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QUALITY ASSURANCE AND MEASUREMENT IN HIGHER EDUCATION: A COMPARATIVE ANALYSIS

Dissertation thesis

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Prohlášení

Prohlašuji, že jsem disertační práci s názvem Quality Assurance and Measurement in Higher Education: a Comparative Analysis vypracoval samostatně, pouze na základě uvedených pramenů a literatury.

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List of abbreviations

AACSB	The Association to Advance Collegiate Schools of Business
AACR	Accreditation Commission of the Czech Republic
ARWU	Academic Ranking of World Universities (Shanghai Ranking)
CHEA	Council for Higher Education Accreditation (USA)
CI	Composite Indicators
CIDI	Composite I-distance indicator
CWCU	Center for World-Class Universities
FTE	Full-time equivalent
GDP	Gross domestic product
HDI	Human Development Index
HESS	QS Higher Education System Strength Rankings
NAB	National Accreditation Bureau for Higher Education
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
QAA	Quality Assurance Agency for Higher Education (UK)
QCA	Qualitative comparative analysis
csQCA	Crisp set Qualitative comparative analysis
fsQCA	Fuzzy set Qualitative comparative analysis
mvQCA	Multi-value Qualitative comparative analysis
QS	Quacqarelli-Symmonds
QSWUR	Quacqarelli-Symmonds World University Rankings
SACS	Southern Association of Colleges and Schools (USA)
THE	Times Higher Education
THEWUR	Times Higher Education World University Rankings
U21	Universitas 21 Ranking
USDE	U.S. Department of Education
V4	Visegrad Four
WASC	Western Association of Schools and Colleges (USA)
NIAD-UE	National Institution for Academic Degrees and University Evaluation

Introduction

There were different driving forces behind the introduction of formal quality assurance schemes in different world regions and countries. In Western Europe, the main driving force was certainly higher education massification accompanied by the increased role of government in higher education. Until the 1970s, quality in higher education was supervised via administrative channels such as the legal requirements for the establishment of institutions and study programmes (and funds provided by government to fulfil the requirements), formalized and centralized rules for academic staff appointment as well as for student admission. In the 1970s and 1980s, quality assurance as a special tool in university governance and public policy was discovered. The Netherlands, the United Kingdom, and France were the 'pioneer countries' in Western Europe, which introduced the first formal quality assurance policies in the mid-1980s (Schwarz and Westerheijden 2007b).

In the Central and Eastern Europe during the communist regime, quality assurance was not an issue. The quality of higher education was just declared and taken for granted (Šebková 2007; Kohoutek 2009). After the fall of communism in the 1990s, formal quality assurance schemes were introduced as a response to the increased demand for higher education and the entrance of new private higher education providers into the sector (Šebková 2007; Schwarz and Westerheijden 2007b). The state-controlled accreditation schemes were implemented in the region in order to redefine the minimum levels of quality. The aim was to keep 'rogue providers' out of higher education (Van der Wende and Westerheijden 2003; Schwarz and Westerheijden 2007b).

Contrary to Europe, where the quality assurance schemes were introduced by government initiatives driven mainly by the accountability rationale, in the United States, accreditation was originally introduced in order to protect institutions from public authorities, in order to keep the government out of higher education (Weissburg 2008; Stensaker 2011). Higher education institutions started to form voluntary membership associations in the 1880s – the very first one was the New England Association of Colleges and Secondary Schools, which was created in 1885 (Weissburg 2008). Therefore, the United States can be regarded as the founding fathers of accreditation in higher education (Kohoutek 2009).

To explain the terminology used, the term quality assurance is quite broad and quality assurance schemes may use various tools (Schwarz and Westerheijden 2007b). At the beginning of the new millennium, accreditation became the most dominant form of quality assurance in Europe

(Stensaker and Harvey 2006). In the United States, it has always been the case. Accreditation-like processes have also been recently predominant in non-European OECD countries.

Schwarz and Westerheijden (2007b, p. 2) define accreditation schemes as: "all institutionalized and systematically implemented evaluation schemes of higher education institutions, degree types and programmes that end in a formal summary judgement that leads to formal processes regarding the respective institution or degree type and/or, programme." The main difference between accreditation and evaluation schemes is that the "evaluation activities do not directly or indirectly lead to the approval processes regarding the respective institution or degree type and programme" (Schwarz and Westerheijden 2007b, p. 3). Schindler et al. (2015) point out that the terms quality assurance and accreditation are, in some instances, used interchangeably.

Quality assurance is not the only role of the quality assurance (accreditation) systems. There are also other roles performed by the respective quality assurance bodies (accreditors). They need to ensure that the public money invested in higher education is spent properly as government financial support is usually directly or indirectly linked to accreditation status of the particular institution or programme. They also provide valuable information for other relevant stakeholders, i.e. employers in the labour market, and also for prospective students (or their parents), who can be regarded as investors in human capital through higher education. According to Langfeldt et al. (2010), the overall aim of the quality assurance activities should be the guaranteed enhancement of the quality of the education and of the national higher education system as such.

The issue of quality assurance in higher education has been widely discussed and analysed. There have been many studies dealing with quality assurance policy and practice in a specific country[1] (e.g. Troutt 1979; Yonezawa 2002; Vidovich 2002; Hodson and Thomas 2003; Vidal 2003; Wergin 2005; Hoecht 2006; Bornmann et al. 2006; King et al. 2007; Serrano-Velarde 2008; Brittingham 2009; Kehm 2010; Stensaker et al. 2011; Shah et al. 2011; Vilgats and Heidmets 2011; Edwards 2012; Kettunen 2012; Brown 2013; Espinoza and Gonzáles 2013; Weinrib and Jones 2014; Ramírez 2015) as well as in multiple countries or specific regions[2]

[1] Most of the studies are further used and interpreted in Chapter 5 in the main empirical part of my thesis. The studies allowed me to examine and interpret the quality assurance schemes in the respective countries. Therefore, I was able to divide the countries into the groups accordingly, which was crucial for the research method used in my thesis.

[2] Again, some studies allowed me to examine and interpret the quality assurance schemes in the respective countries (e.g. Alderman 2005, Foss Hansen 2009, or Kirkwood and Cameron 2013) and are further used and interpreted in Chapter 5. Some studies were further used in Chapter 6, where the Czech and US accreditation systems are analysed and compared (Rhoades and Sporn 2002, Stensakaer 2011, Kohoutek 2014). Several studies dealt with quality assurance in the EU context and the Bologna process (Westerheijden 2001, Rozsnyai 2003, Haug 2003, Horga 2009), which helped me to comprehend the matter in a broader context.

(e.g. Westerheijden 2001; Rhoades and Sporn 2002; Rozsnyai 2003; Haug 2003; Alderman 2005; Perellon 2005; Foss Hansen 2009; Horga 2009; Mertova and Webster 2009; Stensaker 2011; Kirkwood and Cameron 2013; El Hassan 2013; Kohoutek 2014; Hou et al. 2015). There have been also conceptual studies related to the issue of quality assurance (Jeliazkova and Westerheijden 2002; Perellon 2010; Westerheijden et al. 2014; Elassy 2015). The book by Schwarz and Westerheijden (2007a) describes the accreditation and evaluation schemes used in twenty European countries. Some studies try to analyse the impact of accreditation on the institutional level, e.g. Stensaker et al. (2011) studied the impact of the Norwegian quality assurance agency on the individual schools, or Womac (2015) who tried to analyse the impact of AACSB[3] accreditation on the student enrolment. Nonetheless, no research study has empirically analysed the impacts of quality assurance systems on performance on a macro (national) level as pointed out by Westerheijden[4] (2010).

Hence, my research interest was to identify whether and how the national quality assurance systems affect the quality of the higher education sector. In my thesis, I will empirically analyse the impact of national quality assurance (accreditation) schemes on quality of the higher education sector. The method of Qualitative comparative analysis (QCA), which was introduced and further developed by Ragin (1987, 2000, 2006, 2008), will be used for this purpose.

To be more specific, the QCA method will be used in order to assess the impact of national quality assurance (accreditation) schemes and also other relevant features (explained in the following text) of the higher education systems of 20 OECD countries on the quality of the higher education sector measured by a world ranking of national higher education systems.

The analysis results will be used for the formulation of relevant policy recommendations, which should be introduced to increase the quality of higher education in the Czech Republic.

Each national accreditation system is somehow unique and has its specifics. However, while analysing the accreditation systems, I identified two main patterns with regard to the general accreditation approach. The first one can be called *improvement-oriented* as there is an emphasis on quality improvement, process of teaching and learning, and self-regulation through the internal quality assurance mechanism. The second one can be called *input-oriented* as it is primarily focused on inputs, e.g. academic staff ranks and their publications, programme

[3] The Association to Advance Collegiate Schools of Business (AACSB) is an American professional organization providing accreditation to business schools.
[4] Professor Westerheijden is a leading scholar in the field of quality assurance and accreditation.

curriculum features, individual course description or library resources. Westerheijden (2001) regards systems of programme accreditation focusing on standards for inputs (academic staff, curriculum plans, facilities) as a 'first generation accreditation' system, which was implemented in the mid-90s in Central and Eastern European Countries. It was caused by the situation in the region as a redefinition of the minimum quality levels after the fall of communism was needed (Van der Wende and Westerheijden 2003). In some countries included in the study, though, the accreditation approach remains unchanged till the end of the period observed. The input-oriented systems have been criticized for neglecting the actual process of learning and the learning outcomes. In my dissertation thesis, the actual impact of those two main accreditation approaches will be analysed empirically.

The accreditation systems can also be divided into two groups according to the possibility of competition between the accreditors, i.e. whether the higher education institutions in the system are free to choose the accreditation agency. According to Blackmour (2010), a greater number of agencies exercising the regulatory activity in higher education leads to a greater risk of suboptimal outcome and contradictory regulation. The factor of competition will be examined as well.

As suggested above, one of the roles of accreditation should be providing a signal to the employers in the labour market that the university graduate possesses the relevant knowledge, skills and competencies. The accreditation schemes may also be distinguished, considering the involvement of labour market representatives in the accreditation process. It can be expected that the presence of labour market representatives should help to fulfil the signalling role of accreditation, which should be reflected by a higher quality of higher education institutions and their graduates. The real impact of this factor on quality is also a subject of my analysis.

The study is not limited to the influence of the accreditation-related factors only. There are two additional features of national higher education systems included in my study. The reasons are explained in the following paragraphs.

The issue of cost sharing in higher education has been frequently discussed around the world for decades. The limitation of equal access to education is generally the crucial argument expressed against tuition fees charged to students enrolled in public schools. On the contrary, the potential increase of funds in higher education, stronger incentives for students to complete their studies and also to demand higher quality are usually the main arguments voiced in favour of tuition fees in higher education, including the public sector. While there have been many studies dealing with human capital investments through higher education, starting with Becker

(1964), up to the present, as well as many studies analyzing the impact of tuition fees on higher education enrollment, summarized by Leslie and Brinkman (1987) or Hübner (2012), there are only few academic studies measuring the impact of tuition fees on the actual quality of higher education. A study of the U.S. Department of Education (1990) indicates positive correlations between price and institutional quality. However, it does not say explicitly that higher quality is caused by a higher level of tuition fees charged, as the conclusion is rather that higher prices do reflect higher quality. Kemnitz (2010) shows that the introduction of tuition fees can lead to quality improvement depending on the level of (de)centralization. Barr (2004) points out that the introduction of tuition fees in Australia and the UK did not lead to extra funds in the system as originally intended. Again, it does not say, though, anything about the impact on quality as such. Therefore, in order to reduce the lack of empirical evidence, I include in the study a factor of tuition fees and their possible impact on quality.

Finally, I include a distinction between English speaking and non-English speaking countries to analyze the influence of this factor as it has been often argued that university rankings tend to favour universities from English-speaking countries (Marginson 2007; Li et al. 2011; Huang 2012; Dobrota et al. 2016).

Based on the factors mentioned above, the following hypotheses have been formulated and will be tested in the empirical part of the thesis.

Hypothesis 1: The improvement-oriented accreditation approach leads to higher quality

I expect that the accreditation scheme with the main emphasis on quality improvement (process of teaching and learning, self-regulation through internal quality assurance mechanisms) has a positive impact on the quality of education, as opposed to the input-oriented scheme, which neglects the process of learning and the aspect of student learning outcomes.

Hypothesis 2: Competition between accreditation agencies leads to higher quality.

Contrary to the position suggested in the prior text (Blackmour 2010), I expect that competition stimulates an increase in quality as it is the case in all sectors, where competition is possible.

Hypothesis 3: Involvement of labour market representatives in the accreditation process leads to higher quality.

I expect that the presence of labour market representatives in the accreditation process should have a positive impact on quality as they should make sure that the curriculum is composed in a way which reflects the current needs of the labour market. Therefore, it should have a positive impact, especially on the skills and competencies of the graduates, which lead to their higher employability and better prospects in the labour market.

Hypothesis 4: Charging tuition fees leads to higher quality.

I expect that the stronger incentives for students to complete their studies and to demand higher quality as well as a certain regulation of the real interest of the prospective students to seek a university degree are the crucial aspects stimulating the quality of higher education.

The hypotheses verification (based on the conducted analysis) should help me to formulate relevant policy recommendations. Therefore, the main goal of my thesis is to provide the policy recommendations, which should be introduced to increase the quality of higher education in the Czech Republic.

The local accreditation system was intensively discussed and criticized among the academic community and university representatives for many years. There was a programme accreditation scheme used as a main tool for quality assurance in the Czech higher education, which means that any institution of higher education was required to have each programme or field of study accredited separately. Kohoutek (2014) proposed replacing the programme accreditation scheme by a quality audit. Major changes, e.g. the concept of institutional accreditation, were implemented formally by the Higher Education Act amendment as of September 1, 2016. In 2017 the newly established accreditation agency dealt with the new accreditation methodology and guidelines, and also with pending issues from the former period related to individual programmes of study. The actual full implementation of policy changes started in 2018. The additional goal of my thesis is to analyse the local Czech accreditation system (both the previous and current) in comparison with the system used in the USA. The U.S. accreditation model was chosen for comparison because the United States can be certainly regarded as the founding fathers of accreditation in higher education having had a century-long tradition of institutional accreditation (Ewell 2010; Weissburg 2008; Kohoutek 2009). Moreover, some scholars such as Stensaker (2011) admits that the leading position of US universities and the system of accreditation might be related. Also, I would like to supplement the broader comparative analysis of the accreditation system of 20 OECD countries (and its

influence on the quality on a national level) with two more detailed case studies. I have a first-hand experience with both systems, i.e. the Czech and the U.S. accreditation system[5]. Hence, I can look more into the actual praxis of the accreditation systems.

The accountability role of accreditation (i.e. monitoring academic quality and monitoring that government money is invested in quality higher education) is not the only one. Accreditation also serves as consumer protection, correcting the information asymmetry (Blackmur 2010; Dill 2010). It provides information to prospective students (or their parents), who can be regarded as investors in human capital through higher education. Williamson (1985) points out that the issue of consumer protection may draw the attention of the government to the performance of the higher education sector. Dill (2010) adds that the relevant information on academic quality is important not only for consumer protection purposes, but also for the effectiveness of producers. Therefore, the emergence of organizational (university) rankings can be perceived as a reaction of commercial organizations to the inadequacy of existing information on the quality of higher education. Stensaker and Harvey (2006) regard the emerging rankings as a new competitor or even as a threat to government quality assurance schemes. On the contrary, Westerheijden et al. (2010) see rankings as an addition to the higher education policy tool box, which does not necessarily need to replace the previously existing instruments.

In my thesis, the world university rankings will be used as a tool for the comparison of the academic performance of Czech universities with their fellow universities of the Visegrad region. The nations share many historical similarities, which affected the educational development significantly. Therefore, it is certainly not irrelevant to make an up-to-date comparison of the V4 higher education institutions and the whole higher education systems as such. Taylor and Braddock (2007) briefly compare rankings of Australian and Japanese universities in ARWU and THE-QS ranking finding contradictory results depending on the respective ranking. Soh and Ho (2014) provide a detailed comparison of two former British colonies Hong Kong and Singapore regarding their performance in the established university rankings concluding that universities in the two cities are on par. As briefly suggested above, the last goal of my thesis is to compare the standing of V4 countries in the world university rankings.

[5] I have been a staff member (of the office dealing with accreditation agenda) of the Anglo-American university, which went through successfully the accreditation process with WASC Senior College and University Commission (recognized by the Council for Higher Education Accreditation and by the U.S. Department of Education)

It needs to be mentioned and emphasized that quality measurement is a very subjective and controversial issue. One certainly needs to bear this in mind, when any attempt to measure quality is made. The limitations of university rankings are mentioned and discussed in Chapters 2 and 3. The issues related to the concept of quality (the subjectivity of perception) are also mentioned in Chapter 1.

To summarize the goals of my dissertation thesis:

The primary goal

- to provide policy recommendations, which should be introduced to increase the quality of higher education in the Czech Republic. The recommendations will be based on the analysis of the impact of national accreditation schemes (the main accreditation approach, the involvement of labour market representatives, the possibility of competition between accreditation agencies) and other relevant features (tuition fees, national language) on the quality of the higher education sector.

Secondary goals

- to compare the Czech accreditation system (both the previous and current) with the accreditation system used in the USA.
- to compare the standing of the Visegrad Four countries in the world university rankings.

The thesis is structured as follows: Chapter 1 deals with the theoretical framework regarding the definition of quality in higher education. The leading concepts of defining and classifying quality are provided.

Chapter 2 focuses on the phenomena of the world university rankings. Scholarly discourse on rankings is summarised and the methodology of the most prominent world university ranking is outlined and discussed. The respective methodology shows implicitly how the quality in higher education is perceived and defined by the respective ranking providers.

Chapter 3 deals with the issue of composite indicators, as the world university rankings (at least the most established ones) use a composite indicator to assess the performance of universities and whole national higher education systems, thus share the same general similarities, characteristics, advantages, and limitations.

Chapter 4 deals with the Qualitative comparative analysis (QCA) method. The origins and development, advantages and critique, applications, and the actual technique of the method are presented.

In Chapter 5, the impact of national accreditation schemes and other relevant features (tuition fees, national language) of the higher education systems of 20 OECD countries on quality of the higher education sector is analysed and measured. The Qualitative comparative analysis (QCA) method is used.

In Chapter 6, the local Czech accreditation system is analysed and discussed. The analysis is supported by empirical evidence. A comparison with the system used by the accreditation founding fathers, i.e. the United States is provided. The role and value of accreditation is outlined in a broader context. Economic policy perspectives related to the accreditation process, such as unemployment, economic regulation, the principal-agent problem, Gresham's law, information asymmetry, human capital and signalling theory are also discussed in this chapter.

In Chapter 7, the performance of the Visegrad Four countries in the recent editions of the most established individual university rankings as well as in the rankings of national higher education systems is empirically analysed and compared. Relevant socioeconomic factors, which influence a country's performance in university rankings, are also considered and discussed.

Finally, the thesis conclusion and policy recommendations are provided.

1. Defining quality in higher education (theoretical framework)

The issue of defining quality in higher education has been discussed for more than three decades starting with Ball (1985) asking "what the hell is quality?". It seems that his provocative question has not been answered unequivocally, no consensus on a single definition has been reached so far (Schindler et al. 2015). There have been, however, several concepts defining and classifying quality in higher education, which certainly influenced and shaped the scholarly discourse.

The widely accepted and very frequently cited concept of quality is certainly the one developed by Harvey and Green (1993). The authors conceptualized quality into five distinct, but interconnected, categories as follows: quality as transformative, quality as value for money, quality as perfection (or consistency), quality as fitness for purpose, and quality as exceptional. They stressed that quality means different things to different people as well as that quality is relative to 'processes' or 'outcomes'. *Quality as Exceptional* considers the quality of something special as axiomatic. The exceptional notion of this quality consists of three sub-concepts: The traditional notion of quality, excellence I (exceeding high standards), and the weaker notion of exceptional quality (checking standards). The traditional notion does not actually try to define quality or set any benchmarks. It sees quality as something special, high class or exclusive. Universities simply embody quality, therefore no demonstration is needed. It is an elitist perception of quality, an Oxbridge education serving as an example. This traditional concept is not considered very useful for quality assessment in higher education due to the lack of definable benchmarks. Excellence I is based on excelling in inputs well as output. The learning process and quality of teaching are not relevant. The reputation and resources of the institution are the crucial determinants of excellence in this sense. Again, Oxbridge is given as a perfect example. The third notion of quality as exceptional (checking standards) see quality as the result of quality checks – compliance with standards against which performance is measured. Unlike the first one, the second and third notion of quality as exceptional do have a practical usage in the case of higher education as it provides standards (high or minimum) that can be measurable and quantifiable. *Quality as Perfection (or Consistency)* is encapsulated into two interconnected sub-concepts: Zero defects (excellence II) and getting things right first time. The former approach shifts the attention from inputs and outputs to processes. It is tightly connected with the notion of a quality culture, i.e. everybody in the organization is responsible for quality (not just quality controllers). The later approach is concerned with checking outputs – quality control. The *Quality as Fitness for Purpose* approach sees quality with regard to the extent to

which the service or product fits its purpose. It doesn't see quality as something unique, elitist, exclusive, or something hard to achieve. It is an inclusive approach as every service or product is potentially able to fulfil its purpose. Again, this concept breaks down into two sub-concepts: Customer specification and provider specification (mission). The former approach defines quality according to the degree to which a certain product is able to satisfy the particular customer's needs. The question of a customer in the higher education sector is not simple, though. Is it a student, an employer (large and small corporations), central or municipal government? This definition unfortunately does not provide an answer to the important question – what is the right way of education quality assessment as well as the question of who is the defining authority. The second sub-concept returns the emphasis to the institution, i.e. higher education institution meets its own stated objectives (or mission); that's how quality is defined. It is related to the American-style higher education system, where each institution should find its market niche. The fitness-for-purpose definitions struggle with a clear definition of the purposes of higher education, i.e. various stakeholders may view the purposes of higher education differently. *Quality as Value for Money* is considered by authors as a populist notion of quality. The perception of accountability is crucial for this approach to the quality of education to be effective, i.e. the accountability of providers of the public services to the taxpayers (funding providers) is assumed and expected. Quality is measured by performance indicators such as staff-student ratios, revenue and capital resources indexes, or public/private funds ratios. The *Quality as Transformation* approach does not see "education as service for a customer but an ongoing process of transformation of the participant, student or researcher" (Harvey and Green 1993, p. 24). There are two perceptions of transformative quality in higher education. The former is linked to customer enhancement and the latter can be defined as customer empowerment. The aspect of enhancement is linked to the value-added notions of quality. An example given is a small school located in a problematic district, which can have a huge impact in terms of the value added, unlike Oxbridge, who have always enrolled outstanding high school graduates. The aspect of empowerment is linked to participant empowerment, e.g. shaping the critical thinking skills of students. The empowerment should be at the centre of quality culture in education (Harvey and Green 1993).

Green (1994) added and emphasized that the competing views of all the stakeholders must be considered while conducting quality assessment and that the judgement criteria must be defined as clearly as possible.

Cheng and Tam (1997) introduced seven models of quality in education. The first model (the *goal and specification model)* identifies the quality of education as attainment and compliance to specified targets, which have been established in advance. The academic achievements of students, attendance and drop-out rates, the number of graduates continuing in tertiary education, and the staff credentials etc. can be stated as typical quality indicators. The goals and specifications must be clearly defined and accepted by all constituencies (stakeholders) involved. The second model (the *Resources-Input Model*) considers the quality as the outcome of the relevant institutional resources. Staff/student ratio, quality student intake, recruitment of qualified staff, good equipment and facilities, and amount of funds provided by various stakeholders may be listed as the education quality indicators. The main shortcoming of the model is its overemphasis given to the inputs at the expense of the educational process and the outputs delivered by the institution. The *Process Model* emphasises well-functioning internal institutional processes and learning environment. That is what makes education high quality. The quality indicators are divided into three categories as follows: teaching quality indicators (teaching methods, teaching efficiency), indicators dealing with quality of learning (e.g. data on attendance), and management quality indicators (leadership, decision making). The limitation of the model can be obstacles in terms of the monitoring process as well as the focus on the quality of the process itself instead of the quality of the output. The *Satisfaction Model* defines education quality as the satisfaction of strategic constituencies (stakeholders), i.e. academic staff, management board members, students, parents, alumni, and education department officers. This model is sometimes used instead of a model based on some objective indicators as the unbiased quality assessment and is barely without problems from a technical and conceptual point of view. The *Legitimacy Model* connects quality with the reputational legitimacy of the institution, which means the acceptance and recognition of the public or community. Thus, in this model, the indicators of quality are linked to marketing and public relations, accountability, public image, status or reputation. The *Absence of Problems Model* defines quality as the absence of problems or deficiencies. In this model, the school concentrates mainly on overcoming obstacles rather than on achieving excellent quality. The *Organizational Learning Model* sees quality as continuous development and improvement. It puts the main emphasis on the learning environment. Internal process monitoring, programme evaluation, development planning as well as analysis of the environment, or awareness of community needs, can be stated as examples of the education quality indicators within this model. The seven models described should not been seen separately but a comprehensive approach should be used by educational managers.

Bogue (1998) provided three theoretical perspectives of quality in higher education: the theory of limited supply, the theory of quality within mission, and the theory of value-added. *The Theory of Limited Supply* sees quality in limited supply – a competition of a few truly excellent institutions of higher education. Only large, expensive and demanding institutions, colleges with national reputations, or colleges with impressive resources have quality. Therefore, this approach is connected to a sort of a pyramid of prestige (rankings of college quality). *The Theory of Quality Within Mission* assumes that quality should be present in all institutions in accordance with its goals and missions. It as an alternative to a pyramidal structure of quality (order of prestige and reputation). Quality is perceived as compliance to the particular mission of the university, within the accountability and integrity standards, which are publicly accepted. Diversity with distinction is the key word related to this vision of quality. *The Theory of Value-Added* contradicts the views of education quality based on reputation and quality of resources. The quality is seen in the outcomes, so is perceived as the value added by the particular university. The most excellent institution is the one having the greatest impact on the competencies and skills of students, as well as on the research and teaching skills of academic staff members. This theory shifts a focus to what difference an institution makes.

Tam (2001, p. 47) argued that "quality is a highly contested concept and has multiple meanings depending on how higher education is conceived". She highlighted, though, the transformative aspect of quality (maximizing the student's education development) as the most important. Therefore, any attempt to measure and evaluate the quality and performance cannot omit this component.

Srikanthan and Dalrymple (2002) mentioned four models emphasising quality in higher education: the transformative model, the engagement model of programme quality, the university of learning model, and the model for a responsive university. The *Transformative Model* gives the main emphasis to the value added, as well as the enhancement and empowerment of the participant. Thus, it focuses clearly on student experience, which means a shift of focus from teaching to learning. A dialogue between provider and participant is crucial to the learning process. The *Engagement Model of Programme Quality* stresses the importance of high quality programmes enriching the learning process of students. The model highlights student learning as the fundamental goal of higher education, taking into account the crucial role of academic staff, administrators and students as the principal stakeholders. The *University of Learning Model* sees the quality of learning as essential for quality in a university context.

The *Model for a Responsive University* emphasises the quality of relationships and quality of outcomes. Universities need to be responsive and service oriented to be competitive. Based on the selected models, the authors came up with a generic model for quality management in education. The model has three core features: transformation of learners (enhancement – value added – empowerment), synergistic collaboration leading to new external partnership with community, and senior management of institutions encouraging the collegial culture.

Srikanthan and Dalrymple (2003) also presented the main four stakeholder perspectives within the framework of quality developed by Harvey and Green (1993) as follows: *Providers* (funding bodies and community). The quality is interpreted as 'value for money', as the fund providers want to have adequate outcome on their investments. *Users of Product* (e.g. current and prospective students); The quality is here interpreted as 'excellence', which guides student choices. *Users of Outputs* (e.g. employers). Here the quality is perceived as 'fitness for purpose', as employers seek capable graduates having the relevant competencies. *The Employees of the Sector* (academics and administrators). The quality is understood as 'perfection (or consistency)', as job satisfaction should be achieved through meeting the core behavioral and ethical norms. The fifth interpretation of quality 'quality as transformation', suggested by Harvey and Green (1993), is considered a sort of a meta-quality concept containing the other concepts.

Van Kemenade et al. (2008) urged for a new definition of quality. They described a quality concept with the following four constituents: object, standard, subject, and values. The authors also outlined four new values system on quality and quality management: process control, continuous improvement, commitment, and breakthrough.

Schindler et al. (2015) summarized the discourse and found four wide conceptual categories of quality: quality as purposeful, exceptional, transformative, and accountable. The respective definitions and concepts are outlined in Table 1.1 below. The authors also recalled and highlighted three main challenges related to defining quality in higher education – quality is an elusive concept and its interpretations depend on the perceptions of different stakeholders; reducing the concept of quality is problematic as quality consists of multidimensional concepts, and finally the third challenge is that quality should be considered in a larger educational, political, social and economic context as the concept of quality is not static but rather dynamic.

Table 1.1 Classifications of quality

Classifications	**Definitions**
Purposeful	Institutional products and services conform to a stated mission (vision) or a set of specifications, requirements, or standards, including those defined by accrediting or regulatory bodies (Harvey and Green 1993; Green 1994; Harvey and Knight 1996; Cheng and Tam 1997)
Exceptional	Institutional products and services achieve distinction and exclusivity through the fulfilment of high standards (Harvey and Green 1993; Green 1994; Harvey and Knight 1996; Cheng and Tam 1997; Bogue 1998)
Transformative	Institutional products and services effect positive change in student learning (affective, cognitive, and psychomotor domains) and personal and professional potential (Harvey and Green 1993; Green 1994; Harvey and Knight 1996; Cheng and Tam 1997; Bogue 1998; Srikanthan & Dalrymple 2002, 2003, 2004, 2005)
Accountable	Institutions are accountable to stakeholders for the optimal use of resources and the delivery of accurate educational products and services with zero defects (Harvey and Green 1993; Green 1994; Harvey and Knight 1996; Cheng and Tam 1997; Harvey 2005)

Source: Schindler et al. 2015

2. World university rankings

2.1 Scholarly discourse overview

The global university rankings have become very popular, since the publication of the Academic Ranking of World Universities (also known as the Shanghai Ranking) in 2003.The Academic Ranking of World Universities (ARWU) was followed closely by Quacqarelli-Symmonds World University Rankings (QSWUR), and later by the Times Higher Education World University Rankings (THEWUR). The QSWUR was originally published jointly by Quacquarelli Symonds and the Times Higher Education magazine as THE-QS World University Rankings from 2004 to 2009. In 2010, both started publishing their own ranking separately. Times Higher Education adopted a new methodology, while Quacquarelli Symonds kept using the original one. Although quite a few new university rankings have recently emerged, those three world university rankings mentioned above can be certainly regarded as the most established and influential ones (Millot 2015; Soh 2014; Soh 2015; Jajo and Harrison 2014; Dobrota et al. 2016; Hou and Jackob 2017). Methodology of ARWU, THEWUR and QSWUR (as well as the methodology of the rankings of national higher education systems) is outlined in the following sections of the chapter. The methodologies implicitly show how the quality in higher education is perceived and defined by the respective ranking providers.

University rankings have been critically examined by scholars from the very beginning up to present. Here the overview of the most significant contributions to the discourse.

Marginson (2007) points out that the world university rankings are more favourable to English speaking countries as non-English language academic work is less published and cited. He also criticizes certain individual indicators used by the prominent ranking systems. The Nobel Prize criterion is found as the most controversial as for the ARWU. The THE-QS ranking is mainly criticized for the usage of the reputational surveys, which are not transparent. The author also doesn't consider the student–staff ratio as a good indicator of the teaching quality.

Hazelkorn (2007) finds that despite the methodological and conceptual criticism, institutions of higher education take the results of LTRS (league tables and ranking systems) seriously and the results have an impact on their decision making.

Taylor and Braddock (2007) briefly compare the performance of Australian and Japanese universities in ARWU and THE-QS rankings. They find contradictory results depending on the respective ranking. They also state that rankings are fait accompli, thus we need to make sure that we use them in an informed way. They emphasized that rankings should not dictate policies

either at a national or institutional level; the rankings should be used and interpreted by the respective universities in accordance with their mission. On a national level the rankings can be useful for government, higher education policy makers and the general public.

Federkeil (2008) admits that rankings are very controversial. He points out, though, that rankings are not intended as an instrument of internal quality assurance, but they can contribute indirectly to quality assurance on a systems level as they can stimulate competition.

Huang (2011) compares the 2009 ranking results from the three ranking systems (HEEACT Ranking, THE-QS ranking, and ARWU). The comparison reveals that THE-QS ranking favoured UK universities.

Saisana et al. (2011) remind that both prominent rankings (AWRU and THE-QS) are heavily dependent on bibliometric indicators, which favour English-speaking universities as well as the universities mainly focused on hard-science. They also highlight the main shortcomings of the ARWU as follows. Only the research aspect was considered, even though the relationship between research and teaching cannot be always directly linked. Five out of six indicators (accounting for 90%) are size-dependent, while only one indicator (academic performance per capita) is normalized by size. The critique of the THE-QS ranking is focused on the use of survey-based indicators (lack of transparency in selecting the experts) and rankings fluctuation, which is caused by methodological changes over the year (e.g. change of the citation database provider). The authors conducted a robustness analysis, which finds no bias towards Chinese universities. These findings were surprising as the ranking was firstly introduced in order to help to estimate the performance gap between Chinese institutions of higher education and universities in different regions. They also point out that the higher volatility of the THE-QS ranking doesn't mean that it is worse than ARWU. They also conclude that both rankings clearly reflect the perspectives of their producers (the conceptual difference between ARWU and THE-QS is clear), but the rankings do not always provide the information needed by the relevant stakeholders such as students or policy makers.

Lee and Park (2012) find significant positive correlation between university rankings and web visibility (based on ARWU data), which suggests that indicators of web visibility can function as a proxy measure of conventional university rankings. Their research also shows that the central positions in network structures of web visibility were occupied by universities in English-speaking countries as the expense of those in non-English-speaking countries.

Bastedo and Bowman (2011b) find that the rankings impact depends on stakeholders' position in the sector of tertiary education. Stakeholders within the higher education field such as college administrators, academic staff, graduates, and out-of-state students are influenced strongly (Although rankings are intended mainly for the relevant bodies outside of higher education, who seemed to be largely unaffected, e.g. foundations and industry). Their research (based on 1998 U.S. News and World Report national university Rankings) show that college rankings have an effect on the research and development funding provided by business or the state, but there is no significant effect on funding from foundations. It also shows that the rankings strongly influence out-of-state tuition and fees, but no such effect is found as for in-state tuition and fees. Finally, according to their research findings, rankings do have an impact on the proportion donators among the alumni, but such an effect doesn't influence the total amount donated by the graduates (alumni).

Li et al. (2011, p. 923) find that "a large amount of cross-country variation in university performance can be explained by just four socioeconomic factors: income, population size, research and development spending, and the national language". I was done, using ARWU ranking statistics, after the examination of several socioeconomic variables, which have the potential to impact academic performance. According to their model, the USA's dominance is caused by its big population and economic power, which was further supported by its enormous R&D expenditures (2.7% of GDP compared to the sample mean of 0.89%) and English as the national (predominant) language. Their research show that a country in the English-speaking world has 41% more universities among the top five hundred than a country, where English is not an official language, while the country is identical in all other aspects.

Bowman and Bastedo (2011a) find significant evidence for the anchoring effect on institutional reputation assessments (after analysing data from the first 3 years of the THE-QS rankings). They point out that rankings form the institutional reputation. So, the reputation cannot be used as an independent indicator of quality assessment

Wilkins and Huisman (2012) analyse UK business school rankings (undergraduate programme, MBA programmes and research rankings published in almost three decades). Their research shows that the leading representatives of higher education institutions do care about the impact of the universities and do manage their institutions accordingly. The reason is that the business school top management believe that rankings can be helpful with establishing and keeping reputation and position of their school. They presume that rankings can affect student preferences, funding and attractiveness for the top academic staff.

The study of Huang (2012) discusses and analyses the indicators and weightings used in the QS survey. The author points out that there is certain reginal bias (tending to be more advantageous for the Commonwealth of Nations) caused by the issues related to the response rate of the returned questionnaires together with its unequal distribution.

Altbach (2012) mentions that rankings are a predictable outcome of higher education's massification around the world, so that's why rankings became used initially in the United States. He criticizes the established world university rankings for neglecting the teaching quality (assessing its impact on learning), for its bias towards the hard sciences as well as the universities form the Anglophone countries.

Soo (2013) studied the Sunday Times rankings data (from 2005 to 2009) and found out that university rankings influence the perceptions of key academic administrators as well as the academic staff, no statistically significant impact as regards student applications was proved.

Hazelkorn (2013, p. 77) summarizes that rankings do measure: "bio- and medical science research, publication in Nature and Science, Student and faculty characteristics (e.g. productivity, entry criteria, faculty/student ratio), internationalization, reputation (among peers, employers, students)". She adds that rankings unfortunately do not measure: "teaching and learning including value added, the impact of research on teaching, humanities and social science research, knowledge transfer or impact of research, regional or civic engagement, and student experience" (Hazelkorn 2013, p. 77). She concludes considering all the problems, rankings do not genuinely reflect educational quality.

Soh (2013a, 2013b) finds discrepancies between nominal and attained weights in all three of the most established university rankings. Soh (2014) adds that the same methodological shortcoming is linked to Universitas 21 Ranking of National Higher Education Systems.

Marginson (2014) critically analyses all relevant world university rankings. He points out that rankings may be so popular because they are easily remembered and understood; rankings correspond to old ideas about university status and modern competitions like football league tables.

Jajo and Harrison (2014) criticize the ARWU rankings for their emphasis on Nobel Prizes and Fields Medals as well as for the heavy weighting towards the natural sciences at the expense of the arts and humanities. They also pointed out that ARWU rankings neglect the assessment of teaching quality. Too much emphasis on subjective survey data is the main shortcoming of the

THE-QS rankings. Authors introduce an index measuring a university's achievement in multiple ranking systems at once.)

Soh and Ho (2014) compare in detail the performance of two former British colonies Hong Kong and Singapore in the prominent university rankings. They conclude that universities in the two cities are on the same level.

Rauhvargers (2014) recalls and summarizes the main persisting shortcomings of the global university rankings as follows: universities producing non-English language research output are at a disadvantage. There is still a strong focus on the research function of universities but especially the research in the area of the arts and humanities is not fully acknowledged. There are still serious issues related to the bibliometric indicators. Rankings still cannot fully measure teaching performance. He also reminds us that university top administration and its decision making are still strongly influenced by the ranking results. He adds that rankings also have an influence on the macro level as it affects the public policy of particular countries, e.g. immigration policy (Netherlands, Denmark), eligibility of partner institutions (India, Brazil), or mergers of institutions, establishing excellent schemes to support top universities (Japan, Taiwan, Singapore and Malaysia).

Carroll (2014) finds that graduates from globally ranked Australian universities earn more than graduates from lower-ranked or non-ranked universities (based on ARWU). The results show, however, that the effect is rather minor. Field of study had a much stronger effect on graduate starting wages.

Millot (2015) compares the respective methodologies and results of major university rankings with those of the Universitas 21 system ranking, which as a ranking of national higher education systems. He finds that the results tend to converge as the methodologies of the two types of rankings have some commonalities. He points out that the system rankings should include more countries (also low-income countries), and it should better reflect various missions fulfilled by national higher education systems.

Marconi and Ritzen (2015) find that expenditure per student is positively related to a university's score (analyzing 2007 THES-QS ranking), with an elasticity of expenditure per student for ranking score being between 4% and 9%. They calculated that that a university needs to increase its expenditures per student by 3% to 7% to improve its rank by one position. Their findings also confirmed that research-oriented universities seem to be at an advantage in the ranking as well as that larger universities do better in the rankings than the smaller ones.

Bougnol and Dula (2015) criticize world university rankings for the following methodological issues: anti-isotonic attribute, rewarding inefficiency, co-linearity in the data, (not sufficient) transparency and reproducibility.

Soh (2015) classifies indicators used by three prominent world university rankings into two categories: managerial and academic. He finds that the QSWUR and THEWUR 2013 data show that the academic and managerial factors may not correlate and might be even antagonistic.

It can be concluded and summarized that university rankings have been often criticized for tending to favour universities from English-speaking countries (Marginson 2007; Li et al. 2011; Huang 2012; Altbach 2012; Dobrota et al. 2016). The prominent university rankings have been also often criticized for its bias towards hard sciences at the expense of arts, humanities and social science research (Altbach 2012; Hazelkorn 2013; Jajo and Harrison 2014; Rauhvargers 2014).

AWRU methodology has been criticized mainly for the emphasis placed on research and Nobel Prize winners, while neglecting the aspect of teaching and learning (Taylor and Braddock 2007; Marginson 2007; Saisana et al. 2011; Marginson 2014; Jajo and Harrison 2014; Rauhvarges 2014). Marginson (2014) points out that AWRU surprisingly states the Nobel alumni measure as an indicator of teaching quality. Bougnol and Dula (2015) add that the indicator of Nobel Prizes winners on staff should be rather regarded as an input to generate the outcome measured, remarking that treating inputs as outputs can lead to rewarding inefficiency. Despite its limitations ARWU is recognized and preferred by experts due to the data quality and objectivity (Saisana et al. 2011; Li et al. 2011; Marginson 2014).

The QS-THE university ranking methodology[6] has been heavily criticized for placing too much emphasis on reputation data based on survey among academics and employers (Taylor and Braddock 2007; Marginson 2007; Federkeil 2008; Bowman and Bastedo 2011; Huang 2012; Marginson 2014; Jajo and Harrison 2014). Dobrota et al. (2016) criticize QS ranking methodology for its subjective, possibly biased, component indicator weights. On the contrary, Dobrota et al. (2016) appreciate that the QS ranking is not so affected by bibliometric preferences compared to other rankings as it is focused on various areas, which may be appealing ad interesting for students, i.e. teaching, research, employability, and internationalization. Soh (2015) praises the QS rankings for reflecting conception of the modern

[6] Since 2010, QS and THE publish their own ranking separately. Both rankings use reputation surveys.

university, which values synergic relationships with industry community and international cooperation.

The research shows that rakings have an impact on the micro (institutional) level, i.e. on strategic planning and management of higher education institutions (Hazelkorn 2007; Hazelkorn 2008; Federkeil 2008; Wilkins and Huisman 2012; Soo 2013; Rauhvargers 2014; Marconi and Ritzen 2015). There is also an impact on a macro (national) level, i.e. on public policy. Ranking may have an influence on immigration policy rules, eligibility of partner institutions, recognition of qualifications, university mergers, centres of excellence, or government study abroad scholarships (Rauhvargers 2014; Saisana et al. 2011; Li et al. 2011; Dobrota et al. 2016).

Despite all the criticism and controversial nature of the world university rankings, scholars frequently conclude their papers admitting that rankings are here to stay. Thus, we need to make sure that the rankings are used and interpreted carefully in an informed way (Taylor and Braddock 2007; Hazelkorn 2007; Federkeil 2008; Altbach 2012; Rauhvargers 2014; Dobrota et al. 2016).

2.2 Academic Ranking of World Universities (ARWU) – methodology

The Academic Ranking of World Universities (ARWU) was published for the first time in 2003 by the Center for World-Class Universities (CWCU), Graduate School of Education (formerly the Institute of Higher Education) of Shanghai Jiao Tong University, China. The ranking is updated and published annually. Starting 2009 the Academic Ranking of World Universities (ARWU) has been released by Shanghai Ranking Consultancy (ShanghaiRanking Consultancy 2018).

ARWU (ShanghaiRanking Consultancy 2018.) ranks universities by six academic or research performance indicators (such as staff winning Nobel Prizes and Fields Medals, highly cited researchers, papers published in Nature and Science, papers indexed in major citation indices, and the per capita academic performance of an institution) using weights assigned as summarized in Table 2.1 below.

Table 2.1 Indicators and weights for ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
	Highly cited researchers in 21 broad subject categories	HiCi	20%
Research Output	Papers published in Nature and Science*	N&S	20%
	Papers indexed in Science Citation Index-expanded and Social Science Citation Index	PUB	20%
Per Capita Performance	Per capita academic performance of an institution	PCP	10%
Total			100%

* For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators.
Source: ShanghaiRanking Consultancy 2017a

"For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect, standard statistical techniques are used to adjust the indicator if necessary". (ShanghaiRanking Consultancy 2017a).

More detailed definition of the AWRU performance indicators can be found in Table 2.2 below.

Table 2.2 ARWU indicator definitions

Indicator	Definition
Alumni	The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelor's, master's or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees in 2001-2010, 90% for alumni obtaining degrees in 1991-2000, 80% for alumni obtaining degrees in 1981-1990, and so on, and finally 10% for alumni obtaining degrees in 1911-1920. If a person obtains more than one degree from an institution, the institution is considered once only.
Award	The total number of the staff of an institution winning Nobel Prizes in Physics, Chemistry, Medicine and Economics and Fields Medal in Mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners after 2011, 90% for winners in 2001-2010, 80% for winners in 1991-2000, 70% for winners in 1981-1990, and so on, and finally 10% for winners in 1921-1930. If a winner is affiliated with more than one institution, each institution is assigned the reciprocal of the number of institutions. For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize.
HiCi	The number of Highly Cited Researchers selected by Clarivate Analytics. The Highly Cited Researchers list issued in November 2016 (2016 HCR List as of November 16 2016) was used for the calculation of HiCi indicator in ARWU 2017. Only the primary affiliations of Highly Cited Researchers are considered.
N&S	The number of papers published in Nature and Science between 2012 and 2016. To distinguish the order of author affiliation, a weight of 100% is assigned for corresponding author affiliation, 50% for first author affiliation (second author affiliation if the first author affiliation is the same as corresponding author affiliation), 25% for the next author affiliation, and 10% for other author affiliations. When there are more than one corresponding author addresses, we consider the first corresponding author address as the corresponding author address and consider other corresponding author addresses as first author address, second author address etc. following the order of the author addresses. Only publications of 'Article' type is considered.
PUB	Total number of papers indexed in Science Citation Index-Expanded and Social Science Citation Index in 2016. Only publications of 'Article' type is considered. When calculating the total number of papers of an institution, a special weight of two was introduced for papers indexed in Social Science Citation Index.
PCP	The weighted scores of the above five indicators divided by the number of full-time equivalent academic staff. If the number of academic staff for institutions of a country cannot be obtained, the weighted scores of the above five indicators is used. For ARWU 2017, the numbers of full-time equivalent academic staff are obtained for institutions in USA, UK, France, Canada, Japan, Italy, China, Australia, Netherlands, Sweden, Switzerland, Belgium, South Korea, Czech Republic, Slovenia, New Zealand etc.

Source: ShanghaiRanking Consultancy 2017a

Data sources used by ARWU are listed in Table 2.3 below.

Table 2.3 ARWU data sources

Indicator	Data Source
Nobel laureates	http://nobelprize.org/
Fields Medals	http://www.mathunion.org/index.php?id=prizewinners
Highly cited researchers	http://www.highlycited.com/
Papers published in Nature and Science	http://www.webofscience.com/
Articles indexed in Science Citation Index-Expanded and Social Science Citation Index	http://www.webofscience.com/
Others	Number of academic staff. Data is obtained from national agencies such as National Ministry of Education, National Bureau of Statistics, National Association of Universities and Colleges, National Rector's Conference.

Source: ShanghaiRanking Consultancy 2017a

The selection of universities is conducted in accordance with the following criteria: "every university that has any Nobel laureates, field medalists, highly cited researchers, or papers published in Nature or Science is considered by ARWU. The universities having a significant amount of papers indexed by the Science Citation Index-Expanded (SCIE) and the Social Science Citation Index (SSCI) are also included. In total, more than 1300 universities are ranked and the best 500 are published. From 2017, the universities ranked between 501 and 800 are also published as ARWU World Top 500 Candidates (ShanghaiRanking Consultancy 2017a).

2.3 The Times Higher Education World University Ranking (THEWUR) – methodology

The Times Higher Education World University Rankings (THEWUR) use 13 performance indicators, which are divided into five areas (Times Higher Education 2017). The THEWUR indicators including the respective weights are outlined in Table 2.4.

Table 2.4 THEWUR performance indicators and weights

Indicator category	Indicator	Weight
Teaching (the learning environment) 30%	Reputation survey	15%
	Staff-to-student ratio	4.5%
	Doctorate-to-bachelor's ratio	2.25%
	Doctorates-awarded- to-academic-staff ratio	6%
	Institutional income	2.25%
Research (volume, income and reputation) 30%	Reputation survey	18%
	Research income	6%
	Research productivity	6%
Citations (research influence) 30%	Citations	30%
International outlook (staff, students and research) 7.5%	International-to-domestic-student ratio: 2.5%	2.5%
	International-to-domestic-staff ratio	2.5%
	International collaboration:	2.5%
Industry income (knowledge transfer) 2.5%	Industry income	2.5%

Source: Times Higher Education 2017

Further details regarding the THEWUR performance indicator descriptions can be found in Table 2.5.

Table 2.5 THEWUR performance indicator descriptions

Indicator	Description
Teaching (the learning environment)	
Reputation survey	The most recent academic reputation survey (run annually) that underpins this category was carried out in January to March 2017, attracting 10,568 responses. The survey examined the perceived prestige of institutions in teaching. The responses were statistically representative of the global academy's geographical and subject mix. The 2017 data are combined with the results of the 2016 survey, giving more than 20,000 responses.
Staff-to-student ratio	These indicators should reflect how committed an institution is to educating and fostering the next generation of academics, a high proportion of postgraduate research students also suggests the provision of teaching at the highest level that is thus attractive to graduates and effective at developing them. This indicator is normalised to take account of a university's unique subject mix, reflecting that the volume of doctoral awards varies by discipline.
Doctorate-to-bachelor's ratio	
Doctorates-awarded- to-academic-staff ratio	
Institutional income	Institutional income is scaled against academic staff numbers and normalised for purchasing-power parity (PPP). It indicates an institution's general status and gives a broad sense of the infrastructure and facilities available to students and staff.
Research (volume, income and reputation)	
Reputation survey	The most prominent indicator in this category looks at a university's reputation for research excellence among its peers, based on the responses to the annual academic reputation survey.

Research income	Research income is scaled against academic staff numbers and adjusted for purchasing-power parity (PPP). This is a controversial indicator because it can be influenced by national policy and economic circumstances. But income is crucial to the development of world-class research, and because much of it is subject to competition and judged by peer review, our experts suggested that it was a valid measure. This indicator is fully normalised to take account of each university's distinct subject profile, reflecting the fact that research grants in science subjects are often bigger than those awarded for the highest-quality social science, arts and humanities research.
Research productivity	The indicator counts the number of papers published in the academic journals indexed by Elsevier's Scopus database per scholar, scaled for institutional size and normalised for subject. This gives a sense of the university's ability to get papers published in quality peer-reviewed journals. (This year, we devised a method to give credit for papers that are published in subjects where a university declares no staff).
Citations (research influence)	
Citations	Research influence is examined by capturing the average number of times a university's published work is cited by scholars globally. The data include the 23,000 academic journals indexed by Elsevier's Scopus database and all indexed publications between 2012 and 2016. Citations to these publications made in the six years from 2012 to 2017 are also collected. The data are normalised by the overall number of papers produced, and to reflect variations in citation volume between different subject areas. This means that large institutions or those with high levels of research activity in subjects with traditionally high citation counts do not gain an unfair advantage.
International outlook (staff, students and research)	
International-to-domestic-student ratio	The indicators reflect the ability of a university to attract undergraduates, postgraduates and faculty from all over the planet, which is key to its success on the world stage.
International-to-domestic-staff ratio	
International collaboration:	The third international outlook indicator calculates the proportion of a university's total research journal publications that have at least one international co-author and reward higher volumes. The indicator is normalised to account for a university's subject mix and uses the same five-year window as the "Citations: research influence" category.
Industry income (knowledge transfer)	
Industry income	A university's ability to help industry with innovations, inventions and consultancy has become a core mission of the contemporary global academy. This category seeks to capture such knowledge-transfer activity by looking at how much research income an institution earns from industry (adjusted for PPP), scaled against the number of academic staff it employs. It suggests the extent to which businesses are willing to pay for research and a university's ability to attract funding in the commercial marketplace – useful indicators of institutional quality.

Source: Times Higher Education 2017

To be included and published in the in the Overall Ranking, higher education institutions are obliged to meet the criteria defined by the ranking. Institutions must have sufficient research output, i.e. more than 1000 articles in the period of the last five years. The number of publications required for a period of one year needs to exceed 150. Universities also must teach at an undergraduate level, and they must not be focused exclusively on a specific subject area (Times Higher Education 2017).

2.4 QS World University Rankings

QS Universities evaluate universities according to six metrics, which are outlined in Table 2.6 below.

Table 2.6 QSWUR performance indicators and weights

Indicator	Weight	Description
Academic Reputation	40%	The indicator is based on Academic Survey, which collates the expert opinions of over 80,000 individuals in the higher education sector regarding teaching and research quality at the world's universities.
Employer Reputation	10%	The indicator is based on over 40,000 responses to the *QS Employer Survey*, which asks employers to identify those institutions from which they source the most competent, innovative, effective graduates.
Faculty/Student Ratio	20%	Teacher/student ratio has been determined as the most effective proxy metric for teaching quality. (bearing mind that teaching quality is notoriously difficult to measure. The indicator assesses the extent to which institutions are able to provide students with meaningful access to lecturers and tutors, it recognizes that a high number of faculty members per student will reduce the teaching burden on each individual academic.
Citations per faculty	20%	The total number of citations received by all papers produced by an institution across a five-year period is divided by the number of faculty members at that institution. The citations are normalized to reflect different publishing cultures of different fields. In this edition citations from the period of 2012-2017 are considered (using Elsevier's *Scopus* database).
International Faculty Ratio	5%	These two metrics demonstrate an ability to attract faculty and students from across the world, which in turn suggests that it possesses a strong international brand.
International Student Ratio	5%	

Source: Quacquarelli Symonds 2018f

2.5 Individual university rankings – comparison and discussion

The methodologies of the established world university rankings implicitly show how the quality in higher education is perceived and defined by the respective ranking providers. That's why it is included in the theoretical part of my thesis. Despite all the criticism, the rankings proved influential, on both micro and macro level, as suggested previously (in section 2.1).

The main distinction between ARWU and the other two established rankings is that ARWU focuses solely on research, while QSWUR and THEWUR try to reflect also on other aspects of higher education, i.e. teaching and learning components, employability of graduates, cooperation with the industry, and internationalization. I consider the one-sided view of ARWU as a limitation of the ranking in comparison with QSWUR and THEWUR, contrary to the position of many higher education and experts, who prefer ARWU to other rankings (supposedly due to data quality and objectivity as mentioned in the overview of the scholarly discourse). I agree that research is an important component, but the other components are certainly no less important in my opinion. I regard the quality of teaching together with knowledge, skills and competencies of graduates (which are obviously interconnected) as very important in particular. Therefore, I appreciate the effort of QSWUR and THEWUR made in this regard. I am aware, though, that the measurement of teaching quality is a very challenging task. ARWU uses the Alumni of an institution winning Nobel Prizes and Fields Medals as the indicator reflecting Quality of Education. I am not convinced at all that this indicator reflects well the quality of education of a university as this notion of education quality is very elitist and narrow. Also, staff of an institution winning Nobel Prizes and Fields Medals is not an ideal indicator which should be reflecting the quality of the faculty (as it is the case of ARWU). There are plenty of faculty members who are great teachers but never won the Nobel Prizes or Fields Medal. Again, I believe that this perception of the quality of the faculty is very elitist and restricted. Moreover, the number of Nobel Prize winners on the faculty is still rather an input to the process of teaching and learning, which doesn't guarantee the learning (or research) outcomes, which should be measured at the end of the day. Both, THEWUR and QS use the academic staff vs. student ratios in order to measure teaching quality. The smaller classes are certainly a good precondition for good and productive instruction. I am aware that this indicator doesn't reflect fully the quality of instruction and again the ratio is rather an input to the educational process than any measurable outcome, but it shows, at least in some way, the commitment of an institution to focus on the process of teaching and learning. I am sure that the issue of class sizes often creates a lot of tension between the university bursar (chief

financial officer) arguing for higher economic efficiency and the academic part of the university committed to teaching quality. THEWUR uses, besides the ratios, a survey related to the teaching reputation of the institution (on how the institution's prestige in teaching is perceived). QSWUR uses a survey related to the competencies of graduates (an indicator of Employer Reputation). I agree with higher education experts that reputation surveys are very subjective and controversial. On the other hand, I appreciate at least some effort of the THEWUR and QSWUR to get information and data on teaching and competencies of graduates to reflect these important aspects in the rankings. I believe that the reputation surveys still reflect the quality of education and graduates more effectively than the numbers of Nobel Prizes and Fields Medals among the faculty or alumni of the institution. Both QSWUR and THEWUR include indicators related to internationalization as opposed to ARWU. Although I don't share the opinion that something international is always better than something national, I understand why this aspect was included. A good university should have at least some international outreach, which shows that the quality of the university is good enough to attract international students and faculty as well as for international cooperation on research projects. The aspect of internationalization, though, should not be overestimated. Therefore, I find the relatively low indicator weights (7.5% in the case of THE, 10% in the case of QSWUR) as reasonable and justifiable. The QSWUR and THEWUR methodology share many similarities, which is not surprising as there was originally only one ranking published jointly by Quacquarelli Symonds and Times Higher Education magazine (from 2004 to 2009). In 2010, both started publishing their own ranking separately. Times Higher Education adopted a new methodology, while Quacquarelli Symonds kept using the original one. The main shortcoming of the QSWUR is its dependency on the subjective and controversial reputational surveys (accounting for 50% of the total score). The (new) THEWUR methodology is more complex as the total indicator is composed of 13 sub-indicators, contrary to QSWUR still using the original 6 sub-indicators. The portion of reputation surveys on the total score was reduced to 33%. As for the new sub-indicators, I especially appreciate the addition of the Industry income (knowledge transfer) indicator, which indicates the ability of the university to collaborate with the industry sector (innovation, consultancy) and thus its attractiveness for the commercial sector.

To conclude the discussion and comparison of the three most established university rankings, I find the THEWUR the most relevant, followed by QSWUR and ARWU.

2.5 Rankings of national higher education systems - methodology

Rankings of national higher education systems do not use individual universities but national higher education systems as a unit of analysis. There are currently two relevant rankings of higher education systems, i.e. Universitas 21 Ranking (U21) and QS Higher Education System Strength Rankings (HESS). Universitas 21 Ranking has been published by the Melbourne Institute of Applied Economic and Social Research annually since 2012. The QS Higher Education System Strength Rankings was published by Quacqarelli-Symmonds for the first time in 2016. The second edition was released in 2018.

The Universitas 21 Ranking evaluates the performance of the national systems in four areas as follows: Resources, Environment, Connectivity and Output. The indicators are outlined in Table 2.7 below. Variables used are standardised for population size. Within each measure, the countries are assigned scores proportionally to the country, which performs the best and gets the maximum score of 100 (Melbourne Institute of Applied Economic and Social Research 2018).

Table 2.7 Universitas 21 ranking indicators

Indicator area	Indicator	Weight
Resources (20%)	Government expenditure on tertiary education institutions as a percentage of GDP, 2014.	5%
	Total expenditure on tertiary education institutions as a percentage of GDP, 2014.	5%
	Annual expenditure per student (full-time equivalent) by tertiary education institutions in USD purchasing power parity, 2014.	5%
	Expenditure in tertiary education institutions for research and development as a percentage of GDP, 2015.	2.5%
	Expenditure in tertiary education institutions for research and development per head of population at USD purchasing power parity, 2015.	2.5%
Environment (20%)	Proportion of female students in tertiary education, 2015.	1%
	Proportion of female academic staff in tertiary institutions, 2015.	2%
	A rating for data quality. For each quantitative series, the value is 2 if the data are available for the exact definition of the variable; 1 if some data are available which relate to the variable but some informed adjustment is required; and 0 otherwise.	2%
	Qualitative measure of the policy environment (percentage of tertiary students enrolled in private institutions - capped at 50 percent, percentage of students enrolled in ISCED level 5 courses in 2015, Survey results for the policy and regulatory environment, Survey results for the financial autonomy of public universities)	10%
	Responses to WEF survey question (7-point scale):	5%

	"How well does the educational system in your country meet the needs of a competitive economy?".	
Connectivity (20%)	Proportion of international students in tertiary education, 2015.	4%
	Proportion of articles co-authored with international collaborators, 2016.	4%
	Webometrics VISIBILITY index (external links that university web domains receive from third parties via MAJESTIC). Sum of data for 10,000 tertiary institutions divided by country's population, July 2017 edition.	4%
	Responses to question 'Knowledge transfer is highly developed between companies and universities', asked of business executives in the annual survey by IMD World Development Centre, Switzerland, 2017.	4%
	Percentage of university scientific research publications that are co-authored with industry researchers, 2013–15.	4%
Output (40%)	Total research documents produced by higher education institutions, 2016.	10%
	Total research documents produced by higher education institutions per head of population, 2016.	3%
	Average impact of articles as measured by the Category Normalised Citation Impact for documents published 2012–16.	5%
	The depth of world class universities in a country. This is calculated as the total scores for a nation's universities in the Shanghai Jiao Tong Index top 500 institutions, divided by population.	3%
	The excellence of a nation's best universities calculated by totalling the 2017 Shanghai Jiao Tong Index scores for the nation's three best universities.	7%
	Enrolments in tertiary education as a percentage of the eligible population, defined as the five-year age group following on from secondary education, 2015.	3%
	Percentage of the population aged 25–64 with a tertiary qualification, 2016.	3%
	Number of researchers (full-time equivalent) in the nation per million of population, 2015.	3%
	Unemployment rates among tertiary educated aged 25–64 years compared with unemployment rates for those with only upper secondary or post-secondary non-tertiary education, 2016.	3%

Source: Melbourne Institute of Applied Economic and Social Research 2018

QS Higher Education System Strength Rankings ranks and compares national higher education systems in four areas (indicators). The areas are assigned equal weights in order to provide the overall scores. The top 50 countries are published. Further Information on the individual indicators is summarized in Table 2.8 below.

Table 2.8 HESS indicators

Indicator	Weight	Description
System strength	25%	The indicator assesses overall national system strength, based on performance in the international rankings. Each country is awarded a score based on the number of its institutions ranked 700 or above in the QS World University Rankings, divided by the average position of those institutions.
Access	25%	The indicator provides an indication of the chances of gaining a place at a world-class university for residents of the country in question. Scores in this category are calculated based on the number of places available at universities ranked within the global top 500, divided by an indicator of population size. The specific figures used in this calculation are the total number of full-time equivalent students at universities in the top 500 of the QS World University Rankings, divided by the square root of the population
Flagship institution performance	25%	The indicator assesses the performance of the country's leading institution within the global rankings (based on the premise that the performance of a country's leading university is a credit to the overall system, often resulting from national investment in developing a flagship institution to lead the way) It is a normalized score, based on the place each nation's top university occupies in the QS World University Rankings.
Economic context	25%	The indicator assesses the impact of national investment in higher education, by comparing each nation's financial situation to its performance in the international rankings. An indexed score is awarded for each university featured in the rankings (7 points for a university in the top 100, 6 points for 101-200, 5 points for 201-300, 4 for 301-400, 3 for 401-500, 2 for 501-600 and 1 for 601-700), and this is then factored against the GDP per capita for the country in question.

Source: Quacquarelli Symonds 2018d

2.6 Rankings of national higher education systems – comparison and discussion

The Universitas 21 Ranking (U21) seems quite complex as it uses 24 sub-indicators (divided into four broader) categories. However, I find many of these sub-indicators problematic, especially these in the first Indicator area of Resources, which is, in my opinion, the main shortcoming of the ranking. The respective sub-indicators reflecting resources (Government expenditure on tertiary education institutions as a percentage of GDP; Total expenditure on tertiary education institutions as a percentage of GDP; Expenditure in tertiary education institutions on research and development as a percentage of GDP; Expenditure in tertiary education institutions on research and development per head of the population at USD

purchasing power parity) should be definitely treated rather as the input factors potentially affecting the final performance of the system, but Universitas 21 Ranking considers the expenditure the expenditures on education, research and development as the performance (output) indicator. This is very problematic also from the economic point of view as performance (quality) is in this case reflected by expenditures (costs). In terms of the second area indicator, i.e. Environment, I find quite problematic two sub-indicators related to the proportion of females among students and academic staff in the instiutions of higher education. I am definitely against any kind of gender based discrimination but the propoportion of females itself doesn't say anything about the perfomance(quality) of the respective higher education system. As for the Indicator area of Output, the sub-indicators related to higher education enrolment and the percentage of population with a higher education degree can be also found questionable. I don't think that we can claim unambiguously that a higher education system with higher enrolment or with a higher number of graduates is better than the system with lower enrolment or a lower number of university graduates and, and vice versa. I appreciate that the Universitas 21 Ranking includes the sub-indicator related to unemployment, but I think that the weight of this sub-indicator should be higher that 3%.

QS Higher Education System Strength Rankings is based to a large extent on the performance of the respective national universities in the QSWUR. Thus, it shares the same advantages (e.g. considering the competencies of graduates and teaching – at least to a certain extent) and disadvantages (e.g. dependence on the reputation surveys). I appreciate that the QS Higher Education System Strength Rankings consider the economic context as well as the aspect of access (chances to get a place at top universities in the respective country).

To conclude the discussion and comparison of the two rankings of the national higher education system, I believe that the Universitas 21 Ranking has more shortcomings (mentioned above) than advantages, especially regarding the issue related to the sub-indicators in the Resources indicator area. The QS Higher Education System Strength Ranking is certainly far from being perfect, but I believe that it reflects the quality of the national higher education system in a more relevant way.

Therefore, I choose The QS Higher Education System Strength Ranking as the indicator of quality of national higher education systems, which will be used in the main empirical part of the thesis (Chapter 5).

3. Composite indicators

3.1 Overview

This chapter deals with the issue of composite indicators as the world university rankings (at least the most established ones) use composite indicators to assess the performance of universities and whole national higher education systems, and thus share the same general similarities, characteristics, advantages, and shortcomings.

Composite Indicators (CI) have become recognized as a policy analysis tool, which can be used in order to compare the performance of various countries in various areas such as economy, society, environment, innovation and technology (OECD, JRC 2008; Nardo et al. 2005; Freudenberg 2003).

OECD Glossary of Statistical Terms uses the following definition: "A composite indicator is formed when individual indicators are compiled into a single index, on the basis of an underlying model of the multi-dimensional concept that is being measured." (OECD 2013b).

Saisana and Tarantola (2002, p. 5) characterize the composite indicators as follows: "Indicators are pieces of information that summarize the characteristics of a system or highlight what is happening in a system. They are often a compromise between scientific accuracy and the information available at a reasonable cost. A mathematical combination (or aggregation as it is termed) of a set of is most often called an index or a composite indicator."

Hudrlíková (2013) points out that the composite indicator approach is very attractive for a wide range of users (e.g. policymakers, scholars, journalists, the general public) as it allows them to work with a single number only.

One of the most established and recognized composite indicators is certainly Human Development Index (HDI) introduced in 1990 in the first Human Development Report, which is released annually within the framework of the United Nations Development Programme. HDI consists of the following three sub-indicators (dimensions): Life expectancy index (Long and healthy life), Education index (Knowledge), and GNI index (A decent standard of living). The first dimension is measured by life expectancy at birth, the dimension of knowledge is assessed by expected years of schooling and mean years of schooling, and finally the standard of living dimension reflected by gross national income per capita (Human Development Report Office n.d.) Examples of the established composite indicators can be found in the table below divided according to the respective areas.

Table 3.1 Composite indicators examples

Area	Composite Indicator
Economy	Composite of Leading Indicators (OECD) OECD International Regulation Database (OECD) Economic Freedom of the World Index (Economic Freedom Network) Economic Sentiment Indicator (EC) Internal Market Index (EC) Business Climate Indicator (EC)
Environment	Environmental Sustainability Index (World Economic Forum) Wellbeing Index (Prescott-Allen) Sustainable Development Index (UN) Synthetic Environmental Indices (Isla M.) Eco-Indicator 99 (Pre Consultants) Concern about Environmental Problems (Parker) Index of Environmental Friendliness (Puolamaa) Environmental Policy Performance Index (Adriaanse)
Globalisation	Global Competitiveness Report (World Economic Forum) Transnationality Index (UNCTAD) Globalisation Index (A.T. Kearny) Globalisation Index (World Markets Research Centre)
Society	Human Development Index (UN) Corruption Perceptions Index (Transparency International) Overall Health Attainment (WHO) National Health Care Systems Performance (King's Fund) Relative Intensity of Regional Problems (EC) Employment Index (Storrie and Bjurek)
Innovation / Technology	Summary Innovation Index (EC) Networked Readiness Index (CID) National Innovation Capacity Index (Porter and Stern) Investment in Knowledge-Based Economy (EC) Performance in Knowledge-Based Economy (EC) Technology Achievement Index (UN) General Indicator of Science and Technology (NISTEP) Information and Communications Technologies Index (Fagerberg) Success of Software Process Improvement (Emam)

Source: Freudenberg 2003

There have been ongoing disputes between scholars and experts dealing with the phenomena of the composite indicators. I believe, the following frequently cited quotations encapsulate the issue very well.

Saisana et al. (2005) point out: "In practice, it is difficult to imagine that the debate on the use of composite indicators will ever be settled. Just to give an example that is linked to our experience, official statisticians may tend to resent composite indicators, whereby a large

amount of work in data collection and editing is 'wasted' or 'hidden' behind a single number of dubious significance. However, the temptation of stakeholders and practitioners to summarize complex and sometime elusive processes (e.g. sustainability or a single-market policy) into a single figure to bench-mark country performance for policy consumption seems likewise irresistible."

Sharpe (2004, p. 9) even divides the research community into two groups according to their preference to aggregate variables into one composite indicator, or not as follows: "The aggregators believe for two major reasons there is value in combining indicators in some manner to produce a bottom line. First, they believe such a summary statistic can indeed capture reality and is meaningful. Second, they stress that bottom lines are extremely useful in garnering media interest and hence the attention of policy makers. The non-aggregators believe one should stop once an appropriate set of indicators has been created and not go the further step of producing a composite index. Their key objection to aggregation is what they see as the arbitrary nature of the weighting process by which the variables are combined."

Nardo et al. (2005, p. 6) sum up the advantages of the composite indicators as follows:

- "Summarise complex or multi-dimensional issues, in view of supporting decision-makers;
- are easier to interpret than trying to find a trend in many separate indicators;
- facilitate the task of ranking countries on complex issues in a benchmarking exercise;
- assess progress of countries over time on complex issues;
- reduce the size of a set of indicators or include more information within the existing size limit;
- place issues of countries performance and progress at the centre of the policy arena;
- facilitate communication with ordinary citizens and promote accountability."

The authors, however, warn that composite indicators may also have the following shortcomings:

- "May send misleading policy messages, if they are poorly constructed or misinterpreted;
- may invite drawing simplistic policy conclusions, if not used in combination with the indicators;

- may lend themselves to instrumental use (e.g. be built to support the desired policy), if the various stages (e.g. selection of indicators, choice of model, weights) are not transparent and based on sound statistical or conceptual principles;
- the selection of indicators and weights could be the target of political challenges;
- may disguise serious failings in some dimensions of the phenomenon, and thus increase the difficulty in identifying the proper remedial action;
- may lead wrong policies, if dimensions of performance that are difficult to measure are ignored." (Nardo et al. 2005, p.6)

The pros and cons of the composite indicators are perceived and stated analogically also by other expert or scholar studies (e.g. Saisana and Tarantola 2002; Freudenberg 2003; OECD, JRC 2008; Hudrlíková 2013; Petkovová 2015).

The composite indicators expert groups (Nardo et al. 2005; Saltelli 2007; OECD, JRC 2008) agree that certain steps need to be take in order to construct a composite indicator correctly. The steps are outlined and explained in the following Table 3.2.

Table 3.2 Steps for the construction of composite indicators

Theoretical framework	A theoretical framework should be developed to provide the basis for the selection and combination of single indicators into a meaningful composite indicator under a fitness-for-purpose principle
Data selection	Indicators should be selected on the basis of their analytical soundness, measurability, country coverage, relevance to the phenomenon being measured and relationship to each other. The use of proxy variables should be considered when data are scarce.
Multivariate analysis	An exploratory analysis should investigate the overall structure of the indicators, assess the suitability of the data set and explain the methodological choices, e.g., weighting, aggregation.
Imputation of missing data	Consideration should be given to different approaches for imputing missing values. Extreme values should be examined as they can become unintended benchmarks.
Normalisation	Indicators should be normalised to render them comparable.
Weighting and aggregation	Indicators should be aggregated and weighted according to the underlying theoretical framework
Robustness and sensitivity	Analysis should be undertaken to assess the robustness of the composite indicator in terms of e.g., the mechanism for including or excluding single indicators, the normalisation scheme, the imputation of missing data and the choice of weights.
Links to other variables	Attempts should be made to correlate the composite indicator with other published indicators as well as to identify linkages through regressions.
Visualisation	Composite indicators can be visualised or presented in a number of different ways, which can influence their interpretation
Back to the real data	Composite indicators should be transparent and be able to be decomposed into their underlying indicators or values.

Source: Saltelli 2007; OECD, JRC 2008

As pointed out our briefly above, one of the biggest challenges concerning the composite indicators is the assignment of the sub-indicator weights. The methods of the weight assignment can be broadly divided into two groups, i.e. methods based on subjective assessment of the weights such as Budget allocation process, and methods based on mathematical-statistical approaches such as Principal components and factor analysis, Data envelopment analysis, or Benefit of the doubt approach (Petkovová 2015; OECD, JRC 2008). The simplest method of the weight assignments are equal weights. The method is used especially for its clarity and simplicity of calculation. The equal weights are used for instance by Living Planet Index (Petkovová 2015).

As for the aggregation methods, the linear aggregation methods are used very frequently due to their clarity and easiness interpretation. Living Planet Index, Index of Sustainable and Economic Welfare, and Ecological Footprint can serve as examples of this (Petkovová 2015).

Summation of the resulting rankings is the simplest linear aggregation method. The main advantages of the method are its simplicity and the independence of outliers. On the other hand, the disadvantage of the method is the loss of the absolute value of information. The Information and Communication Technologies Index can be mentioned as an example. Another linear aggregation method is based on the number of indicators being above and below the set benchmark. Again, the advantage of the method lies in the independency of outliers. There is a loss of the interval level information though. The most familiar linear aggregation method is aggregation using the arithmetic mean, Environmental Sustainability Index or Environmental Performance Index being the examples (OECD, JRC 2008; Petkovová 2015).

There is also a method of geometric aggregation used for the construction of composite indicators. The method uses the geometric mean as the main aggregation tool. For instance, calculation of the well-established Human Development Index is based on the geometric aggregation (Petkovová 2015).

Nardo et al. (2005, p. 84) summarize the characteristics and differences of the linear and geometric aggregation methods as follows: “Linear aggregation method is useful when all sub-indicators have the same measurement unit and further ambiguities due to the scale effects have been neutralized, while geometric aggregations are appropriate when non-comparable and strictly positive sub-indicators are expressed in different ratio-scales. The absence of synergy or conflict effects among the indicators is a necessary condition to admit either linear or

geometric aggregations. Furthermore, linear aggregations reward base-indicators proportionally to the weights, while geometric aggregations reward more those countries with higher scores."

In addition to the linear aggregation methods and geometric aggregation, there are also methods derived from the theory of multi-criteria decision (Petkovová 2015; OECD, JRC 2008).

Saisana and Tarantola (2002, p.10) regard the six following aggregation techniques of calculating a composite indicator (from the simplest to the most complex) as the most established: "Sum of country rankings, Number of indicators above the mean minus the number below the mean, Ratio or percentage differences from the mean, Percentage of annual differences over consecutive years, Standardized values, Re-scaled values."

3.2 Composite indicators and world university rankings

The world university rankings have been critically examined also within the concept of the composite indicators.

Saisana et al. (2011) conducted a robustness analysis in order to test the validity of deduction associated with the ARWU and THE-QS rankings, which did not disclose the legitimacy of both rankings to measure the performance of a university. The analysis finds higher volatility of the THE-QS ranking, which however doesn't indicate its inferiority towards ARWU. Saisana et al. (2011, p. 175) emphasize: "The statistical robustness analysis is indeed only one element of a comprehensive assessment of any composite indicator. The global relevance of a ranking also depends on the reliability of all the steps in the construction of the CI, from the development of a theoretical framework and the selection of variables to the presentation and dissemination of results to the general public and policy-makers through league tables. This is particularly important in the light of the numerous criticisms directed at the choice of indicators in both rankings. The results of this analysis must therefore be read against the context of these limitations."

Dobrota et al. (2016) proposed alternative weights of the QS ranking, based on the Composite I-Distance Indicator (CIDI) methodology, which improves stability and reduces the uncertainty of the QS ranking system. The CIDI methodology is derived from the I-distance method. Data from 2008-2013 were used. The results of the analysis and proposed weights are outlined in the table below.

Table 3.3 Differences in composite I-distance indicator (CIDI) weights and original (QS) ranking weights.

QS ranking indicators	QS ranking weights	CIDI weights
Academic reputation (AR)	40%	19.9%
Employer reputation (ER)	10%	19.8%
Student-to-faculty ratio (FS)	20%	14.8%
Citations per faculty (CPF)	20%	13.6%
International faculty ratio (IF)	5%	14.6%
International student ratio (IS)	5%	17.3%

Source: Dobrota et al. 2016

Discrepancies regarding the weights of the individual sub-indicators used by all the three most established university rankings (i.e. ARWU, THEWUR, QSWUR) have been found by Soh (2013a, 2013b). He suggested that the issue can be rectified by the application of score standardisation via T-scaling (Soh 2013b).

Soh (2014) points out that the same issue is linked to the Universitas 21 Ranking of National Higher Education Systems. He points out that the Resources indicator is over-weighted, and the Environment indicator is underweighted in the computation of the Overall (composite indicator), when comparing the indicators with the same nominal (assigned) weights of 25%.

Although the CWTS Leiden Ranking Leiden Ranking is as established and cited as the most prominent rankings, its approach and methodology are highly regarded by scholars in the field of research policy and management (Marginson 2014). One of the main reasons is that it does not provide a composite multi-indicator, i.e. a single number or rank, so it avoids some of the methodological shortcomings of the prominent rankings, which provide one single number as a composite indicator (Bougnol and Dula 2015).

3.3 Chapter summary and discussion

As briefly outlined above, the issue of is quite controversial and the construction of a composite indicator is complex and challenging. I believe, however, that it shouldn't discourage us from using such a policy analysis tool. There are pros (e.g. summarization of a complex problem for, easiness of interpretation, reducing of number of indicators, or encouraging public interest in the certain area) and cons (such as providing simplified, misleading information if not composed or interpreted correctly) related to the phenomena of composite indicators. There are

clearly defined steps that should be fulfilled in order to construct the composite indicator correctly.

The composite indicators have their proponents (so called aggregators) as well as their opponents (so called non-aggregators). Although I am aware of all the shortcomings raised by the respected experts, I integrate myself into the group of so-called aggregators. The main reason is that the composite indicators provide concise and clear pieces of information on complex issues (which require certain simplification and aggregation of related indicators, sometimes at the expense of perfect scientific accuracy) in order to provide comparison between individual countries (or other respective entities). Obviously, the results cannot be accepted dogmatically and must be interpreted carefully in the context.

4. Qualitative comparative analysis (QCA)

This chapter deals with the method used in order to analyse the influence of the national accreditation schemes (also other factors) on the quality of the higher education systems. The origins and development, advantages and critique, applications, and finally the actual technique of the method are presented in the following text.

4.1 Overview – origins, advantages and critique

The Qualitative comparative analysis (QCA) method was introduced and further developed by Ragin (1987, 2000, 2006, 2008). Ragin (1987) intended to develop some "synthetic strategy", which would be in between the qualitative (case study oriented) approaches and the quantitative (variable oriented) approaches, which would "integrate the best features of the case-oriented approach with the best features of the variable oriented approach" (Ragin 1987, p. 84). The author considered QCA more than a method, he saw it rather as an approach, to be precise as: "a dialogue between ideas and evidence" (Ragin 1987, p. 164).

Rihoux et al. (2011) point out that the method was originally designed for multiple case-studies, for a small number of cases or intermediate-number of cases. Therefore "It strives to meet two apparently contradicting goals: gathering in-depth insight in the different cases and capturing the complexity of the cases (gaining 'intimacy' with the cases), but also producing some level of generalization." Rihoux et al. (2011, p. 12). Rihoux et al. (2011) admit that Qualitative comparative analysis is mainly case state sensitive, but it certainly has some important aspects (crucial strengths) of the quantitative methods as it gives the possibility to also analyse a medium number of cases (contrary to the case-study oriented works), which allows for the provision of generalizations. They add that the key operations of QCA "rely on Boolean algebra and Set logic, and require that each case be reduced to a series of variables (conditions and an outcome). Hence, it is an analytic approach, which allows replication." (Rihoux et al. 2011, p. 13).

Rihoux (2006) highlights that QCA can be used for several different purposes. It can be used for data summarization, i.e. the truth table helps to depict the cases in a synthetic way. Second, it also enables the realization of more concerning the individual cases, while checking the data coherency and contradictions. The method is a great tool for the testing of existing or even new assumptions or theories; it also enables the development of new ones. Thus, QCA can be certainly considered as an inductive method. Rihoux (2006) further appreciates QCA for its

significant input, high transparency, and also for allowing the deliberation over both qualitative and quantitative variability of the issue.

On the other hand, there are also critical views of the QCA approach. Rihoux (2003) identifies the following seven types of critiques. This first type is related to the data dichotomization (potentially leading to a significant loss of information as well as the arbitrariness of dichotomization – setting the threshold). The second type of critique is related to the cases not being in the table but existing logically. The third type of critique concerns the sensitivity of QCA to the individual cases (potential addition or removal of a single case can alter the results). The fourth sort of critique mentions the difficulty of the relevant condition selection under QCA in comparison to other techniques. The fifth sort points out that independent variables are usually (as for social sciences) interconnected somehow, thus not purely independent, which arguably challenges also QCA. The sixth type of criticism is connected to the black box problem. Lastly, the static nature of the approach that is being raised.

Rihoux (2003), however, adds that many of the critical objections are not relevant and provides the following counterarguments. First, he points out that here is always a certain simplification concerning both quantitative or qualitative empirical research. He states that: "Dichotomization can be (should be) theoretically informed and the dichotomization threshold can be fine-tuned inductively while performing data exploration with QCA" (Rihoux 2003, p. 358). Second, in QCA the simplification of assumptions is more visible, compared to other analytical techniques, which also work with simplified hypothesis. Third, additional cases can actually help with detecting other explanations. Fourth, the issue of variable (relevant condition) selections is shared by other social science research methods. Fifth, the conditions under the QCA approach are not considered, in statistical terms, independent variables. Hence, this type of criticism is not reasonable. Sixth, QCA does not aim to deal with the black box of process as it is up to the researcher to interpret the results. Only the last objection is found relevant as "it identifies a real weakness of QCA: The method is static in its essence." Rihoux 2003, p. 358).

Legewie (2013) sees the main advantages of QCA as follows:

1) many social sciences inquiries work, perhaps not explicitly, work with some assumptions of the necessary or sufficient conditions to generate certain outcome (which is the foundation of QCA);
2) QCA is helpful for qualitative research projects conducting cross-case (e.g. country) comparison of medium-N data sets (i.e. N=15 to N=50);
3) QCA can help to make research more transparent and systematic;

4) QCA is helpful with the development of mid-range theories.

4.2 Application of QCA – social sciences, public policy

Although the number of adaptations in social sciences was quite sporadic (39 in total in peer-reviewed journals) in the beginning (untill 1997), papers using QCA were published in top journals. Hence, its impact was quite significant (Marx et al. 2014). The overview is presented in the table below.

Table 4.1 Early adoption: QCA applications per year (1984[7]–1997)

Year	Double-blind peer-reviewed journal articles	Other journal articles	Full books	Book chapters	Others	Total
1984	1	0	0	0	0	1
1985	0	0	0	0	0	0
1986	0	0	2	0	0	2
1987	1	0	0	0	0	1
1988	0	0	0	0	0	0
1989	1	0	0	0	0	1
1990	2	0	0	0	0	2
1991	4	0	2	6	1	13
1992	3	0	1	0	2	6
1993	3	0	2	2	1	8
1994	5	0	1	4	0	10
1995	5	1	0	1	2	9
1996	9	0	0	0	3	12
1997	5	1	2	1	3	12
Total	39	2	10	14	12	77

Source: Marx et al. 2014

In the following years, the QCA became increasingly popular in public policy analysis.

Rihoux et al. (2011) find 143 references with empirical application of QCA between 1992 and 2011, with a rapid increase after 2008. As for the policy domains, the QCA is mainly used for the policies related to welfare state, macroeconomic, health and environmental issues. QCA is also applied to issues related to party politics, comparative politics, sociology, criminology, governance or regulation. Some applications of QCA are also in the field of education, history, psychology and geography (Rihoux et al. 2011; Rihoux 2006; Marx et al. 2014; Warren et al. 2013). As regards level the analysis level, the majority of dealt with cross-country analytical studies (Rihoux et al. 2011).

[7] Although the Ragin's key book was published in 1987, the principles of the approach were roughly outlined in a paper in 1984.

Rihoux et al. (2011) emphasize that QCA could be very beneficial for policy analysis and practice as it helps to systematically compare policy programmes (cross-regional or cross-national comparison, e.g. OECD or EU, suitable for small or intermediate sample sizes), moreover it enables the discovery of more (alternative) pathways (policies) leading to an (un)desirable policy outcome (as opposed to the more conventional statistical methods).

4.3 QCA technique

There are three main types of QCA currently utilised (Rihoux et al. 2011; Marx et al. 2014; Haesebrouck 2016):

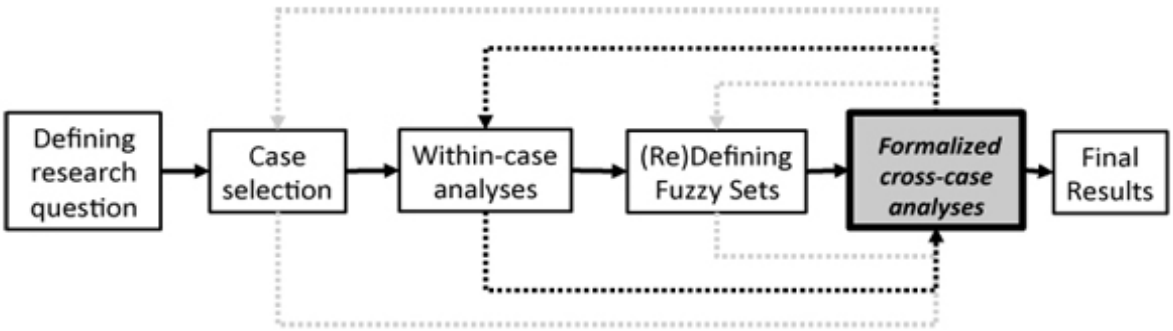
1) Crisp set (csQCA) – the original one, developed by Ragin (1987), using the conventional dichotomized Boolean sets ("0" or "1");
2) Fuzzy set (fsQCA) – later developed and incorporated by Ragin (2000), linking fuzzy sets with the analysis of the truth table;
3) Multi-value (mvQCA) – introduced by Cronqvist (2003), allowing multi-value conditions.

The last variant is used considerably less frequently than the csQCA and fsQCA (Haesebrouck 2016).

Rihoux et al. (2011) point out that the procedure is similar for all three variants of QCA.

The QCA research process is illustrated in Figure 1 below.

Figure 1 Research process with QCA



Source: Legewie 2013

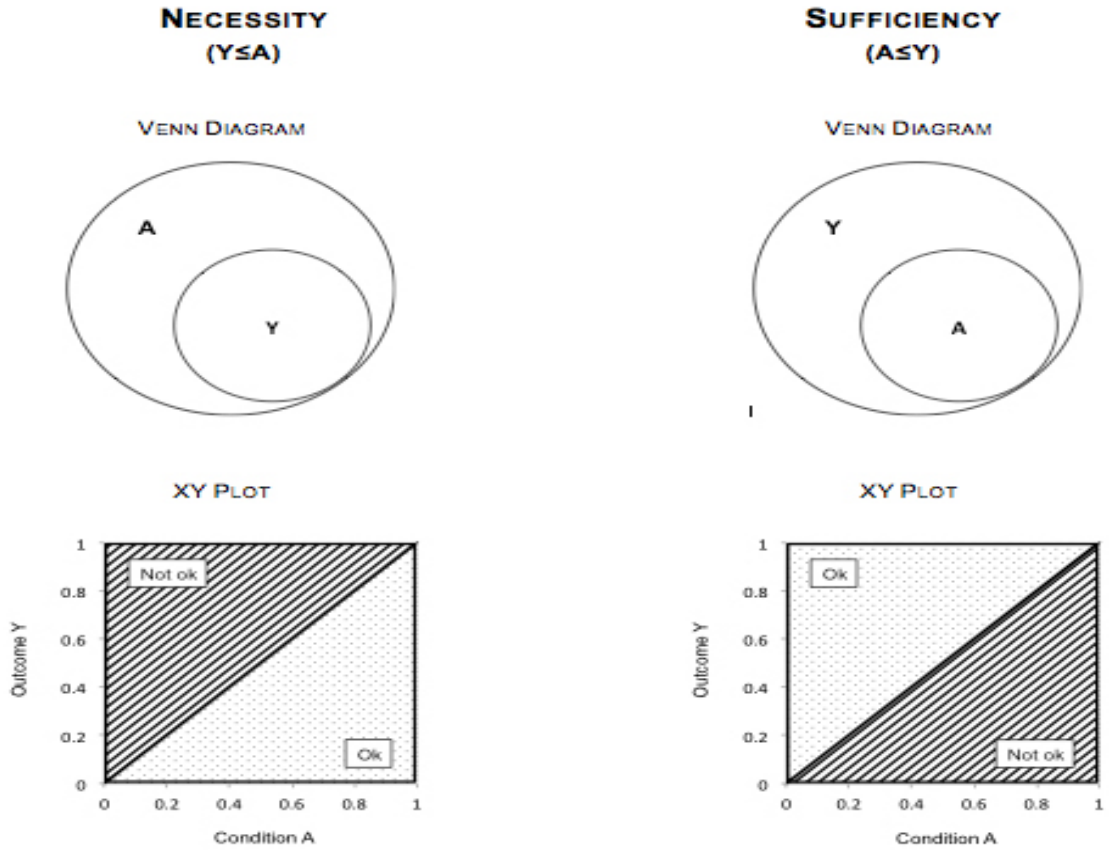
QCA seeks to identify conditions (or combinations of conditions) that are necessary or sufficient to produce the outcome (Ragin 1987; Warren et al; 2013 Legewie 2013).

"Condition A is necessary for outcome Y if the occurrence of Y is not possible without the presence of A, but A alone is not enough to produce Y. In such cases, all cases in which outcome Y occurs share the presence of condition A In fuzzy set terms, a necessary relation exists if outcome Y is a subset of causal condition A; that is, in each case the degree of membership in Y is less than or equal to the degree of membership in A ($Y \leq A$)." (Legewie 2013, para. 27).

"A condition A or combination of conditions X is sufficient for outcome Y if Y will always occur if A is present, but other conditions besides A that may also produce Y. Empirically, this means that all cases where A is present share the occurrence of Y. In fuzzy set terms, a sufficient relation exists if A is a subset of outcome Y; that is, across all cases the degree of membership in condition A or combination of conditions X is consistently less than or equal to the degree of membership in outcome Y ($A \leq Y$)." (Legewie 2013, para 28).

Both *necessity* and *sufficiency* are visualized in Figure 2 below (using fictive data).

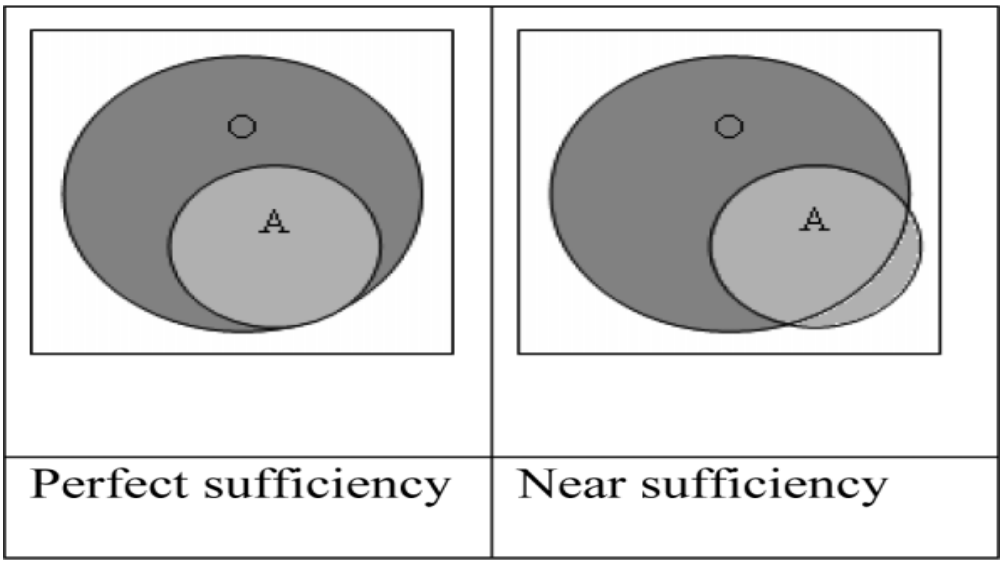
Figure 2 Necessity and Sufficiency - visualizations of logical relations



Source: Legewie 2013

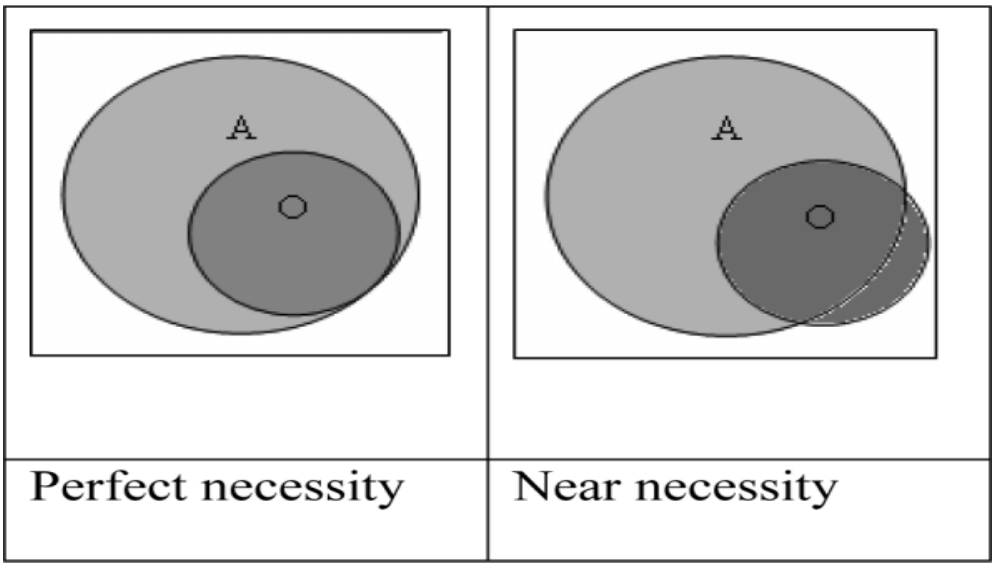
The Venn diagrams in Figure 2 showed the cases of *prefect necessity* and *perfect sufficiency*, which are rather theoretical concepts, but in practice it is not usually the case.
Much more common are cases of *near sufficiency* and *near necessity*, which are illustrated in Figures 3 and 4.

Figure 3 Perfect and Near Sufficiency



Source: Glaesser et al. 2009

Figure 4 Perfect and Near Necessity



Source: Glaesser et al. 2009

Thus, Ragin (2006) introduces and defines two crucial QCA measures *consistency* and *coverage* as follows:

"The first measure *consistency* assesses the degree to which a subset relation has been approximated, whereas the second measure *coverage* assesses the empirical relevance of a consistent subset." (Ragin 2006, p. 291).

"*Consistency* assesses the degree to which the cases sharing a given condition or combination of conditions agree in displaying the outcome in question." (Ragin 2006, p. 292).

The measure of *consistency* can be perceived as kind of significance in statistical models. Its values range from 0 – no consistency to 1 – perfect consistency (Legewie 2013).

"*Coverage*, by contrast, assesses the degree to which a cause or causal combination 'accounts for' instances of an outcome." (Ragin 2006, p. 292).

The measure of *coverage* can be perceived as kind of variance in statistical models, coefficient of determination R^2 in regression analysis. Its values range again from 0 to 1 (Legewie 2013; Thiem 2010; Glaesser et al. 2009).

There are two types of *coverage (*Ragin 2006; Glaesser et al. 2009*): unique coverage* (without overlap with other configuration*)* and *raw coverage* (including the cases covered also by other configurations).

There is usually a trade-off between these two measures, *consistency* often working against *coverage*. However, *coverage* should be always calculated and assessed only after addressing and assessing properly *consistency* (Ragin 2006; Thiem 2010).

How should the values of *consistency* and *coverage* (provided by the software) be interpreted resulting from the particular qualitative comparative analysis? As for the *consistency*, Ragin (2006, p. 293) point out that: "In general, consistency scores should be as close to 1.0 (perfect consistency) as possible. With observed consistency scores below 0.75, it becomes increasingly difficult on substantive grounds to maintain that a subset relation exists, even a very rough one." Therefore, models (studies) can be considered wrongly specified, if the solution consistency is below 0.75 (Legewie 2013). As far the *coverage*, the lower the (*raw*) *coverage i*s, the lower the empirical relevance of the analysis is (Legewie 2013).

The important tool for analysis of the data using the QCA is the so-called truth table, which uses Boolean sets. The example of the truth table (with hypothetical data can be found below).

Table 4.2 Exemplary truth table (hypothetical data)

	A	B	C	Cases	Outcome (Y)	Consistency
I	1	1	1	1	1	1.00
II	1	1	0	4	0	1.00
III	1	0	1	2	1	1.00
IV	0	1	1	0	?	?
V	1	0	0	1	0	0.00
VI	0	1	0	3	0	0.33
VII	0	0	1	0	?	?
VIII	0	0	0	1	0	0.00

Source: Legewie 2013

The table consists of all the logical configurations of the hypothetical data set; three hypothetical conditions (A, B, C) – condition present (1), or condition absent (0); number of cases corresponding to the particular configuration; Outcome; and level of Consistency of the particular configuration.

I believe that the truth table summarizes and illustrates well the principles and components of the QCA method.

5. National accreditation and funding schemes - impact on quality of higher education systems

5.1 Chapter introduction

As outlined in the thesis introduction the overall aim of the quality assurance activities should be certain enhancement of the quality of education and of the national higher education system as such (Langfeldt at al. 2010) Although the matter of quality of assurance in higher education has been widely discussed and analysed, there is lack of empirical research analysing impacts of quality assurance systems on performance on a macro (national) level. as admitted by Westerheijden (2010)

In this chapter, I will use the Qualitative comparative analysis (QCA) method, which was described in Chapter 4, in order to assess the impact of national quality assurance (accreditation) schemes and also other relevant features (such as the possibility of charging tuition fees by public universities, as well as the national language) of the higher education systems of 20 OECD countries on quality of the higher education sector measured by the selected world ranking of national higher education systems.

Each national accreditation system is somehow unique and has its specifics. However, while analysing the accreditation systems, two main patterns in terms of the general accreditation approach have been identified. The first one I call *improvement-oriented* as there is an emphasis on quality improvement, process of teaching and learning, and self-regulation through internal quality assurance mechanism. The second one I call *input-oriented* as it is primarily focused on inputs, e.g. academic staff ranks and their publications, programme curriculum features, individual course description or library resources.

The accreditation systems are divided into two groups also according to the possibility of competition between the accreditors, i.e. whether the higher education institutions in the system are free to choose the accreditation agency or not.

The accreditation schemes are also distinguished concerning the involvement of labour market representatives in the accreditation process (whether the labour market experts are somehow involved in the accreditation process or not)

As suggested in the thesis introduction, the study is not limited to the influence of the accreditation-related factors only.

The countries in the sample are also divided into two groups as regards the tuition fees, i.e. countries, where public universities are allowed (or not allowed) to charge tuition fees.

Finally, the distinction between English speaking and non-English speaking countries is included.

The following hypotheses have been formulated to be tested by QCA.

Hypothesis 1: The improvement-oriented accreditation approach leads to higher quality

Hypothesis 2: Competition between the accreditation agencies leads to higher quality.

Hypothesis 3: The involvement of labour market representatives in the accreditation process leads to higher quality.

Hypothesis 4: Charging tuition fees leads to higher quality.

5.2 Study design

Data - Variables (Conditions)

The factors introduced above were analysed in the decade from 2003 to 2012. The period was chosen considering that many countries introduced a formal system of accreditation at the beginning of the new millennium, and also taking into account the time lag of policy influence on the quality of universities and the whole sector. The country sample was influenced by availability of the relevant data.

The accreditation[8] approach is depicted by *Variable (Condition) A*. Czech Republic, Slovakia, Poland, and Latvia are the countries where the accreditation officials were predominantly concerned with inputs such as academic staff credentials, facilities or library resources, i.e. input-oriented approach prevailed. The Czech accreditation system was already criticized by OECD experts in 2006 in their evaluation report for focusing on the inputs instead of considering the whole institutional performance (Šebková 2009). Kohoutek (2014) points out that the Czech and Slovak accreditation systems shared the same shortcomings of strong reliance on programme inputs especially concerning academic staff ranks. In Poland, the

[8] The term accreditation is not used in all countries in the same context, e.g. in UK is term accreditation used rather for professional bodies and programmes. Australia, New Zealand, UK, and Finland used quality audit as the main tool for quality assurance (which shares many similarities with institutional accreditation approach). Combination of accreditation and audit elements were used in Sweden and Norway.

declared emphasis on internal quality assurance was only formal as the main reasons for not granting accreditation were related to input requirements (Chmielecka 2009). Rusakova and Rauhvargers (2009) add that the improvement-oriented elements were not enforced, thus only formal also in Latvia.

In all remaining countries[9] in the sample the main emphasis was placed on the process of student learning, self-improvement and an internal quality assurance mechanism, i.e. an improvement-oriented approach. As mentioned in the introduction, the accreditation systems of the countries within the group are certainly not identical. However, the improvement-oriented elements of the general approach are present in all cases outlined below. All Nordic countries in the sample can be definitely placed into this group. The improvement-oriented focus of the internal institutional quality assurance schemes was strongly encouraged by the Norwegian Agency for Quality Assurance in Education (Stensaker et al. 2011; Westerheijden et al. 2014; Stensaker 2007, Stensaker and Harvey 2006). The quality assurance system and internal processes of the higher education institutions were evaluated by the institutional audits in Finland (Kettunen 2012). In Sweden, the responsibility for the quality of the educational process was primarily with the institution of higher education (Foss Hansen 2009; Wahlén 2007). The Flemish[10] accreditation system was inspired by the Dutch model, which based on self-regulation and improvement, i.e. quality work inside institutions of higher education (Van Damme 2007; Westerheijden et al. 2014; Jeliazkova and Westerheijden 2007). Internal quality assurance measures were neglected neither by the accreditation agencies operating in Germany (Kehm 2010; Schade 2007; Bornmann et al. 2006). In Hungary, the higher education act was passed in 2005, and introduced the emphasis on internal quality assurance structures at higher education institutions (Rozsnyai 2009). In France the system introduced in 2006 shifted the focus from the inputs to the process of learning (NIAD-UE 2012). The quality assurance systems of the universities were also examined in Estonia (Vilgats and Heidmets 2011). The emphasis on the process of student learning, self-improvement and internal quality assurance procedures was present especially in the non-European countries included in the study. In New Zealand, the institutional academic audit placed a strong emphasis on enhancement-led, continuous improvement of quality processes (Kirkwood and Cameron 2013; Wahanga Tatari 2011). In the period observed, the Australian Universities Quality Agency (AUQA) conducted quality audits focused on strengthening internal quality assurance processes in universities (Shah et al.

[9] We consider the system prevailing in the period concerned. In France the system was introduced in 2006, in Hungary in 2005.

[10] As regards the factors related to accreditation, we consider only the Flemish part of Belgium due to the availability of data.

2011; Edwards 2012). The Chilean model of accreditation, which was introduced in 2006, resembles the US accreditation model, having self-assessment and peer review as key features of quality assessment (Espinoza and Gonzales 2012). The institutional certified accreditors in Japan focused mainly on learning and teaching, internal quality assurance systems (NIAD-UE 2014; Hou et al. 2015). There was no traditional quality assurance system in Canada in the period observed. The universities, however, had functioning internal quality assurance systems in place as they were primarily responsible for the quality themselves (Weinrib and Jones 2014). Mutuality (self-regulation) was the dominant mode of control of quality assurance in the United Kingdom as the institutional audit conducted by the Quality Assurance Agency for Higher Education (QAA) focused particularly on institutional internal quality assurance processes (Brown 2013; Brennan and Williams 2007; Hoecht 2006; King et al. 2007). Alderman (2005) adds that British approach is less concerned with inputs as the QAA audit teams were focused more on the quality of teaching delivered rather than on the credentials of the academic staff. And finally, as self-regulation can certainly be described, the approach used by the founding fathers of accreditation as the U.S. accreditation also focused on processes and quality management within the higher education institution, giving a strong emphasis to student learning outcomes and their analysis (Ewell 2010; Brittingham 2009; Ramírez 2015).

The factor of competition between accreditation agencies is reflected by *Variable (Condition) C*. In a majority of the countries in the sample, there was no competition between the accreditation agencies, i.e. there was only one national (regional) accreditation body granting the accreditation for the respective type of institution or degree.[11] Germany, the Netherlands, Belgium[12], Chile and Japan were the few countries with a so called open accreditation system, i.e. there was more than one official recognized accreditation agency eligible to conduct the accreditation process[13]. Therefore, higher education institutions were free to choose by which officially recognized agency they (or their degree programmes) wanted to be accredited. There were six officially recognized accreditation agencies operating in Germany (Kehm 2010; Serrano-Velarde 2008; Schade 2007). Since 2006 the National Accreditation Commission in Chile licensed private accreditors to conduct accreditation procedures (Espinoza and Gonzales 2012). In the period observed, four institutional certified accreditors operated in Japan (NIAD-UE 2014). The Netherlands Accreditation Organization produced an annual list of agencies

[11] In some countries, there was a special agency or association granting accreditation to professional (vocational) degree programmes.
[12] In Flanders
[13] Even for the institutions (degrees) of the same kind.

satisfying the set requirements for quality and expertise (Jeliazkova and Westerheijden 2007). Serrano-Velarde (2008) as well as Kehm (2010) mentions the Netherlands as a good example of an open accreditation system. The Dutch accreditation scheme served as an inspiration for the Flemish accreditation system implemented in 2004 (Van Damme 2007).

Participation of the labour market representatives in the accreditation process is captured by *Variable (Condition) L*. While labour market representatives were in some countries official members of the national accreditation bodies or reviewing panels, in some higher education systems the professional or vocational degrees were accredited separately by a specialized agency or professional association composed of practitioners. I have included both cases into one group for the sake of simplification for a binary truth table. Labour market representatives were official members of the national accreditation bodies or reviewing panels in Poland[14] (Dziennik Ustaw 2005), Australia (Tertiary Education Quality and Standards Agency 2012), Belgium (Van Damme 2007), Finland (Kettunen 2012; NOQA 2014), France (NIAD-UE 2012), Germany (Schade 2007; Kehm 2010), Hungary, (Rozsnyai 2009, Rozsnyai 2007), and Latvia (Rusakova and Rauhvargers 2009). Professional and vocational degrees were accredited separately by a specialized agency or professional association composed of practitioners and professionals from the relevant field in Canada (Weinrib and Jones 2014), Chile (Espinoza and Gonzales 2012), Japan (NIAD-UE 2014; Hou 2015), Netherlands (Jeliazkova and Westerheijden 2007; NIAD-UE 2011) Sweden (Foss Hansen 2009), United Kingdom (Brennan and Williams 2007), United States (CHEA 2010; Brittingham 2009), and New Zealand (Kirkwood and Cameron 2013, Wahanga Tatari 2011). In all those countries the labour market representatives were somehow involved in the accreditation process.

Participation of the labour market representatives in the accreditation process was not required in Czech Republic (Šebková 2009), Slovakia (Kohoutek 2014) Estonia (Vilgats and Heidmets 2011), and Norway (Foss Hansen 2009; Hansen et al. 2014).

The factor of tuition fees charged by public universities is depicted by *Variable (Condition) T*. There were no tuition fees charged to the full-time national students at public schools in Finland, Sweden, Norway, Czech Republic, Poland and Slovakia. In all remaining countries[15] of the sample, public schools did charge tuition fees in the period observed.[16][17] In all the countries of

[14] Since 2005

[15] In Germany, seven federal states introduced tuition fees in the year 2006 or 2007 (Achelpöhler et at. 2007).

[16] OECD, Education at a Glance, https://www.oecd-ilibrary.org/education/education-at-a-glance_19991487. I have examined all studies, which provided the information on tuition fees in the period from 2003 to 2012.

[17] "There is a dual track tuition system in Estonia. Those students who are admitted to state-funded places at the universities do not pay tuition. Universities can charge tuition from students admitted beyond state-commissioned study places.

the sample, with the exception for two countries[18], there was a majority of students enrolled in public universities[19] (OECD n.d.; Slantcheva and Levy 2007; Chernoshtan and Verovska 2016).

Finally, *Variable (Condition) H* captures the factor of English language as outlined in the introduction. The English-speaking countries in the sample are Australia, Canada, New Zealand, UK, and USA.

This information is summarized here in the binary truth table below using the abbreviations, as I suggested previously.

Table 5.1 Summary truth table

Country	L	A	C	T	H	QS HESS Rankings	Quartile Rank
Hungary	1	1	0	1	0	50+	4
Latvia	1	0	0	1	0	50+	4
Slovakia	0	0	0	0	0	50+	4
Estonia	0	1	0	1	0	49	4
Poland	1	0	0	0	0	43	4
Czech Republic	0	0	0	0	0	38	3
Norway	0	1	0	0	0	32	3
Chile	1	1	1	1	0	31	3
Finland	1	1	0	0	0	19	3
New Zealand	1	1	0	1	1	16	3
Belgium	1	1	1	1	0	15	2
Sweden	1	1	0	0	0	14	2
Japan	1	1	1	1	0	10	2
Netherlands	1	1	1	1	0	7	2
France	1	1	0	1	0	6	2
Canada	1	1	0	1	1	5	1
Australia	1	1	0	1	1	4	1
Germany	1	1	1	1	0	3	1
UK	1	1	0	1	1	2	1
USA	1	1	0	1	1	1	1

For the purposes of the analysis, the countries are also grouped into four quartiles according to their position in the QS Higher Education System Strength Rankings 2016 (Quacquarelli Symonds 2016). The internal rank 1 has been assigned to the countries that finished at the top of the sample, while rank 4 has been assigned to those at the bottom[20]. QS Higher Education

Universities can decide upon both the amount of the tuition fee as well as the number of students to charge." (OECD 2013a, p. 233)

[18] Japan and Chile

[19] In Belgium and UK was a majority of students enrolled in so called government-dependent private institutions (government-dependent private institution is one that receives more than 50% of its core funding from government agencies).

[20] 2018 edition of the ranking has been recently released. There are small changes in the ranks of some countries, but the division to the quartiles would remain the same.

System Strength Rankings is one of the two rankings currently available, which are focused on national higher education systems as a whole rather than on the individual universities. The ranking methodology is described in the following section.

Methodology of QS rankings

The QS Higher Education System Strength Rankings methodology compares the performance of the national systems in four areas, which are outlined in the following table.

Table 5.2 Methodology of QS Higher Education System Strength Rankings

Indicator	**Weight**	**Description**
System strength	25%	Each country is awarded a score based on the number of its institutions ranked 700 or above in the QS World University Rankings, divided by the average position of those institutions. The indicator assesses overall national system strength, based on performance in the international rankings.
Access	25%	Scores in this category are calculated based on the number of places available at universities ranked within the global top 500, divided by an indicator of population size. The specific figures used in this calculation are the total number of full-time equivalent students at universities in the top 500 of the QS World University Rankings, divided by the square root of the population. The indicator provides an indication of the chances of gaining a place at a world-class university for residents of the country in question
Flagship institution performance	25%	It is a normalized score, based on the place each nation's top university occupies in the QS World University Rankings. The indicator assesses the performance of the country's leading institution within the global rankings (based on the premise that the performance of a country's leading university is a credit to the overall system, often resulting from national investment in developing a flagship institution to lead the way).
Economic context	25%	An indexed score is awarded for each university featured in the rankings (7 points for a university in the top 100, 6 points for 101-200, 5 points for 201-300, 4 for 301-400, 3 for 401-500, 2 for 501-600 and 1 for 601-700), and this is then factored against the GDP per capita for the country in question. The indicator assesses the impact of national investment in higher education, by comparing each nation's financial situation to its performance in the international rankings.

Quacquarelli Symonds 2018d

As suggested above the country's ranking is influenced by the individual ranking of the respective universities. Therefore, I should also briefly state the methodological framework of the QS World University Rankings. Universities are evaluated according to the following six

metrics (Quacquarelli Symonds 2018f): academic reputation (40%), employer reputation (10%), faculty/student ratio (20%), citations per faculty (20%), international faculty ratio (5%), international student ratio (5%).

Estimation method - Qualitative comparative analysis (QCA)

The Qualitative comparative analysis (QCA) method has been chosen as the appropriate for the study. The origins and development, advantages and critique, applications as well as the main principles and technique of the method were presented in Chapter 4.

The main reason for the method selection was that QCA is suitable for an analysis and comparison of medium-N data samples (Legewie 2013; Rihoux et al. 2011), which is the case of my data sample (N=20).

Using QCA, I explore the effects of the accreditation system, the approach to cost sharing in higher education, and the official language of the respective countries on the quality of the higher education sector measured by a world ranking of higher education systems. While explanatory variables are strictly binary (0-1), ranking is in interval 1-4. Ranking was therefore fuzzyfied to lie in interval (0,1) as well. That means for countries with the highest ranking (first quartile) the value of R=1 - they are “fully in”. Countries in the third quartile are “mostly out”, having R=0,333.

Table 5.3 Table of configurations

bestfit	Freq.	Percent	Cum.
LAChT	5	25	25
LAcHT	5	25	50
LAchT	2	10	60
LAcht	2	10	70
LachT	1	5	75
Lacht	1	5	80
lAchT	1	5	85
lAcht	1	5	90
lacht	2	10	100
Total	20	100	

The table shows 9 possible configurations of the designated variables(conditions) in the sample. The most frequent configurations (25%) are LAChT and LAcHT, i.e. in both cases the systems with the accreditation approach mainly focused on the internal quality assurance mechanisms and processes, labour market representatives involved in the accreditation process, and public schools charging tuition fees.

Table 5.4 Coincidence matrix

	R	L	A	C	H	T
R	1					
L	0.933	1				
A	0.967	0.875	1			
C	0.667	1	1	1		
H	0.867	1	1	0	1	
T	0.833	0.929	0.929	1	1	1

Table 5.5 Sufficiency and necessity matrix

	R	L	A	C	H	T
R	1	0.933	0.967	0.333	0.433	0.833
L	0.583	1	0.875	0.312	0.312	0.812
A	0.604	0.875	1	0.312	0.312	0.812
C	0.667	1	1	1	0	1
H	0.867	1	1	0	1	1
T	0.595	0.929	0.929	0.357	0.357	1

The coincidence matrix shows clear evidence with regard to certain variables. Typical rank coincides with the accreditation process emphasis (A) in 96,7 % cases, followed closely by the involvement of the labour market experts (L) in 93,3% of cases, English language and tuition fees both exceeding 80%. It doesn't, however, imply higher rank. We are observing only coincidence intensity at this point.

Configuration analysis – results, main findings

Table 5.6 Configuration analysis

Set	YConsist	Set Value	F	P	NumBestFit
lacht	0.167	0.8	27.44	0	2
lAcht	0.333	0.8	.	.	1
lAchT	0	0.8	.	.	1
Lacht	0	0.8	.	.	1
LachT	0	0.8	.	.	1
LAcht	0.5	0.8	6.16	0.023	2
LAchT	0.333	0.8	3.72	0.069	2
LAcHT	0.867	0.8	0.3	0.592	5
LAChT	0.667	0.8	1.9	0.184	5

No configuration exceeds consistency of 0.8, which is the set (reference) value, while being also statistically significant. It seems that two configurations – LAcHT and LAChT have the greatest consistency of all variants, having 5 bestfit observations. Both configurations share accreditation system focused mainly on the internal quality assurance mechanisms (A), labour market representatives involved in the accreditation process (L), and public universities charging tuition fees (T). They differ in terms of the competition of agencies and English language.

After reducing the set value to 0.6 (i.e. 60%) and conducting consistency comparison (Y vs. N), we obtain the results presented in table 5.7 below.

Table 5.7 Consistency and coverage

Set	YCons	NCons	F	P	NumBestFit
LAcHT	0.867	0.133	8.98	0.007	5
Set	YConsist	Set Value	F	P	NumBestFit
LAcHT	0.867	0,6	4.75	0.042	5
Set Raw	Coverage	Unique Coverage		Solution Consistency	
L*A*c*H*T	**0.433**	**0.433**		**0.867**	
Total Coverage =	0.433				

The results show that there is actually just one type of education system leading to higher position in the ranking (quality of the system) – the LAcHT configuration. In the QCA terms, these are the conditions producing the outcome. Accreditation system focused mainly on the

internal quality assurance mechanisms and processes (A), labour market representatives involved in the accreditation process (L), and public universities charging tuition fees (T) have a positive impact on the ranking of the national higher education system. It also seems that English speaking countries (H) generally perform better. On the other hand, the presence of competition among accreditation agencies (c) does not account for higher rank. *Consistency* is quite high as the value of 0.867 exceeds the critical benchmark level of 0.75 set by Ragin (2006). Sample *Coverage* is good in relation to sample size.

The further discussion and interpretation of the results are provided in the next chapter.

Potential study limitations

The study may be limited by certain shortcomings of the selected method and ranking.

As for the potential shortcomings and critical views on the QCA approach, Rihoux (2003) summarizes the following sorts of critics raised. This first sort is related to the data dichotomization (potentially leading into a significant loss of information as well the arbitrariness of dichotomization – setting the threshold). The second sort of critique is related to the cases not being in the table but existing logically. The third type of critique concerns sensitiveness of QCA to the individual cases (the potential addition or removal of a single case can alter the results). The fourth sort of critique mentions difficulty of the relevant condition selection under QCA in comparison to other techniques. The fifth sort points out that independent variables are usually (as for the social sciences) interconnected somehow, thus not purely independent, which arguably challenges also QCA. The sixth type of criticism is connected to the black box problem. Finally, the static nature of the approach is being mentioned.

On the other hand, Rihoux (2003) refutes the critical objections and provides the following explanations and counterarguments. First, he points out that here is always a certain simplification concerning both in quantitative or qualitative empirical research. He reminds us that: "Dichotomization can be (should be) theoretically informed and the dichotomization threshold can be fine-tuned inductively while performing data exploration with QCA" (Rihoux 2003, p. 358). Second, in QCA the simplification of assumptions is more visible, compared to other analytical techniques, which also work with simplified hypothesis. Third, additional cases can actually help with detecting of another explanations. Fourth, the issue of variable (relevant condition) selections is shared by other social science research methods. Fifth, the conditions

under the QCA approach are not considered, in statistical terms, independent variables. Hence, this type of criticism is not reasonable. Sixth, QCA does not aim to deal with the black box of process as it is up to the researcher to interpret the results. Only the last objection is found relevant as "it identifies a real weakness of QCA: The method is static in its essence." Rihoux 2003, p. 358)

In general, university rankings, as quality measurement tools, have been looked upon by scholars very critically right from the beginning. Discrepancies between the nominal and attained indicator weights used by the most established rankings have been found (Soh 2013). As pointed out in the introduction, it has been also argued that university rankings tend to favour universities from English-speaking countries (Marginson 2007; Li et al. 2011; Huang 2012; Dobrota et al. 2016).

The QS university ranking methodology has been frequently criticized for overemphasizing reputation data based on surveys among academics and employers (Taylor and Braddock 2007; Federkeil 2008; Marginson 2007; Huang 2012; Marginson 2014; Jajo and Harrison 2014). On the contrary, Soh (2015) appreciates the QS rankings for reflecting on the conception of the modern university, which values synergic relationships with industry community and international cooperation. Dobrota et al. (2016) add that the QS ranking is not so affected by bibliometric preferences compared to other rankings as it is focused on various areas appealing to students, i.e. teaching, research, employability, and internationalization.

By all means, the QS ranking is one of the three most established and influential world university rankings (Millot 2015; Soh 2014; Soh 2015; Jajo and Harrison 2014; Dobrota et al. 2016).

Despite all the criticism and controversial nature, scholars frequently conclude their papers admitting that rankings are 'fait accompli', so we need to make sure it is used and interpreted carefully in an informed way (Taylor and Braddock 2007; Hazelkorn 2007; Federkeil 2008; Rauhvargers 2014; Dobrota et al. 2016). I believe that the rankings still arguably possess the only way to comprehensively and understandably measure the quality of higher education, both on an institutional and national level. Therefore, the selected ranking of higher education systems is used as the variable (Outcome in QCA terms) reflecting the quality.

5.3 Chapter conclusion

Based on the QCA results, I conclude that higher education systems with accreditation system focused mainly on internal quality assurance mechanisms, having professionals involved in the accreditation process, having a single body granting accreditation for the respective type of institution or degree, and allowing public universities to charge tuition fees do better in the higher education system strength ranking. The analysis also confirmed that English speaking countries perform generally better in the ranking.

As for the formulated hypotheses tested by QCA, the results are following:

Hypothesis 1: Improvement-oriented accreditation approach leads to higher quality

Result: hypothesis validated.

The improvement-oriented accreditation schemes seem to have better impact on quality than the ones focused only on the inputs to the learning process. Apparently, the main emphasis on quality improvement (self-regulation through internal quality assurance mechanisms) is very important. The issues related to the input-oriented schemes, i.e. the neglect of the learning process and student learning outcomes, seem to be problematic and the critique of this approach appears legitimate.

Hypothesis 2: Competition between the accreditation agencies lead to higher quality.

Result: hypothesis refuted.

The absence of competition, i.e. single accreditation agency for the respective type of institution or degree, seems to have a rather positive impact. I was expecting that competition stimulates quality of the accreditation agencies, which would lead to a higher quality of higher education. It might be the case that a higher number of agencies exercising the regulatory activity in higher education leads to greater risk of suboptimal outcome, contradictory regulation as suggested by Blackmur (2010).

Hypothesis 3: The involvement of labour market representatives in the accreditation process lead to higher quality.

Result: hypothesis validated.

The presence of the labour market experts also proved to have positive effects. It seems that the practitioners make sure that the curriculum is composed in a way which reflects the current needs of the labour market. Thus, it has a positive impact especially on the skills and competencies of the graduates, which lead to their higher employability and better prospects in the labour market.

Hypothesis 4: Charging tuition fees leads to higher quality.

Result: hypothesis validated.

The stronger incentives for students to complete their studies and to demand higher quality, as well as a certain regulation of the real interest of the prospective students to seek a university degree seem to be important aspects stimulating the quality of higher education.

I am aware of the concerns raised regarding the fact that the QS ranking methodology is significantly based on reputation surveys. In such a case, however, it can be said that the outlined conditions are likely to lead to a higher education system with reputable universities. As regards the factor of English language, I conclude that the English-speaking countries do better in the ranking. The study did not aim to analyze, whether it is really caused by the quality of the higher education system, or by a possible bias of the ranking in favour of English-speaking countries. It is easier to publish and get cited for native English speakers. It is also easier for universities located in an English-speaking environment to attract more and international students. It is a question whether a university in an Anglophone country is better than a university, which is otherwise identical, in for instance continental Europe. I don't think it is the case.

6. Accreditation of higher education in the Czech Republic – policy, empirical and comparative perspective[21]

6.1 Chapter introduction

A rapid increase of students and a demand for regulation of new private higher education providers were the main driving forces for an introduction of compulsory accreditation, legally codified by Czech Higher Education Act No. 111/1998 Coll. (Šebková 2007; Kohoutek 2014). The period before, i.e. 1990 to 1998, may be called *implicit accreditation* (Šebková 2007) or *experimental accreditation* (Kohoutek 2014).

The former Czech accreditation system was intensively discussed and criticized among the academic community and university representatives for many years. Major changes, e.g. the concept of institutional accreditation, were implemented formally by the Higher Education Act amendment as of September 1, 2016. In 2017 the newly established accreditation agency dealt with the new accreditation methodology and guidelines, and also with pending issues from the former period related to individual programmes of study. The actual full implementation of policy changes started in 2018.

The chapter analyses the Czech accreditation system and provides a comparison with the accreditation approached by the accreditation founding fathers, i.e. the United States (U.S.). First, it describes the former system used in the Czech Republic. The following section deals with the main shortcomings of the system and provides rationale for why it couldn't continue the same way. The Higher Education Act amendment is also considered and analysed. Finally, the accreditation system used in the USA is discussed, analysed and followed by a discussion regarding the role and value of accreditation. Economic policy perspectives related to the accreditation process, such as unemployment, economic regulation, the principal-agent problem, Gresham's law, information asymmetry, human capital and signalling theory are also discussed in this chapter.

[21] The chapter has been partly published. Vašenda, J. (2018). Czech Higher Education Policy: The Case of Accreditation. *Journal of Business & Economic Policy,* 5(4), 72-79.

6.2 Accreditation in the Czech Republic – former system

There was a programme accreditation scheme used as a main tool for quality assurance in Czech higher education. It means that a university was required to have accredited each programme or field of study separately by the Accreditation Commission to be eligible to offer and issue a diploma for the particular degree (e.g. Bc. or Mgr.) Although the accreditation was officially granted by the Ministry of Education, only in very exceptional cases[22] did the ministry overrule a recommendation of the Accreditation Commission of the Czech Republic (hereinafter 'Accreditation Commission' or 'ACCR')[23]. Therefore, the ACCR was certainly an influential player. The members of the Accreditation Commission were appointed by the government.

The former Czech accreditation system had a two tier character. This means that every university degree consisted of a respective study programme and a field of study. A study programme was defined broadly and might contain more than one field of study.

Application for accreditation (or its expansion or extension) must have included information about certain features of the programme to be offered, specifically: Characteristics of the field of study (study programme); profile of the graduate (including the occupational profile) and programme objectives; number of accepted applicants to study in the academic year; data regarding space, information and technical resources to support the study programme; Information about the programme curriculum and its structure; description of all individual courses in the programme including required and recommended literature; information about the state exams, proposed thesis topics and defended thesis topics examples; admission requirements; scientific, research, development, artistic and other innovative activity related to the study programme; profiles of all academic staff members expected to teach in the programme with particular attention to their rank, selected recent publications (in the last 5 years), and also to the type and extent of their employment contract. Comprehensive data about the academic staff should have been provided as well, e.g. total headcount of Full Professors (also their FTE), Associate Professors (also their FTE), Assistant Professors, Instructors, Assistants and other academic staff (Akreditační komise Česká republika 2016).

[22] The case of the Law Faculty, University of West Bohemia is the most famous example, when the ministry didn't respect the recommendation of ACCR. The ministry also didn't follow the ACCR's recommendations to withdraw the accreditation. of the College of Banking and to limit the accreditation of The Jan Amos Komensky University. All the cases belong to the period of 2011 and 2012.

[23] https://www.akreditacnikomise.cz/

Universities were required to designate a guarantor for each programme submitted for (re)accreditation. The requirements were set by the Higher Education Act as follows: A guarantor of the study programme must hold a rank of Associate professor ('docent') or a Professor in the field of study in which she/he should be a guarantor of quality and development and the guarantor's publication or artistic activities within the last five years related to the guaranteed field are sufficient. She/he must have a full employment contract at the respective institution and his/her another employment at another institution cannot exceed a half-time workload. The guarantor could guarantee only one bachelor, one master and one doctoral study programme at a time (Accreditation Commission Czech Republic 2016).

ACCR would also assess whether the profile of the graduate (including the occupational profile), programme objectives, selection of required courses, content of the state exam and proposed final thesis topics were in mutual correspondence and thus create a coherent integral entity. Strong emphasis was on academic staff ranks (taking into account their recent publication record) and also on the credentials of the programme guarantor.

Finally, the ACCR also made recommendations on (not)granting a state consent to a legal entity wishing to operate as a private university. An application for the state consent must have also included a study programme(s) offered by the institution. The standards and requirements were basically the same as described above.

6.3 Shortcomings of the former system and reasons for a change

The former scheme of the programme accreditation presented administrative burden for the university administration as they needed to submit all the required information on every individual programme they wanted to accredit or re-accredit. Moreover, the provided information very often overlapped as many courses featured in various programmes and the same applies to many instructors.

The two-tier characteristic of programme accreditation made the system ratherconfusing and more complicated than anything else. What is the need for having study programmes divided into individual study fields of study? Besides, I believe that anywhere else in the academic environment the expression 'field' has a broader meaning than 'programme' unlike in the case of the Czech accreditation.

The main issue connected with the system was that ACCR focused primarily on inputs (i.e. academic staff ranks and their publications, programme and individual course description).

Much less attention was paid to the process of internal quality assurance and the student learning outcomes. The fact that the system was more focused on the inputs instead of considering the whole institutional performance was already criticized by OECD experts in their 2006 evaluation report (Šebková 2009).

Another issue is that of the programme guarantor. The requirements for the programme guarantor were not favourable towards private universities. As mentioned before ranks of the academic staff teaching in the programme and especially credentials of the programme guarantor were the crucial attributes when the accreditation proposal was assessed by the ACCR. One disadvantage for private schools is that only public universities possess the right to appoint full professors or associate professors (which is the minimum requirement for the programme guarantor). No private university has this privilege. A university needs to have accreditation for appointing the professors and associate professors, which is again based on the requirement of having enough professors and associate professors.

Academic staff possessing a rank of the full professor or associate professor ('docent') are entitled to use their rank at all universities in the country unlike for instance in the case of the USA where the title is linked to the institution, which awarded the academic rank.

The requirement of having an internal full-time programme guarantor (prior to 2011 an external guarantor was accepted) may be understandable in principle, yet it can actually prove quite problematic, as seen in the following examples from Czech academia. The idea was to avoid the situation that one university professor was guaranteeing programmes at several institutions at the same time. The high profile full-time internal guarantor should be the one around whom the programme is built and developed. The same principle applies to the phenomena of so called 'turbo' professors featured at several programmes in several universities at the same time with his/her total workload significantly exceeding a plausible amount. A problem, however, may appear with regard to the decision-making process, as the role of the programme guarantor has not been clear in that respect. An important factor to note here is that the decision-making power has always been with the respective programme director (department chair, dean of the faculty offering the programme) so the role of the programme guarantor in terms of decision-making was rather a formality, as the respective dean or chair didn't always also perform the role of programme guarantor. The need to have a programme guarantor may be seen as problematic also from another stand point. The ACCR was already assessing the programme content including the academic staff credentials, curriculum etc. so there was no need to have the requirement for the programme guarantor. Conversely, the high-profile programme guarantor

is the one who should oversee and guarantee the quality of the programme so there shouldn't be a need to assess the programme content for a second time as it would suggest that the role of the guarantor is again rather formal. Therefore, neither external nor internal programme guarantor are needed.

Although the ranks of academic staff are important, and certainly are prerequisites for a good instruction (as academic staff members having higher academic ranks possess stronger academic experience and publication records) this, does not necessarily always guarantee better student learning outcomes (Alderman 2005).

Another potential problem may be described by the following example: Let's assume that a university professor teaches the same course (e.g. Foundations of economics) in similar programmes (e.g. Business administration) at two different universities. While a programme director at one university instructed the professor to require a certain level of the student performance, a programme director at another university might be satisfied with lower student effort and achievement. The 'value' of the same professor in the programme accreditation proposal of both universities, when assessed by ACCR, was the same (e.g. 0.5 FTE Professor) but the learning outcomes delivered by the professor might differ significantly.

Here is some empirical evidence of the ACCR recommendation standpoints. The negative recommendations made by the ACCR between 2002 and 2016 are numbered and classified in Table 6.1 below[24]. I've divided the reasons for not granting the accreditation (including expansion or extension) into 4 categories, i.e. *academic staff*, *programme guarantor*, *curricular issues*, and *other* reasons. The reasoning related to the individual programme accreditation cases mentioned in the reports published by ACCR[25] might fall to more than one category. While between years 2010 and 2015, the most frequent reason claimed by ACCR were unsatisfactory credentials of the academic staff featuring in the respective programme, prior to that, from 2002 to 2009, ACCR was mostly concerned with the proposed programme curriculum and related issues. Reasons classified into the category *Other* were mainly unsatisfactory study guides for a combined form of study and technical (formal) flaws of the application. From the table data is also apparent that a programme guarantor became an issue only after the introduction of the internal programme guarantor requirement in 2011.

[24] Only bachelor and master's programmes are considered, I did not consider accreditation of rigorous exams (so called 'small doctorate' leading to a degree PhDr.), which is a phenomenon connected to Central Europe, even though it is officially regarded as a master degree by the Czech Ministry of Education. I also did not consider different language mutation of the very same programme (it is considered as one accreditation case).

[25] Akreditační komise ČR: Zápisy ze zasedání, https://www.akreditacnikomise.cz/cs/

Table 6.1 Reasons for not granting accreditation

Year	Negative recommendations	Academic staff	Programme guarantor	Curricular issues	Other
2015	62	40	23	36	16
2014	67	45	20	34	20
2013	64	52	27	36	14
2012	98	57	26	50	37
2011	104	70	22	56	32
2010	106	77	2	65	25
2009	112	62		70	30
2008	120	66		85	12
2007	105	40		80	17
2006	74	36		45	25
2005	54	29		39	5
2004	63	17		51	9
2003	68	37		48	11
2002	121	35		36	64

Source: by author

Westerheijden (2001) regards such a system of programme accreditation focusing on standards for inputs (academic staff, curriculum plans, facilities) as a 'first generation accreditation' system, which was implemented in the mid-90s in Central and East European Countries. It was caused by the situation in the region as a redefinition of the minimum quality levels after the fall of communism was needed (Van der Wende and Westerheijden 2003). This could have been used as an excuse in the 90s, but the accreditation system in the Czech Republic should have been changed much sooner than in 2016.

Kohoutek (2014) proposed replacing the programme accreditation scheme with a quality audit. The Czech accreditation system has been finally altered by the Higher Education Act amendment, which will be mentioned in the following section.

6.4 Higher Education Act amendment and new accreditation scheme

The Czech accreditation system was altered significantly by the amendment of the Higher Education Act, which became effective in September 2016. According to the amendment the institutional accreditation was introduced, which means that institutions of higher education now have a chance to be accredited as a whole. Under such a scheme a university is able to receive the institutional accreditation for a particular subject area(s) and is eligible to offer degree programmes within the designated subject area without being obliged to have each study programme accredited separately. The accreditation may be granted for 10 years (in some

specific cases for 5 years only) based on a detailed self-evaluation submitted by the respective institution (Zákon č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů).

The National Accreditation Bureau for Higher Education (hereinafter National Accreditation Bureau) has been established as a new quality assurance body, instead of the Accreditation Commission. The National Accreditation Bureau is technically an organisation unit of the Czech ministry of education but the office is expected to be completely independent regarding its decision-making. The National Accreditation Bureau makes decisions especially on the institutional accreditation, also on programme and other accreditations. The head officer of the body is the Chairperson of National Accreditation Bureau who appoints the evaluation committees to conduct the evaluation and assessment. The Board of National Accreditation Bureau consisting of 15 members serves as the executive body of National Accreditation Bureau (Zákon č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů). All members of the council, including the chairperson, have already been appointed.

The rights of the National Accreditation Bureau are stronger compared to its predecessor. Previously, Accreditation Commission could only take an official stance but the newly established body will be able to make the ultimate decision on granting accreditation. The role of the ministry has been diminished under the new scenario and the National Accreditation Bureau became the supreme regulator of the higher education market in the country.

Standards for institutional accreditation include requirements for the institutional environment, particularly requirements for a strategy and university governance, study programmes and its students, research, international cooperation, student internships, academic staff members, university resources. Universities seeking institutional accreditation are required to establish a Council for internal assessment as the key body conducting and monitoring the process of internal quality management (Zákon č. 111/1998 Sb., o vysokých školách a o změně a doplnění dalších zákonů). The universities must also prove that they have developed appropriate internal regulations for the process of approval and adjustment of individual programmes.

The requirements for the programmes must correspond to the requirements set by the accreditation standards (Národní akreditační úřad pro vysoké školství 2017). The requirements for the study programme are related especially to the content of the programmes, profile of the graduate, professional knowledge and skills with regard to the respective subject area, requirements for the academic staff credentials, resources supporting the programme, international cooperation and student internships, equal access for handicapped applicants and students to the higher education must be guaranteed (Zákon č. 111/1998 Sb., o vysokých

školách a o změně a doplnění dalších zákonů; Nařízení vlády č. 274/2016 Sb. ze dne 24. srpna o standardech pro akreditace ve vysokém školství).

Although the concept (option) of institutional accreditation was introduced, programme accreditation still remains as an option. It seems that this option will be used especially by smaller and private universities. There is one significant change related to the programme accreditation requirements, in comparison to the previous accreditation system. In addition to the notorious required forms (including programme curriculum, description of individual courses etc.) universities need to submit also a self-evaluation report, which is related to the respective programme but also partly to the whole institutional environment. Universities should provide their own commentary to individual standards, i.e. how the university sees itself fulfilling particular standards. Although it creates more administrative work for universities, I believe that a self-evaluation report provides a good option for universities to give further explanation in addition to the information submitted in the required forms. This was not very possible under the previous scheme, which could create misunderstandings and an incomplete picture for evaluators. It also forces the university to think more about the particular aspects of the program and try to identify shortcomings, which can be improved.

The new accreditation standards (Nařízení vlády č. 274/2016 Sb. ze dne 24. srpna o standardech pro akreditace ve vysokém školství) specify quite detailed requirements for the academic staff credentials. There are some general requirements (related to all courses in the programme) as follows. The number, qualification and age structure of the faculty featuring in the programme should be appropriate (academic ranks and publication record in the last 5 years is considered). The total engagement of faculty member (including contracts with other universities) cannot exceed 1.5, i.e. 60 hours/week – to be considered for the sake of accreditation. Engagements up to 0.2 signed for a limited period (one year at the most) are neglected. All faculty members must hold at least a master's degree (with the exception for art programmes - in such a case the faculty member must prove sufficient professional expertise). Final theses should be supervised by permanent academic staff members (adjuncts could be accepted in exceptional justified cases). There are, however, also some specific requirements related to specific courses of the programme curriculum. There were two new categories of courses introduced, which are crucial with regard to the assessment of the academic staff featuring in the programme, i.e. *profile courses* and *basic theoretical profile courses* (subset of *profile courses Profile courses* must be instructed only by permanent academic staff members (professional experts could work as adjuncts in single justified cases –e.g. laboratory, studio instruction). *Basic theoretical profile*

courses must be guaranteed (instructed) only by full-time (1.0) permanent academic staff members (less than 1.0 could be accepted in exceptional justified cases). There are also specifications as for the level of the degree programme. At the bachelor's level, *basic theoretical profile courses* must be guaranteed (instructed) by an academic staff member holding at least a doctoral degree (with the exception of art programmes). *Profile courses* should be guaranteed (instructed) by an academic staff member holding at least a doctoral degree (with the exception of art programmes). At a master's level, *basic theoretical profile courses* must be guaranteed (instructed) by an academic staff member having at least a rank of 'docent'(with the exception of art programmes). *Profile courses* must be guaranteed (i.e. instructed in our case) by an academic staff member holding at least a doctoral degree (with the exception of art programmes).

I understand, in principle, why these course categories were implemented. The (*basic theoretical*) *profile courses* should be the crucial courses of the programme curriculum, which need to be instructed by academic staff members with appropriate degrees and type of work contract. Nonetheless, there are no specifying guidelines and the classification of individual programme courses into the suggested categories is left up to the discretion of the university (and the accreditation evaluators of course). I think it might lead to a situation that similar cases are assessed differently depending on the respective accreditation evaluators.

What I find also problematic about the title requirements is the exemption given to the art programmes where an absence of the master's degree can be compensated by sufficient professional expertise. In such a case, the same exemption should be given also to other fields. I would see it reasonable to give the same exemption to all professionally-related programmes. This brings me to another related problem. There are also new types of bachelor's and master's degree programmes, i.e. *academic programmes* and *professional programmes*. However, the requirements as regards academic staff ranks and types of contracts are the same. I would understand if the respective requirements for the *professional programmes* were more lenient, the same way it is in the case of the art programmes.

The new accreditation standards (Nařízení vlády č. 274/2016 Sb. ze dne 24. srpna o standardech pro akreditace ve vysokém školství) also set requirements related to creative, scientific and artistic activity. As for the academic staff of the programme, the following rules are applied. Three main creative activity outputs (publications) in the last five years related to the particular course instructed by the academic staff member are taken into account. Publications in impact factor journals, peer-reviewed scientific journals, monographies, as well as professional and

artistic experience, are considered. Quality and relevance (whether it relates to the course instructed by the faculty member) of the publications are also taken into account.

There are also general requirements for the respective programmes (according to the type and level)

- *Bachelor's and master's professional's programme* - creative activity is required
- *Bachelor's and master's academic programme* – scientific or artistic activity is required
- *Master's academic programme*– scientific or artistic grants and projects during last five years are required
- *Master's professional programme*– scientific or artistic grants and projects in last three years are required (applied or contractual research projects could work instead)
- *Master's academic and doctoral program* –the scientific or artistic activity must correspond to the respective international level.

Academic staff members involved in the grants and projects must be also involved in teaching of the required classes of the programme in particular (Nařízení vlády č. 274/2016 Sb. ze dne 24. srpna o standardech pro akreditace ve vysokém školství).

The consideration of the publication record of the faculty members in the last five years was already present in the former accreditation scheme. However, the linkage to the particular courses taught by an academic member is new. I believe that rule is very strict if taken seriously by the evaluators. Again, I think this requirement might lead to a situation that similar cases are assessed differently depending on the respective accreditation evaluators.

I am afraid that the discussion above (regarding requirements for academic staff ranks and publication records) suggest that those factors will play important role in (not) granting the accreditation.

Universities still have the responsibility to designate guarantors for the individual programmes. While the requirements for the master's programme guarantor remain the same (full time academic staff members having a minimum rank of assoc. professor), the requirements for the bachelor programme guarantor have been lessened. Under the new scheme a full-time academic staff member having a doctoral degree is also eligible to guarantee a bachelor programme.

I believe that the step towards the institutional accreditation process is certainly moving in the right direction. Institutional accreditation should also strengthen the internal mechanisms of

quality control, which are more important for the daily operations of the university than the external ones. Good universities, though, conduct an internal quality evaluation already without any external coercion. Moreover, it is not guaranteed that the newly established body Council for internal assessment itself would increase the efficiency of the internal quality assurance process. However, the option of the institutional accreditation emphasizing the internal quality management is a step in the right direction in the long run.

Another significant change introduced by the amendment is the abolishment of the fields of study (within the study programmes), which should make the system clearer and easier to understand. Non-obligatory *specializations* have been introduced instead. I find this solution to be the right one.

The amendment keeps the requirement of the programme guarantor, so all the described issues connected to the phenomena remain unsolved. Moreover, it could undermine the main philosophy of the institutional accreditation, under which the institution is assessed and accredited as a whole. The amendment designates 37 subject areas, for which universities may receive the institutional accreditation. It means that for instance a university might be found eligible for a certain subject area (and would be allowed to offer any relevant degree programme) but it might not be found eligible in terms of another subject area. Therefore, the system may be actually called a system of 'subject area accreditation' rather than 'institutional accreditation'. Moreover, universities are required to have at least one programme belonging to the respective subject area already accredited for 10 years at the time of application, which excludes some applications right from the beginning. Again, I see no rationale behind such a requirement. It seems that the system has been designed mainly for the established big public universities.

The National Accreditation Bureau firstly dealt with the new accreditation methodology and guidelines, and also with pending issues from the former period related to individual programmes of study. Recently, the first applications for institutional accreditation of big public universities have been evaluated.

The decisions made by the National Accreditation Bureau in 2018[26] suggest that the factor of academic staff (publications and rank) might still play an important role in the final decisions, not only in case of the programme but also in the case of the institutional accreditation.

[26] Národní akreditační úřad pro vysoké školství: Zápisy ze zasedání 2018, https://www.nauvs.cz/index.php/cs/zapisy-ze-zasedani-rady-nau/144-zapisy-ze-zasedani-rady-nau-v-roce-2018

However, it still very soon to provide any comprehensive analysis of the new accreditation system. Thus, it is still too soon to judge, whether we will really shift from the input-based system to an improvement-based system paying attention to student learning, or not. The long-term review of the decisions made by the National Accreditation Bureau will be certainly the subject of my future research.

6.5 Accreditation in the USA

The U.S. accreditation model was chosen for comparison because the United States can be certainly regarded as the founding fathers of accreditation in higher education having a century-long tradition of institutional accreditation (Ewell 2010; Weissburg 2008; Kohoutek 2009). Moreover, the U.S. higher education system ranks at the top of the rankings of national higher education systems (e.g. Quacquarelli Symonds 2016; Melbourne Institute of Applied Economic and Social Research 2017), and for instance Stensaker (2011) admits that the leading position of US universities and the system of accreditation might be related.

The system of accreditation in the U.S. differs significantly from the system used in the Czech Republic. The U.S. Department of Education (hereinafter 'USDE') in collaboration with The Council for Higher Education Accreditation (hereinafter 'CHEA') approves (accredits) the accreditation granting bodies, i.e. accrediting organisations, which have the right to accredit U.S. universities or in some cases (e.g. law, medicine, engineering or health professions) also individual programmes. The USDE currently recognises the national, regional and programme accrediting organisations. The regional accrediting organisations are definitely the most prestigious ones as they accredit all the famous U.S. universities. More than 23 994 000 students were enrolled in accredited institutions in 2012-2013. Regionally accredited institutions are home to more than 20 297 000 of these enrolees (CHEA n.d.).

There are currently 6 major regional accreditation associations operating within the respective regions of the United States. The Regional accreditors assess each institution of higher education as a whole. Thus, the following text refers to the so called institutional accreditation.

The process of the accrediting organization recognition is similar to university accreditation in many ways. CHEA and USDE each develop standards that must be met by an accrediting organisation in order to be recognised and the accrediting organisation undertakes self-evaluation based on recognition standards (Eaton 2015). While the CHEA standards are quite

broad and general, the USDE standards require accrediting organisations to maintain criteria or standards in specific areas.

The described process of delegation from the USDE to accreditors, however, may lead into the principal-agent problem. The situation in the U.S. is very similar to the Czech Republic (i.e. the USDE is the main principal and the accreditors should serve as the agents) with only one exception. The accreditation organisations often see also the accredited institutions as their principals also as they are funded by the institutional dues and fees from members of the respective regional accrediting association, i.e. accredited institutions (Weissburg 2008). The accreditors are sometimes considered sort of 'buffers' between government control and institutional autonomy (Wergin 2005; Brittingham 2009).

The CHEA and USDE recognise many of the same accrediting organisations, but not all as the goals of the two recognition processes are different. CHEA assures that accreditors contribute to maintaining and improving academic quality. USDE recognition, on the contrary, is compulsory for accrediting organisations whose institutions or programmes wants to become eligible for the federal student aid funding (Eaton 2015). There is also a difference in terms of funding as CHEA recognition is funded by institutional dues (paid by its institutional members) while USDE recognition is funded by the U.S. Congress.

Accreditation in the USA is not officially compulsory. However, unaccredited institutions are excluded from federal funding (Alderman 2005). For instance, in 2015-16, undergraduate and graduate students received $158.3 billion in student aid from the federal budget (College Board 2016), which shows that the role of accreditation in public finance terms is enormous.

Even though accreditation is voluntary and non-governmental issue in principle, the eligibility for certain federal funds (via student financial aid programmes, which are linked to the accreditation status) moved U.S. accreditation system towards a quasi-governmental status. It means a certain convergence to the European approach, where universities are obligated to have institutional or programme accreditation. Therefore, accreditation is used as a regulatory instrument by the respective governments (Bogue and Hall 2003; Kohoutek 2009).

As suggested briefly in the prior text, the USDE standards are more specific than the ones set by the CHEA. Here are some specific standards, which universities must comply with to become accredited by any of the regional accrediting organisations: First, the university needs to define its purpose and establish its objectives accordingly. This means that the university knows where it's going and how to get there. Strategic planning has a long tradition in the U.S.

as institutions of higher education were created by boards and presidents, from the top down (Rhoades and Sporn 2002). The U.S. accreditation system highly emphasises so called data driven decision making, which suggests that universities carefully analyse the relevant data and make the necessary changes accordingly. Thus, the U.S. universities are expected to collect, evaluate and make public data about student achievement and performance with special attention to evidence of student learning outcomes and data on retention and graduation (WASC 2013; SACS 2012; SACS 2017).

The issue of student learning outcomes evidence in addition to retention and graduation figures analysis can be regarded as the cornerstone of the current U.S. accreditation system. The so-called assessment movement in the U.S. higher education started in the 1980s, which led to a change in terms of how the quality is judged and defined, i.e. universities stopped being judged according to their inputs and resources but rather according to processes and outcomes. What the university has is no longer as important as what the university actually does with it what it has (Wergin 2005). Ewell (2010) dates this period of learning outcomes emergence specifically from 1983 to 1991.

An institution must define its student learning outcomes at the institutional, programme and individual course level and make sure that the stated learning outcomes are met. It suggests that all individual class assignments should be linked to the course learning outcomes (which are related to the programme ones and eventually to the institutional ones). Universities are advised to draw so called curriculum maps reflecting the respective degree programme structure and propose steps for improvement in order to meet the defined institutional learning outcomes (WASC 2013; SACS 2012; SACS 2017).[27]

Measurement of learning outcomes is not an easy task especially in certain academic disciplines. Student achievements can be measured quite comfortably for instance in the field of mathematics or civil engineering unlike in some social sciences or humanities, where any exact measurement of the learning outcomes might be problematic. Universities, however, need to make the effort in that regard. Collection and analysis of the data regarding student graduation and retention is also closely monitored by U.S. accreditation organizations.

[27] I use and interpret materials of the Western Association of Schools and Colleges (WASC) because I have a first-hand experience with this association. I have been a staff member (of the office dealing with accreditation agenda) of the Anglo-American university, which went through successfully the accreditation process with WASC Senior College and University Commission. The Southern Association of Colleges and Schools (SACS) accredits George Mason University, where I spent one semester as a visiting scholar, so I also have a certain experience with this association.

As mentioned above, only the students enrolled in officially accredited institutions are eligible for the federal financial aid, so the role of accreditation is to make sure that the vast amount of federal funds invested in higher education is spent properly and effectively (including avoidance of high student loans default rate). Therefore, the universities seeking the accreditation should ensure that acceptable proportion of their students complete their degree on time (WASC 2013). Basically, universities should be able to select the right students already through the admission process and work with them (support them) so they will be able to succeed. This approach contradicts the approach used by several Czech public universities, which often proudly state that a high percentage of their students do not graduate because they cannot meet the challenging requirements. U.S. universities are recommended to benchmark their graduation and retention numbers against their peer institutions, or against their own aspirations. Generally speaking, however, the higher the graduation and retention rates, the better the university, from the accreditors' (or USDE) point of view. The question is - what approach is actually the right one? The U.S. system which emphasises high graduation rates certainly tries to avoid the inefficiency of public funding of higher education. On the contrary, it might lead to lowering quality standards in some cases. The issue of completion rates certainly needs to be analysed according to its context. High graduation rates in the case of a high-profile university may suggest that the university work very well with its students, while high graduation rates, in the case of some less reputable institutions, may suggest that the university operates rather as a 'degree mill'.

Although the model of institutional accreditation deals with the institution as a whole, there are also criteria and standards related to individual degree programmes (WASC 2013): Universities are required to conduct a regular systematic (4-8 years) review of their degree programmes. Again, the main attention is paid to programme learning outcomes and the students' achievements analysis (i.e. retention and completion rates). All relevant stakeholders, including alumni, current students, employers, practitioners etc. should be involved in the academic programme review. The undergraduate programmes should develop primarily the core competencies (such as written and oral communication, so called quantitative reasoning, information literacy and critical thinking). Obviously, the degree programmes must also include significant in-depth study in the respective area. In terms of the graduate programmes, institutions need to ensure that students are actively engaged with the literature of the respective field. The interesting thing is that universities offering graduate level programmes are expected to employ, at least, one full-time academic staff member for each graduate degree programme

offered. This recommendation may resemble up to the point the Czech accreditation requirement for the programme guarantor. In the U.S. accreditation system, however, this issue is certainly not the key assessment indicator unlike in the case of the Czech accreditation.

A majority of the academic staff members teaching at the graduate level is expected to hold the relevant terminal degree in the discipline (in the U.S. it is a Ph.D. degree for most of the academic disciplines). The recommendations for the academic staff degrees/credentials at the undergraduate level are usually quite vague but some accreditors do have specific guidelines, e.g. "At least 25 percent of the course hours in each major at the baccalaureate level are taught by academic staff members holding an appropriate terminal degree" (SACS 2012, Principle 3.5.4).

Generally speaking, in the US environment, the main distinction between the academic staff, in terms of their degrees and ranks, is between the academic staff who hold a Ph.D. title and those who do not. The former Czech accreditation standards certainly did distinguish between the academic staff with and without Ph.D.'s but the crucial distinction (from the accreditation point of view) was the distinction between the academic staff with Ph.D's. and academic staff holding the rank of 'docent' (Assoc. Professor). In the new Czech accreditation scheme, the requirements for bachelor level programmes (related to academic staff and programme guarantor credentials) were lessened.

There is a strong emphasis in the U.S. system on a systematic academic staff evaluation, which is mainly peer-review-based. The evaluation should help to improve the process of learning and teaching.

The issue of integrity and transparency is also very important in the US academic environment. Therefore, universities must have proper academic policies developed, regarding academic freedom, diversity, hiring and admission criteria, student grievances, appeals and complaints.

The complete accreditation process may take several years, as many as 10 years in some cases. As suggested above, accreditors are paid mainly by annual dues and accreditation review fees from the accredited institutions. The accreditation expenses for a university may range from several thousand to a million dollars depending on the circumstances.

The main difference between the Czech and the U.S. system lies in the emphasis put on student learning outcomes. Whereas the Czech system (especially the former) emphasized inputs such as academic staff ranks, the U.S. system emphasises student learning outcomes and achievement.

The U.S. system of the institutional accreditation can be considered advantageous compared to the programme accreditation scheme previously used in the Czech Republic. Although the measurement of learning outcomes might be quite problematic in some cases, it can be regarded as an advantage of the system. Also, the emphasis on self-improvement (based on data analysis), on the internal management quality is important for any university, which seeks academic excellence or simply aims to be a good university. It is important to note however, that the U.S. accreditation process does not set an exact goal for the student learning outcomes to be achieved, this could be considered problematic by some. These goals need to be set by individual universities themselves. The lack of set standard learning outcomes, however, strengthens the autonomy of universities. Moreover, accreditation systems with very precise and quantifiable standards and criteria tend to reduce promotion of excellence and diversity as pointed out by Langfeldt et al. (2010).

Although the emphasis on university autonomy and internal quality management is stressed by the CHEA and all its accreditors, universities actually need to comply with plenty of standards and criteria for review. The U.S. accreditation simply assumes that if a set of compliance-based criteria is adhered to, quality education results (Alderman 2005). The whole accreditation system (re-accreditation) may also become quite costly for U.S. universities. On the contrary, universities in the Czech Republic have not been charged any fee connected with the accreditation process. Obviously, such money is better spent when invested into the actual process of learning and teaching. Neal (2008) points out that the U.S. accreditation system secured the regional accreditors a nearly unchecked monopoly position, which allows them to apply intrusive, prescriptive standards, and which also makes the process of accreditation for universities more expensive.

6.6 Role, value and policy perspective of accreditation

The quality assurance is the main and essential role of accreditation, but we shouldn’t omit other roles performed by the accreditors.

As the major fraction of the money spent on higher education in the Czech Republic is from public sources, the implicit task for the accreditor is to make sure that the government money invested to higher education is spent properly, i.e. to well-functioning institutions and programmes. Another role of accreditation is to provide a signal to the employers in the labour market that the university graduate possesses the relevant knowledge, skills and competencies.

In the case that there is persistent long-term unemployment of university graduates, it may suggest that the money invested into the higher education (to a particular institution or its programme) was not spent efficiently as any unemployed person causes burden for the state social system.

In several cases, ACCR failed to perform the role for the labour market as the graduates of some institutions hardly possess the appropriate knowledge, skills and competencies expected from a university graduate. In the period from 2008 and 2012, only 60,4% of master university graduates started their professional carrier in occupations, where the respective university degree (level and field of study) was expected (Koucký et al. 2014). This number cannot be attributed to the world financial crisis only. Obviously, no one can blame, for instance, a private for-profit university for offering such a degree programme if there is enormous student demand and if it was officially approved by the ACCR and the ministry. It would be the same as if we were to blame an entrepreneur, regardless of the branch, for his/her products being highly in demand.

If the government assures quality, regardless of the branch, people care much less about the actual quality of the goods and services, which is obviously favourable to those offering lower quality than the others. In the case of higher education, the beneficiaries are the low-quality universities and their graduates as at the end of the day the graduates do have a degree from an officially accredited programme.

The matter described in the prior paragraph is a paraphrase of Gresham's law, which refers to monetary policy but describes an analogous problem in principle. The law basically says that money which is artificially overvalued by government intervention, will drive out of circulation money which is artificially undervalued (Rothbard 2010). In our case, bad education would drive out good education. Westerheijden (2010) gives as a specific example a government policy, which encourages the graduation of the highest possible number of students.

Let's assume that there was no involvement of the government in higher education, which means there would be no public sources invested into higher education, thus no public universities. In such a case there would be no need for the state quality assurance body as the higher education market consisting only of private universities might be self-regulating.[28]

[28] It would mean a sort of a comeback to origins like in the USA where universities created membership association to regulate quality, and also to keep the government out of higher education.

The issue of universities' autonomy has been discussed for ages. Public university representatives always claim that any government intervention into university operations or governance is absolutely unacceptable, especially in terms of the curricular matters[29]. The claim is partly justifiable as the complete government control of the curriculum at any level of education is certainly not desirable and it has already been abused in a number of cases, particularly by totalitarian regimes for ideological state propaganda. The issue, however, is more complex. Even in democratic countries certain government intervention in public university operations or governance may be understandable up to a point. Since public universities are almost fully funded from public sources (from taxpayers' money), the rights of the government to interfere (make sure the money is spent properly) may also appear as partly justifiable. I am afraid that there is no simple and indisputable solution to the problem. Government intervention in higher education would be fully excluded (this time indisputably) only in the case of an entirely private higher education market where no public sources (collected from the taxpayers) are spent. Under such a scenario, with no official quality assurance body, the reputation of the university would play a crucial role. In the long run, it would certainly become apparent which institutions are good and which institutions are not. Therefore, prospective students would have enough information to choose the right university or programme (based on its reputation) without risking any major monetary or non-monetary loss. A potential problem, however, might appear in the short run in the case that students enrol in some institution, which turns out to be a scam at the end of the day. On the other hand, such an issue cannot necessarily always be recognized by the national quality assurance body. Another question might arise in relation to the traditional university (academic) degrees. Would it actually even be needed? Under such a scheme, with no government standards (implemented through quality assurance bodies) and requirements in terms of admission, access to further studies etc., the difference between a university in the traditional sense (centres of research and community intellectual life) and any institution or company offering any kind of certificate programmes would probably disappear.

A step in a similar direction became apparent several years ago in the US post-secondary education, where so called 'alternative providers of higher education' started being more and more popular[30]. They usually provide non-credit online courses[31], badges and private company

[29] We cannot forget that the Chairperson and members of the ACCR (NAB) have been appointed by the government.
[30] One of the most popular providers *Udacity* had 1.6 million users in April 2014
[31] sometime referred to as Massive Open Online Courses (MOOCs)

options without being officially accredited as traditional colleges and universities. The alternative higher education path is apparently a response to the increasing tuition fees charged by the traditional institutions of higher education as well as to the changing demands for skilled workers (CHEA 2014).

Both the left-wing and the right-wing public policy experts agree on the crucial importance of the university autonomy. What they do not agree on is the way universities should be funded. The former would rely on public sources of funding while the latter would leave the funding rather up to private entities. In the case that vast public sources are invested in higher education, a well-designed and well-performing system of quality assurance overseen by the government is certainly needed.

Under the current scheme in the Czech Republic, where 77% of expenditures on higher educational institutions are made from public resources (OECD 2016), the significant role of the government (through the accreditation body) may be considered justifiable.

ACCR[32] could have been also perceived as the regulator of the higher education market in the country. So, let's consider also some further economic policy perspectives related to accreditation of higher education, such as economic regulation theory and the principal-agent problem. The original idea of economic regulation, dated to the beginning of the former century, was that certain industries considered at that time to be naturally monopolistic must be regulated for the public interest, i.e. in order to protect consumers. The later empirical work of Stigler (1971) and Posner (1974), however, has shown that regulation was not conducted in the public interest but rather in favour of inefficient firms within the industry to protect them against the new competitors. In economic literature, capture theory is the term which describes when the regulatory body is actually dominated by the 'regulated' firms. Accreditation organizations in general (in this case ACCR[33]) possess the right (delegated from their principal, i.e. the Czech government) to regulate the entry into the higher education market. The necessity to obtain accreditation can be certainly seen as a barrier to entry into the higher education market. The principal-agent problem is caused by the fact that the principal cannot always fully oversee the action of the agent so the agent very often acts in its own self-interest rather than in the principal's interest. In general, the principal can be broadly described as someone (some party) who delegates work (rights) to someone else – the agent. The agent acts on behalf of the

[32] Now the new body National Accreditation Bureau
[33] Now the new body National Accreditation Bureau

principal then. As briefly suggested above, in the case of Czech accreditation, the principal was the Czech government and the agent was the ACCR. In a broader sense the whole higher education community can be regarded as the second principal.

Let's have a look how the value of accreditation is perceived in the USA. CHEA defines the value of accreditation as follows: "Accreditation in the United States is a means to assure and improve higher education quality, assisting institutions and programmes using a set of standards developed by peers. An institution or programme that has successfully completed an accreditation review has in place the needed instructional, student support and other services to assist students to achieve their educational goals. Accreditation has helped to provide the conditions necessary for the United States to develop diverse, flexible, robust and often admired higher education." (CHEA 2010, p.1). Nonetheless, the main value of accreditation from the fiscal and student point view is arguably the one described in the previous section, i.e. that only the students enrolled in the officially accredited institutions are eligible for the federal financial aid (CHEA 2010). The accreditation should also signal to labour market companies that the study programme meets certain official standards (CHEA 2010). So, in this case accreditation serves the private sector as it should provide valuable information for their investment decision making. Not only does it help assess the job applicant's credentials but it also helps when deciding financial support for current employees, who consider additional education. The same applies to the individuals (and foundations) as they certainly take into account the accreditation status of a particular institution when considering investments into their higher education studies (CHEA 2012). Obviously, in the economic terms, higher education can be regarded as an investment good as well as a consumption good. The accreditation can be also perceived as a kind of consumers' protection correcting the information asymmetry (Blackmur 2010).

The role and value of accreditation is therefore the same as in the Czech Republic with respect to its signalling role for the labour market. There are also certain similarities in terms of eligibility for government funds. The role in the USA is clear but university funding is linked with accreditation up to a point in the Czech Republic as well. Czech public universities still receive the majority of their funding based on the number of students enrolled. Therefore, if a university loses accreditation for one of its high enrolment degree programmes, it can have a significant financial impact.

In accordance with the Human Capital Theory developed and finalised explicitly by Gary Becker (1962), people (in the case of higher education, university students) invest into their human capital through education or additional training in order to get future benefits from such

an investment. The theory says that salaries, wages differentials reflect knowledge and skills, i.e. amount of human capital accumulated and possessed by the respective employee. When translated to 'accreditation language', this means that student learning outcomes is what matters most. The U.S. government makes sure, through their accreditation system, that graduates of accredited universities (those who pay attention to the learning outcomes analysis) are expected to possess the relevant knowledge, skills and competencies, i.e. the right human capital gained by higher education studies. As mentioned above the accreditation helps to the investor in human capital, i.e. prospective student by providing useful information when choosing the right university for their studies.

However, it can be sometimes difficult to assess whether the students got the attributes relevant for employment throughout their university studies or whether they already had it even before they enrolled in the university. This could be also consistent with the signalling theory. The signalling theory (Spence 1973) says that the main value of a university degree is to send a signal to the labour market that the particular university graduate is a prospective capable employee (somebody who is diligent, committed, reliable, and mainly has the ability to learn), while the actual knowledge and skills gained at school are not so important, thus the only role of universities is mainly to 'screen' the abler students. If this is the case, the U.S. higher education accreditation policy emphasising high completion rates would actually encourage universities to put the stamp 'capable' on as many students as possible, and thus basically limit the process of screening to the admission process only.

6.7 Discussion

The former Czech accreditation system dates to the period between 1998 and 2016. As shown in the tables bellow, the number of university students, number of university graduates, and net entry rates to higher education increased unprecedentedly in the period concerned. The number of higher education institutions increased from 23 in the 1998/99 academic year to 72 in the 2015/16 academic year[34], which made the higher education sector less transparent and more difficult to oversee and regulate. It was all part of a broader national and EU policy to increase the share of the population with a university degree, which the AACR significantly helped to fulfil. I believe that the former Czech accreditation system, led by the AACR, failed to perform

[34] Český statistický úřad (2010); MŠMT: Výroční zprávy o stavu a rozvoji vzdělávání v České republice, 2011-2017, http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/vyrocni-zpravy-o-stavu-a-rozvoji-vzdelavani-v-ceske-1

the expected roles of accreditation especially with regard to accountability (use of tax payers funds), reduction of information asymmetry, a consumer and investor protection (signalling to the labour market).

The net entry rates for the Czech Republic from 1998 till 2016 are shown in the table below.

Table 6.2 First time entry rates - tertiary level (percentages)[35]

Year	Czech Republic	OECD avg.	EU avg.
2016	57	66	62
2015	66	66	62
2014	69	68	63
2013	67	67	63
2012	60	58	56
2011	60	60	59
2010	60	69	67
2009	59	59	58
2008	57	56	55
2007	54	56	55
2006	50	56	55
2005	41	48	47
2004	38	53	52
2003	33	53	50
2002	30	52	52
2001	30	48	48
2000	25	47	47
1999	23	N/A	N/A
1998	22	N/A	N/A

Source: OECD[36]

The net entry rates grew rapidly from 22 % in 1998 to 69 % in 2014.

Table 6.3 below depicts the development of student enrolment between 2000 to 2017. The student numbers grew significantly from 2000 and peaked in 2010. The ratio of 2.08 (year 2010 to 2000) shows that by the end of the respective decade, the number of students had more than doubled.

[35] The net entry rate of a specific age is obtained by dividing the number of first-time entrants to each type of tertiary education of that age by the total population in the corresponding age group (multiplied by 100).
[36] OECD, Education at a Glance, https://www.oecd-ilibrary.org/education/education-at-a-glance_19991487

Table 6.3 Numbers of students (in thousands) enrolled in universities in the Czech Republic

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of students	190,2	203,5	220,2	243,7	264,8	289,5	289,5	343,9	368,0	389,0
Year	2010	2011	2012	2013	2014	2015	2016	2017	2017 to 2000 ratio	2010 to 2000 ratio
Number of students	396,0	392,0	380,9	367,8	346,9	326,5	311,2	299,1	1.57	2.08

Source: MŠMT[37], calculations by author

The higher percentage of the cohort entering higher education means lower average IQ and learning abilities of the cohort concerned. Therefore, its more challenging for universities to keep the quality at an appropriate level. Here it is important to remind the different concepts and notions of quality in higher education.

In case we perceive quality as something exceptional (Harvey and Green 1993), the massification of higher education poses a serious problem. The reason is that only a small and exclusive group can be excellent, which is simply not possible in the age of massification.

If we consider the concept of quality as transformation (Harvey and Green 1993), which emphasizes the value-added aspect, the massification itself doesn't necessarily have to be a big problem. However, the former Czech accreditation system completely neglected the transformative aspect of quality. The former scheme did not encourage universities to focus on the process of teaching and learning. Universities were not expected to pay attention to the student learning outcomes.

In the period observed, there were different dynamics (of the student increase) for specific subject areas. The relevant data are presented in the Table 6.4 below. The increase in student enrolment was most significant in the area of humanities and social sciences. When it comes to the ratio between 2010 (the enrollment peak) to 2000, we can observe that by the end of the respective decade, the number of humanities and social sciences students had tripled.

[37] MŠMT: Data o studentech, poprvé zapsaných a absolventech vysokých škol,http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/data-o-studentech-poprve-zapsanych-a-absolventech-vysokych

Table 6.4 Increase of the student numbers according to subject areas

Subject area	Year 2017 to 2000 ratio	Year 2010 to 2000 ratio
Natural sciences	1.79	2.09
Technical sciences	1.20	1.59
Agriculture and forestry	1.73	1.96
Medicine and pharmacy	2.11	1.95
Humanities and social sciences	2.24	2.99
Economic sciences	1.67	2.73
Legal sciences	1.49	1.76
Education and welfare	1,10	1.67
Culture and art science	1.97	2.15

Source: MŠMT[38], calculations by author

The increase of student enrolment naturally influenced the numbers of university graduates. Table 6.5 reflects the development of the number of graduates between 2001 to 2017. Again, there was a rapid increase in the numbers of graduates. In the case of graduates, the number reached its peak in the year 2012. The ratio of 3.13 (year 2012 to 2001) shows that by the end of 2012, the number of students had more than tripled.

Table 6.5 Numbers of university graduates in Czech Republic (in thousands)

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of graduates	30,1	31,2	33,0	44,4	44,3	53,5	63,8	73,3	81,8
Year	2010	2011	2012	2013	2014	2015	2016	2017	Ratio 2012 to 2001
Number of graduates	88,1	93,1	94,1	91,7	88,2	82,0	77,4	72,1	3.13

Source: MŠMT, calculations by author

Again, there were different dynamics for specific subject areas. The relevant data are presented in the table 6.6 below. Not surprisingly, the increase in the number of graduates was most significant in the area of humanities and social sciences. In this case, the proportional increase was higher than in the case of the enrollment numbers. The number of students graduating from humanities and social science disciplines in 2012 (peak year) was five time higher than in the year of 2001.

[38] MŠMT: Data o studentech, poprvé zapsaných a absolventech vysokých škol,http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/data-o-studentech-poprve-zapsanych-a-absolventech-vysokych

Table 6.6 Increase of the number of graduates according to subject areas

Subject area	Year 2017 to 2001 ratio	Year 2012 to 2000 ratio
Natural sciences	2.83	3.27
Technical sciences	2.40	2.75
Agriculture and forestry	2.52	2.99
Medicine and pharmacy	2.65	2.53
Humanities and social sciences	3.94	5.06
Economic sciences	2.17	3.40
Legal sciences	1.76	2.51
Education and welfare	1.65	2.53
Culture and art science	2.52	2.73

Source: MŠMT[39], calculations by author

I think that such a disproportional increase (in the number of students and graduates) in the area of humanities and social science may suggest that the students chose such disciplines because it was easier for them to study and complete their degree compared for instance to technical fields, where the increase was not so significant. I also believe that it is easier also for schools, that offer degrees in humanities and social sciences, to set the lower level of standards than for the technical universities. Czech public universities still receive the majority of their funding based on the number of students enrolled. Thus, I am not convinced that the government funds were used efficiently (especially when we consider the concept of quality as something exceptional).

Table 6.7 depicts the numbers (and the ratio) of the students, who enter a university for the first time, and the high school graduates (eligible[40] to apply to university) in the respective years.

We can observe that the numbers in the two columns are nearly the same in the last decade. In some years including the last two years (2016 and 2017) is the number of eligible high school leavers even lower than the number of first-time university entrants.

The numbers of first-time entrants to higher education approximately reflects the number of places at Czech universities. It may suggest that there are too many places at universities in the Czech Republic and hence the public resources are not used efficiently.

[39] MŠMT: Data o studentech, poprvé zapsaných a absolventech vysokých škol,http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/data-o-studentech-poprve-zapsanych-a-absolventech-vysokych

[40] Students, who passed ‘maturita‘ exam

Table 6.7 First time entrants to higher education vs. eligible high school graduates

Year	First time entries to higher education*	Number of high school graduates (eligible to enter a university)	Index
2002	48,727	61,997	1.27
2003	55,639	67,089	1.21
2004	62,730	68,930	1.10
2005	68,000	71,916	1.06
2006	73,064	69,878	0.96
2007	78,612	85,799	1.09
2008	82,114	84,348	1.03
2009	83,084	83,951	1.01
2010	81,621	81,064	0.99
2011	75,961	74,568	0.98
2012	72,172	72,607	1.01
2013	67,737	68,381	1.01
2014	59,359	59,740	1.01
2015	55,654	56,059	1.01
2016	53,608	52,706	0.98
2017	53,468	52,152	0.98

*students enrolled for the first time in the bachelors or long-cycle masters programmes
Source: MŠMT[41], calculations by author

My study (chapter 5) proved empirically that input-oriented schemes do not have a positive impact on the quality of the higher education. I believe this was the case concerning the former accreditation system in the Czech Republic. The former scheme, led by AACR (and supervised by the Ministry), did not have a positive impact on the higher education sector.

The universities were overloaded by unnecessary administration related to accreditation of individual study programmes. They were not encouraged by the accreditation system to pay attention to student learning outcomes. They were neither expected to trace the employability of their graduates nor were they encouraged to cooperate with the application sphere. The expected signalling role of accreditation was not delivered. If the government assures the quality regardless of the branch, people care much less about the actual quality of the goods and services, which is favourable to those offering lower quality than the others. In the case of higher education, the beneficiaries are the low-quality universities and their graduates as at the

[41] MŠMT: Data o studentech, poprvé zapsaných a absolventech vysokých škol, http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/data-o-studentech-poprve-zapsanych-a-absolventech-vysokych
MŠMT: Výroční zprávy, 2005-2010, http://www.msmt.cz/dokumenty/vyrocni-zpravy
MŠMT: Výroční zprávy o stavu a rozvoji vzdělávání v České republice, 2011-2017, http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/vyrocni-zpravy-o-stavu-a-rozvoji-vzdelavani-v-ceske-1

end of the day the graduates do have a degree from an officially accredited programme. There is an analogy with Gresham's law. In this case bad education (artificially overvalued by the AACR) drive out the good education, which might have happened under the former accreditation scheme in the Czech Republic.

6.8 Chapter conclusion

Czech accreditation previously did not focus on internal quality assurance processes and learning outcomes but rather on the quality of input into the teaching process. Empirical evidence shows that the main reasons for not granting accreditation were unsatisfactory credentials of the academic staff and issues related to the proposed programme curriculum. No attention was paid to the process of internal quality assurance and the student learning outcomes. On the contrary, the U.S. accreditation system puts its main emphasis on the student learning outcomes (and their analysis), which should be monitored by a well-functioning internal quality assurance system.

The former scheme of programme accreditation in the Czech Republic was no longer sustainable due to the reasons described in the previous text, i.e. not only the unreasonable administrative demand of the current system but mainly the emphasis given to inputs rather than outputs and its unfavourable approach towards private universities caused by the requirement for the programme guarantor accompanied by the system of promotion to the highest academic ranks in the country. Academic ranks and credentials of the academic staff definitely matter as the academic staff members having higher academic ranks possess stronger academic experience and publication records, which are certainly prerequisites for good instruction. This, however, does not necessarily guarantee better student learning outcomes. Universities need to make sure that student learning outcomes are analysed and eventually met through a well-functioning internal management quality system.

The step towards the institutional accreditation scheme is certainly moving in the right direction as it should provide universities with more autonomy. Institutional accreditation should also strengthen the internal mechanisms of quality control, which are more important for the daily operations of the university than the external ones. It could mean a certain convergence towards the U.S. accreditation model, where the universities are expected to manage the quality internally themselves.

However, the new Czech accreditation scheme also brings several concerns, which could undermine the main philosophy of the institutional accreditation scheme, such as the subject area approach and the persisting programme guarantor requirement, or arguably remaining emphasis on academic staff credentials and publication records. The National Accreditation Bureau has just officially assessed only big public universities for institutional accreditation, it is still too early for any comprehensive analysis of the new scheme. The most important question to answer is what will be the main criterion for (not) granting the accreditation exercised by the accreditation officials, and whether we will really shift to a system paying attention to student learning, or all the declared changes will only be formal. The long-term review of the decisions made by the National Accreditation Bureau will be certainly the subject of my future research.

7. Visegrad Group countries compared through world university rankings

7.1 Introduction and background information

The Visegrad Group, also called Visegrad Four (or V4) is an alliance of four Central European countries, i.e. the Czech Republic, Hungary, Poland and Slovakia, founded by Visegrad Declaration in 1991.[42] The initiative was inspired by initial meeting of the Polish, Czech and Hungarian kings at the Visegrad castle in the year of 1335. The nations share many historical similarities, which affected the educational development significantly. They all belonged to the Austro-Hungarian Empire[43]. The 1774 Educational reform of Maria Theresa introducing compulsory schooling in the monarchy is certainly the most remarkable milestone of that area with regard to education. All the nations obviously also share the heritage of the communists totalitarian regime, being members of the former Soviet bloc in the second half of the twentieth century. Although private higher education institution started legally operation in all the countries in the 90s, a vast majority of students still remains enrolled in public universities in all countries of the Visegrad group (OECD n.d.). In 2000, the Visegrad Four countries agreed to establish the International Visegrad Fund, which promotes regional cooperation within the V4 region as well as between the V4 region and other countries, especially in the area of culture, education, science and research. V4 countries also joined together European Union in 2004 and have been collaborating closely within the EU since. Therefore, it is certainly not irrelevant to make an up-to-date comparison of the V4 higher education institutions and the whole higher education systems as such.

The chapter is structured as follows. It first deals with a brief summary of the scholarly discourse on the phenomena of university rankings including cross-country comparative studies. Then it analyses and compares the performance of V4 countries in the recent editions of the most established individual university rankings as well as in the latest rankings of national higher education systems. Relevant socioeconomic factors influencing country's performance in the rankings are analysed and discussed later. In all tables the V4 countries are presented in the alphabetical order.

[42] http://www.visegradgroup.eu/documents/visegrad-declarations/visegrad-declaration-110412-2
[43] Poland only partly

7.2 World university rankings – literature review summary

University rankings have been looked upon quite critically. It has been often reminded that university rankings tend to favour universities from English-speaking countries (Marginson 2007; Li et al. 2011; Huang 2012; Altbach 2012; Dobrota et al. 2016). Soh (2013a; 2013b; 2014) finds discrepancies between the nominal and attained indicator weights used by all three most established rankings as well as by the ranking of national higher education systems Universitas 21 Ranking. Hazelkorn (2013, p. 77) points out that "rankings do not measure properly teaching and learning including value added, the impact of research on teaching, humanities and social science research, knowledge transfer or impact of research, regional or civic engagement, and student experience."

The QS-THE university ranking methodology[44] has been heavily criticized for putting too much emphasis on reputation data based on survey among academics and employers (Taylor and Braddock 2007; Marginson 2007; Federkeil 2008; Bowman and Bastedo 2011; Huang 2012; Marginson 2014; Jajo and Harrison 2014). Dobrota et al. (2016) criticize QS ranking methodology for its subjective, possibly biased, component indicator weights. On the contrary, Dobrota et al. (2016) appreciate that the QS ranking is not so affected by bibliometric preferences compared to other rankings as it is focused on various areas, which might be interesting and appealing for prospective students, i.e. teaching, research, employability, and internationalization. Soh (2015) praises the QS rankings for reflecting conception of the modern university, which values synergic relationships with industry community and international cooperation.

The AWRU methodology has been criticized mainly for the emphasis placed on research and Nobel Prize winners, while neglecting the aspect of teaching and learning (Taylor and Braddock 2007; Marginson 2007; Saisana et al. 2011; Marginson 2014; Jajo and Harrison 2014; Rauhvarges 2014). Bougnol and Dula (2015) add that the indicator of Nobel Prizes winners on staff should be rather regarded as an input to generate the outcome measured, remarking that treating inputs as outputs can lead to rewarding inefficiency. Jajo and Harrison (2014) see the heavy weighting towards the natural sciences at the expense the of arts and humanities as a limitation of the ranking. Saisana et al. (2011) object that five out of six indicators are size-dependent with only one indicator (academic performance per capita) being normalized by size.

[44] Since 2010, QS and THE publish their own ranking separately. Both rankings use reputation surveys.

ARWU is, however, in spite of its limitations recognized and preferred by experts due to the data quality and objectivity (Saisana et al. 2011; Li et al. 2011; Marginson 2014).

It has been shown that rakings have an impact on the micro (institutional) level, i.e. on strategic planning and management of higher education institutions (Hazelkorn 2007; Hazelkorn 2008; Federkeil 2008; Wilkins and Huisman 2012; Soo 2013; Rauhvargers 2014; Marconi and Ritzen 2015). We also shouldn't omit the impact on the macro (national) level, i.e. on public policy. Ranking may have an influence on immigration policy rules, eligibility of partner institutions, recognition of qualifications, university msergers, centres of excellence, or government study abroad scholarships (Rauhvargers 2014; Saisana et al. 2011; Li et al. 2011; Dobrota et al. 2016).

Taylor and Braddock (2007) compare briefly rankings of Australian and Japanese universities in ARWU and THE-QS finding contradictory results depending on the respective ranking. Soh and Ho (2014) provide a detailed comparison of two former British colonies Hong Kong and Singapore as regards their performance in the established university rankings concluding that universities in the two cities are on par. Standing of V4 countries is analyzed and compared in the following sections of the chapter.

7.3 Performance in university rankings

Academic Ranking of World Universities 2017

Universities are ranked by six academic or research performance indicators using weights assigned as follows (ShanghaiRanking Consultancy 2017a): Alumni winning Nobel Prizes and Fields Medals (10%); Staff winning Nobel Prizes and Fields Medals (20%); Highly cited researchers (20%), Papers published in Nature and Science (20%); Papers indexed in Science Citation Index-expanded and Social Science Citation Index (20%); Per capita academic performance of an institution (10%).

Since 2017, ARWU publishes top 800 universities, while in the previous years it was only top 500. Those institutions ranked between 501 and 800 are regarded as ARWU World Top 500 Candidates (ShanghaiRanking Consultancy 2017a).

Exact ranks and overall scores are available only the for top hundred universities, which is not the case for any V4 university. Table 7.1 shows the rankings of V4 universities in Academic Ranking of World Universities 2017.

Table 7.1 V4 Universities in ARWU 2017

University	**Rank**
Czech Republic	
Charles University in Prague	201-300
Czech Technical University in Prague	601-700
Masaryk University	601-700
Palacký University	601-700
Hungary	
Eotvos Lorand University	501-600
University of Szeged	501-600
Budapest University of Technology and Economics	701-800
Poland	
University of Warsaw	301-400
Jagiellonian University	401-500
AGH University of Science and Technology	601-700
Adam Mickiewicz University	701-800
Medical University of Silesia	701-800
University of Wroclaw	701-800
Slovakia	
Comenius University in Bratislava	701-800

Source: ShanghaiRanking Consultancy 2017b

There are only three universities ranked in the top 500, two of them being from Poland and one from the Czech Republic. The Charles University in Prague performs the best from the V4 region being able to finish among the top 300 universities. Poland has the highest number (6) of representatives in the published top 800.

Table 7.2 Comparisons of V4 group universities on ARWU indicator scores (mean values)

	Alumni	Award	HiCi	N&S	PUB	PCP	SD (PCP)
Czech Republic (N=4)	4.0	0.0	3.9	5.9	30.6	17.8	2.69
Hungary (N=3)	7.9	4.4	0,0	4.9	22.6	12.5	0.92
Poland (N=6)	5.1	0.0	3.6	4.4	28.0	14.8	2.92
Slovakia (N=1)	0	0	0	3.6	25.0	12.5	0

Source: ShanghaiRanking Consultancy 2017b, mean values and standard deviations calculated by author

Mean values of the individual indicators scores are presented in Table 7.2. As mentioned in the prior sections, the ARWU individual indicators are not normalized by size with the only

exception for *Per capita academic performance of an institution* (PCP), which divides the weighted scores of all the remaining sub-indicators by the academic staff FTE, and thereby makes the indicator suitable for a comparison. As regards PCP, on average, top Czech universities do the best, followed by Polish universities, with Hungarian universities being on the same level as the one Slovakian university included in the ranking. Low standard deviations (SD-PCP) show that that the mean values reflect the situation well (in a statistically reliable way), taking into account the very low number of universities.

The Times Higher Education World University Rankings 2018

The indicators and respective weights used by THE World University Rankings are following (Times Higher Education 2017): Teaching - the learning environment (30%); Research - volume, income and reputation (30%); Citations - research influence (30%); International outlook - staff, students and research (7,5%); Industry income (2,5%).

There were 13 Czech, 6 Hungarian, 12 Polish, and 3 Slovak universities ranked among 1102 institutions published in The Times Higher Education World University Rankings 2018 (Times Higher Education 2018). The total of 34 V4 universities included in the ranking is the highest number from the three most established university rankings considered. However, only 13 of them were able to rank in the top 800, which is similar to 14 universities from the V4 group in the top 800 published by ARWU 2017 as well as 14 universities from V4 countries featuring among the best 800 in QS World University Rankings 2018. Table 7.3 depicts the average scores as for the individual indicators gained by the respective V4 group universities included in the ranking.

Table 7.3 Comparisons of V4 group universities on THE indicator scores (mean values)

	Teaching	Research	Citations	Industry income	International outlook
Czech Republic (N=13)	20.1	14.3	24.0	36.5	42.8
Hungary (N=6)	19.6	10.1	36.3	38.6	49.9
Poland (N=12)	19.4	11.0	27.1	33.8	26.9
Slovakia (N=3)	21.9	12.5	20.1	36.1	31.7

Source: Times Higher Education 2018, mean values calculated by author

On average, the Hungarian and Czech Universities included in the ranking do significantly better than the Polish and Slovakian universities as for the indicator of *International outlook*.

The Hungarian universities also perform comparatively well in terms of the research influence indicator measured by *Citations.* As regards *Teaching*, *Research* and *Industry income*, there are no significant differences between the average scores gained by the top representatives of the respective countries.

QS World University Rankings

Universities are assessed according to the following six metrics (Quacquarelli Symonds 2018f): academic reputation (40%); employer reputation (10%); faculty/student ratio (20%); citations per faculty (20%); international faculty ratio (5%); international student ratio (5%).

Table 7.4 shows rankings of V4 Universities in QS World University Rankings 2018.

Table 7.4 V4 Universities in QS World University Rankings 2018

University	**Rank**
Czech Republic	
Charles University in Prague	314
Czech Technical University in Prague	491-500
Masaryk University	551-600
Brno University of Technology	601-650
Palacký University in Olomouc	701-750
Hungary	
University of Szeged	501-550
Eötvös LoràND University	651-700
University of Debrecen	651-700
Budapest University of Technology and Economics	751-800
University of Pécs	751-800
Corvinus University of Budapest	801-1000
Poland	
University of Warsaw	411-420
Jagiellonian University	461-470
Warsaw University of Technology	601-650
Adam Mickiewicz University	801-1000
AGH University of Science and Technology	801-1000
University of Lodz	801-1000
Nicolaus Copernicus University	801-1000
University of Wroclaw	801-1000
Wroclaw University of Technology	801-1000
Slovakia	
Comenius University in Bratislava	701-750

Source: Quacquarelli Symonds 2018g

There are 5 Czech, 6 Hungarian, and 9 Polish ranked in the top 1000 published by the QS World University Rankings 2018. Again, similar to the ARWU, Comenius University in Bratislava is the only Slovak university considered competitive worldwide. Two Czech and two Polish universities were able to make the top 500. Neither the Hungarian nor the Slovak institutions feature in the top 500. Exact ranks are specified only for the top four hundred universities, which is only the case with Charles University in Prague. As mentioned above, 9 Polish universities got to the top thousand included in the ranking, however 6 of them were ranked in the last range of 801-1000.

There is unfortunately only very limited data available regarding exact scores, both overall and individual indicators, which makes more detailed comparison impossible.

Summary - individual university rankings

Table 7.5 provides a summary of the appearance of the V4 countries in the most established rankings. Many universities feature in all three rankings, therefore counted more than once. Average rankings are shown in Table 7.6.

Table 7.5 No. of appearance - summary table

	ARWU	THE	QS	Total
Czech Republic	4	13	5	22
Hungary	3	6	6	15
Poland	6	12	9	27
Slovakia	1	3	1	5

Table 7.6 Average rankings - summary table

	ARWU	THE	QS
Czech Republic	550.0	803.8	546.8
Hungary	616.7	758.3	720.8
Poland	616.7	858.3	767.2
Slovakia	750.0	833.3	725.0

Note: Means of intervals were used for calculating the average ranking

Polish universities had the most appearances in total in the selected rankings, followed by Czech Republic, Hungary, and Slovakia. On average, Czech universities ranked highest within the group as for ARWU and QSWUR, while Hungarian universities reached the best average ranking in THEWUR.

Graduate Employability Rankings 2018

Graduate Employability Rankings is one of the specific QS rankings, which is certainly worth considering and mentioning due to its linkage to the labour market.

The ranking assesses universities according to the following subcategories (QS Graduate Quacquarelli Symonds 2018c): Alumni outcomes, employer-student connection, employer reputation, graduate employment rate, and partnership with employers. Again, there is only very limited data available regarding individual indicators.

General ranking performance (intervals) of the V4 group universities is shown in Table 7.7. There are three Czech universities, three Polish universities, two Hungarian universities, and one Slovak university listed in the top 500 published by the Graduate Employability Rankings 2018. The Charles University in Prague ranks the best, i.e. 161-170, followed by Brno University of Technology falling within the range of 251-300, while all other universities from the V4 group listed in the ranking were assigned a rank within the range of 301-500.

Table 7.7 QS Graduate Employability Rankings 2018

University	**Rank**
Czech Republic	
Charles University in Prague	161-170
Brno University of Technology	251-300
Czech Technical University in Prague	301-500
Hungary	
Budapest University of Technology and Economics	301-500
Eötvös LoràND University	301-500
Poland	
Jagiellonian University	301-500
University of Warsaw	301-500
Wroclaw University of Technology	301-500
Slovakia	
Comenius University in Bratislava	301-500

Source: Quacquarelli Symonds 2018a

CWTS Leiden Ranking 2017

Although the Leiden Ranking is not so established and cited as the three rankings mentioned above, its approach and methodology are highly regarded by scholars in the field of research policy and management (Marginson 2014). Bougnol and Dula (2015) appreciate that the CWTS Leiden Ranking avoids the technical methodological pitfalls of the established world university rankings. That is why the ranking is also taken into account.

CWTS Leiden Ranking focuses solely on research performance. It does not provide a composite multi-indicator, i.e. a single number or rank. It provides separate rankings based on various individual indicators of scientific impact and collaboration.

The Leiden Ranking 2017 includes 903 universities from 54 different countries. These are all universities worldwide that have produced at least 1000 Web of Science indexed publications in the period 2012–2015 (Centre for Science and Technology Studies 2017). There were 5 Czech, 5 Hungarian, 19 Polish and 1 Slovakian university, that met the ranking criteria.

Table 7.8 shows the averages of selected relevant indicators gained by the respective V4 group universities included in the ranking.

Table 7.8 V4 group universities in CWTS Leiden Ranking 2017 (mean values)

	P	P (top 10%)	P (industry)
Czech Republic N=5	2178.4	140.6	205.8
Hungary N=5	1359.4	80.8	220.0
Poland N=19	1519.3	78.7	62.7
Slovakia N=1	1525.0	66.0	134.0

Source: Centre for Science and Technology Studies 2017, mean values calculated by author
P - Number of publications in the Web of Science database produced by Clarivate Analytics.
P (top 10%) - the number of a university's publications that, compared with other publications in the same field and in the same year, belong to the top 10% most frequently cited.
P(industry) - the number of a university's publications that have been co-authored with one or more industrial organizations. All private sector for profit business enterprises, covering all manufacturing and services sectors, are regarded as industrial organizations. This includes research institutes and other corporate R&D laboratories that are fully funded or owned by for profit business enterprises. Organizations in the private education sector and private medical/health sector (including hospitals and clinics) are not classified as industrial organizations (Centre for Science and Technology Studies 2017).

While Poland has by far the highest number of representatives in the ranking, Czech universities averaged the highest number of all publications as well as of the most frequently cited ones. Again, it was mainly caused by the performance of the Charles University, Prague, which is by far the best among the V4 universities in both indicators (Centre for Science and Technology

Studies 2017). Hungarian universities did the best as for the publications co-authored with industrial organizations. Slovakia has only one university included in the ranking, which is in line with the results of the rankings analyzed in the prior text.

Rankings by subject areas

I am aware that the comparison of school focusing on different subjects cannot always be fair. Therefore, comparison in two subject areas (discipline) rankings is also provided.

Table 7.9 THEWUR 2019 – Psychology subjects

University	**Rank**
Czech Republic	
Charles University in Prague	301-400
Masaryk University	401+
Hungary	
Eötvös Loránd University	251-300
Poland	
University of Warsaw	251-300
Jagiellonian University	401+
Slovakia	
N/A	

Source Times Higher Education 2019

Two Czech, two Hungarian universities, and one Polish university were able to score in the latest THEWUR for Psychology subjects as shown in Table 7.11. No Slovakian university made the top 400 hundred published.

Table 7.10 depicts the performance of V4 universities in the subject area of Economics & Econometrics.

Table 7.10 QS Ranking 2018: Economics & Econometrics

University	**Rank**
Czech Republic	
Charles University in Prague	251-300
University of Economics, Prague	251-300
Hungary	
Central European University	151-200
Corvinus University of Budapest	301-350
Poland	
Warsaw School of Economics (SGH)	251-300
University of Warsaw	301-350
Slovakia	
N/A	

Source: Quacquarelli Symonds 2018b

There are two Czech, two Polish, and two Hungarian universities included in the respective ranking. It cannot be concluded from the available data, which of the three countries is doing the best. No Slovakian university made the top 400 hundred published. Central European University ranks highest from the V4 countries in this subject ranking.

7.4 Performance in rankings of national higher education systems

Rankings of national higher education systems do not use individual universities but national higher education systems as a unit of analysis. There are currently two relevant rankings of higher education systems, i.e. *Universitas 21 Ranking* and *QS Higher Education System Strength Rankings.*

Universitas 21 ranking 2017

Universitas 21 Ranking evaluates performance of the national systems in the following four areas using the respective weights (Melbourne Institute of Applied Economic and Social Research 2017): Resources (20%), Environment (20%), Connectivity (20%) and Output (40%). The indicators are briefly outlined below. Variables used are standardised for population size.

Resources: expenditures on tertiary education, research and development, etc.

Environment: proportion of female students and staff, financial autonomy, regulatory environment, etc.

Connectivity: international vs. local student ratio, articles published with international co-authorship, publications with industry co-authorship, etc.

Output: total number of published articles, average impact of articles, performance of the top national universities, tertiary education enrolment proportionally to the eligible population, unemployment rates comparison, etc.

Table 7.11 Performance in U21 Ranking 2017

	Rank	Overall	Resources	Environment	Connectivity	Output
Czech Republic	24	56.9	58.5 (26)	76.5 (33)	56.9 (21)	36.8 (30)
Hungary	31	50.8	44.2 (38)	72.6 (39)	57.6 (20)	31.2 (32)
Poland	32	50.0	52.6 (33)	82.5 (17)	28.4 (46)	34.9 (31)
Slovakia	38	45.9	45.3 (36)	71.4 (40)	38.8 (33)	29.2 (35)

Source: Melbourne Institute of Applied Economic and Social Research 2017, figures in parenthesis are ranks among 50 nations included

As shown in Table 7.11, Czech Republic ranks the highest within the group, followed by Hungary, Poland and Slovakia. The gap between Hungary and Poland is very narrow as Hungary ranks only a single position above Poland. When it comes to the individual areas of the ranking, we can see Poland doing very well in terms of *Environment* indicator, while doing poorly as for the area of *Connectivity.* Otherwise, the ranks gained in the individual areas are not too distant from the overall ranks of the respective countries.

QS Higher Education System Strength Rankings 2016 and 2018

The QS Higher Education System Strength Rankings methodology was explained and discussed in detail in Chapter 2. This ranking of national higher education systems is based to a large extent on the performance of the respective national universities in the individual university QSWUR ranking published by the same company Quacquarelli Symonds. Therefore, it shares the same advantages (e.g. considering the competencies of graduates and teaching – at least to a certain extent) and disadvantages (e.g. dependence on the reputation surveys).

There are four wide areas of the respective national higher education systems reflected by four sub-indicators having all the same weight of 25 %. The first sub-indicator (System Strength) reflects the number of universities, which were able to make top 700 in the QSWUR. The second area (Access) deals with the chances of the students in the respective country to get a place at the top universities (again considering the QSWUR) in the country, considering the size of the country's population. The third sub-indicator is based on the ranking of the top national university (Flagship Institution). Finally, the last sub-indicator (Economic Context) considers the economic situation (GDP per capita) of the respective country (Quacquarelli Symonds 2018d)

Table 7.12 Performance in QS Higher Education System Strength Rankings 2016

	Rank	Overall	System	Access	Flagship	Economic
Czech Republic	38	31.8	16.5	46.8	46.4	17.5
Poland	43	20	11.2	25.2	29.8	13.9
Hungary	50+	N/A				
Slovakia	50+	N/A				

Source: Quacquarelli Symonds 2016

As presented in Table 7.12, Czech Republic does the best out of the V4 countries, followed by Poland. Hungary and Slovakia do not feature among the top 50 countries included in the ranking. The leading position of the Czech Republic in the region can be attributed especially to the performance of the *flagship institution*, and by the good score in the indicator of *access*[45]. As regards the two remaining indicators (*system strength* and *economic context*), the gap between Czech Republic and Poland is not so significant. Similar results (as for the V4 comparison) can be seen in Table 7.13 reflecting the performance in the recent edition of the rankings.

Table 7.13 Performance in QS Higher Education System Strength Rankings 2018

	Rank	Overall	System	Access	Flagship	Economic
Czech Republic	43	30.4	19.8	55.2	29.4	17.2
Poland	46	18.6	14.1	38.5	7.0	14.6
Hungary	50+	N/A				
Slovakia	50+	N/A				

Source: Quacquarelli Symonds 2018e

In both national higher education system rankings, Czech Republic does the best out of the V4 countries, followed by either Hungary or Poland depending on the ranking. Slovakian higher education system lags in comparison with the other countries of the region.

7.5 Ranking performance determinants

What are the determinants of a country's success in the university rankings? Li et al. (2011) examined various socioeconomic factors[46] that could have an impact and found out that differences between the countries can be largely explained by several variables, especially by the size of population and country's GDP, supplemented by the research and development expenditure and the English language factor (all variables having positive influence).

Table 7.14 shows potentially relevant socioeconomic indicators as for V4 countries[47]. Considering the crucial factors (variables) mentioned above, Czech Republic leads the group

[45] In 2016, there were two Czech institutions (Charles University in Prague and Czech Technical University) and two Polish institutions (University of Warsaw and Jagiellonian University) ranked in the top 500 relevant for the indicator calculation.
[46] The choice of the variables was largely based on human capital theory.
[47] Rankings of national higher education system standardize variables and indicators for country's population size and income to a certain extent (as outlined in the prior text). Hence, these factors should not influence the system rankings significantly, unlike the individual university rankings.

in terms of GDP per capita as well as R&D expenditure, while Poland having the highest population by far. In neither of the countries English is the official national language.

It should be noted that expenditure on education, research and development are obviously treated as an input factor affecting the final performance, while Universitas 21 Ranking considers the expenditure as performance (output) indicator, which I find as a shortcoming of the ranking, similar to the issue related to the ARWU indicator of Nobel Prize winners mentioned in the prior text.

As regards the determinants on the level of institution, Marconi and Ritzen (2015) conclude that expenditure per student is positively related to a university's score. The Czech Government spent the most per tertiary student as shown also in Table 5.10.

Table 7.14 Relevant socioeconomic indicators - V4 countries, 2008-2013 averages[48]

	Czech Republic	Hungary	Poland	Slovakia
Population (million)	10.5	10.0	38.1	5.4
GDP per capita (constant 2010 US$)	19,938	13,332	12,802	16,842
Research and development expenditure (% of GDP)	1.5	1.2	0.7	0.6
Government expenditure on education, total (% of GDP)	4.1	4.7	4.9	3.9
Expenditure on tertiary education (% of government expenditure on education)	23.4	21.4	22.5	22.0
Government expenditure per student, tertiary education (in PPP$)[49]	6715	5548	4480	4766

Source: WDI- The World Bank, averages calculated by author

7.6 Discussion and chapter conclusion

It is not easy to draw any strong conclusions from the data available. However, considering the individual university rankings (number of universities ranked, actual rankings, individual indicator scores) and the national higher education system rankings as well, the Czech Republic seems to be doing the best, followed by Poland and Hungary, being approximately on the same level, while Slovakia falls behind in comparison with fellow V4 countries.

The leading position of the Czech Republic may be explained by the country's economic power and R&D expenditure. Poland seems to benefit from its high population having the most

[48] the time periods of indicators are chosen to lag 2016-2017 (the release dates of the respective rankings analyzed)
[49] UNESCO Institute of Statistics: Browse by country, http://uis.unesco.org/en/home#tabs-0-uis_home_top_menus-3

appearances in the established individual university ranking (Table 7.5). However, only up to a point, as the difference is not as substantial as one would expect, considering the significant population gap between Poland and the other countries in the region. This could be attributed (or certainly not unrelated) to the comparatively low GDP per capita of Poland. Low population together with low R&D expenditure seem to be the factors limiting the performance of Slovakia in the rankings, having only one globally competitive university.

It should be also mentioned that the leading position of the Czech Republic was significantly supported by the performance of its flagship institution (the Charles University in Prague), which does the best in the region considering all the relevant established rankings including the special ranking of graduate employability.

Despite all the criticism mentioned, we simply have to accept that university rankings are here to stay and still arguably possess the only way to comprehensively and understandably measure the quality of higher education, both on an institutional and national level. The results must be interpreted with caution, bearing in mind all the shortcomings described. Therefore, I don't intend to claim that higher education in one country is unambiguously better than in another, and vice versa, the conclusion being based solely on the ranking figures and scores. However, the conducted comparison does provide certain information about the higher education systems of the V4 countries.

Thesis conclusion and policy recommendations

In my dissertation thesis, I have empirically analysed the impact of national quality assurance (accreditation) schemes on the quality of the higher education sector. Specifically, I have used the Qualitative comparative analysis (QCA) to assess the impact of the accreditation schemes (the main accreditation approach, the involvement of labour market representatives, the possibility of competition of accreditation agencies) and also other relevant features (tuition fees, national language) of the higher education systems of 20 OECD countries on the quality of the higher education sector measured by a world ranking of national higher education systems. The analysis shows that the higher education systems with accreditation systems focused mainly on the internal quality assurance processes and mechanisms, having labour market representatives involved in the accreditation process, having a single body granting accreditation for the respective type of institution or degree, having English as an official language, and allowing public universities to charge tuition fees do better in the the QS higher education system strength rankings.

The improvement-oriented accreditation schemes have more positive impact on quality than the ones focused only on the inputs to the learning process. The presence of labour market representatives also proved to have positive effects, though the possibility of competition between accreditation agencies does not. Finally, charging tuition fees seems to result in better quality of higher education. The findings also suggest that English-speaking countries do better in the ranking. The study did not aim to asses, though, whether there is a causal relationship, or the measured effect is only an artifact of biases built in the rankings.

As for the formulated hypotheses tested by QCA, the results are following:

Hypothesis 1: The improvement-oriented accreditation approach leads to higher quality

Result: hypothesis validated.

The QCA method results show that improvement-oriented accreditation schemes have better impact on quality than the ones focused only on the inputs to the learning process. Apparently the main emphasis on quality improvement (self-regulation through internal quality assurance mechanisms) is very important. The issues related to the input-oriented schemes, i.e. the neglection of the learning process and student learning outcomes, seem to be problematic and the critique of these approaches legitimate

Hypothesis 2: Competition between the accreditation agencies lead to higher quality.

Result: hypothesis refuted.

The absence of competition, i.e. single accreditation agency for the respective type of institution or degree, seems to have a rather positive impact. I was expecting that competition stimulates quality of the accreditation agencies, which would lead into higher quality of higher education. It might be the case that higher number of agencies exercising the regulatory activity in higher education leads to greater risk of suboptimal outcome, contradictory regulation as suggested by Blackmur (2010).

Hypothesis 3: The Involvement of labour market representatives in the accreditation process lead to higher quality.

Result: hypothesis validated.

The presence of labour market representatives also proved to have positive effects. It seems that the practitioners make sure that the curriculum is composed in a way that it reflects the current needs of the labour market. Thus, it has a positive impact especially on the skills and competencies of the graduates, which lead into their higher employability and better prospects in the labour market.

Hypothesis 4: Charging tuition fees leads to higher quality

Result: hypothesis validated.

The stronger incentives for students to complete their studies and to demand higher quality as well as a certain regulation of the real interest of the prospective students to seek a university degree seem to be important aspects stimulating the quality of higher education.

It is important to provide some caveats regarding the results. The study may be limited by certain shortcomings of the selected method and ranking, which were discussed in detail in section 5.2 of my thesis. Arguably one of the limitations may be that the selected ranking is significantly based on reputation surveys. In such a case, however, it can be said that the outlined conditions are likely to lead to a higher education system with reputable universities.

The main goal of my thesis has been reached. Based on the results of the analysis conducted in my thesis, the following policy recommendations can be made: improvement-oriented accreditation schemes should be introduced, labour market representatives should be involved in the accreditation process, and finally public universities should be allowed to charge tuition fees.

In the Czech Republic, the former accreditation scheme was altered by the Higher Education Act amendment in 2016. The option of institutional accreditation was introduced and emphasis to internal quality assurance mechanism was incorporated to the accreditation standards. The Board of National Accreditation Bureau, which serves as the executive body, now includes one labour market representative. The Higher Education Act amendment also introduces two categories of degree programmes, i.e. academically oriented programmes and professionally oriented programmes. There should be a significant involvement of professional experts in the instruction of the professionally oriented programmes.

Based on my analysis, these are steps in the right direction, but I believe that the requirements for the academic staff professional programmes (in terms of the ranks) should be more lenient, in the same way it is in the case of art programmes. My analysis shows that individual programme reviews, in which all relevant stakeholders, including alumni, current students, employers, and practitioners are involved, are very important for the internal quality assurance mechanisms. The involvement of labour market representatives (employers or professionals) in instruction, guest lectures, programme reviews or curriculum design should be encouraged by the accreditation policy. Universities also need to be encouraged by the accreditation officials to track and carefully analyse the employability of their graduates. I believe that the same level of importance should be given to these factors as to the input factors (such as academic staff credentials and publication records), which were crucial for (not) granting accreditation in the past. The labour market representatives involved in the accreditation process should have an advisory role, so they complement the academic expertise of the other participants.

The last policy recommendation has not been introduced yet, even though such ideas and proposals were publicly presented and discussed in the past. The introduction of tuition fees would not only mean an increase of funds in higher education, stronger incentives for students to complete their studies, but most importantly it would lead to the better quality of higher education as proved empirically in the fifth chapter of my thesis. In 2013, the minister of education proposed so called enrolment fees of 3,000 CZK, which would be charged to all students at public universities at the beginning of every semester. I believe it was a reasonable proposal. I would also recommend that public policy makers should introduce the enrolment fees, i.e. direct tuition fees. In this case schools can use the collected funds immediately, partly for the social stipends for students coming from an under-privileged family background (depending on household income), and partly for further development of their academic programmes. Tuition fees (even low amount) can serve as a certain regulatory mechanism for

recognition of the real interest, i.e. who takes higher education studies seriously and who does not. However, I think it is very difficult to set the right amount centrally. The amount of tuition charged should be ideally decided on an unregulated market (by the interaction of supply and demand), where the schools would be free to set the prices of their products (individual degree programmes).

The second goal of my thesis has been reached as well, i.e. comparison of the Czech and U.S. accreditation system. It supplements the broader comparative analysis of the accreditation system of 20 OECD countries (and its influence on the quality on the national level) with two more detailed case studies, which looked more deeply into the praxis of the accreditation systems.

The Czech accreditation previously did not focus on internal quality assurance processes and learning outcomes but rather on the quality of input into the teaching process. Empirical evidence shows that the main reasons for not granting accreditation were unsatisfactory credentials of the academic staff and issues related to the proposed programme curriculum. No attention was paid to the process of internal quality assurance and the student learning outcomes. On the contrary, the U.S. accreditation system gives the main emphasis to the student learning outcomes (and their analysis), which should be monitored which should be monitored by a well-functioning internal quality assurance system.

The former scheme of programme accreditation in the Czech Republic was no longer sustainable due to the reasons described in the respective part of my thesis, i.e. not only the unreasonable administrative demand of the system but mainly the emphasis placed on inputs rather than outputs. Academic ranks and credentials of the academic staff definitely matter as the academic staff members having higher academic ranks possess stronger academic experience and publication records, which are certainly prerequisites for good instruction. This, however, does not necessarily guarantee better student learning outcomes. Universities need to make sure that student learning outcomes are analysed and eventually met through a well-functioning internal quality assurance system.

The step towards the institutional accreditation scheme is certainly moving in the right direction as it should provide universities with more autonomy. Institutional accreditation should also strengthen the internal mechanisms of quality control, which are more important for the daily operations of the university than the external ones. It could mean a certain convergence towards the U.S. accreditation model, where the universities are expected to manage quality internally themselves.

However, the new Czech accreditation scheme also brings several concerns, which could undermine the main philosophy of the institutional accreditation scheme, such as the subject area approach and the persisting programme guarantor requirement, or arguably remaining emphasis on academic staff credentials and publication records. The National Accreditation Bureau has just officially assessed only big public universities for institutional accreditation, it is still too early for any comprehensive analysis of the new scheme. The most important question to answer is what will be the main criterion for (not) granting the accreditation exercised by the accreditation officials, and whether we will really shift to a system paying attention to student learning, or all the declared changes will only be formal. The long-term review of the decisions made by the National Accreditation Bureau will be the subject of my future research.

The last goal of my thesis has also been reached. The performance of the Visegrad Four countries in the recent editions of the most established individual university rankings as well as in the rankings of national higher education systems have been empirically analysed and compared, concluding that Czech Republic seems to be doing the best, followed by Poland and Hungary being approximately on the same level, while Slovakia is falling behind in comparison with fellow countries in the region.

The leading position of the Czech Republic may be explained by the country's economic power and R&D expenditure. Poland seems to benefit from its high population having the most appearances in the established individual university ranking. However, only up to a point as the difference is not as substantial as one would expect considering the significant population gap between Poland and the other countries in the region. This could be attributed (or certainly not unrelated) to the comparatively low GDP per capita of Poland. Low population together with low R&D expenditure seem to be the factors limiting the performance of Slovakia in the rankings, having only one globally competitive university.

The problem of higher education quality is important and understudied. It has important policy implications and even though my thesis is limited in scope it shows some conclusions which can be used for policy recommendations as suggested above. My thesis is a step in filling an empirical gap in the literature on the impact of accreditation on the quality of higher education. Future research can use alternative tools for measuring quality, different methods and also case studies. The long-term impacts of the new local accreditation system will definitely be a subject of my future research.

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