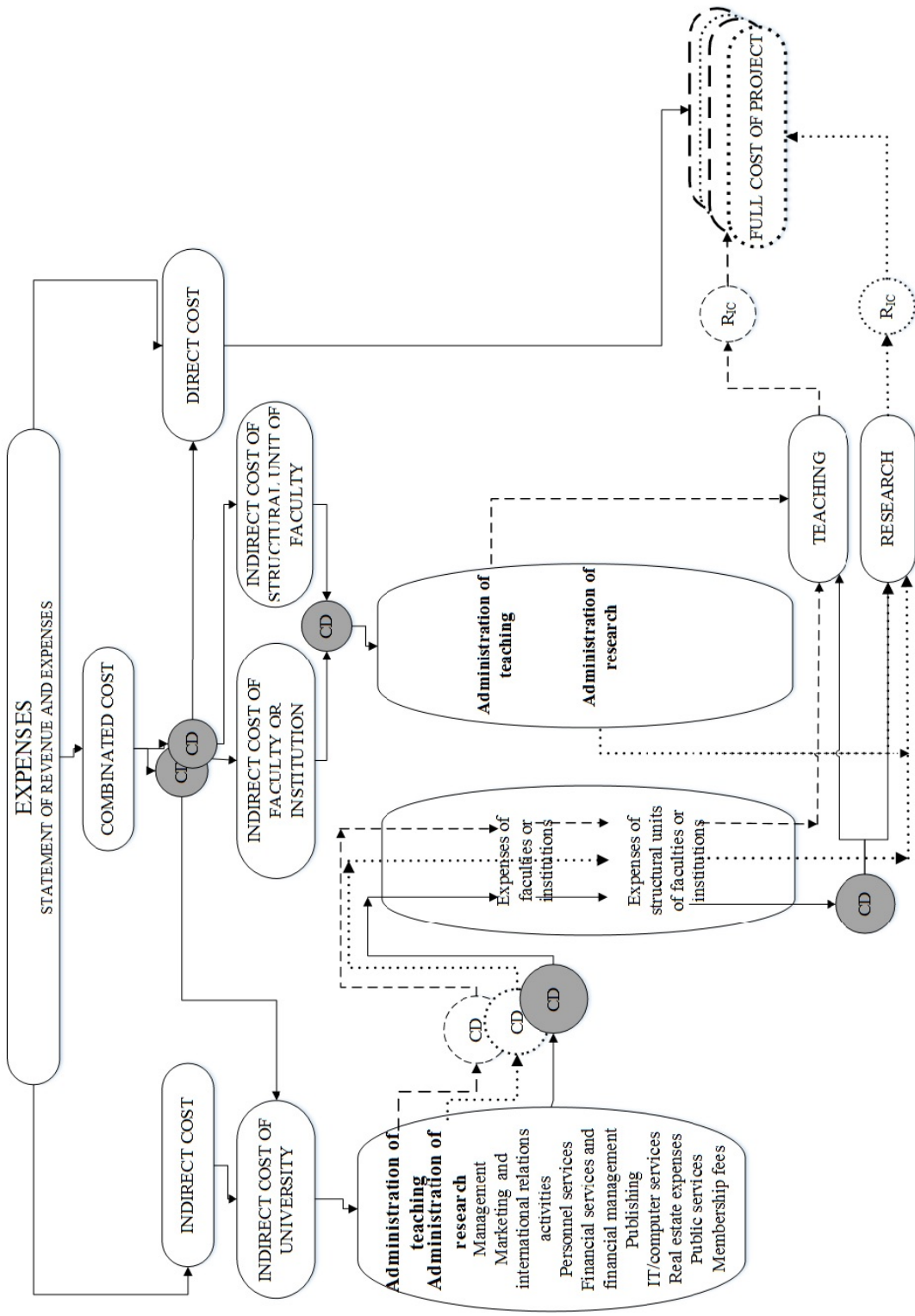


Figure 44. General chart of cost allocation at TUT  
Source: (Compiled by the author)

As seen Figure 44, cost drivers play an important role in cost allocation. How to select cost drivers is the problem that is studied in the next chapter.

## 4.2 Selecting cost drivers and activities

According to researches (e.g. Lin et al., 2001), in general, the most relevant cost drivers can often be determined by interviewing those employees who are most familiar with the activity to indicate which factor causes an increase or decrease in the time and effort they spend on the activity. According to CAQ, the most frequently used cost drivers in cost allocation were the time spent, square metres, number of staff in FTE, and number of students.

The author claims that the relevant drivers can often be determined by studying practices of other universities. According to the practice of UvA, the used cost drivers are work stations, connection points, square metres, persons employed, invoices/declarations processed, students, projects, FTE academic staff, etc. (see Appendix VII, Table 20).

Cost drivers in this chapter are selected based on the cause-and-effect relationship, TUT experts' opinions about the compatibility of cost drivers, as well as practices of other universities. The cost drivers used are shown in Figure 45.

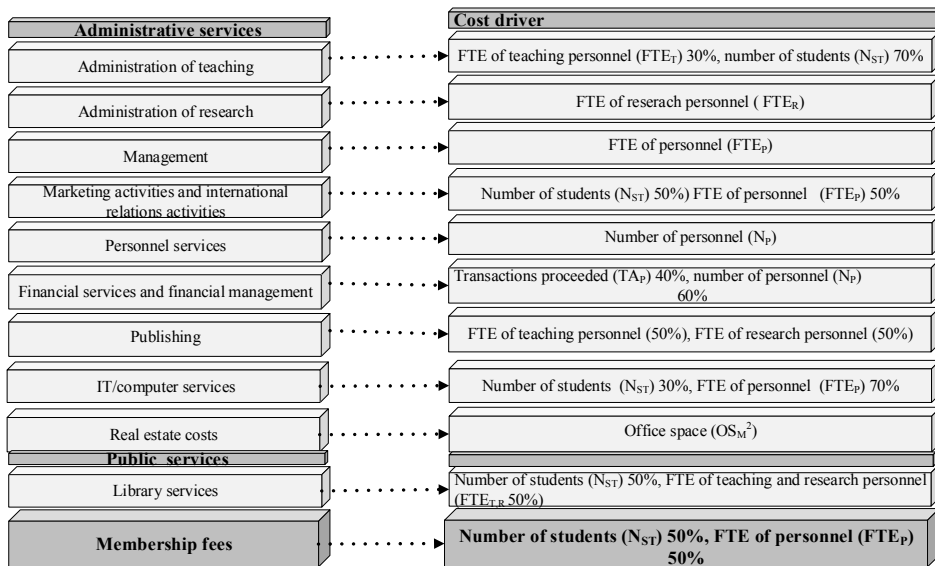


Figure 45. Selected cost drivers  
Source: (Compiled by the author)

Activities have been selected based on the university's core tasks: teaching and research. The motives of selecting the cost drivers are described in the next chapters. The proportions of cost drivers are explained next.

#### 4.2.1 Administration of teaching at the university level

The university level indirect teaching expenses generally include maintenance expenses of administrative-support structures that provide support and administration services, financing of the student council, payments from the reserve of the vice-rector for academic affairs, and development expenditures and/or expenses in the area.

Most of the activities are targeted directly at students and some activities are mediated to students by the teaching staff (e.g. services provided by the Education Technology Centre of TUT). On the other hand, the services provided by the Education Technology Centre and Open University are targeted in addition to regular students also to those studying at Open University and in continuing education, and these services are not measured in terms of the number of students. Hence, it would be reasonable to use two cost drivers in parallel since the student number does not measure all activities in the cost pool of teaching activities.

The author argues that, in general, the proportion of cost drivers can be determined:

- by interviewing those employees who are most familiar with the activity;
- based on the proportion between departments represented in the cost pool of the activity;
- based on the general practice.

In addition, the author analysed the effects of alternative cost driver proportions on the allocation of costs (see Figure 47).

In this chapter such cost drivers are analysed: full time student equivalent (first alternative); number of students (second alternative), combination of students and teaching personnel number (third alternative).

The full-time student equivalent, FTEs can also be used as a driver instead of the number of students (the number of students and full-time student equivalent is given in Figure 46), the full-time student equivalent can be found using the following formula:

$$\text{Full time student equivalent (FTE}_s\text{)} = \frac{ECTS\ CREDIT}{60}$$

The denominator 60 shows the prescribed number of credits per year. One credit point corresponds to 26 hours of study by a student – this amounts to 1,560 hours and 60 credit points per academic year<sup>38</sup>.

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<sup>38</sup> Universities Act.

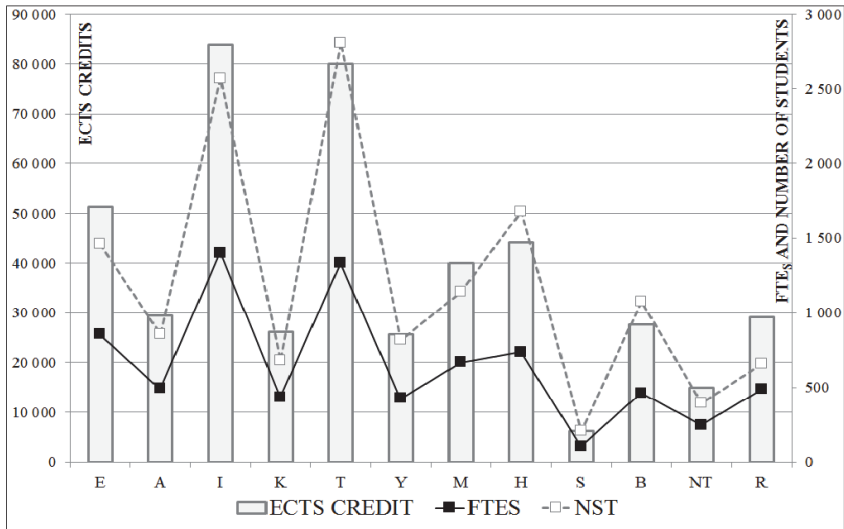


Figure 46. Overview of ECTS credits, FTEs and number of students (NST)  
 Source: (Compiled by the author; source: SIS, annual report)

In the third alternative, a proportion between cost drivers is 30% for the teaching personnel and 70% for students. The proportion is based on the proportion between departments represented in the cost pool of the activity.

The analysis demonstrated that using the number of students, full-time student equivalent or the students and teaching personnel number combination (70/30) as allocation bases of indirect costs give different results (see Figure 47).

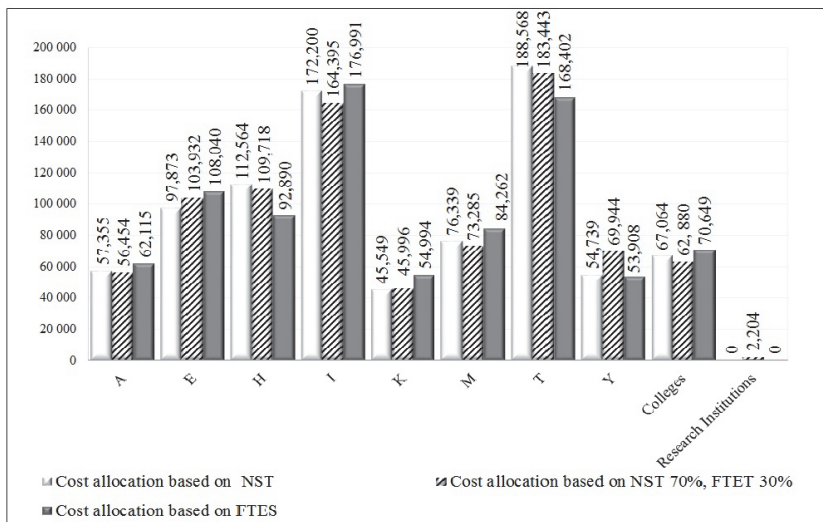


Figure 47. Benchmarking administration of teaching expenses (€) using different cost drivers (see symbols on page 9)  
 Source: (Compiled by the author)

Nevertheless, teaching experts recommend using the number of students and justify their argument by that part-time students mostly do not influence the teaching department's volume of activity. Therefore, the number of students and the number of teaching staff were used as cost drivers for allocating teaching administration expenses in the costing model. Since the teaching staff is part of academic structural units, a share (30%) of teaching administration expenses are allocated directly to academic structural units. Another share (70%) of teaching expenses is allocated on the basis of the number of students. Expenses are allocated to faculties because students are counted at the faculty level and it is not directly connected with academic structural units. Teaching administration expenses allocated on the basis of students number are re-allocated from the faculty level to academic structural units by the means of volume.

The description of the administration of teaching expenses and their amounts is presented in Appendix II.

#### **4.2.2 Administration of research at the university level**

University level indirect costs are incurred by maintenance of administrative and support structures that provide support and administration services for research, making payments from the reserves of the vice-rector for research and of the vice-rector for innovation and internationalisation, and development expenses in the field of research.

Research costs are allocated using the research staff FTE<sup>39</sup>. Since the research staff are in the composition of academic structural units, the administration costs of research are allocated directly to academic structural units.

The description of the administration of research expenses and their amounts is presented in Appendix II.

#### **4.2.3 General and administrative expenses at the university level**

General and administrative expenses (administration overheads) include expenses of management, marketing and international relations, personnel and financial services, publishing, IT/computer services and real estate expenses.

Expenses of management comprise the rector's office, internal auditing office, legal office, document management office, public procurement office, the university-level development expenses. FTE of all personnel has been used as the cost driver.

Marketing and international relations activities include the maintenance expenses of the marketing and communications office and those of the international relations office, and the communication, international relations,

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<sup>39</sup> FTE – the equivalent employees working full-time. One FTE is equivalent to one employee working full-time.

marketing and advertising related project expenses. Marketing (incl. communication) and international relations activities related both students and staff and therefore the cost drivers here are the number of students and personnel FTE. The cost driver proportion is 70% based on the number of students, and 30% based on personnel FTE. The proportions are based on expert opinions.

The personnel office's (personnel services) core activities are administration of employment relations, personnel management, consultancy, mediation of training courses and organisation of occupational health. The cost drivers are the number of employees since the work load has no major effect on the personnel office's activity and the amount of respective expenses.

Financial services and financial management are connected with the number of personnel as well as the number of transactions. Accounting activities also include the payment of study allowances and other activities (for example, project accounting). The author of this dissertation is of the opinion that it is not reasonable to use more than two cost drivers. Since salaries account for approximately 50% of the university expenses, the number of employees should be used as one cost driver for allocating accounting (financial services) expenses. The second cost driver is the number of transactions. The proportion between the drivers is 60% (number of personnel) to 40% (number of transactions). The drivers have been selected based on expert opinions.

Publishing activities are related to teaching and research personnel. The cost drivers used for allocating publishing expenses are teaching and research personnel's FTE. The expenses are allocated to academic structural units.

IT and computer services expenses are allocated using the personnel FTE, as well as the number of students; the proportion between the drivers is 70%  $FTE_P$  to 30%  $N_{ST}$ . The proportion has been calculated on the basis of experts' opinions.

Real estate expenses is the biggest expense item of the university level indirect costs, accounting for approximately 57% of the indirect costs. TUT locates in different buildings and in different cities in Estonia, but a large part of space is associated with the main building in Tallinn. The biggest problem is associated with the measurement of expenses. The real estate expenses are not measurable separately by structural units in the main building. The total space at the beginning of 2013 was 120,399 square metres (see Table 8).

Table 8. TUT space overview in 2013

Structure	Space in m <sup>2</sup>				
	Office space, m <sup>2</sup>	Auditoriums, laboratories, m <sup>2</sup>	Other space, m <sup>2</sup>	Incl. rental space, m <sup>2</sup>	Total space, m <sup>2</sup>
1. Faculties	10,557.5	0.0	0.0	1,528.0	10,557.5
B	277.9	932.7	1,347.2		2,557.8
R	561.3	2,321.5	12,355.2		15,238.0

S	186.6	457.0	297.0	940.6	940.6
NT	430.6	700.7	1,897.7		3,029.0
2. Colleges	1,456.4	4,411.9	15,897.1	940.6	21,765.4
NG	461.5	628.6	717.8		1,807.9
NY	1,535.8	435.8	2,367.2		4,338.8
NS	979.2			979.2	979.2
ND	501.2	98.7	219.4	341.6	819.3
3. Research institutions	3,477.7	1,163.1	3,304.4	1,320.8	7,945.2
4. Other institutions	38.1				38.1
5. Administrative- and support staff	3,504.0	0.0	0.0	0.0	3,504.0
6. Library	974.1		9,605.7		10,579.8
7. Commonly used space	0.0	22,689.9	37,128.6	60.5	59,818.5
8. Sports hall			6,190.0		6,190.0
Total space of university	20,007.9	28,264.9	72,125.8	3,849.9	120,398.6

Source: (Compiled by the author)

The real estate expenses can be grouped into:

- Real estate administration expenses;
- Real estate accessory expenses (maintenance fees) including electricity, water and sewage, heat, security, cleaning etc;
- Depreciation of buildings.

In the structural units located in the main building it is not possible to measure expenses (electricity, water, heating) separately because there are no relevant metres. In TUT institutions located outside the main building, the expenses can be measured separately and these institutions pay for the real estate expenses from their accounting centres. In addition, it is not possible to allocate directly the expenses of using lecture rooms to structural units either.

The most suitable cost driver for allocating indirect costs in the case of real estate is the square metres used. The amount of relevant expenses depends directly on the amount of square metres. When using space as the cost driver, those who have more space per employee or FTE also pay more. Such allocation of expenses would motivate structural units to revise and analyse the space at their disposal. The number of personnel or FTE as the cost driver, however, would measure expenses without taking into account the space usage efficiency.

The real estate administration expenses are intertwined with the expenses of the facilities management services and construction management services. Since TUT institutions consume services of the above-named departments in different

amounts compared to the faculties, these expenses are allocated to structural units based on the service provider's estimates on the use of services.

Maintenance fees are not allocated to those structural units which pay for their real estate accessory expenses themselves (e.g. colleges, NY and NG). The real estate cost allocation is presented in Figure 48.

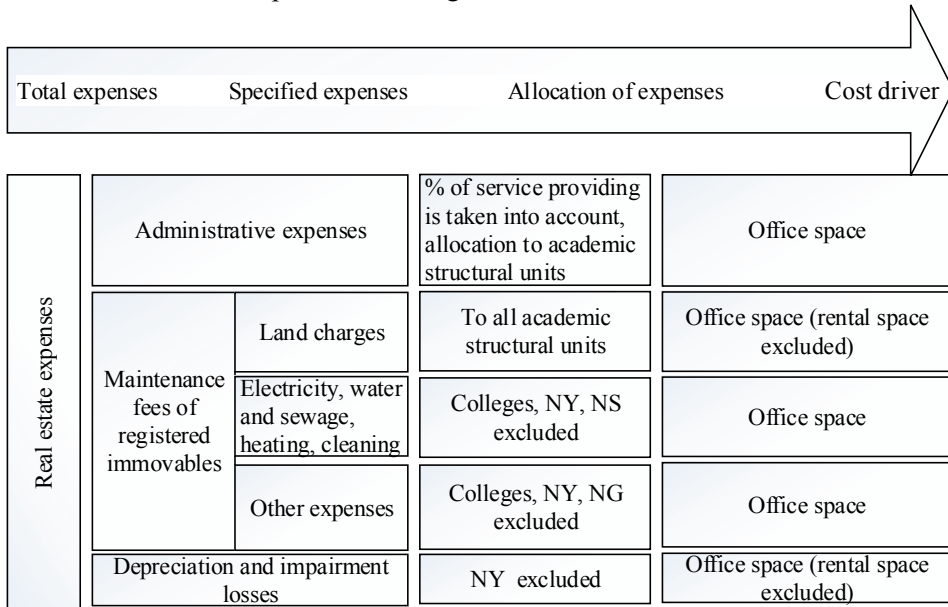


Figure 48. General scheme of real estate expenses allocation at the university level

Source: (Compiled by the author)

Maintenance fees cannot be measured at TUT and therefore the maintenance fees are allocated by the means of cost drivers.

The issue of different resource use by TUT faculties was raised in the process of allocating maintenance fees. In general, it may be assumed that, for example, the School of Economics and Business Administration and the Faculty of Social Sciences consume less electricity and water than the Faculty of Chemical and Materials Technology, or the Faculty of Science, or the Faculty of Power Engineering.

The problem was analysed (see Figures 49 and 50) by the author of the dissertation on the example of the buildings whose expenses can be measured separately.



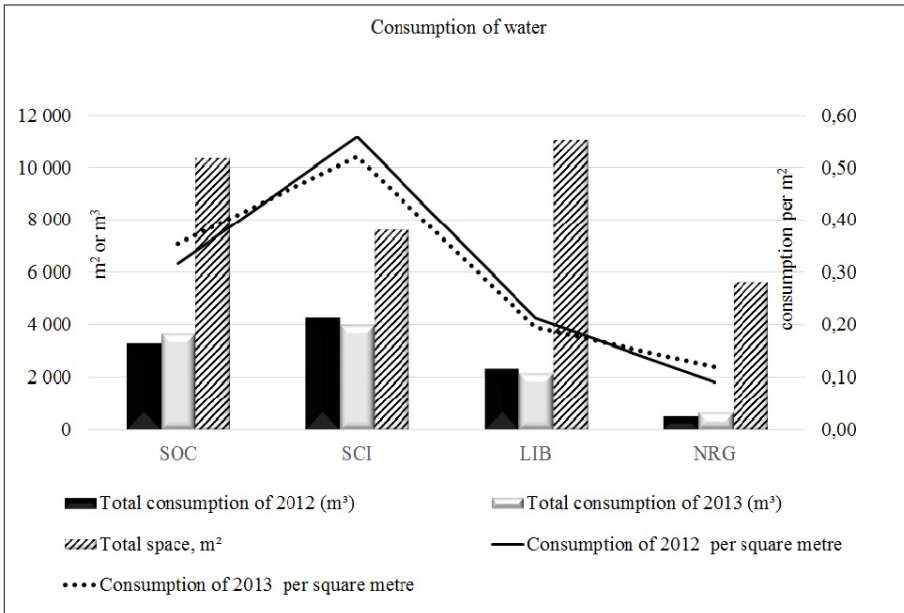


Figure 49. Maintenance fees (water) in buildings LIB, SOC, SCI, NRG  
Source: (Compiled by the author)

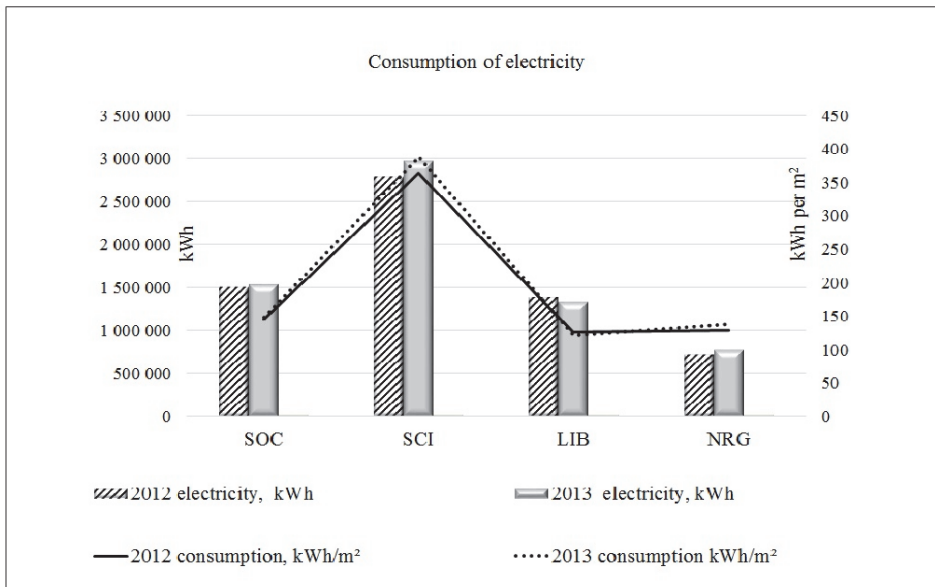


Figure 50. Maintenance fees (electricity) in buildings LIB, SOC, SCI, NRG  
Source: (Compiled by the author)

The analysis implied that the most expensive in terms of electricity and water consumption is the building of the Faculty of Science, and the building of the Faculty of Power Engineering is less expensive than the building of the School of

Economics and Business Administration. Considering that not all structural units of the Faculty of Science are located in the same building and less expensive structural units in terms of electricity and water consumption (e.g. department of physics and department of mathematics) are in the main building of the university, the average electricity and water consumption by the Faculty of Science is close to that of the School of Economics and Business Administration and the building of the Faculty of Social Sciences. In the above-described conditions, the author thinks it is not correct to use coefficients for allocating real estate maintenance expenses.

The description and amount of real estate expenses are given in Appendix II.

#### 4.2.4 Public services and membership fees at the university level

The activities of TUT library have been reported as public services. The cost drivers used for allocating library expenses are the FTE of teaching and research staff and the number of students. The proportion of cost drivers is 50% ( $N_{ST}$ ) to 50% – FTE of teaching and research staff ( $FTE_{T,R}$ ).

Membership fees represent mostly those paid to TUT subsidiaries: TUT sports club and cultural centre. These organisations offer sports facilities and cultural entertainment to TUT employees and students. The cost drivers are the number of students and personnel FTE.

The description and amount of public services and membership fees are presented in Appendix II.

### 4.3 Time recording

Time recording is not performed at TUT in the form that would provide information on how much academic staff members have contributed to teaching or research. One possibility for time recording by activity is basing on recommended<sup>40</sup> work performance (RWP) (see Appendix X). Ideally, the staff working time by activities should equal the recommended performance.

Work performance by activities can be found using the following algorithm:

$$\text{Recommended work performance} = \sum RWP_T \times FTE + RWP_R \times FTE$$

$$\text{Work performance for teaching} = \frac{\sum RWP_T \times FTE}{\sum RWP_T \times FTE + RWP_R \times FTE} \times 100\%$$

$$\text{Work performance for research} = \frac{\sum RWP_R \times FTE}{\sum RWP_T \times FTE + RWP_R \times FTE} \times 100\%$$

---

<sup>40</sup> TUT Rector's Directive No 322 of 17.12.2013 "Akadeemilise personali töösoorituse hindamise juhised" (Guidelines for assessing work performance of academic staff).

where

FTE – full-time equivalent

$RWP_R$  – recommended work performance of research personnel

$RWP_T$  – recommended work performance of teaching personnel.

Another option seen by the author of the dissertation is to use the actual salary proportion as the basis.

Since salaries are paid based on the accounting objects, which are classified on the basis of revenue from teaching and research activities, then salaries show the relationship between the employees and activities.

The author of the dissertation investigated what the outcome would have been if structural units themselves had assessed the proportion between teaching and research work performance. The results of the analysis are presented in Figure 51.

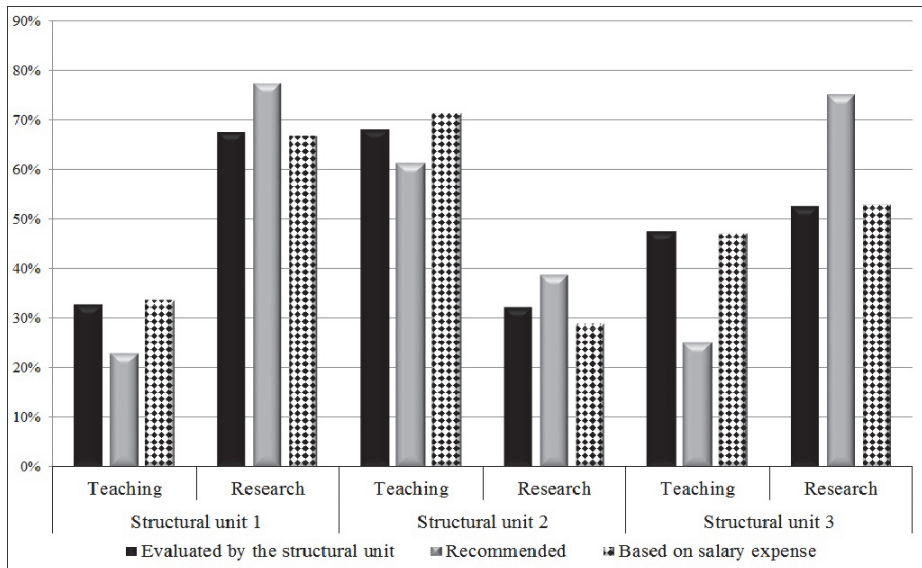


Figure 51. Work performance based on assessments of structural units, RWP and actual salary

Source: (Compiled by the author)

The structural units of TUT assess their work performance proportions between activities analogously with the proportion of actual salary expenses. In this dissertation, the estimated results in case of both of these alternatives have been taken into account.

#### 4.4 Calculations of indirect costs

The calculations are based on the TUT statement of revenue and expenses (see Table 9).

All costs, including indirect costs are reported in the statement of revenue and expenses and can be certified.

Table 9. Statement of revenue and expenses of TUT in 2012

<b>Operating expenses, €</b>	<b>TUT</b>	<b>NG</b>	<b>NY</b>	<b>Total</b>
Other operating expenses	21,872,978	384,068	1,119,886	23,376,932
Scholarships	5,726,799	13,465	61,045	5,801,309
Personnel expenses				
Incl. Personnel expenses	27,002,395	780,942	1,429,116	29,212,453
Social security costs	8,774,572	259,236	472,381	9,506,189
Unemployment insurance premium	360,434	10,904	19,729	391,067
<i>Total personnel expenses</i>	<i>36,137,401</i>	<i>1,051,082</i>	<i>1,921,226</i>	<i>39,109,709</i>
Depreciation and impairment loss	9,576,770	334,573	140,415	10,051,758
Other expenses	86,302	3,460	3,809	93,571
<b>Total operating expenses</b>	<b>73,400,250</b>	<b>1,786,648</b>	<b>3,246,381</b>	<b>78,433,279</b>
<b>Surplus/deficit from operations</b>	<b>8,984,283</b>	<b>-495,297</b>	<b>-193,908</b>	<b>8,295,078</b>
<b>Net surplus/deficit for the financial year</b>	<b>8,671,081</b>	<b>-495,922</b>	<b>-193,957</b>	<b>7,981,202</b>

Source: (annual report of TUT)

Direct costs are assigned to accounting objects and indirect costs are grouped into cost pools and are allocated to accounting objects via cost drivers. In 2012, TUT had incurred various level indirect costs in total of 22,719,339 Euro, which accounted for 29% of the total costs (Euro 78,433,279).

$$\text{Rate of indirect cost (ca 40,8\%)} = \frac{\text{indirect costs (22,719,339 €)}}{\text{direct costs (55,713,940 €)}}$$

The indirect cost rate denotes the amount of indirect costs that should be added to direct costs.

Considering the methods described in Chapter 4, the indirect costs of TUT are calculated in Table 10.

Table 10. Indirect costs of TUT by activities in 2012

Indirect cost of TUT in 2012	IC <sub>C</sub> - indirect costs, €	IC <sub>F</sub> +IC <sub>SU</sub> - indirect costs, €	Total indirect costs, €	Rate of indirect costs, %
1. Administrative expenses				
1.1. Administration of teaching	872,251	4,061,666	4,933,917	8,9%
1.2. Administration of research	805,604	2,208,139	3,013,743	5,4%
1.3. General and administrative expenses				
1.3.1. Management	1,497,577		1,497,577	2,7%
1.3.2. Marketing and international relations activities	949,272		949,272	1,7%
1.3.3. Personnel activities	241,576		241,576	0,4%
1.3.4. Financial services and financial management	434,094		434,094	0,8%
1.3.5. Publishing	18,396		18,396	0,0%
1.3.6. Real estate expenses	9,415,512		9,415,512	17,0%
1.3.7. IT/computer services	622,948		622,948	1,1%
Total administrative expenses	13,800,188	6,269,805	21,127,035	38,0%
2. Public services				
2.1. Library services (includes databases of library)	1,070,807		1,070,807	1,9%
Total public services	1,070,807		1,070,807	1,9%
3. Membership fees	521,499		521,499	0,9%
Total indirect costs	16,449,535	6,269,805	22,719,339	40,8%
Rate of indirect costs, %	29,5%	11,3%	40,8%	xxx

Source: (Compiled by the author)

This dissertation investigates the possibility of using work performance standard as the basis for time recording. An alternative is to use salaries for time recording, which is enabled by the system used at TUT where all accounting objects are linked to activities (research or teaching) and remuneration for projects, teaching etc. is always linked to the accounting object. Hence, using the definition of the accounting object, it is possible to assess the actual work performance in research and teaching.

In the process of research also special tests were carried out, which implied that the proportion of activities calculated on the basis of salaries is the most appropriate basis for time recording. Next, the author provides an overview of the results of using the two alternatives (see Tables 11 and 12).

Table 11. Rate of indirect costs for teaching and research based on actual salaries

Indirect costs	Total	Incl.	
	Euro	Teaching	Research
IC <sub>C</sub> (€)	16,449,535	9,233,428	7,216,107
IC <sub>F</sub> (€)	6,269,805	4,061,666	2,208,139
Share of indirect costs	100%	59%	41%

Total indirect costs (€)	22,719,339	13,295,094	9,424,245
Rate of indirect costs	40.8%	23.9%	16.9%
Revenue in 2012 (€)	71,052,700	34,727,500	36,325,200
Proportion from revenue		38.3%	25.9%

Source: (Compiled by the author)

Table 12. Rate of indirect cost of teaching and research based on recommended work performance by academic personnel

Indirect costs	Total	Incl.	
		Teaching	Research
	Euro		
IC <sub>C</sub> (€)	16,449,535	6,774,903	9,674,631
IC <sub>F</sub> (€)	6,269,805	3,217,723	3,052,081
Share of indirect costs	100%	44%	56%
Total indirect costs (€)	22,719,339	9,992,626	12,726,713
Rate of indirect costs	40.8%	18.0%	22.8%
Revenue in 2012 (€)	71,052,700	34,727,500	36,325,200
Proportion from revenue		28.8%	35.0%

Source: (Compiled by the author)

The author's opinion is that the work performance standard is excessively focused on research and further calculations are based on time recording data and salary proportions.

Summed up at the university level, the indirect costs of teaching activities accounted for 59% of total indirect costs and indirect costs of research 41% of total indirect costs.

Based on revenue, it can be said that the indirect cost coverage rate of 38% should be applied to teaching revenue and 26% in the case of research revenue (see Table 11).

Table 13. The actual cost covering in 2012 and cost covering considering the methods described in Chapter 4

Structure	% of teaching	% of research	% of teaching	% of research
	indirect costs based on the methods described in Chapter 4		indirect costs based on revenue (today's situation)	
A	52%	48%	91%	9%
E	66%	34%	94%	6%
H	81%	19%	94%	6%
I	56%	44%	85%	15%
K	34%	66%	66%	34%
M	48%	52%	76%	24%
T	86%	14%	93%	7%
Y	37%	63%	70%	30%

Source: (Compiled by the author)

Actually, the indirect costs of research activities are subsidised by the teaching activities (the examples are presented in Table 13), meaning first of all that all projects and contracts are subsidised by teaching.

In 2011, the Estonian Ministry of Education and Research found that costing in Estonian universities should be improved. At the state level, the first stage of the full costing project of universities “Indirect Costs of Universities and the Principles of Assigning Them” was funded from the higher education cooperation and innovation development sub-measure “Higher Education Innovation”. The general aim of the project was to define and determine methodologically correctly indirect costs of universities and to develop and coordinate methodological bases for determining the indirect costs so that using the methods the universities could defend their indirect cost rates in various project applications and curriculum costs. In the framework of the project, universities analysed their costing and worked out methodologies for calculating indirect costs, communicating the results between them and harmonising the methodologies.

The author of the dissertation participated in the above named project as a representative of TUT. The author’s contribution into the project is revealed primarily in the elaboration of the methodology named above. The author’s contribution into this project was remarkable. The results of the project are used in this dissertation and otherwise, the results of the dissertation are used in the project.

The indirect cost rates of Estonian public universities (in 2012) are presented in Figure 52.

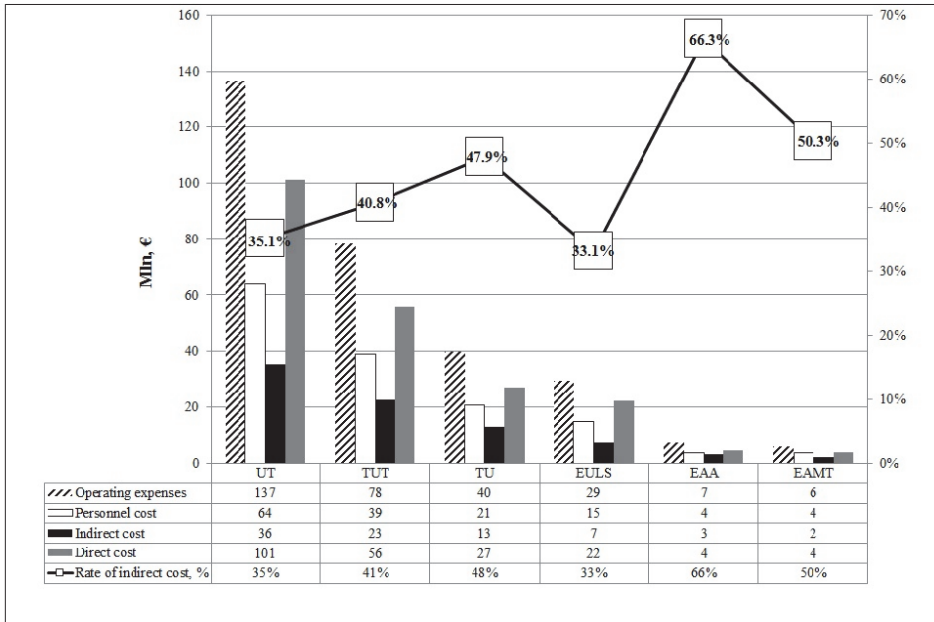


Figure 52. Indirect cost rates of the Estonian public universities  
Source: (Compiled by the author)

The indirect cost rates are calculated based on annual reports according to the following formula: Rate of indirect costs (%) = (indirect cost)/(direct cost). The indirect cost rates of public universities are in the range of 35%–66%.

#### 4.5 Summary of the full costing model construction

The development of a costing model is organisation specific, largely depending on the structure, including where indirect costs are incurred in the structure and other factors. In the second chapter, it became evident that one essential condition for the costing methodology and its model is simplicity.

Another important issue is what should be the simplicity to precision ratio. This dissertation sought to take account of the consumption of services by structural units in cost assignment. However, due to the university’s speciality, it is not possible to allocate the maintenance costs very precisely because the relevant meters are missing.

Other universities’ practices as well as evaluations of the respective university staff were used for choosing the cost drivers. The allocation of costs to structural units and projects depends on the selection of cost drivers. When cost drivers are changed, also allocation of costs to structural units and projects changes.

In this dissertation the indirect cost rate 40.8% for the university (TUT) has been calculated. Based on the Estonian legislation, the principles of financing, etc., the university research identified that indirect costs in general are financed to the extent of 0–30% (see Appendix IX).



A substantial value of this dissertation is that for the first time the indirect cost rate was calculated, which enables discussions about indirect cost financing. Clearly, so far finance providers have financed indirect costs of projects in the amount that does not cover the actual indirect costs of these projects. Hence, the university has been discriminating the sources of finance and in the main part has paid indirect costs to the account of teaching resources.

Another important condition based on the second chapter appeared to be that the costing methodology and model should be flexible. It should be possible to refuse financing of certain indirect costs, where necessary.

The third condition based on the second chapter is that the methodology and model should be applicable in practice. As far as this dissertation is based on common practices (at the example of universities worldwide) and conceptions, the suggestions made in this dissertation are in general suitable for other universities.

# 5 CONCLUSIONS, CONTRIBUTION, LIMITATION OF RESEARCH AND SUGGESTIONS FOR FUTURE RESEARCH

## 5.1 Conclusions

To ensure the financial sustainability of universities, the focus should be on the diversification of revenues as well as keeping expenses under control and ascertaining actual expenses of different activities. Today, efficiency, effectiveness and economy are the important indicators also for the public sector organisations and these organisations are expected to base their decision-making on transparency and financial awareness. Full costing is seen as the means to help universities achieve the above-mentioned aims. Implementation of full costing has been a topic of discussions between European universities and their representative organisations for some time already.

Given the above, **the aim of this research is to elaborate a model of full costing for universities to better understand in-depth the issues of costing, which can be communicated internally and externally for universities' aims.**

Considering the finance providers' and universities' requirements, concerns and interests, universities need a methodology that could be communicated to finance providers as well as internally, which could be used in real financial management.

The research question was formulated as follows: What is the full-costing methodology and the model representing it for universities and what are the factors that affect its design and implementation?

The research sub-questions were formulated as follows: what is the framework of costing that supports the creation of a full costing methodology and a full costing model? (RQ<sub>1</sub>); What are universities' costing practices today and what can be learnt from this information when developing a full costing methodology and a full costing model? (RQ<sub>2</sub>); What are the university specific factors that influence the design of a costing model and its implementation?(RQ<sub>3</sub>); What are the indirect cost rates based on the proposed FC model?(RQ<sub>4</sub>).

Table 14. Summary of the results of the research

RQ	The <b>main</b> results of the research
RQ	The author has analysed the conceptual framework of costing and the conceptual full costing model is proposed (see Figure 38), which creates a better understanding and communicates the nature of costing. The factors that affect the design and implementation of costing are identified.

RQ <sub>1</sub>	<p>The author proposed the conceptual framework of full costing (see Figure 11):</p> <ul style="list-style-type: none"> <li>• The author analysed the costing theory, discussed various alternatives in creating a full costing system and proposed a framework of full costing;</li> <li>• The author found the most typical elements of costing systems.</li> </ul>
RQ <sub>2</sub>	<p>The author conducted research where she studied costing practices in universities worldwide and the area of costing in general:</p> <ul style="list-style-type: none"> <li>• The author verified the conceptual full costing model of universities and supplemented it with practices;</li> <li>• The practice-based full costing model is presented (see Figure 22);</li> <li>• The author confirmed the finding by Cropper and Cook that most of the universities use up to 9 cost drivers.</li> </ul>
RQ <sub>3</sub>	<p>The author has analysed what the university specific factors that influence design of a costing model and its implementation are:</p> <ul style="list-style-type: none"> <li>• The author investigated the contingency factors and found the factors that influenced the design of costing. The concept of the factors that influence the design of a costing system is elaborated by the author (see Figure 10);</li> <li>• The author investigated the success and failure factors and identified the factors that influenced the implementation of costing. The concept of the success and failure factors that influence the implementation of a costing system is elaborated by the author;</li> <li>• The author investigated costing at Tallinn University of Technology and identified the factors that influenced the design and implementation of TUT's costing.</li> </ul>
RQ <sub>4</sub>	<p>The indirect cost rates at Tallinn University of Technology are calculated based on the proposed model:</p> <ul style="list-style-type: none"> <li>• The overall indirect cost rate at TUT is calculated - it is 40.8%;</li> <li>• The indirect cost rate of TUT is compared with the indirect cost rates of other universities;</li> <li>• An explanation of the process of development of full costing is presented (see Chapter 4).</li> </ul>

Source: (Compiled by the author)

Based on the research sub-questions (RQ<sub>1</sub>), at first the framework of costing was studied. Based on a costing theory, there are different opportunities to build up a costing system. The choice of a costing system depends on the aims for which the data generated by the system will be used. A costing system methodology presumes aim setting for the system and the aims in this dissertation were to prove the performance and ensure sustainability, transparency and to increase financial awareness, offer input to the decision-making process and a methodology for the finance providers and for the internal allocation of resource expenses.

In the past, costing in the public sector was sometimes regarded as not a priority because the aim of the public sector was to provide public services and national well-being; today, however, it is important to take into account, in parallel with the named aims, also the economic side of the services. Costing can help provide information about service prices and create preconditions for the growth of efficiency, effectiveness and economy.

The research topic defined full costing as a costing system, based on which costing techniques – TC, ABC and TDABC – were analysed. After examining the costing methodology, ABC was selected as the costing technique for this dissertation.

Increased costs, diversity of services, large overheads, the need for better management decisions, and for nonfinancial information, to improve the ineffectiveness and build up the accountability level, etc. are the reasons why to implement ABC (see e.g. Cooper, 1991; Vokurka and Lummus, 2001; Fawzi, 2008; Mansor et al., 2012; Bacsich et al., 2001). Many researchers have demonstrated also the suitability of ABC in education (see e.g. Amir et al., 2012; Clarke & Bellis-Jones, 1996; Tatikonda & Tatikonda, 2005; Granof et al., 2000; Cropper & Cook, 2000; etc.).

The author has analysed the costing theory and found that the frequently occurring procedures of costing are: tracing costs to activities and/or cost objects; identifying resource costs; identifying activities; identifying cost objects; making reports.

The author has analysed costing theory and found that the frequently occurring elements of costing system are: cost objects; activities; resource expenses; activity and/or cost centres; resource, cost and/or activity driver.

The author conducted research where she studied costing practices in universities worldwide and the area of costing in general (RQ<sub>2</sub>).

Using the Costing Questionnaire (CAQ), it may be said that full costing is necessary first of all for the organisation itself. An organisation itself should want to be sustainable. An organisation should want to understand its expenses and be willing to use cost information in the decision-making process.

The costing methods used by universities today are relatively simple and most of the universities use full costing as the costing technique.

Altogether, only two activities are distinguished in general, i.e. teaching and research. Sub-activities are based on the type of finance provider (public or non-public), level of study (PhD, master or bachelor), etc. In general, expenses are assigned to structural units, projects or activities. Expenses are accumulated annually. The most frequently used cost drivers are time recording data (time spent), square metres and the number of students or employees.

The universities use a maximum of 9 cost drivers. Hence, this dissertation confirms the finding by Cropper and Cook that most of the universities use up to 9 cost drivers.

Cost drivers should be selected based on the cause-and-effect relationship; however, data availability has also been mentioned as a reason for selecting cost drivers.

In general, different coefficients are not used for faculties. Different coefficients are used for different room types and, for instance, certain norms have been established for rooms.

Time recording and the respective data collection is one of the most popular costing topics. Different time recording methods are used. Generally, the time recording method where employees fill in the timesheet either weekly or monthly is used, whereas in many cases percentages are used. Time recording as a rule is reported for core activities, mostly teaching and research.

Pricing at universities is based on full costs.

The importance of costing on a 10-point scale has been assessed at an average of 6.3 points and on average 58.8% of the decisions are made on the basis of costing information, whereas this varies in individual cases. In some universities only 10% of the decisions are based on costing information and in some cases all of them are supported by costing information.

CAQ inquired about the top management and middle managers' support to implementation of costing. The support of top management was valued higher than the support of middle managers.

This dissertation supports the design of a costing methodology for TUT and assures that the methodology laid out by TUT is in conformity with the widely used costing practices of universities.

In addition to CAQ, the full costing technique used at the University of Amsterdam (UvA) is presented in Appendix VII, which is significant by that this university uses the methodology accepted by the EU Commission.

RQ<sub>3</sub> studied the university specific factors that influence the design of a costing model and its implementation. Costing is organisation specific and the costing system is designed by certain factors. There are some contingencies named, such as traditional "hard" contingencies environment, size and structure of organisation and technology (Waterhouse & Tiessen, 1978; Otley, 1980) and newer, the so-called "soft" contingencies such as culture (Harrison & McKinnon, 1999) and strategy (Langfield-Smith, 2006), and separately pointed out in activity-based costing research are competition and government policies (see Kongchan, 2013).

The author analysed the contingency framework and found the following:

1. The size of the organisation (e.g. number of activities, diversity, etc.) explains the adoption of a sophisticated costing system. The greater degree of product diversity, volume diversity and using of imperfectly correlated cost drivers means that a larger number of cost drivers is needed. The number of cost drivers is related to the number of activities, meaning that more cost drivers are needed for a larger number and greater diversity of activities. As regards the size related resources, the organisations with bigger resources (finance, employees, knowledge, etc.) probably have more opportunities to develop and implement the ABC and sophisticated systems.

2. The type and diversity of the organisation is related to the number of cost drivers and the diversity of the organisation is related to the costing technique.
3. The structure of the organisation plays a significant role in costing. It determines the elements of the costing system, e.g. activities, costs pools, cost objects, etc. The importance of ABC design is the identification of the major activities that take place in a firm (activity analysis); the activity analysis should be based on the organisational structure. The number of activities is related to the number of cost drivers.
4. Overall, universities should contribute to effective operation (see also the concept of “Three Es”), financial awareness, transparency, etc. The strategy influences costing information through precise assessments (accuracy), measurement of costs (e.g., costing should measure costs of diverse activities). The strategy influences elements of a costing system through allocation levels, e.g. cost objects, diverse activities.
5. The author concludes that there are certain cultural factors, and these factors are relevant in the context of costing. The implementation of costing techniques relates to uncertainty avoidance and innovation. Culture is seen in people’s doings, e.g. if the decisions are made based on costing information. Other factors related to costing are accuracy (detail-oriented culture), cost control (tight versus loose), transparency, etc. These factors affect the design of a costing system. The greater degree of accuracy means that a larger number of cost drivers are needed. However, in the context of accounting, there are also the behavioural factors such as uncertainty, unwillingness, etc., and these factors affect the implementation of costing. Both are relevant in the context of costing.
6. Contemporary costing requires better IT, it requires also non-financial information (e.g. cost drivers). The level of IT should be taken into account while selecting costing techniques and the elements of a costing system. The literature points out that technology has an influence on a management accounting system through routine or non-routine activities.
7. The external environment influences the elements of a costing system through costing techniques (e.g., policies). The external environment influences information of costing through importance, accuracy, timeliness, etc.

These factors have been studied also in the TUT based research. The main contingency factors which influence the costing system of TUT are its structure and size, the external environment and culture. The strategy and technology were less relevant.

The structure and size have a visible effect on the design of a costing system, through the multitude and diversity of cost objects, number of cost centres, level of decentralisation, etc.

The impacts of the external environment have been associated primarily with policies. Competition and national policies have not induced TUT to change its costing system. The TUT based survey has pointed out that because today, in order to get contracts, universities need to tender the lowest possible price (low price culture), the costing information is not emphasised in such price calculations.

Culture can be regarded as an organisation's internal as well as external factor. Culture is how managers and employees make the decisions, what kind of information managers and employees need for that, what managers and employees use the costing information for, etc.

The university strategy is not directly cost saving, but costing must support efficiency, effectiveness and economy. Strategically, an important aim is to work out costing for curricula.

It may be said that the factors that ensure successful implementation of costing are communication, continuing education, IT advancement and management improvement.

In special literature the factors that influence the implementation of a costing system have been separately analysed. These factors are, for example, top management support; linkage to competitive strategies; performance evaluation and compensation; non-accounting ownership; sufficient resources; training in designing, implementing and using cost-management system; consensus about the clarity of the aims of the cost-management system; internal resistance, etc. (see e.g. Velmurugan, 2010; Fei & Isa, 2010; Shaik, 2010; Fawzi, 2008; etc.).

The author of the dissertation analysed and grouped these technical, cultural and organisational factors as internal and external factors and the internal factors are grouped as factors related to human resources and to other internal issues.

The author has found:

1. Factors, related to human resources are: top management support; adequate employee, incl. non-accounting employee, resources; adequacy of training and education; knowledge; employees' resistance to changes; the user denial; staff time and amount of work needed; initiators and consultants needed; performance evaluation and compensation; etc.
2. Other internal issues are: IT resources; a higher priority of other events; technical data collection, identifying and maintaining (e.g. activities, cost drivers); clarity of the aims; linkage to competitive strategies; communication; poor ABC model design; uncertainty of ABC benefits; satisfaction with the current systems; etc.
3. External success or failure factors are: external financial or cost accounting standards or practices.

In the author's opinion, most of the named factors (see above) are related to the internal environment of an organisation and specifically to human resources. In the author's opinion, the problem of employees' resistance plays a significant role in the implementation of costing.

The factors that influence the implementation of a costing system were investigated at the example of TUT. The main success and failure factors of costing according to TUT's research linked to internal (employees' attitudes and management culture) and external factors (laws and finance providers' attitudes). In the author's opinion, the managerial costing not being important enough to require a change in the costing system. Also, IT is the area where improvements are needed.

Based on RQ<sub>4</sub>, in Chapter 4, alternative calculations with real data were presented. The methodology is based on the statement of revenue and expenses, gathering indirect costs into activity cost pools and allocating these costs to activities and accounting (cost) objects. Cost allocation to activities is based on time recording data. Time recording is based on actual salary expenses, since the TUT accounting system enables to determine the percentages of activities performed (teaching and research) through salary expenses. Time recording on the basis of salary expenses has been tested through structural units' assessments, showing that the time allocation to structural units on the basis of salaries corresponds to the structural units' assessments.

Based on the research sub-questions (RQ<sub>1</sub>, RQ<sub>2</sub>) and supplementing these with the research sub-question RQ<sub>3</sub>, the conceptual full costing model was presented (see Figure 38).

Considering the statistics of 2012 and based on the research sub-question (RQ<sub>4</sub>), the overall indirect cost rate at TUT is 40.8%. The indirect cost rate varies by structural unit.

Calculations with statistics using full costing methods confirmed that teaching activities subsidise research. Projects are also extensively subsidised at the cost of teaching. This result should be communicated both in TUT as well as outside TUT, because in a normal situation all activities should cover in addition to direct costs also the related indirect costs. Indirect cost communication may essentially change the attitude of the state as well as of the business sector.

From the aspect of sustainability, it is also important for TUT to internally increase cost awareness. Universities (incl. TUT) should also reach the situation where economically more rational decisions are made.

## **5.2 Research contribution**

The dissertation is the author's contribution to costing studies in universities, providing specific, detailed and comprehensive information on the development and implementation of costing methods in universities. Several researchers (see, for example Amir et al., 2012) have pointed out that there is limited evidence on the public university's costing systems. Hence, more evidence is needed. Several doctoral dissertations have been devoted to costing in recent years, the fact that tells of the importance of the subject. The development of costing methods for covering costs of teaching and research contracts is still a topic on the agenda of all universities and research institutions worldwide.

The aim of this research is to elaborate a model of full costing for universities to better understand in-depth the issues of costing, which can be communicated internally and externally for universities' aims. The author's contribution to this dissertation and hence to costing, especially university costing theory, methodology and practice, is remarkable.

The author's main contribution to working out the full costing methodology and the respective model was as follows:



1. The author analysed the costing theory, discussed various alternatives in creating a full costing system; investigated costing and the factors that influenced its implementation and design, and designed a conceptual full costing model for universities.
2. The author conducted research where she studied costing practices in universities worldwide and the costing area in general, where she verified the conceptual full costing model of universities and supplemented it with practices, proposing the conceptual full costing model.
3. Specifically, the author investigated costing at Tallinn University of Technology and identified the factors that influenced the design and implementation of costing.
4. Based on the verified conceptual model of full costing, and the costing research at Tallinn University of Technology, the author performed full costing on the example of Tallinn University of Technology and proposed an alternative full-costing methodology and the respective model for universities and for the first time calculated the indirect cost rate for Tallinn University of Technology.

The author thinks it important to emphasise the information gathered for this dissertation, presented in Chapter 3.1, which is the author's remarkable contribution to university costing research.

The author's contribution to methodology is revealed, in the author's opinion, primarily in the elaboration of costing methodology and research methodology.

The author's contribution to theory is that the author of the dissertation investigates the costing theory along with the contingency theory and the concept of "success or failure factors", and based on this, has built up a conceptual framework and model for university full costing.

Based on costing research results of universities worldwide, the conceptual model has been upgraded with practice, thereby proposing a full costing model that would be widely acceptable.

The authors' practical contribution includes the presentation of actual numerical indicators (indirect cost rate), as well as indirect costs to finance providers, enabling discussion and proof of full costing elements and the model representing these.

### **5.2.1 Contribution to methodology**

During the research, costing and related information was gathered from universities, which is disclosed in this doctoral dissertation. A costing questionnaire was developed, which is a valuable source of information and might be re-usable in future research.

The dissertation provides an overview of the process of working out a full costing methodology and of the choice of components for the methodology. This

is valuable information that might be important methodological material for the universities still thinking of working out full costing methods.

Full costing methodology is a crucial subject also for the Estonian public universities and for all universities worldwide. Universities need a methodology that would enable negotiating with the finance providers, including the state. In addition, universities need information, especially full cost information to improve the decision-making, including strategic decision-making. Within the framework of this research, a costing methodology was worked out on the example of Tallinn University of Technology, which enables to calculate and allocate indirect costs and can be reported to finance providers on request as well as used for decision-making internally. The general framework of the methodology suits to universities in general.

### **5.2.2 Theoretical contribution**

The contribution of this dissertation to costing theory is the construction of a full costing model suitable for universities, based on theory and enriched with practical experience.

The suggested full costing model for universities links the essential system components based on both theory and practices, providing an overview of the accepted contemporary approach to university costing.

In addition to the main aim of the research – the full costing model elaboration – also the design of a costing system and factors that influence the implementation of costing in the university context were investigated and as a result, a large amount of valuable theoretical material was aggregated into the dissertation. The author investigated the success and failure factors and identified the factors that influence the implementation of costing. The concept of the success and failure factors that influence the implementation of a costing system is elaborated by the author.

The author investigated the contingency factors and found the factors that influence the design of a costing system. The concept of the factors that influence the design of a costing system is elaborated by the author (see Figure 10).

### **5.2.3 Practical contribution**

The dissertation is based on the practical need that is examined through conceptual frameworks, is tested in research, as a result getting an elaborated model that would be implemented in practice.

Covering teaching and research contracts related expenses is a topical issue in all universities and research institutes worldwide. The tendency of universities' revenues turning largely project based has led to a decline in the capacity of indirect cost financing. In order to ensure that universities are and remain sustainable, it is necessary to keep expenses under control and ascertain the actual expenses of various activities.

The practical task of the dissertation is to increase awareness of the stakeholder groups, including finance providers, of rates of indirect costs and provide them with a methodology.

The aim of the dissertation is just this kind of methodology and the construction of the related model that would be accepted by finance providers and based on which the finance providers would be willing to cover the full costs. The methodology can be used also in the universities decision-making processes and it fulfils the aims set in this dissertation.

### **5.3 Limitations of research**

Limitations of research are not under the control of the researcher. Limitations are factors that may have an effect on the interpretation of the findings or on the generalizability of the results and may arise from the methodology, data, the method of analysis, etc.

A limitation of this dissertation might be the CAQ feedbacking outcome – 34 responses were received and the response rate was 4%. The author analysed the reasons for not responding. Based on the feedback, the non-response was explained by poor language skills, lack of time and unwillingness. Various reasons for not participating in questionnaire surveys have been pointed out in the literature, for example, Fawzi (2008) has mentioned the following reasons: company policy that employees do not complete questionnaires; no interest in completing a questionnaire; unable to complete the questionnaire due to business travel and commitments; do not have time to participate; the questionnaire is too long, etc. The author believes that in this doctoral dissertation there might be cultural differences also, for example, in the case of Korea and China.

A limited number of tests were performed for implementing the costing model, which was tested for one year (2012). In future, the methods should be tested further.

### **5.4 Suggestions for future research**

University costing is an important research area for further research. Many questions about this topic are up in the air, but the recommended areas for future research based on this dissertation are as follows.

Combining the best methodology for university full costing, the question of the suitability of TDABC for university costing remained unsolved. TDABC is appropriate rather under the routine process conditions if research can be described as a routine activity. There are few examples of universities using TDABC as the costing method; this is a suitable costing method rather for university libraries. The topic is interesting and should be definitely developed further.

Curriculum expenses, which comprise direct and indirect costs, are a topical subject for educational institutions. This dissertation was focused on indirect costs

because according to the established opinion, just indirect costing is complicated because of the missing direct connection to the cost object. Curriculum costing is interesting in terms of technical solutions as well as practical investigations.

The factors of success or failure of costing implementation need to be studied further. The author of this dissertation is of the opinion that the research philosophy for studying these factors should test the constructivist paradigm.

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## LIST OF PUBLICATIONS

1. Toompuu, K., Põlajeva, T. (2014). Theoretical framework and an overview of the cost drivers that are applied in universities for allocating indirect costs. In: *Procedia - Social and Behavioral Sciences: Contemporary issues in business management and education 2013*, Lithuania, Vilnius Gediminas Technical University, 14–15.11.2013. Elsevier.
2. Põlajeva, T., Toompuu, K. (2010). The Use of Full Cost Accounting Principles as a Decision Support Tool For Determining the Cost and Benefits in the Estonian Public Universities. In: *The 6th International Scientific Conference. Business and Management 2010. Selected Papers*: J. Stankevičienė, R. Ginevičius, A. V. Rutkauskas, & R. Počs (Eds.), selected paper of the 6th International Scientific Conference “Business and Management 2010”, 140–146, Vilnius Gediminas Technical University Press.
3. Põlajeva, T., Toompuu, K. (2008). The financing increase in public universities as one possibility for enlarging European competitiveness. In R. Ginevičius, A. V. Rutkauskas, K. Didenko, T. Põlajeva, & J. Sae, J. (Eds.), *proceedings of the 5th International Scientific Conference “Business and Management 2008”*, 582–587 Vilnius Gediminas Technical University Press.
4. Põlajeva, T., Toompuu, K. (2008). The financial increase in public universities as one possibility for enlarging European competitiveness. In R. Ginevičius, A. V. Rutkauskas, K. Didenko, T. Põlajeva, & J. Sae, J. (Eds.), *selected papers of the 5th International Scientific Conference “Business and Management 2008”*, 398–403 Vilnius Gediminas Technical University Press.



## ACKNOWLEDGMENTS

Writing this dissertation has been the most interesting and educational experience for me, as well as hard work.

I would like to express my sincere gratitude to my supervisors, Dr. Tatjana Põlajeva, associate professor of TUT and Jaan Alver, professor of TUT, for their support and contribution to the dissertation preparation.

I also thank the members of the preliminary doctoral defence committee, Associate Professor Ülle Päril, Associate Professor Tarmo Kadak, and Ardo Kamratov, member of the TUT Board of Governors, who all made useful remarks and suggestions.

I owe thanks to the respondents of the survey who made efforts to complete the questionnaire as well as those colleagues who sacrificed their time to be interviewed by me so that I could gain valuable knowledge for my research.

I also want to thank my colleagues from the university for their ideas and help in the dissertation preparation.

Finally and especially, I owe my gratitude to my family for their understanding and support during my studies. Without their patience and support I would not have been able to achieve this.

The publication of this dissertation is granted by the Doctoral School of Economics and Innovation created under the auspices of European Social Fund.

## SUMMARY

In the framework of Burrell and Morgan's paradigms, the dissertation is positioned into the functionalist/positivist paradigm, which is the leading paradigm in accounting research. The dissertation is based on the philosophy that reality is stable and objectively describable, and a phenomenon existing independently of human nature. Quantitative methods were used for research.

The research area for this doctoral dissertation is costing at universities. The research topic is the full costing model and its implementation. Research questions were posed concerning the theoretical framework of costing; identification of costing practices at universities; analysis of the design and implementation of costing system related issues; calculation of indirect cost rate. The conceptual framework of the doctoral dissertation discusses costing, including costing techniques and approaches used at universities. In parallel, the conceptual framework addresses the contingency theory based approach to costing and the factors that conduce to successful implementation of costing.

According to contingency theory, a costing system is influenced by certain factors, which generally are an organisation's structure and size, environment and technology (Waterhouse & Tiessen, 1978; Otley, 1980), culture (Harrison & McKinnon 1999), and strategy (Langfield-Smith 2006). The factors that recently have been separately pointed out in activity-based costing research are competition and government policies (Kongchan, 2013).

In order to analyse the success factors, success or failure concepts suggested by different researchers (Fawzi, 2008; Fei & Isa, 2010; Hasan & Akter, 2010; Abdallah & Li, 2008; Askarany & Yazdifat, 2007; Căpuşeanu et al., 2012; etc.) are examined.

The principal outcome is the conceptual model to describe the principal relationships of a university's costing based on theory, which is supplemented by universities' practices worldwide as well as results obtained from research on universities' costing. In addition, the TUT specific costing area and the factors that influence them, are studied.

The method of descriptive statistics was used for analysing and interpreting the surveys.

The subject of full costing has been topical in discussions at universities and their representative organisations (e.g. EUA) since 2008. Considering the meagre resources of universities, orientation to transparency and accountability, the topic is important today and will be so in future.

**The aim of this research is to elaborate the model of full costing, the respective descriptive model for universities based on internationally accepted principles and to fit it into the environment, to better understand in-depth the issues of costing and which can be communicated internally and externally for universities' aims, including techniques and elements of costing (e.g. resources, activities, cost drivers, etc.). As additional aims, the design of full costing and the specific factors to ensure its successful implementation were**

investigated. The key issue in the methodology is just **indirect cost** ascertainment and allocation to activities and projects.

Universities' revenues are to a large extent project based and universities' contract partners (finance providers) are apt to pay only for the certified costs where a direct linkage to the project aims has been indicated. Such a financing scheme does not allow covering contract related indirect costs. Hence, it is of utmost importance to find out the actual costs of various activities and work out and communicate simplified **methods** of finance.

Today, business enterprises in Estonia do not wish to pay the full price for contracts either. Active communication of full costs of universities and relevant methods and models to internal as well as external partners may change their attitude and behaviour.

Although in this dissertation costing methodology has been worked out on the example of TUT, its general principles conform to the full costing of other universities.

The significant factors in implementing costing are the external as well as internal environment. The most important factors in the external environment are finance providers accepting the method and their attitude toward cost covering. Here also the ministry of the area of the government has an important role, whereas their concern should be to ensure sustainable financing to universities.

Understanding and increasing awareness of the role of costing within the university's management accounting process is a factor of critical importance today. Internal stakeholders of universities should also be cost aware and understand the nature and need to cover full costs. Universities should also achieve a situation where activities are evaluated in terms of their economy, efficiency and effectiveness, and the decisions are made based on these evaluations.

In the author's opinion one of the valuable results of the dissertation is the detailed overview of the development of costing methods, which might be helpful to universities deciding to change the costing method in the future.

## KOKKUVÕTE

Käesolev doktoritöö asetub Burrelli ja Morgani paradigmade raamistikus funktsionalistide/positivistide paradigmasse, mis arvestusuuringute puhul on juhtiv paradigma. Doktoritöö lähtub filosoofilisest seisukohast, et reaalsus on stabiilne ja objektiivselt kirjeldatav ning fenomen eksisteerib sõltumatult inimloomusest. Töös on kasutatud peamiselt kvantitatiivseid uurimismeetodeid.

Doktoritöö uurimisvaldkond on ülikooli kuluarvestus ning uurimisteema täiskuluarvestuse mudel ja selle rakendamine.

Töös püstitatud uurimisküsimused on seotud kuluarvestuse teoreetilise raamistiku uurimise, ülikoolide kuluarvestuse praktika väljaselgitamise, kuluarvestussüsteemi loomise ja rakendamise analüüsimise ning kaudkulude määra arvutamisega.

Doktoritöö kontseptuaalne osa käsitleb kuluarvestust kui süsteemi, selle teoreetilisi ja meetoodilisi aluseid, sealhulgas ülikoolides kasutatavaid meetodeid ja lähenemisi. Paralleelselt kuluarvestuse teooriaga käsitletakse töö kontseptuaalses osas sõltuvusteooria põhised lähenemised kuluarvestusele ja kuluarvestuse rakendamist soodustavaid (edu tagavaid või ebaedu põhjustavaid) tegureid.

Sõltuvusteooria kohaselt mõjutavad kuluarvestussüsteemi teatud tegurid, eeskätt struktuur ja suurus, keskkond, tehnoloogia (Waterhouse & Tiessen, 1978; Otley, 1980), kultuur (Harrison & McKinnon 1999) ja strateegia (Langfield-Smith 2006). Viimasel ajal on tegevuspõhise kuluarvestuse uuringutes eraldi nimetatud selliseid tegureid nagu konkurents ja valitsuse poliitika (Kongchan, 2013).

Edu tegurite analüüsimisel on vaadeldud paljude teadlaste (Fawzi, 2008; Fei & Isa, 2010; Hasan & Akter, 2010; Abdallah & Li, 2008; Askarany & Yazdifat, 2007; Căpușeanu et al, 2011; etc.) pakutud edu ja/või ebaedu kontseptsioone.

Doktoritöö kontseptuaalne raamistik panustab ülikooli kuluarvestuse põhiseoseid kirjeldava mudeli loomisesse, mida täiendatakse ülikoolide praktikaga ehk tulemustega, mis saadakse ülikoolide kuluarvestuse uuringute tulemusel. Töö raames uuriti nii maailma ülikoolide kuluarvestuse praktikat kui ka TTÜ spetsiifilist kuluarvestuse valdkonda ja seda mõjutavaid tegureid. Ülikoolide uuringute analüüsimisel ja interpreteerimisel on kasutatud kirjeldava statistika meetodit.

Täiskuluarvestuse temaatika on olnud aktuaalne ülikoolide ja ülikoole esindavate organisatsioonide (näiteks EUA) aruteludes juba 2008. aastast. Arvestades ülikoolide nappe ressursse, suundumust läbipaistvusele, jätkusuutlikkusele ja tulemusvastutusele, on see teema oluline nii praegu kui ka tulevikus.

Doktoritöö eesmärk oli rahvusvaheliselt tunnustatud põhimõtetele tugineva täiskuluarvestuse mudeli väljatöötamine ja selle sobitamine keskkonnaga, et mõista sügavuti kuluarvestuse valdkonda ja mida kommunikeerida ülikooli siseselt ja väliselt, sh kasutatavaid meetodeid, kuluarvestussüsteemi elemente

(ressursse, toiminguid, kulukäitureid) jm. Lisaks on uuritud täiskuluarvestuse meetodika tuletamise ja rakendamise edukust tagavaid spetsiifilisi tegureid.

Metoodika raames on põhiküsimus just kaudkulude väljaselgitamine ja seostamine mitmesuguste tegevusliikide ning projektidega.

Ülikoolide tulu on muutunud suures osas projektipõhiseks ja lepingupartnerid (finantseerijad) on valmis tasuma ainult nende kulutuste eest, mille kohta finantseerijale esitatakse dokumentaalselt tõendatud kuludokument ning näidatakse ära kulutuste otsene seos projekti eesmärkidega. Selline finantseerimisskeem ei võimalda aga katta lepingute täitmisega kaasnevaid kaudseid kulusid. Seega on mitmesuguste toimingute tegeliku maksumuse väljaselgitamise ja lihtsustatud rahastamise meetodika väljatöötamine ja selle teavitamine äärmiselt oluline.

Kuluarvestuse rakendamisel on olulised tegurid välis- ja sisekeskkond. Väliskeskkonna puhul on oluline rahastajate poolne meetodika aktsepteerimine ja suhtumine kulude katmisse. Tänapäeval ei soovi ka äriettevõtted Eestis maksta lepingute täitmise eest täishinda. Ülikoolisestest ja -välisest lepingupartnerite aktiivne teavitamine täiskuluarvestuse meetodikast ning mudelitest peaks mõjutama ka nende suhtumist ja käitumist. Siin on oluline roll kanda ka valitsemisala ministeriumil, kelle huvi peaks olema suunatud ülikoolide jätkusuutliku finantseerimise tagamisele.

Kuluarvestuse rolli mõistmine ja selle teadvustamine ülikoolisiseses juhtimisarvestuse protsessis on tänapäeval organisatsioonile otsustava tähtsusega edutegur. Ka ülikoolisisesed huvirühmad peavad olema kuluteadlikud ning mõistma täiskulude olemust ja katmise vajadust. Ülikoolid peavad jõudma olukorda, kus tegevust hinnatakse ökonoomsuse, efektiivsuse ja tõhususe seisukohalt ning hinnangud on juhtimisotsuste langetamise aluseks.

Doktoritöö väärtuseks peab töö autor kindlasti ka seda, et on antud põhjalik ülevaade kuluarvestusmeetodika väljatöötamisest, mis võib tulevikus pakkuda tuge ülikoolidele, kes kaaluvad kuluarvestuse meetodika muutmist. Doktoritöös TTÜ näitel loodud kuluarvestuse meetodika ja sellele tuginev mudel sobivad ka teistes ülikoolides rakendatavate täiskuluarvestuse põhimõtetega.

## APPENDIX I THE ROADMAP TO FULL COSTING

The roadmap to full costing includes the following steps:

- Define the aims;
- Status analysis;
- Scan the environment;
- Setting up the project management;
- Define settings of costing methodology;
- Manage the data (EUA, 2008).

The roadmap:

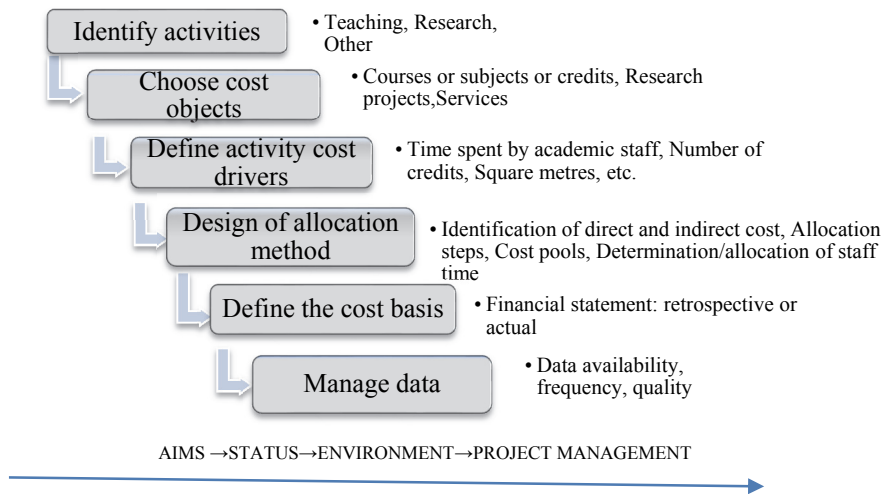


Figure 53. Basic concept of costing methodology development for universities recommended by EUA

Source: (EUA 2008)

## APPENDIX II LIST OF ADMINISTRATIVE ACTIVITIES

**Administration of teaching** – includes all expenses regarded as indirect costs of teaching irrespective of where these are incurred. Indirect costs of an organisation of studies are principally: maintenance expenses of structural units involved in teaching (including maintenance expenses of the office of academic affairs, public university centre; student council; education technology centre, etc.); salaries and other expenses of an organisation of study specialists; expenses of ancillary activities of teaching and/or projects (including expenses of student recruitment, admission, learning, counselling and other ancillary services); expenses of student activities (including expenses of student councils); expenses of co-financing of teaching related projects, expenses of study related development projects (including expenses of curricula development), etc.

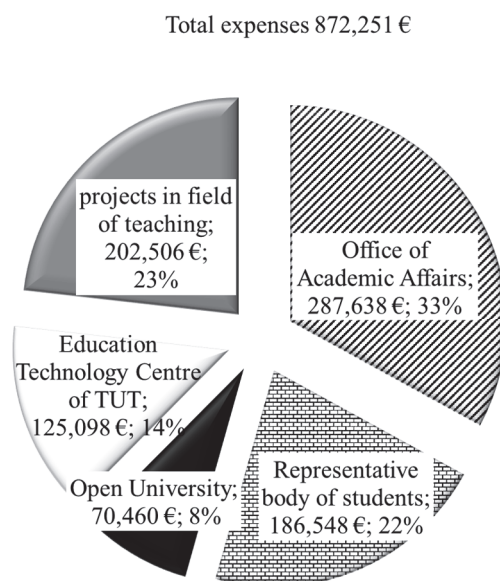


Figure 54. Allocations of IC<sub>c</sub> level administration expenses of teaching activities (based on data of 2012)

Source: (Compiled by the author)

**Administration of research** – includes all expenses regarded as indirect costs of an organisation of research and development irrespective of where these are incurred. Indirect research and development expenses are principally: maintenance expenses of structural units involved in an organisation of research and development activities (incl. maintenance expenses of the faculties, innovation and/or business centre); salaries and other expenses of research and/or

development specialists; expenses of research and development ancillary activities and/or projects (incl. expenses of intellectual property protection, co-financing expenses of research and development projects; expenses of development projects in the field of research and development, research incentive expenses, student research expenses, payments to research and development centres), etc.

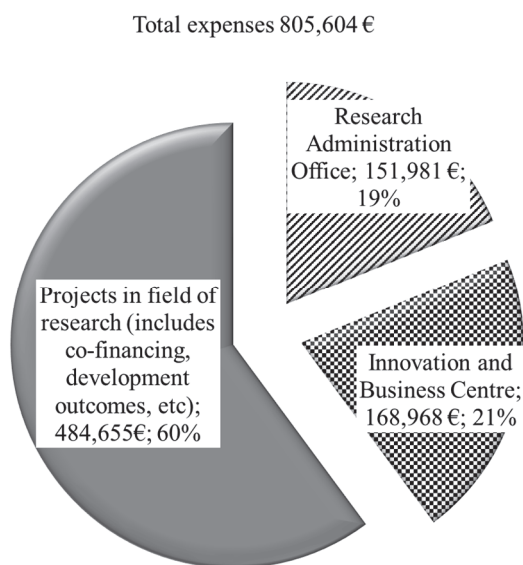


Figure 55. Allocations of ICC level administration expenses of research activities (based on data of 2012)  
 Source: (Compiled by the author)

**General and administrative expenses** – all administration expenses that are not directly assigned to core activities and which are not regarded as direct costs (incl. management, marketing and international relations activities, personnel service, financial services and financial management, publishing, administrative activities, real estate expenses (depreciation is excluded), information technology expenses).  
**Management** – covers all expenses incurred by the management, including expenses of the decision-making and advisory bodies and of the day-to-day operation bodies; expenses of top management (including the rector’s office); expenses incurred by university activities and/or expenses deriving from the law that are not associated with a particular domain (incl. expenses of the document management office, legal office, public procurement office, internal auditing and institutional evaluation expenses); disbursements from reserves (excl. vacation reserve) and funds.



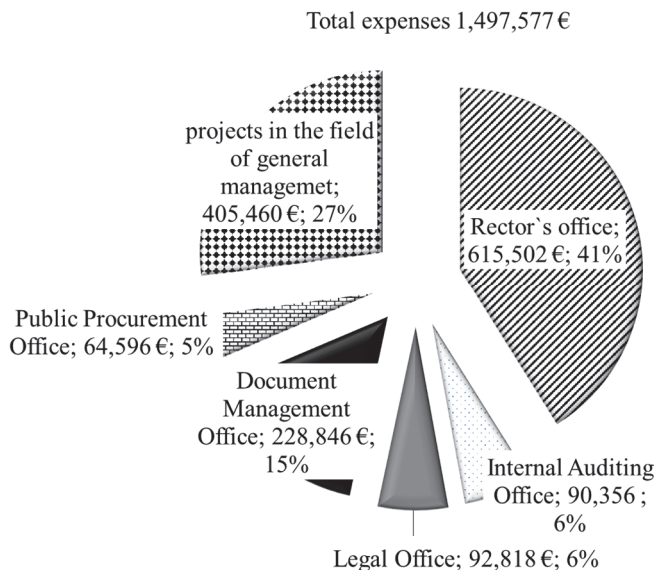


Figure 56. Allocations of university level (ICc) management expenses (based on data of 2012)

Source: (Compiled by the author)

**Marketing and international relations activities** – includes all expenses related to communication, international relations, marketing, advertising. Marketing and communication covers: related maintenance expenses of structural units (incl. maintenance expenses of the communication and/or marketing office, international relations office); publication expenses of the university newspaper/journal and expenses of supporting university related journals; salaries expenses and other expenses of communication and/or marketing specialists; activity expenses of promoting membership mobility and academic exchange; expenses of hosting visitors from abroad; public relations expenses (excl. expenses of student admission and recruitment), etc.

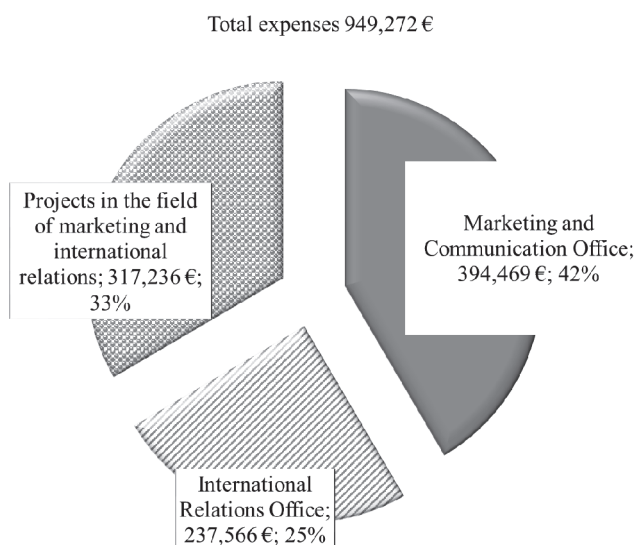


Figure 57. Allocations of university (IC<sub>c</sub>) level marketing and international relations expenses (based on data of 2012)

Source: (Compiled by the author)

**Personnel service** – expenses of personnel services: maintenance expenses of the personnel office; salaries and other expenses of personnel specialists; occupational health expenses; employees’ participation expenses in training programmes; co-financing expenses of employees’ participation in training programmes; membership benefits and/or pensions, etc.

**Financial services and financial management** – accounting, budget and financial management related expenses. Accounting and financial management expenses cover: maintenance expenses of structural units organising accounting and budgeting; salaries and other expenses of financial specialists; auditing expenses, etc.

**Publishing** – publishing expenses, which are not reported as direct expenses elsewhere.

**Information technology expenses** – maintenance expenses of IT services; expenses of IT specialists employed with structural units; maintenance and development expenses of IT infrastructure that are not investments (networks and databases), etc.

Total expenses 1,317,013 €

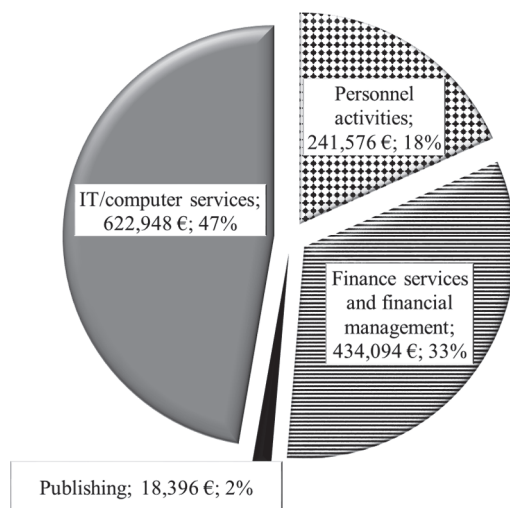


Figure 58. Allocations of expenses for personnel services, financial services and financial management, publishing and IT/computer services of university (IC<sub>c</sub>) level (based on data of 2012)

Source: (Compiled by the author)

**Real estate expenses** contain all property related expenses (incl. rent on land, territorial maintenance expenses, public utility expenses (incl. electricity, heating, water and sewage, etc. (in buildings and university campus territory) that are not direct costs), insurance expenses, rental expenses, expenses of property related services and materials, etc.), etc. Depreciation of buildings is included in real estate expenses. Also, maintenance expenses of structural units which organise administrative and construction activities (incl. salaries and other expenses of administration and construction specialists, etc.) are included.

Total expenses 9,309,084 €

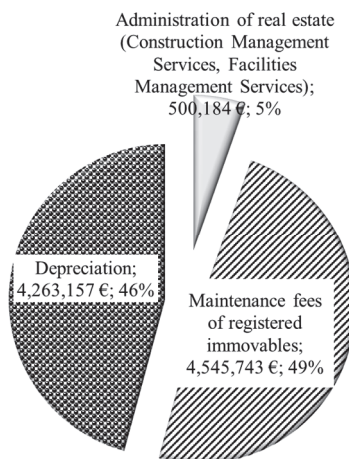


Figure 59. Real estate expenses on IC<sub>C</sub> level (based on data of 2012)

Source: (Compiled by the author)

**Public services** – library (incl. museum) expenses.

**Membership fees** – membership fees of the university as an institution in organisations which are not reported as direct costs elsewhere.

Total expenses 1,592,306 €

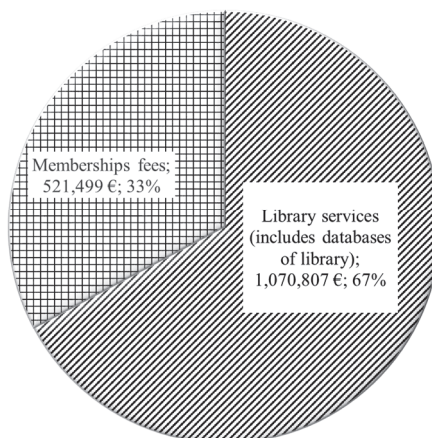


Figure 60. Public services and membership fees

Source: (Compiled by the author)

## APPENDIX III COSTING QUESTIONNAIRE

### Costing Questionnaire

#### 1. IDENTIFICATION OF THE RESPONDENT

Name of the University:

Country:

#### 2. INSTITUTIONAL FRAMEWORK

2.1 Legal status:

- Independent legal entity under public law
- Not for-profit independent legal entity
- For-profit independent legal entity
- Other

Comment:

2.2 Number of students:

- < 5 000
- >= 5 000
- >= 12 000
- >= 20 000
- >= 30 000

2.3 Number of employees:

- < 1 000
- >= 2 500
- >= 3 500
- >= 4 500

Currency:

2.4 Amount of income, mln:

2010:  2011:  2012:

2.5 Amount of costs, mln:

2010:  2011:  2012:

2.6 Amount of indirect costs (overhead costs), mln.<sup>(5)</sup>

2010:  2011:  2012:

2.7 Ownership of real estate:

- University is the owner of its property
- State is the owner of university's property
- Other

Comment:

2.8 Allocation of the income

2.8.1 Allocation of the income 2010 (%):

Teaching:  Research:  Other:

Comment:

2.8.2 Allocation of the income 2011 (%):

Teaching:  Research:  Other:

Comment:

2.8.3 Allocation of the income 2012 (%):

Teaching:  Research:  Other:

Comment:

## 2.9 Status of autonomy

2.9.1 An independent party on legal disputes:

- Yes
- No

2.9.2 Decide upon the membership in non-profit associations or other non-profit organisations:

- Yes
- No

2.9.3 Found for-profit entities or be a shareholder in such entities:

- Yes
- No

2.9.4 To buy and sell its assets:

- Yes
- No

2.9.5 Have the right to obtain loans on commercial bases:

- Yes
- No

2.9.6 Charge fees to students:

- Yes
- No

2.9.7 Change third parties for other educational services, research and development:

- Yes
- No

2.9.8 Freedom to decide upon the number of academic and non-academic positions:

- Yes
- No

2.9.9 Freedom to decide upon the salaries of academic and non-academic positions:

- Yes
- No

2.10 University Government

- appointed
- elected
- internal
- external
- less than 10 members
- more than 10 members
- less than 20 members

2.11 Funding sources, % (based on 2012):

National public funding:  National private funding:  
 International public funding:  International private  
funding:

Comment:

3. ACCOUNTING

3.1 Does your university prepare an annual financial report?  
(in general the report includes a balance sheet, income statement, etc.):

- Yes
- No

3.2 Financial report based on:

- Accrual method
- Other method

Comment:



3.3 Does your university prepare an annual budget?

- Yes
- No

3.4 Does your university prepare a long-term budget?

- Yes, for 3 years
- Yes, for 4 years
- Yes, for 5 years
- More than 5 years
- No

3.5 Budget performance based on:

- Accrual method
- Cash flow method
- Other method

Comment:

3.6 Does your cost accounting follow any of the listed cost-accounting methods?

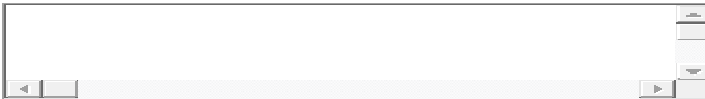
- ABC
- FCA
- TRAC
- TDABC
- Other method

Comment:

3.7 The aim to implement ABC, FCA, TRAC or TDABC at your institution?  
Multiple answers are possible:

- To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects
- National obligation
- National external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery
- To allocate the budget internally
- To steer by incentives
- To undertake activity analysis
- To analyse structural units
- To benchmark the university with the sector
- To have a relevant decision basis for investments
- To report to funding agencies
- To negotiate with public funders
- Pressure from stakeholders/ accountability
- European policies (e.g. “Modernizing Universities”)
- To negotiate with private funders (pricing)
- Other

Comment:




### 3.8 Interested in acceptance of methodology:

- Are you interested in the acceptance of your methodology by the EU Commission?
- Are you interested in the acceptance of your methodology by the national body?
- Are you interested in using a flat rate?
- Have you ever discussed your full costing methodology with the EU Commission?
- Have you ever discussed your full costing methodology with the national body?
- Has your costing methodology been approved by the EU Commission?
- Has your costing methodology been approved by the national body?
- Do you consider submitting the request to accept you methodology?

3.9 Cost accounting based on (in the field of management accounting):

- Statement of revenue and expenses
- Budget performance
- Other

Comment:



3.10 How long did it take to develop the named costing methodology at your institution

- 1 year or less
- 1-3 years
- 1-5 years
- 1-7 years
- more than 7 years

Comment:



3.11 Please fill in the year when the named costing methodology was first used at your university

costing method:

Add row

Remove row

Comment:



3.12 Have you changed or improved your costing methods in recent years?

- Yes, 1 year ago (or this year)
- Yes, 2 years ago
- Yes, 3 years ago
- Yes, 4 years ago

- Yes, 5 years ago
- No

3.13 If you have changed the costing method, please explain briefly what you changed and why:

3.14 Identify the main activities to allocate costs at your university:

- Teaching
- Research
- Other

Comment:

3.15 Identify sub-activities for teaching, research and other activities

3.15.1 Teaching:

Sub-activity:

Add row

Remove row

3.15.2 Research:

Sub-activity:

Add row

Remove row

3.15.3 Other:

Sub-activity:

Add row

Remove row

3.16 Identify cost objects to allocate costs at your university:

- Structural unit
- Activity
- Project
- Curricula
- Course
- Client

Please name cost objects that are additionally used at your university:

Cost object:

Add row

Remove row

3.17 How often do you collect and update data?

- After every 3 months
- After every 6 months
- Annually
- After 2 years
- After 3 years
- After 5 years
- Other

Comment:

3.18 Are direct and indirect costs clearly separated?

- Yes
- No (certain direct and indirect costs are located in the same cost objects)

3.19 If the response to the previous question was no, then please respond to this question: what is the basis for allocating indirect costs?

3.20 Indirect costs are classified as follows:

- Indirect costs of university
- Indirect costs of faculty
- Indirect costs of academic departments
- Other

Comment:

3.21 Please describe briefly the cost allocation at your university by different allocation levels:

#### 4. DRIVERS AND ALLOCATION

4.1 What kind of drivers has your university used in cost allocation?

- Square metres
- Time spent by other staff
- Number of research staff in FTE
- Time spent by academic staff
- Number of staff in FTE
- Number of tutorial hours
- Number of credits
- Number of graduations
- Number of academics in FTE
- Number of applications
- Number of research grant applications
- Number of examinations
- Number of lecture hours
- Teaching students
- Undergraduates
- Number of student counselling sessions
- Number of research projects
- Income

- Number of post-graduate students
- Number of new enrolments
- Number of students
- Graduate students
- Invoices processed
- Courses or subjects or credits
- Headcount personnel
- Time spent by employees
- Number of supervision of graduation thesis
- Student types (i.e. international students)

If the table does not contain the driver, then, please, add:

Driver:

Add row

Remove row

4.2 Please, note what kind of cost driver(s) (allocation bases) you use to allocate the following activities of your university:

<u>Activity</u>	<u>Driver</u>
Salaries:	<input style="width: 200px; height: 15px;" type="text"/>
Loans and interest:	<input style="width: 200px; height: 15px;" type="text"/>
IT/computer services:	<input style="width: 200px; height: 15px;" type="text"/>
Staff facilities:	<input style="width: 200px; height: 15px;" type="text"/>
Premises/estate:	<input style="width: 200px; height: 15px;" type="text"/>
Depreciation:	<input style="width: 200px; height: 15px;" type="text"/>
Finance service:	<input style="width: 200px; height: 15px;" type="text"/>
Personnel service:	<input style="width: 200px; height: 15px;" type="text"/>
Marketing activity:	<input style="width: 200px; height: 15px;" type="text"/>
Academic services:	<input style="width: 200px; height: 15px;" type="text"/>
Administration of teaching:	<input style="width: 200px; height: 15px;" type="text"/>
Administration of research:	<input style="width: 200px; height: 15px;" type="text"/>

Legal activities:

International relations activities:

Auditing activity:

Library services:

Membership fees:

Management of university:

Management and support activities of  
department/college/school:

Management and support activities of  
institutional level:

Other:

Comment:

#### 4.3 Why did your university choose such drivers?

- Easy access to the data
- Biannual or annual data collection can be used
- The cause-and-effect relationship
- Other

Comment:

#### 4.4 Do you take into account differences of the faculties and apply some coefficients?

- Yes
- No

#### 4.5 If the previous answer was yes, then, please, explain briefly?

#### 4.6 What kind of time allocation method does your university use?



- Labour data report completed by employee and turned in weekly or monthly
- Periodic estimates of time spent on activities completed by employees
- Periodic evaluations completed by someone other than employee
- Workload planning models
- Interviews and workshops
- In-year retrospective
- Proxies
- Diaries
- Other

Comment:

4.7 If your university is using timesheets for time allocation, then, please, give the following answers:

4.7.1 Is the timesheet refilled?

- Yes
- No

4.7.2 To allocate workload, does your staff use percentages?

- Yes
- No

4.7.3 Does your staff use hours and minutes to allocate workload?

- Yes
- No

4.7.4 Please select how detailed timesheets you use:

- Only main activities
- Main activities with sub-activities (less than 20)
- Main activities with sub-activities (20...30)
- Main activities with sub-activities (30...40)
- Main activities with sub-activities (40...50)
- Main activities with sub-activities (more than 50)

## 5. MANAGEMENT ATTITUDES AND CULTURE, COMMUNICATION, TRAINING

5.1 How would you describe management attitude relating to cost accounting at your university?

1 2 3 4 5 6 7 8 9 10

LOW HIGH

IMPORTANCE

5.2 Are management decisions always supported by cost accounting information?

1 2 3 4 5 6 7 8 9 10

0% 100%

% OF DECISIONS

5.3 The pricing is based on:

- All cost of university and extra charge is added
- The market price
- Full cost
- Other principles

Comment:

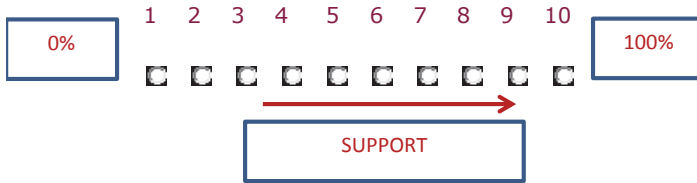
5.4 Does top management support your attempts to implement cost accounting at your university?

1 2 3 4 5 6 7 8 9 10

0% 100%

SUPPORT

5.5 Does middle and project management support your attempts to implement cost accounting at your university:



5.6 Did you have training sessions to educate as many personnel as possible?

- Yes
- No

5.7 Do you provide costing information to stakeholders outside the university?

- Yes
- No

5.8 If the response to the previous question was yes, then, please, respond to this question – what kind of costing information does your university provide to stakeholders?

5.9 Do you have any other comments or recommendations?

5.10 Would you like to receive feedback of the conclusions of the questionnaire?

- Yes, we would like to receive feedback

Source: (Compiled by the author)

## APPENDIX IV DETAILED RESULTS OF CAQ

Table 15. The additional information of CAQ

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Technische Universität Dortmund	FCA, TDABC	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to allocate budget internally; European policies (e.g. Modernizing Universities)	1-3 years	Full costing (2008)	Yes, 1 year ago (or this year)	More details about organisational structures
University of LIEGE	ABC	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to allocate budget internally; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to have relevant decision basis for investments; European policies (e.g. Modernizing Universities)	1-3 years		No	
Griffith University	ABC	To allocate budget internally; to undertake activity analysis; to have relevant decision basis for investments	1-3 years	ABC (2007)	Yes, 1 year ago (or this year)	

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
University of Utah	Other method		1-3 years	OMB A-21 Direct/Indirect (1992)	No	
Stockholm School of Economics in Riga	FCA	To analyse structural units; pressure from stakeholders/accountability	1-3 years	FCA (2010)	No	
University of Manitoba						
Norwegian University of Science and Technology	FCA	To fulfill the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to undertake activity analysis; to have relevant decision basis for investments; to report to funding agencies; to negotiate with public funders; to negotiate with private funders (pricing)	1-3 years (still in the progress of implementing full cost)	FCA (2013)	Yes, 1 year ago (or this year)	We are trying to implement the Norwegian FCA-model developed in 2011-2012. That includes a new method calculating indirect cost and creating price structures for large infrastructures.

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Hanken School of Economics	ABC, FCA, Other method	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery	1-3 years	FCA (2010)	No	
Universiteit Antwerpen	ABC	To undertake activity analysis	1-3 years	ABC method (2012)	Yes, 1 year ago (or this year)	We started using a software tool (QPR Cost Control BV) instead of Excel.
University of Exeter	TRAC	National obligation; to undertake activity analysis; to benchmark the university with the sector; to report to funding agencies; to negotiate with public funders; to negotiate with private funders (pricing)	1-3 years	TRAC (2004)	Yes, 1 year ago (or this year)	System improvements and compliance review leading to better cost driver calculations

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Riga Technical University	FCA	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; European policies (e.g. Modernizing Universities)	1–3 years	Allocation and Application Methodology of the Budgetary Subsidy and Student Tuition Fees for RTU Structural Units (1998)	Yes, 1 year ago (or this year)	The method is not changed, it is improved every year.
University of Turku	FCA	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to report to funding agencies; to negotiate with public funders; to negotiate with private funders (pricing)	1–5 years	FCA (2008)	No	

University name	Newcastle	Does your costing follow any of the listed costing methods? ABC, FCA, TRAC	The aim of implementing ABC, FCA, TRAC or TDABC at your institution? To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to undertake activity analysis; to analyse structural units; to report to funding agencies; to negotiate with public funders; pressure from stakeholders/ accountability; to negotiate with private funders (pricing)	How long did it take to develop this costing at your institution? 1-7 years	The year when this costing first was used at your university TRAC (2006), ABC (2008), FCA (2006)	Have you changed or improved in recent years your costing methods? Yes, 1 year ago (or this year)	If you have changed the costing method, please explain briefly what you changed and why Continual review and refinement of process
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University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
University of Leicester	TRAC	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to undertake activity analysis; to benchmark the university with the sector	1 year or less		Yes, 1 year ago (or this year)	Review each year on continuous improvement basis
Umeå university	FCA	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to negotiate with public funders; to negotiate with private funders (pricing)	1-3 years	2010	No	

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Vilnius University	Other method	<p>To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to allocate budget internally; to steer by incentives; to undertake activity analysis; to analyse structural units; to have relevant decision-making basis for investments; to negotiate with public funders</p> <p>National obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to report to funding agencies; pressure from stakeholders/accountability; European policies (e.g. Modernizing Universities)</p>	1-3 years	Based on financial statement and budget performance (2010)	No	
Eötvös Loránd University	FCA		1-3 years	2006	Yes, 1 year ago (or this year)	Continually developing it in accordance with needs.

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Marquette University	ABC	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; to allocate budget internally; to steer by incentives; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to negotiate with public funders	1-3 years	2012	Yes, 1 year ago (or this year)	
Lappeenranta University of Technology	Other method		1-3 years	Full costing (2008)	Yes, 4 years ago	methodology for indirect costs
Universitat Politècnica de Catalunya	ABC	To undertake activity analysis; other	1 year or less	ABC (2002)	No	
Universiteit Leiden	FCA, Other method	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to benchmark the university with the sector; to report to funding agencies; to negotiate with public funders; pressure from stakeholders/ accountability; European policies (e.g. Modernizing Universities)	1-5 years	Full cost (2010)	No	

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Royal College of Art	TRAC	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; to undertake activity analysis; to benchmark the university with the sector; to have relevant decision basis for investments; to report to funding agencies; to negotiate with public funders; to negotiate with private funders (pricing)	1-3 years	TRAC (1999)	No	
University of Oulu			1-5 years	2008	No	
Lahore University of Management Sciences	FCA	To allocate budget internally; to steer by incentives; to undertake activity analysis; to analyse structural units; to report to funding agencies	1 year or less	FCA (2008)	No	
University of Massachusetts Boston	GASB		1-3 years	GASB (2001)	No	

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Nanyang Technological University	FCA	National external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to report to funding agencies; to negotiate with public funders	1-3 years	Transparent Costing Methodology (2006), Revised Costing Methodology (2012)	Yes, 1 year ago (or this year)	Transparent Costing Methodology is cumbersome and difficult to operationalise. Revised costing methodology (RCM) is based on an explicit mathematical model and requires only readily available data. RCM provides a basis to measure the cost per student by course level.
Universidad de Sevilla	FCA	National obligation; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; pressure from stakeholders/ accountability	1-5 years	FCA (2010)	No	

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
Högskolan i Borås	FCA		1-3 years	2009 ()	Yes, 1 year ago (or this year)	
University of Cyprus			1 year or less		No	
Graz University of Technology	FCA	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to undertake activity analysis; to report to funding agencies; to negotiate with public funders; European policies (e.g. ce.Modernizing Universities); to negotiate with private funders (pricing)	1-3 years	2006	Yes, 1 year ago (or this year)	We adapted our direct costs to new funding regulations
Ludwig-Maxilians-Universität München	Other method		1-5 years	KLR (2008)	Yes, 1 year ago (or this year)	The accounting of costs for teaching was enhanced
Tilburg University	FCA	To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; to allocate budget internally; pressure from stakeholders/ accountability; to negotiate with private funders (pricing)	1-5 years	FCA (2007)	Yes, 2 years ago	Improved overhead calculation for pricing decisions

University name	Does your costing follow any of the listed costing methods?	The aim of implementing ABC, FCA, TRAC or TDABC at your institution?	How long did it take to develop this costing at your institution?	The year when this costing first was used at your university	Have you changed or improved in recent years your costing methods?	If you have changed the costing method, please explain briefly what you changed and why
St Georges University of London	FCA, TRAC	<p>To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to report to funding agencies</p>	1–3 years	TRAC (2003)	No	
University of Vaasa	ABC, FCA	<p>To fulfil the requirements of competitive funding schemes to recover a higher percentage of indirect costs for projects; national obligation; national external competitive funding schemes (i.e. rules of national fund providers, including structural funds) and their conditions of cost recovery; to allocate budget internally; to steer by incentives; to Undertake activity analysis; to analyse structural units; to benchmark the university with the sector; to have relevant decision basis for investments; to report to funding agencies; to negotiate with public funders</p>	1–3 years	ABC (2010)	Yes, 1 year ago (or this year)	The costing is under continuous development.

Source: (Compiled by the author; source: CAQ)

Table 16. An overview of costing methods by countries

Country	Method				
	FC	TDABC	ABC	TRAC	Other method
Australia			ABC		
Austria	FC				
Belgium			ABC		
Canada	no answer				
Cyprus	no answer				
Finland	FC		ABC		
Germany	FC	TDABC			KLR
Hungary	FC				
Latvia	FC				
Lithuania					Other method
Netherlands	FC				
Norway	FC				
Pakistan	FC				
Singapore	FC				
Spain	FC		ABC		
Sweden	FC				
United Kingdom	FC		ABC	TRAC	
United States					OMB A-21 Direct/Indirect (1992), GASB

Source: (Compiled by the author; source: CAQ)



Table 17. Sub-activities to allocate costs

Teaching	Research	Other
Adult education	Institution's own funding, postgraduate research, research councils, other government departments, European Union, UK based charities, industry	
Teaching, including preparing the courses, coaching of students, correcting exams, coaching and correcting theses	Postgraduate degree education, research	Public services, guided teaching in training schools
Publicly funded teaching, non-publicly funded teaching	Participation in scientific research, patents, publications, PhD theses	Real estate rental, movable property rental, services of experts
Basic degree education, adult and extension education	Publicly funded - then analysed by funder, non-publicly funded, own funded research, post-graduate research degree courses	No formal sub-analysis
1 <sup>st</sup> level professional study (college) programmes, undergraduate studies (bachelor and professional studies), post-graduate studies (academic and professional master studies), doctoral (PhD) studies, continuing education courses	Publicly funded and non-publicly funded	Social services, support activities
Publicly funded and regulated, publicly funded not regulated, non-publicly funded	Post-graduate degree teaching, other research	Undertake consulting projects and provide administrative support
Publicly funded and non-publicly funded	Patents	University management
Basic degree teaching, adult teaching	Write papers, publications, participate in conferences	By medical specialists, courses and splitting the UK and international
Conduct workshops, field trips, project teaching	Research with financing, research without financing	
Teaching "degrees", teaching "master", teaching "doctor", teaching "own teaching"	By categories of research activity	

Source: (Compiled by the author; source: CAQ)

Table 18. Cost drivers used for allocating a specific cost and/or activity

Cost or activity	Cost driver (number of users)
Salaries	time spent (9), FTE (4), income (1), tuition (1), head count (1), personnel costs (1), budget/planning (1), direct cost (1), number of credits (1), structural unit (1)
Loans and interests	square metres (3), occupancy (1), capital spent (1), direct cost (1), personnel costs (1), FTE (1), time spent (1), income (1), structural unit (1)
IT/computer services	FTE (5), academic personnel and students (1), time spent (2), head count (1), tuition (1), income (1), student load (1), personnel costs (1), direct allocated salaries (1), activity (1), costs (1), structural unit (1)
Staff facilities	FTE (4), square metres (4), time spent (2), direct allocated salaries (1), income (1), tuition (1), academic personnel and students (1), personnel costs (1), costs (1), structural unit (1)
Premises/estate	square metres (9), occupancy (1), income (1), tuition (1), personnel costs (1), direct allocated salaries (1), time spent (1), academic personnel and students (1), structural unit (1)
Depreciation	square metres (7), occupancy (1), direct allocated salaries (1), investments (1), number of assets (1), personnel costs (1), FTE (1), time spent (1), academic personnel and students (1), direct costs (1), structural unit (1)
Finance service	FTE (5), time spent (2), costs (2), activity (2), academic personnel and students (1), direct allocated salaries (1), equally across group (1), income (1), tuition (1), number of invoices processed (1), personnel costs (1)
Personnel service	FTE (6), time spent (2), costs (2), academic personnel and students (1), head count (1), direct allocated salaries (1), equally across group (1), income (1), tuition (1), number of invoices processed (1), activity (1), personnel costs (1)
Marketing activity	FTE (6), time spent (2), costs (2), income (1), activity (1), tuition (1), new students (1), academic personnel and students (1), personnel costs (1)
Academic services	FTE (4), time spent (2), number of students (2), activity (1), equally across group (1), graduate students (1), undergraduate students (1), tuition (1), number of credits (1), number of examinations (1), number of invoices processed (1), academic personnel and students (1), researchers (1), costs (1), personnel costs (1)
Administration of teaching	FTE (6), number of students (3), time spent (2), academic personnel and students (2), direct salary cost (1), graduate students (1), undergraduate students (1),

	tuition (1), number of credits (1), number of examinations (1), costs (1), personnel costs (1)
Administration of research	time spent (5), FTE (3), number of research grant applications (2), research income (1), tuition (1), research project value (1), costs (1), number of grants (1), academic personnel and students (1), personnel costs (1), direct salary costs (1), turnover of third-party funds (1), result of research (1)
Legal activities	FTE (4), time spent (2), costs (2), income (2), tuition (1), academic personnel and students (1), personnel costs (1), activity (2)
International relation activities	FTE (3), time spent (3), graduate students (1), undergraduate students (1), number of international students (1), number of students (1), tuition (1), number of examinations (1), academic personnel and students (1), costs (1), personnel costs (1), activity (1)
Auditing activity	FTE (4), direct allocated salaries (1), equally across group (1), graduate students (1), undergraduate students (1), income (1), tuition (1), academic personnel and students (1), costs (1), personnel costs (1), time spent (1)
Library services	number of students (4), FTE (3), time spent (2), graduate students (1), undergraduate students (1), tuition (1), number of loans (1), academic personnel and students (1), costs (1), activity (1), researchers (1), personnel costs (1), direct allocated salaries (1)
Membership fees	income (2), cost (1), cost centre (1), tuition (1), personnel costs (1), time spent (1)
Management of university	FTE (5), costs (3), income (2), time spent (3), academic personnel and students (1), equally across group (1), direct salary costs (1), tuition (1), personnel costs (1)
Management and supporting activities of department/college/school	time spent (3), activity (3), costs (2), FTE (2), direct allocated salaries (1), global time capacity of the available teaching and research staff per activity (research and teaching) (1), graduate students (1), undergraduate students (1), tuition (1), number of credits (1), personnel costs (1)
Management and supporting activities of institutional level	FTE (5), costs (3), equally across group (1), graduate students (1), undergraduate students (1), income (1), tuition (1), personnel costs (1), time spent (1)

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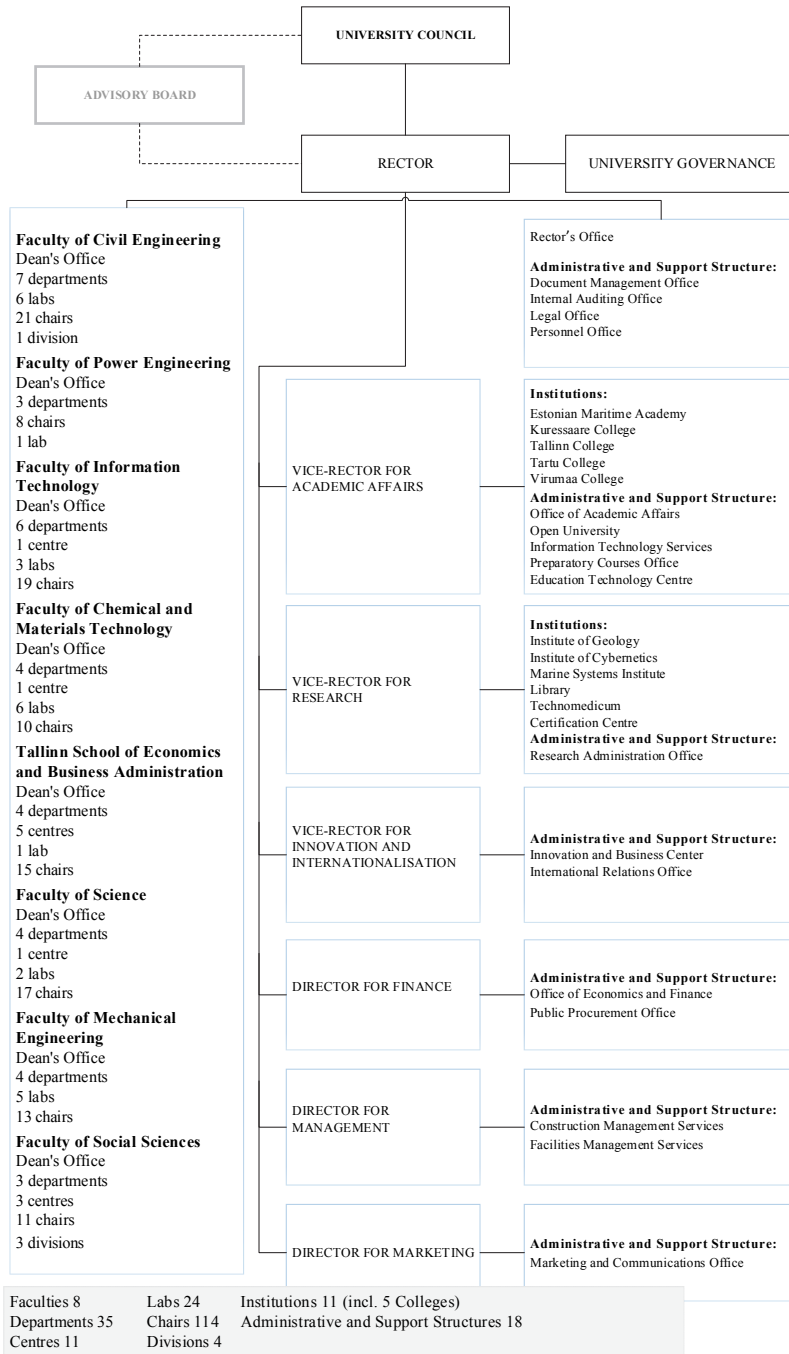
Source: (Compiled by the author; source: CAQ)

Table 19. Cost drivers used by universities

Cost drivers picked from the list (number of users)	Cost drivers additionally marked by universities (number of users)
Time spent (31)	Personnel costs (2)
Square metres (24)	Number of assets (1)
Number of staff in FTE (17)	Time capacity of available teaching or research
	Staff per activity (1)
Number of students (16)	Total direct cost (1)
Number of academic staff in FTE (11)	Tuition (1)
Number on research staff in FTE (10)	Result of research (1)
Number of credits (10)	Direct operating costs (1)
Income (9)	Number of students in FTE (1)
Head count personnel (8)	Total costs (1)
Undergraduates (7)	
Number of research projects (5)	
Number of tutorial hours (4)	
Number of graduations (4)	
Teaching students (4)	
Number of post-graduate students (4)	
Number of research grant applications (3)	
Student types (3)	
Invoices processed (2)	
Courses or subjects or credits (2)	
Number of new enrolments (2)	
Number of examinations (2)	
Number of applications (1)	
Number of lecture hours (1)	
Graduate students (1)	

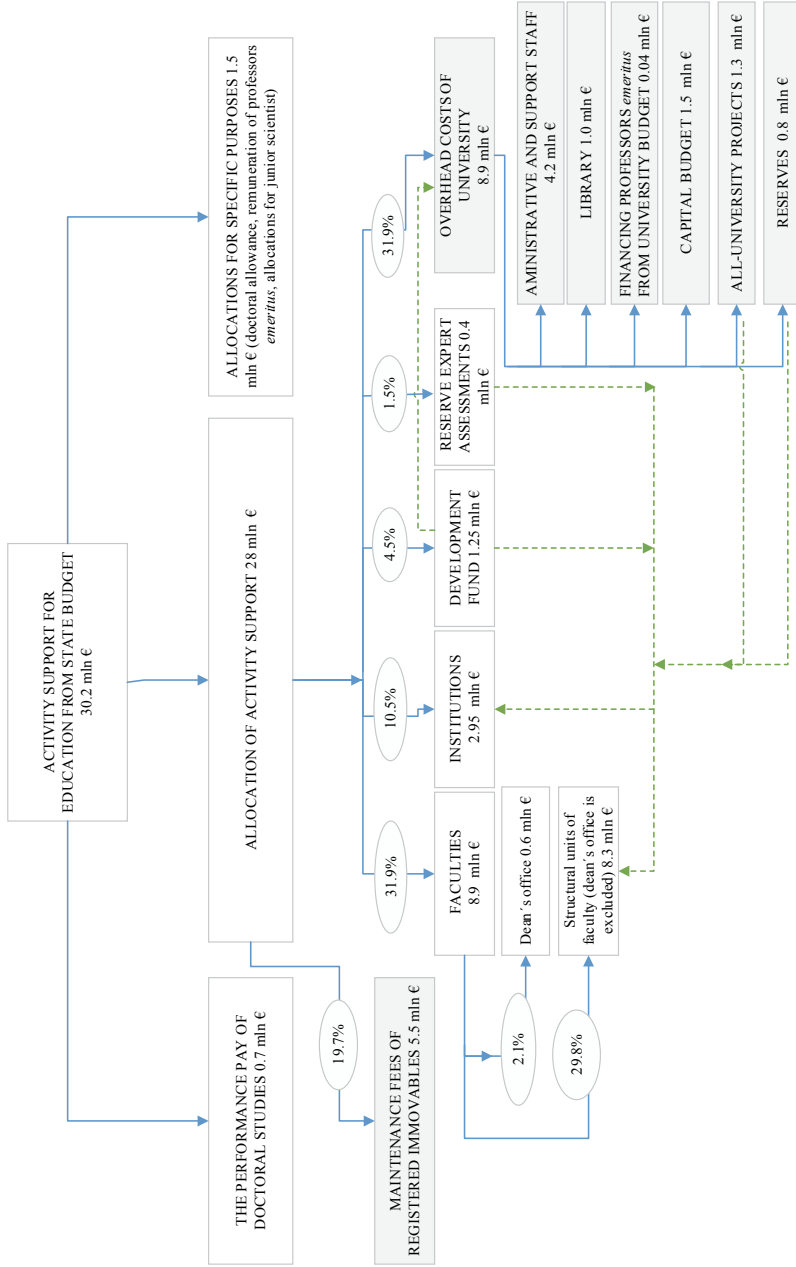
Source: (Compiled by the author; source: CAQ)

## APPENDIX V STRUCTURE OF TUT



Source: (TUT's homepage)

## APPENDIX VI LOCATION OF ACTIVITY SUPPORT



Source: (Compiled by the author)

## APPENDIX VII UNIVERSITY OF AMSTERDAM

During a visit to the University of Amsterdam (UvA), the reasons for the success of using full costing, the technical indicators used (cost drivers, activities), experiences of implementing full costing etc. were studied. In addition to the data gathered during the visit, EUA publications and UvA homepage data were analysed.

- The University of Amsterdam (UvA):
- Founded in 1632, university status since 1876;
- Legally a chartered public body;
- Over 30,000 students in 7 faculties;
- Over 5,400 staff (excluding medicine);
- Over EUR 600 million in annual revenue;
- 250,000 sqm at four locations in Amsterdam;
- World rank 58 by QS.

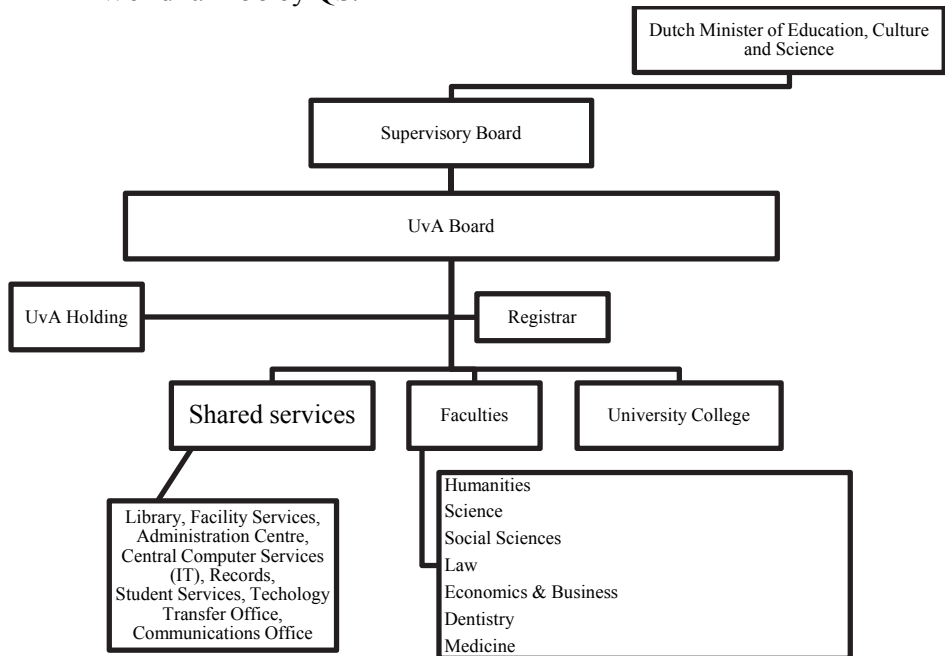


Figure 61. UvA organisation chart  
Source: (UvA homepage)

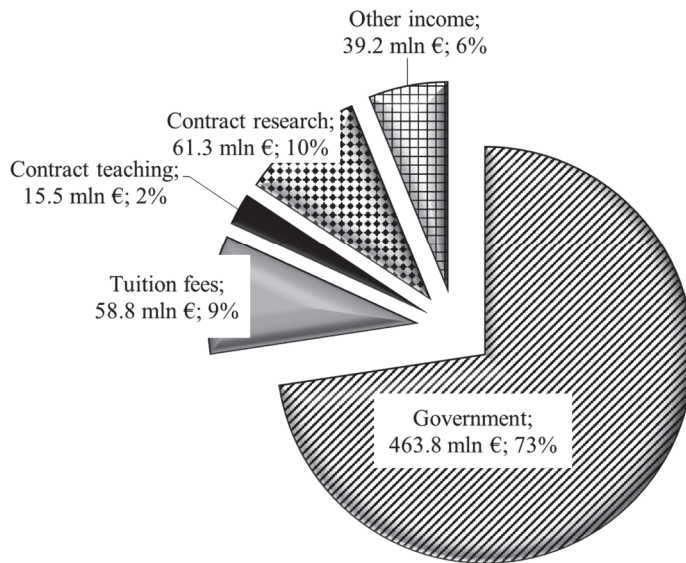


Figure 62. Structure of income of UvA in 2012, 639 mln €  
Source: (documents of UvA)

Universities of the Netherlands do not have the obligation to report the full cost of teaching, research or other activities in their annual report. Universities reported on cost elements (for example, personnel cost, material cost etc.) and cost centres (all units).

Since 2006, UvA has been using a full cost system throughout the university and the main drivers were described, such as:

- Giving a clear expression to the fact that UvA is economically responsible for all profits and losses, thus creating a good basis for sustainability in the long run;
- Internal and external transparency about quality of task performance in relation to cost levels;
- Possibility for rationalisation in internal budget allocation (cost-informed budgets);
- Avoiding unwanted cross-subsidisation and awareness of any contribution of government funding to (partially) private activities;
- Reporting requirements (Aartsen, 2013).

Implementation of full costing was inspired by the university management's ambition to perfect the internal decision-making process, which would be based on truthful information and actual cost of activities. It was underlined that full costing is above all for internal management needs. The system seeks to provide information at all organisational levels. Elements of full costing are fully



implemented throughout the financial system in the management accounting module and SAP<sup>41</sup> is a central and overall accounting system.

Simultaneously with the transition to full costing, structural changes were also made: support units were reorganised. In the process of reorganisation, a limited number of units were formed and starting from 2006, the full costs of these support units are charged to internal clients (structural units) using transparent measurable cost drivers.

After introducing the change, all faculties can see their financial statements, which contain information on the use of rooms and consumption of services, as well as other financial resources used for teaching and research activities.

Implementation of a suitable costing method is seen as the factor that has turned academic structural units into full responsibility centres.

Costing at UvA is carried out through three main components.

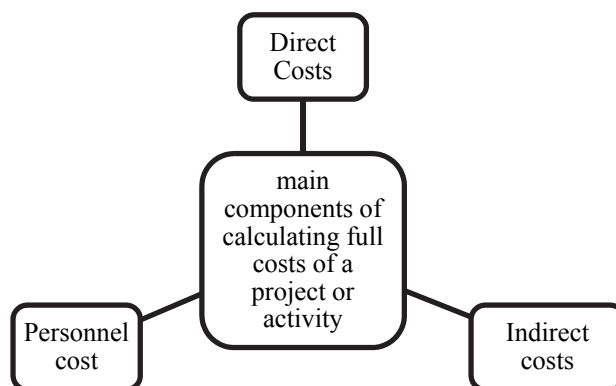


Figure 63. Three main components of full costing in UvA

Source: (Description of the full cost model, University of Amsterdam)

Direct costs are allocated to the project on the basis of invoices and are not part of any of the indirect cost rates.

Personnel costs are costs of academic personnel and sometimes also those of non-academic personnel allocated directly to activities and projects.

Personnel costs are the biggest cost element and the primary cost drivers are related to the staff – FTEs or hours.

The set of principles and general information:

- All overhead rates are expressed as an amount of Euros per year (FTE) and per hour;
- Full cost is charged by university level plus the faculty's overhead;

<sup>41</sup> Software to manage business operations

- Main activities are teaching and research;
- The costs not directly connected to teaching and research activities are financed from the state budget, e.g. UvA museums;
- All space is charged at uniform rent rate per square metre rentable;
- Private enterprises and other third parties are charged at least Full Cost rate;
- Full Cost has provided one organisation-wide language while speaking about costs;
- Full Cost rates show formerly hidden cross-subsidies;
- Full Cost Model of UvA is certified and the recovery rate is 75% in the framework programme 7;
- Time recording is the most important part of full costing;
- Every year an ex post calculation is carried out, which will then be reflected in next year's prices;
- Full Cost model is integrated into the financial system and indirect costs are charged monthly.

University level indirect costs are grouped into central administration costs (e.g. management costs) and costs of shared services. Administration costs are allocated to academic structural units on the basis of hourly rates of academic staff.

In the case of shared services, their full costs are calculated first, which are then allocated with the help of cost drivers to the respective services used.

General methods are used for full cost calculations according to which faculty costs are in sequential steps allocated to research and teaching activities, including projects.

A faculty comprises different units, including academic units, a support unit, research and teaching institutes.

Indirect costs of a faculty are classified as labour costs, costs of academic structural units and departments.

Indirect teaching and research related costs of a faculty, including costs of shared services, are in separate cost pools and are allocated to the structural units involved.

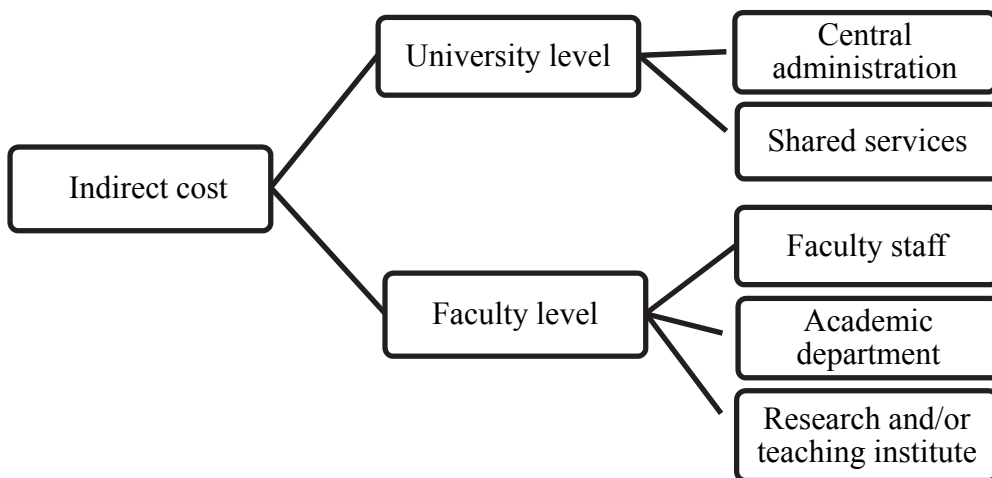


Figure 64. Levels of indirect cost and steps of allocating indirect costs  
 Source: (Description of the full cost model University of Amsterdam)

Table 20. Scheme of cost drivers per service in UvA

Shared Services	Cost allocation to	Cost driver
Information and communications technology (ICT) department	Any user of ICT facilities	Work stations; connection points
Estate department	Any user of space (department or institute)	Square metres
Housing facilities department (energy, maintenance, cleaning, guarding, security etc.)	Any user of space (department or institute)	Square metres (sqm) (Some sqm are weighted: e.g. cleaning services)
Records office (personnel)	All departments (academic and non-academic)	Persons employed
Records office (accounting)	All SSC and faculties	Invoices / declarations processed
Records office (students)	All teaching institutes	Students
Records office (projects)	All departments (academic and non-academic)	Projects
University library	All academic departments (in faculties)	FTE academic staff
Communications & marketing department	All teaching institutes	Students; persons employed (labour market communication)

Student services, blackboard and IT equipped study centres	All teaching institutes	Students
--	-------------------------	----------

Source: (Aartsen, 2013)

UvA believes to have benefitted from implementing the full costing method, described as follows:

Cost awareness has increased and enhanced creativity at all organisational levels in saving costs and in becoming more efficient;

Decision-making is inherently better oriented towards teaching and research: less energy is lost in internal negotiations, since budget allocation and cost-setting are focused on added value for the core activities;

The university's contributions to activities that are not contracted or subsidised on a full cost basis are visible and transparent: formerly implicit or hidden subsidies to contract activities are made explicit. Because of this, the negotiation position vis-à-vis external partners (including the ministry of education) has become stronger;

Since financial procedures have been normalised and integrated into the financial system, the UvA has been able to considerably reduce the financial support staff. Moreover, a total reduction of about 20% on support costs has been realised over the last six years (EUA, 2011).

Although the full costing method has been implemented there are still certain problems. Some of them are: UvA is "not an attractive contract partner" any more because indirect cost rates are increased; it is impossible to satisfy everybody as regards the choice of cost drivers; academics do not see any advantage; time recording does not yet work in some related structures.

Source: (Documents and homepage of UvA)

APPENDIX VIII INFORMATION ABOUT TUT

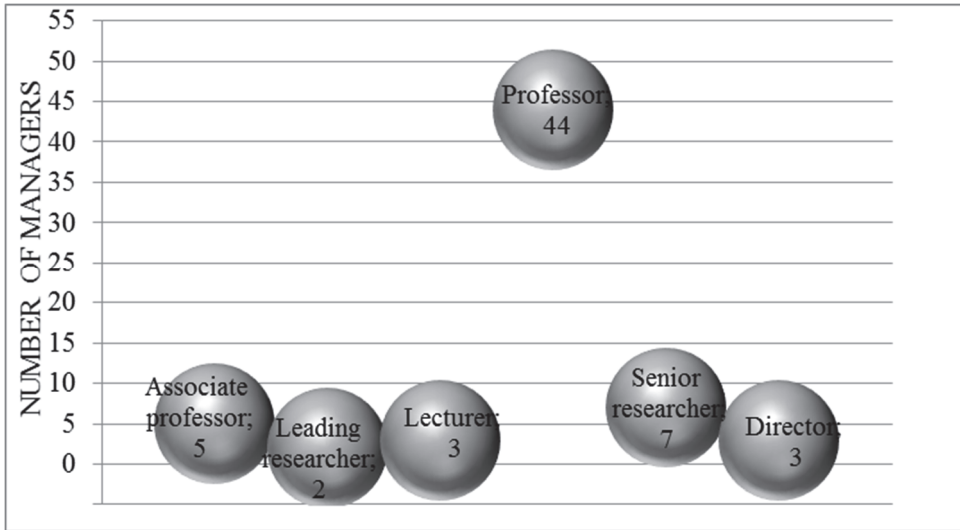


Figure 65. Managers of academic structural units by position and academic managers by age group

Source: (Compiled by the author; source: NAV)

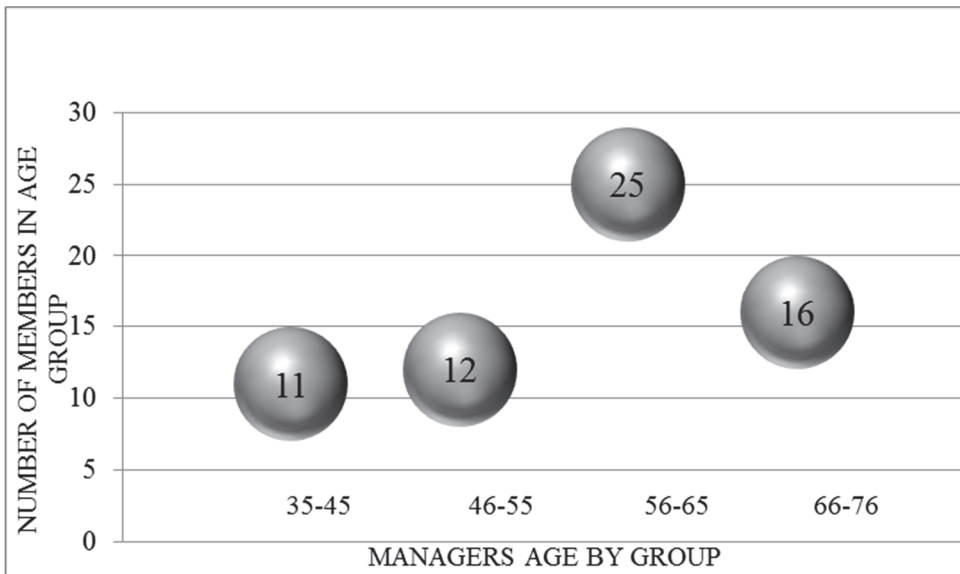


Figure 66. Academic managers incl. library by age group

Source: (Compiled by the author; source: NAV)

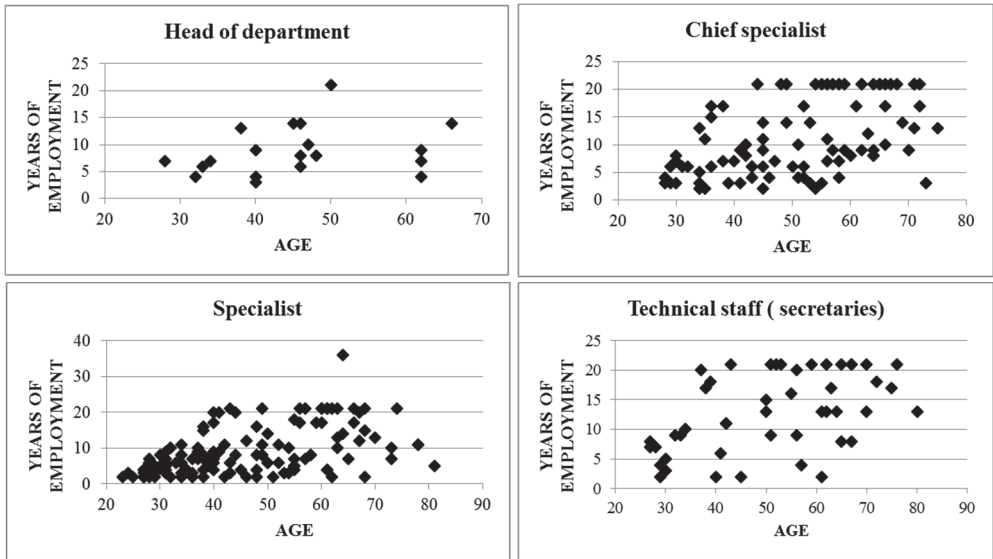


Figure 67. Non-academic staff of TUT by age and years of employment  
Source: (Compiled by the author; source: NAV)

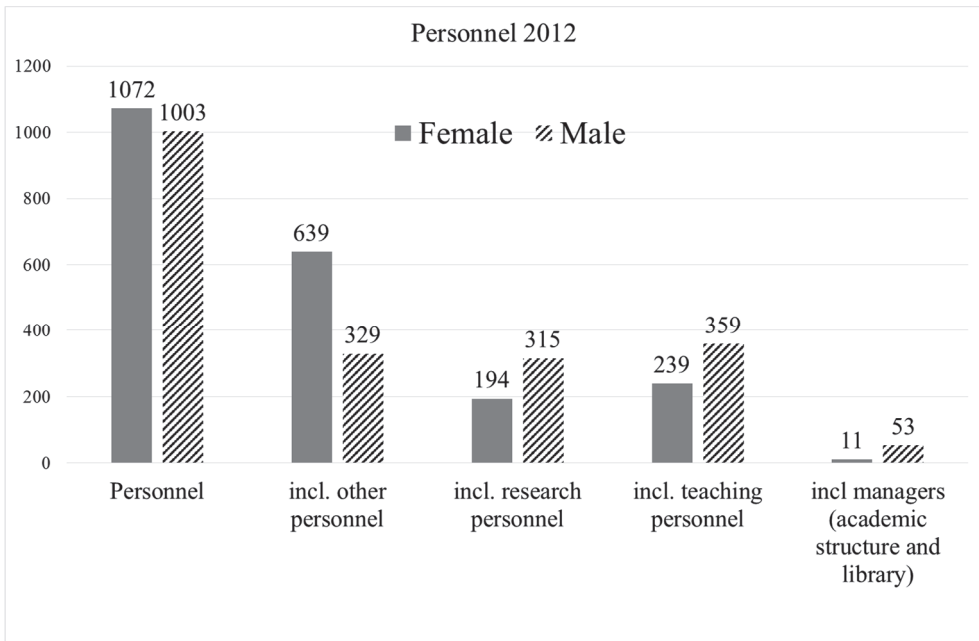


Figure 68. Personnel of TUT (masculinity and femininity)  
Source: (Compiled by the author, data of Personnel Office of TUT)

Table 21. Proportion of central services for institutions

Institution	services, %														Average
	Public Procurement Office	Office of Economics and Finance	Facilities Management Services	Education Technology Centre of Tallinn University of Technology	Open University	Innovation and Business Centre	International Relations Office	Research Administration Office	Document Management Office	Information Technology Services	Marketing and Communications Office	Construction Management Services	Legal Office	Office of Academic Affairs	
Institute of Geology	100%	5%	75%	1%	2%	100%	0%	50%	0%	77%	75%	100%	100%	100%	56%
Institute of Cybernetics	15%	5%	0%	0%	0%	100%	0%	50%	0%	33%	75%	60%	100%	100%	38%
Marine Systems Institute	100%	100%	50%	1%	0%	100%	0%	50%	20%	100%	75%	0%	100%	100%	57%
Technomedicum of TUT	100%	100%	100%	4%	1%	100%	0%	50%	10%	66%	50%	100%	100%	100%	63%
Kuressaare College of TUT	100%	100%	0%	7%	20%	100%	15%	100%	0%	55%	75%	40%	100%	95%	58%
Tallinn College of TUT	100%	100%	0%	7%	28%	100%	20%	1%	0%	44%	75%	100%	100%	95%	55%
Tartu College of TUT	100%	100%	0%	7%	12%	100%	20%	100%	0%	44%	75%	40%	100%	95%	57%
Virumaa College of TUT	30%	100%	0%	6%	36%	100%	15%	100%	0%	55%	75%	40%	100%	95%	54%
Certification Centre of TUT	100%	100%	100%	0%	0%	100%	0%	0%	90%	77%	0%	100%	100%	0%	55%
<b>Average</b>	<b>83%</b>	<b>79%</b>	<b>36%</b>	<b>4%</b>	<b>11%</b>	<b>100%</b>	<b>8%</b>	<b>56%</b>	<b>13%</b>	<b>61%</b>	<b>64%</b>	<b>64%</b>	<b>100%</b>	<b>87%</b>	<b>55%</b>

Source: (Compiled by the author; source: evaluation by managers<sup>42</sup> of non-academic structural units)

<sup>42</sup> The share of services provided has been assessed on a 100% scale. 100% is evaluated by managers of administrative and support units (ASU), it means that all administrative and support services for colleges and institutions are provided by ASU and colleges and institutions do not have a specialist in the named field.

**APPENDIX IX INDIRECT COSTS RATES ESTABLISHED AT  
THE STATE OR AN ORGANISATION**

Financing	Rules are set up by the state or a programme	Rules are set up by the university
Grants for research from state budget	MER reimburses the expenses of the infrastructure of research and development institutions, usually <i>ca</i> 28%	no
ERC	20%	no
Contracts with business and public entities, consultancy	Different agreements, contractual indirect costs do not cover real indirect cost	The amount determined for the faculty by the rector (based on the past three years business contracts, approx. 7%) and the amount determined for the structural unit of faculty by the dean (up to 10%)
EIN	Indirect costs are eligible if they are named in the regulation, are based on real costs and are calculated based on the regulation <sup>43</sup>	no
EE		
Archimedes		
7 FP	Rules of the programme, flat rate 40% or full cost based on approved methodology	no
Horizon 2020	Rules of the programme, flat rate 25%	no
Self-paid education	no	30%
Activity support from the state budget	no	Part of activity support agreed in the process of budgeting
Base-line funding	no	Part of base-line funding agreed in the process of budgeting
Continuing education	no	The amount determined for the faculty by the rector (based on the past three years continuing education, approx. 7%) and the amount determined for the structural unit of faculty by the dean (up to 10%)

Source: (Compiled by the author)

<sup>43</sup> Conditions and Procedure for Determining the Eligibility or non-eligibility of Structural Support Expenses for Aid in the Period 2007–2013.



**APPENDIX X RECOMMENDED WORK PERFORMANCE BY  
ACADEMIC STAFF**

Recommended work performance by activities, %					Reallocation to teaching and research, %		
Recommended work performance by activities	teaching	research	other	total	teaching	research	total
Professor	25	50	25	100	33	67	100
Associate professor	40	45	15	100	47	53	100
Lecturer (involved in research)	70	20	10	100	78	22	100
Lecturer (not involved in research)	90	0	10	100	100	0	100
Assistant (involved in research)	70	20	10	100	78	22	100
Assistant (not involved in research)	90	0	10	100	100	0	100
Teacher	90	0	10	100	100	0	100
Leading researcher (involved in teaching)	10	75	15	100	12	88	100
Leading researcher (not involved in teaching)	0	85	15	100	0	100	100
Senior Researcher (involved in teaching)	10	80	10	100	11	89	100
Senior researcher (not involved in teaching)	0	90	10	100	0	100	100
Researcher (involved in teaching)	10	80	10	100	11	89	100
Researcher (not involved in teaching)	0	90	10	100	0	100	100
Junior researcher (involved in teaching)	10	80	10	100	11	89	100
Junior researcher (not involved in teaching)	0	90	10	100	0	100	100

Source: (Compiled by the author)

## APPENDIX XI BARRIERS, DIFFICULTIES, SUCCESS AND FAILURE OF ABC IMPLEMENTATION

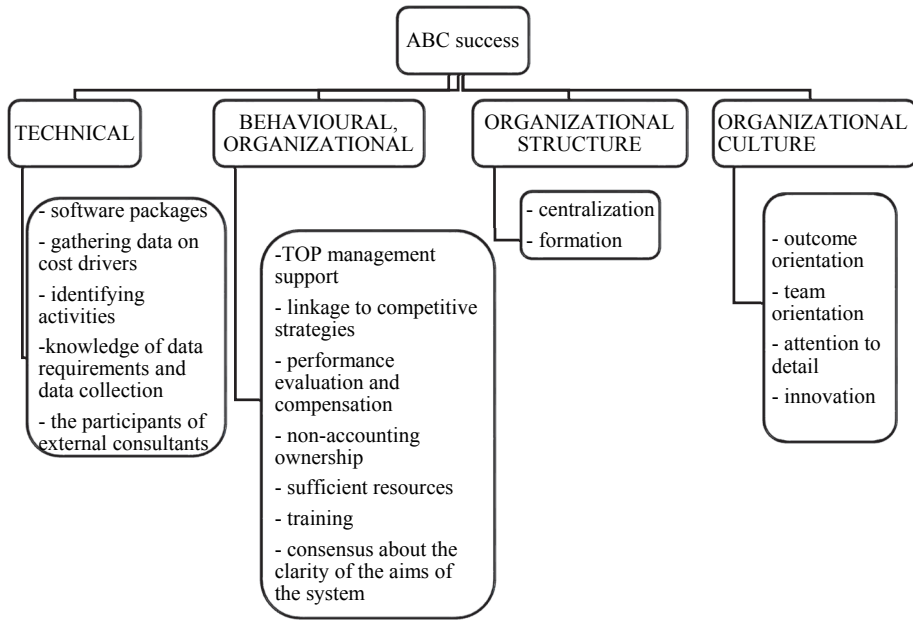


Figure 69. Conception of ABC success  
Source: (Fei & Isa 2010)

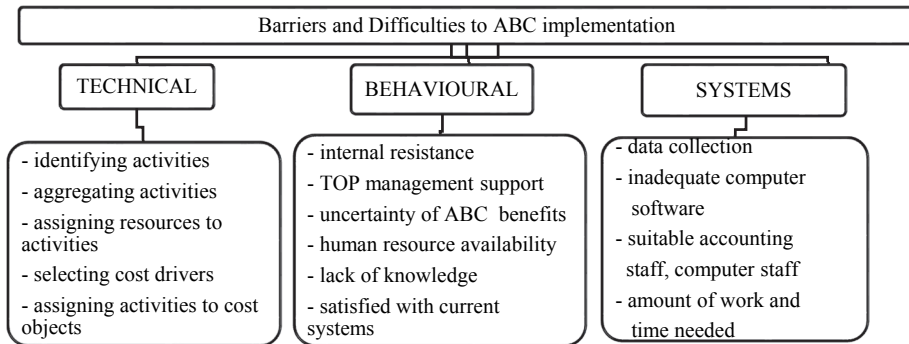


Figure 70. Barriers and difficulties of ABC implementation  
Source: (Fawzi 2008)

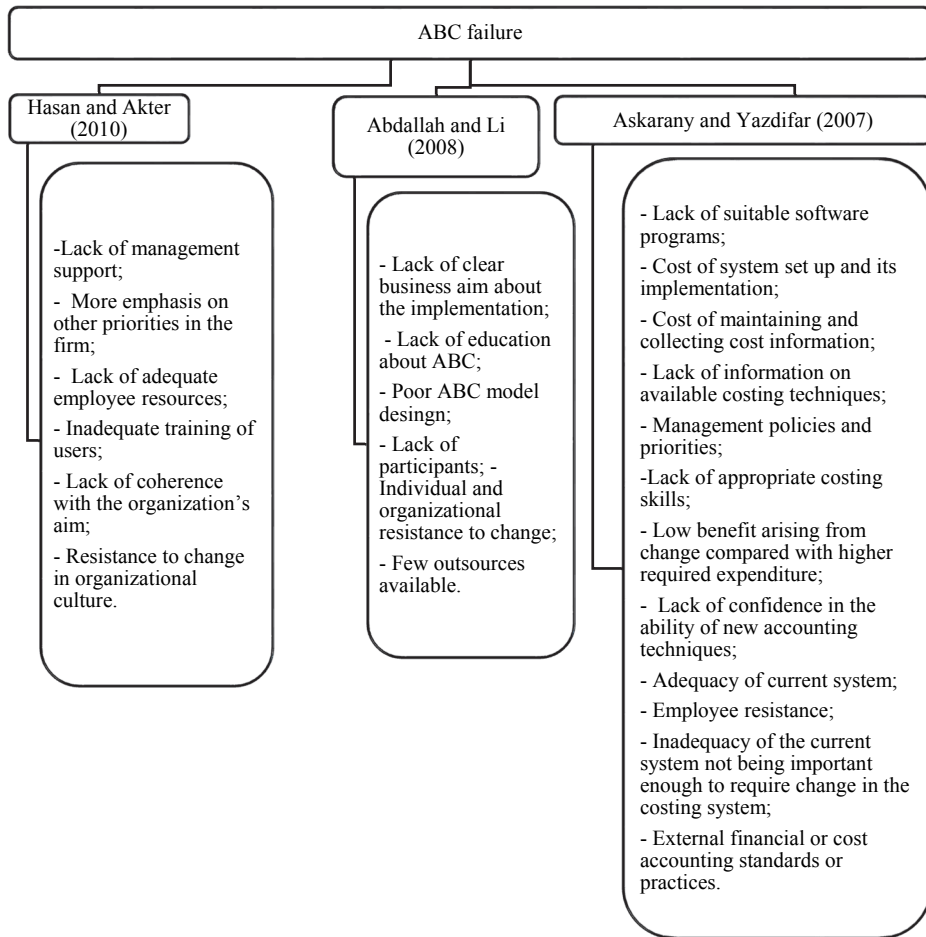


Figure 71. Conception of ABC failure

Source: (Abdallah & Li, 2008; Askarany & Yazdifar, 2007; Hasan & Akter, 2010)

## ELULOOKIRJELDUS

### 1. Isikuandmed

Katrin Toompuu  
26.07.1970, Tallinn  
Eesti  
[katrin.toompuu@ttu.ee](mailto:katrin.toompuu@ttu.ee)

### 2. Hariduskäik

Õppeasutus (nimetus lõpetamise ajal)	Lõpetamise aeg	Haridus (eriala/kraad)
Tallinna Tehnikaülikool	2007- 2015	Doktoriõppe üliõpilane
Tallinna Tehnikaülikool	2002	Ärikorraldus/ magistrikraad
Tallinna Tehnikaülikool	1994	Ühiskondliku toitlustamise tehnoloogia/bakalaureuse kraad
Tallinna 32. keskkool	1988	Keskharidus

### 3. Keelteoskus (alg-, kesk- või kõrgtase)

Keel	Tase
Eesti keel	emakeel
Inglise keel	kesktase
Vene keel	algtase

### 4. Teenistuskäik

Töötamise aeg	Tööandja nimetus	Ametikoht
01.01.2015- ....	TTÜ	Finantsdirektori kt
01.09.2014- ...	TTÜ	Nõukogu liige
11.01.2002-31.12.2014	TTÜ	Eelarve talituse juhataja, peaökonomist
1.12.2000-10.01.2002	TTÜ	Peaökonomist

1.11.1996-30.11.2000	TTÜ	Raamatupidamise ja eelarve osakond, juhataja asetäitja
01.01.1995-31.10.1996	TTÜ	Spetsialist
05.01.1989-31.12.1994	TTÜ	Sekretär

5. Teadustegevus, sh tunnustused ja juhendatud lõputööd

1. Konverents “Contemporary issues in business, management and education” (2013), Leedu, osaleja (ettekanne).
2. Projekt “Kõrgkooli koostöö ja innovatsiooni alameetme “Kõrgkooli innovatsioon” projektis “Ülikoolide täiskulu arvestuse I etapp “ülikooli kaudkulud ja nende määramise alused”” (2011–2014), sisuline täitjana.
3. Konverents “Business and Management” (2010), Leedu, osaleja (ettekanne).
4. Konverents “Business and Managemen” (2008), Leedu, osaleja (ettekanne).

## CURRICULUM VITAE

### 1. Personal data

Katrin Toompuu  
 26.07.1970, Tallinn  
[katrin.toompuu@ttu.ee](mailto:katrin.toompuu@ttu.ee)

### 2. Education

Educational institution	Graduation year	Education (field of study/degree)
Tallinn University of Technology	2007-2015	Business Administration; PhD Student
Tallinn University of Technology	2002	Business Administration, master degree
Tallinn University of Technology	1994	Food technology, bachelor degree
Tallinn Secondary School no. 32	1988	Secondary education

### 3. Language competence/skills (fluent, average, basic skills)

Language	Level
Estonian	mother tongue
English	average
Russian	basic

### 4. Professional employment

Period	Organisation	Position
01.01.2015- ....	TUT	Acting Director for Finance
01.09.2014- ...	TUT	Council member
11.01.2002-31.12.2014	TUT	Head of budget office
1.12.2000-10.01.2002	TUT	Chief financial officer

1.11.1996-30.11.2000	TUT	Office of Economics and Finance, deputy head
01.01.1995-31.10.1996	TUT	Specialist
05.01.1989-31.12.1994	TUT	Secretary

5. Research activities, including honours and theses supervised

1. Conference “Contemporary issues in business, management and education” (2013); Lithuania, the participant (article presented).
2. Project “The first stage of the full costing project of universities “Indirect Costs of Universities and the Principles of Assigning Them”” (2011–2014), executor of project.
3. Conference “Business and Management” (2010), Lithuania, the participant (article presented).
4. Conference “Business and Management” (2008), Lithuania, the participant (article presented).

## **DEFENDED THESES**

### **Master's degree:**

Katrin Toompuu. Eelarvestamise majanduslikud küsimused (Tallinna Tehnikaülikooli näitel). Supervisor professor Ants Kukrus. Tallinn University of Technology, 2002.

### **Bachelor's degree:**

Katrin Kala. Laktoosi intolerantsus. Supervisor professor Raivo Vokk. Tallinn University of Technology, 1994.



**DISSERTATIONS OF TALLINN UNIVERSITY OF  
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