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COMPARING BACHELOR STUDIES IN BUSINESS INFORMATICS AT UNIVERSITIES IN RUSSIA AND GERMANY

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Business informatics is a relatively young academic discipline. During the last years several efforts have been made to compare the German discipline Wirtschaftsinformatik with the Anglo-American sister discipline information systems. However, these studies have mainly focused on research activities; they have not attempted to compare curricula in both disciplines.

With the change of the political and economic system in the former Soviet Union and the introduction of courses of studies in business informatics in Russia it may be helpful to compare the German with the Russian approach to teaching business informatics.

The objective of this paper is to compare bachelor studies in business informatics at selected universities in Russia and Germany.

This paper contains the outline of the history of business informatics as a scientific discipline in Russia and Germany, a description of professional organizations, standards, and guidelines relevant for business informatics in both countries. Special attention is given to an overview of students studying business informatics, a description of time scales and grading scales and the structure of teaching plans in Russia and Germany. The paper contains the explanation of the method used to analyze and compare bachelor studies at ten German and ten Russian universities. Findings of the analysis concern details of bachelor studies in business informatics at German and Russian universities and highlight similarities and differences.

Key words: Business informatics, bachelor programs, studies in business informatics

Introduction

The purpose of business informatics as an academic discipline is the development and application of theories, concepts, models, methods and tools for analysing, designing, and using information systems. It makes use of findings from business administration and computer science (and sometimes economics) and extends this knowledge by own specific findings [1. P. 10].

Business informatics "deals with IS [information systems] both for organizations and individuals in society and economy. IS are sociotechnical in nature and comprised of three object types, namely people (i.e., human task bearers), information and communications technology (i.e., technical task bearers), and organizational concepts (i.e., functions, structures, processes), and the interrelationships between them" [2. P. 8].

Business informatics (the Russian designation is Бизнес-информатика (Biznes-Informatika), the German designation is Wirtschaftsinformatik) is a relatively young academic discipline. During the last years several efforts have been made to compare the

German discipline Wirtschaftsinformatik with the Anglo-American sister discipline information systems [3], [4], [2]. However, these studies have mainly focused on research activities; they have not attempted to compare curricula in both disciplines. To our best knowledge, no research projects have been undertaken to compare the Russian discipline business informatics with the German discipline Wirtschaftsinformatik or the Anglo-American sister discipline information systems.

With the change of the political and economic system in the former Soviet Union and the introduction of courses of studies in business informatics in Russia it may be helpful to compare the German with the Russian approach to teaching business informatics.

To our best knowledge no attempt has yet been made to compare courses of studies in business informatics at universities in Russia and Germany. Consequently, we do not have any information on similarities and differences of business informatics in Russia and Germany. The objective of this paper is to compare bachelor studies in business informatics at selected universities in Russia and Germany.

This paper is organized as follows. In section two we outline the history of business informatics as a scientific discipline in Russia and Germany. Section three describes professional organizations, standards, and guidelines relevant for busines informatics in both countries. Section four gives an overview of students studying business informatics. In section five and six we describe time scales and grading scales and the structure of teaching plans in Russia and Germany. Section seven explains the method that we used to analyze and compare bachelor studies at ten German and ten Russian universities. In section eight we describe the findings of our analysis. Finally, we conclude the paper by summarizing major insights.

History of Business Informatics in Russia and Germany

This section gives an overview of the evolution of Business Informatics in Russia and Germany.

Business Informatics in Russia

In Russia (or, to be more precise, in the USSR, the predecessor of Russia) business informatics dates back to the 1930s. At that time several Soviet higher education institutes specialized in engineering and economics and opened a new specialization, called Mechanization of Accounting and Computing. However, the active development of academic and practice research in the area of computer science management began only in the early 1960s. The research programs as well as training specialists in this field were regulated by the government, as its purpose was the creation of a planned economy. On May 21st, 1963 the Decree of Council of Ministers of the USSR "On Improvement of Guidance Through Integration of Computer Technologies and Automatic Control Systems in the National Economics" was issued. The main idea of the decree was the creation of an integrated automatic system for the management of the Soviet economy. The following proposals were made:

— development and introduction of mathematical and rational methods of planning and management optimization into economic practices;

— development of an integrated documentation system and information encoding methods for the national economy system;

— creation of systems of standard programs for information processing at all levels of the national economy and exchange of such programs;

— integration of computing techniques and automatic control systems for technological processes in different areas of the national economy.

This decree launched wide-scale integration of automatic control systems in Soviet enterprises. From September 1st, 1963 several higher education institutes started preparing specialists in Mechanization of Accounting and Computing, which was later renamed as Arrangement of Automated Processing of Economic Data. The best students in engineering and economics, especially students studying management of mechanical engineering, were encouraged to apply. The main goal of the interdisciplinary specialization was to educate specialists who could accomplish tasks of design and integration of Automatic Control Systems (ACS) in enterprises, especially in manufacturing companies. Specialists, who were able to figure out the requirements for ACS from a business point of view (especially, operational accounting tasks at industrial enterprises) and understood how to arrange computing centers activity, were in high demand [5].

For the next 20 years a lot of research projects in the following subject areas were conducted: formalization, development of standard automation models, cost estimation models for ACS and evaluation of their efficiency. Implementing ACS in enterprises shifted the research focus towards management of organizational structures. These research efforts influenced university education programs, which were continuously updated in accordance with the planned economy requirements. In the late 1980s, the main goal of research and preparation of specialists in development and application of ACS was compatible with the world trends. Within the period from 1966 to 1984 in the USSR 6,900 ACS of different types were developed and introduced [6].

At the beginning of the 1990s, political changes in Russia resulted in drastic changes in the area of application of computer techniques in the economy. Access to a new generation of computing hardware and solutions in building information systems intensively promoted by western companies on the Russian market made the latter much more attractive for use in companies than the obsolete developments of the Soviet period. The majority of teams designing ACS in research institutes turned out to be unprepared to promptly offer solutions that would be desired by companies in the new market conditions. At the same time, companies, many of which had previously been a part of a vertically integrated structure, faced a wide range of problems when operating in new organizational and market conditions. Those problems included: formalization of business processes, lack of clear-cut goals for implementing projects handling different systems, unpreparedness to analyse automated areas and evaluate economic outcomes. Consequently, by the end of the 1990s, PricewaterhouseCoopers analysts' estimates placed over 50% of information system implementation projects in companies of the public and private sectors below the claimed performance levels [7]. One of the causes was the disruption of interrelation systems between universities engaged in training future specialists, scientific research centres, and enterprises. Educational Programs Applied Informatics in Economics were designed for training specialists in developing and implementing Information Systems for companies.

The situation in industry began to improve in the early 2000s. Gradual economic recovery took place against the background of changing roles of information technology

in company management – from a support subsystem they turned into the backbone of a company's business structure. In 2003, the constantly growing demand for specialists capable to meet the challenges of designing the architecture of a company, strategic planning of development of companies' information systems, and simulation and optimization of business processes led the Ministry of Education of Russia to approve a new interdisciplinary course of studies named business informatics.

Graduates in applied informatics in economics are concentrated in system analysis of application areas, design, development and implementation of information systems. Graduates in business informatics professional activities are concentrated in designing enterprise architecture, development of enterprise information systems, information system lifecycle management, and analytical decision support, according to professional stanrdads [8]. Note that currently in Russia research area Business Informatics is actively developing [14], [15], [16].

Wirtschaftsinformatik in Germany

At the end of the 1960s universities in Austria, Germany and Switzerland established chairs and institutes in Betriebswirtschaftslehre (business administration) that were dedicated to "automation", "data processing" or "operations research". From 1974 to 1979 several universities in German speaking countries established diploma courses in Wirtschaftsinformatik (business informatics), e.g., 1976 in Darmstadt [9]. In a survey conducted in 1989, Kemper and Stelzer identified six universities offering courses of studies in Wirtschaftsinformatik in the Federal Republic of Germany (1) [10]. In 2015 47 German universities offer bachelor's and master's programs in Wirtschaftsinformatik.

Originally, students in Wirtschaftsinformatik graduated with a diploma degree. In the course of the Bologna Process German universities have transformed diploma studies to bachelor's and master's programs.

Three manifestations of Wirtschaftsinformatik can be found at German universities:

— wirtschaftsinformatik as a field of study in business administration, e.g., students may select wirtschaftsinformatik as an area of specialization or a minor subject in business administration;

— wirtschaftsinformatik as a field of study in informatics, e.g., students may select wirtschaftsinformatik as an area of specialization or a minor subject in informatics;

— wirtschaftsinformatik as a separate course of studies.

Separate courses of studies in Wirtschaftsinformatik are offered by universities and universities of applied science. Universities have a strong research focus and emphasize transferring theoretical and methodological competencies to students. Only universities are entitled to award doctorates, i.e. only they can award an academic doctoral degree. Universities of applied sciences focus on a practical scientific approach. They are less concerned with the theoretical background and provide a more practical vocational experience.

In this paper we focus on Wirtschaftsinformatik as a separate course of studies offered by German universities.

At some German universities faculties of economics or business are in charge of courses in Wirtschaftsinformatik. At other universites faculties of computer science or informatics

are in charge. In the first case faculties of economics or business import teaching services from faculties of computer science or informatics. In the latter case faculties of computer science or informatics import teaching services from faculties of economics or business [1].

Professional Associations, Standards and Guidelines

This section gives an overview of professional associations, standards and guidelines of business informatics in Russia and Germany.

Professional Associations, Standards and Guidelines in Germany

Two academic organizations are of high importance for scholars, scientists and students in the field of Wirtschaftsinformatik in Germany: the German Academic Association for Business Research and the German Informatics Society.

The German Academic Association for Business Research (Verband der Hochschullehrer für Betriebswirtschaft e.V., abbreviated VHB) pursues the development of business administration as an academic discipline at universities. The main objective of the association is to foster research and education in business administration, as well as providing a platform for cooperation of members, practitioners, and domestic and foreign institutions. The association represents more than 2,100 members who are active researchers and educators in the fields of business and management, including professors at all levels and scientific researchers at universities and similar research institutions. The association is structured into 16 sections that represent sub-disciplines of business research, such as banking and finance, business taxation, logistics, marketing, etc. Each section organises conferences and discusses community issues. One of the sections, named Scientific Commission Wirtschaftsinformatik (Wissenschaftliche Kommission Wirtschaftsinformatik) focusses on business information systems. The focus of this commission lies on initiating research projects, organizing conferences, promoting young scholars, preparing guidelines and recommendations for university curricula, providing mass media with scientific contributions, and lobbying in the political arena, in the Deutsche Forschungsgemeinschaft (the largest independent research funding organisation in Germany, abbreviated DFG) and other scientific committees and organizations.

The German Informatics Society (Gesellschaft für Informatik e.V., abbreviated GI) is a non-profit organization with about 22,000 members living across the world. They are teaching, researching or working in related businesses, organizations or political areas. The main purpose of this network of professionals is supporting each other by means of networking, motivating for informatics, developing the scientific discipline and promoting the impact informatics has on economy, business and the society. GI members are either individuals, companies or non-governmental organizations. The society is structured into 13 technical committees, e.g., foundations of informatics, artificial intelligence, software technology, etc. These committees consist of special interest groups that focus on selected areas of informatics. One committee focusses on Wirtschaftsinformatik [11]. Like the Scientific Commission Wirtschaftsinformatik this committee organizes conferences, initiates research activities, promotes young scholars and provides a basis for networking among professors, scholars, and researchers in the field of Wirtschaftsinformatik.

Both organisations, the Scientific Commission Wirtschaftsinformatik and the committee Wirtschaftsinformatik, closely cooperate as they have similar objectives and most Wirtschaftsinformatik scholars are members in both organizations.

In 1984, the German Informatics Society released guidelines for university courses in Wirtschaftsinformatik for the first time. These guidelines have been revised several times since then. The guidelines constitute a framework for academic regulations and contents of university courses in Wirtschaftsinformatik. Most German universities have based their regulations and teaching contents in Wirtschaftsinformatik on these guidelines. The latest edition of the guidelines was published in 2003 [1].

The guidelines describe:

— objectives and contents of university courses in Wirtschaftsinformatik;
— interfaces to university courses in business administration and informatics;
— what the major fields of teaching Wirtschaftsinformatik are;
— how these major fields can be designed properly.

Graduates should be able to analyze, design, and implement information systems in organizations (e.g., companies or public administration) systematically and holistically. Future managers and executives must be able to realize benefits from information flows in intra- and interorganizational information systems.

Studying Wirtschaftsinformatik at a university should familiarize students with scientific methods. Teaching Wirtschaftsinformatik focusses on practical relevance and methodological rigor. Graduates should be able to solve practical problems by applying scientific knowlegde. Therefore, acquiring skills for solving problems is an important objective of university education. Real world products and case studies are used to demonstrate, illustrate, and implement scientific approaches, methods, and findings. Teaching Wirtschaftsinformatik takes into account that IT supports and enables business models, strategies, business functions and processes in companies and interorganizational systems [1. P. 19].

The guidelines recommend that courses of studies in Wirtschaftsinformatik should consist of four components: business administration, informatics, Wirtschaftsinformatik, and another component consisting of mathematics, statistics, law and behavioral sciences. Each of the four components should have a similar proportion [1. P. 10].

The guidelines also recommend that study programs in Wirtschaftsinformatik should comprise seven knowledge areas: a general part, information and communication technologies, information management, application systems, developing application systems, data and knowledge, and decision support [1. P. 13].

1. The general part explains units of analysis and gives an overview of subdomains of Wirtschaftsinformatik. It clarifies links between Wirtschaftinformatik, computer science and business administration, explains the legal framework and gives an overview of the IT industry and IT products.

2. The knowledge area information and communication technologies consists of theoretical foundations of computer science, operating systems, hardware components, and computer architectures, hardware and system software platforms, computer networks and data communication services and protocols.

3. Information management describes managing the IT function in organisations and consists of information as a factor of production, IT functions in companies, information

needs analysis, planning, controlling, and evaluating IT resources (hardware, software, technical infrastructure, application systems, information, knowledge and people), IT strategy, evaluating costs and benefits of IT usage, IT controlling, organizing the IT function, IT outsourcing, IT integration, computer supported cooperative work, IT security, privacy, and IT architectures.

4. The knowledge area application systems imparts knowledge about enterprise resource planning systems, application systems in manufacturing industries, in commerce and service industries, application systems supporting business processes and functions, customer relationship management, computer integrated manufacturing, supply chain management, electronic marketplaces, and digital products. This knowledge area also comprises electronic and mobile commerce and business.

5. Developing application systems teaches students to analyze, design, implement, test, operate and maintain application systems. They learn how to model data, software functions and business processes. Software engineering, requirements engineering, software ergonomics, development tools, and programming are also components of this knowledge area. Students learn how to develop web-based and mobile application systems. They learn how to evaluate, to select, to customize, and to introduce complex standard application systems. Integration of individual and standard software, of new and legacy systems and software re-engineering are also important elements.

6. Data and knowledge consists of data models and database systems, conceptual data modeling (especially entity-relationship modeling), object-oriented data modeling, database schemes, database management systems, database languages (especially SQL), data marts and data warehouses, knowledge representation and processing, knowledge engineering, knowledge management, business intelligence, business analytics, data mining, and text mining.

7. The knowledge area decision support comprises mathematical and statistical methods and models, e.g., forecasting methods, operations research, simulation, artificial intelligence, soft computing, and agent technology.

Knowledge and skills for using personal computers, smartphones and other devices are no components of the course of studies. It is expected, that students can handle browsers, word processors, spreadsheets, electronic mail software, etc. Freshmen who do not have these skills may attend preparation courses. These courses help to apply office programs to business tasks.

Professional activities of graduates in Wirtschaftsinformatik require several key qualifications, such as working in interdisciplinary teams, presenting and discussing work results, and writing documents – increasingly in foreign languages. Courses in which appropriate skills are taught and practiced must be given a high priority. Performing design tasks when developing and implementing information systems requires understanding of cause-effect relations in software systems. Consequently, it is essential that students learn to design, develop, and implement application systems.

In 1999, the Kultusministerkonferenz (Standing Conference of the Ministers of Education and Cultural Affairs of the Federal States in the Federal Republic of Germany) released a framework for examination rules in Wirtschaftsinformatik [12] which is compatible with the guidelines described above.

Standards and Guidelines in Russia

Historically, starting from the Soviet times, Russia has had a system of university education geared towards continued training of graduate specialists in an immense amount of higher education majors. Introduction of the two-stage level system (bachelor, master) is a crucial element of the complex transformation of the higher education. First of all, reformation of the higher professional education system was brought about by acceleration of technology development and new knowledge. In a situation where the state no longer supported a system of guaranteed employment, it became inexpedient to prepare domain experts in universities starting from freshmen, for five to six years. Introduction of a comprehensive bachelor's program with subsequent specialization in a master's program or in a business environment is more in line with the requirements specified for applicants in the job market and students' demands.

In 2003, Russia joined the Bologna Process and undertook a reform of the higher education system (2). The main aims of the Bologna Process are developing an integrated education environment in European countries, improving the quality of higher education and increasing students' and lecturers' mobility by establishing an integrated academic degree system. Joining the Bologna Process made the Ministry of Education and Science of the Russian Federation design Federal State Educational Standards of higher professional education in training areas. In accordance with the Law on Education, only two universities (Saint Petersburg State University and Moscow State University) are entitled to develop their own educational standards, which must not be at a level below than the federal standards.

The main change in implementing education programs at Russian universities is a shift from educating specialists (programs that take 5 years) to the two-stage level system consisting of bachelor's and master's programs. In accordance with the Bologna Convention, a bachelor is the first degree of a higher education program. It provides undergraduates with basic knowledge in the chosen area of studies. A bachelor's degree is a complete level of higher education, which gives graduates the opportunity to start a professional career or to proceed studying in a master's program in Russia or abroad.

To achieve the aims of the Bologna Process, it is essential to fulfill the main condition — to harmonize curricula of education programs at different universities. It is the main condition which allows students to arrange flexible pathways for their education. The Bologna Process also allows students to take courses at different universities in the countries that participate in the Bologna Process. Therefore, the analysis of higher professional education programs is an essential task for both government agencies and the academic community.

In the Russian Federation, a specialization in business informatics has been offered by universities for about 10 years. Within this period more than 100 universities have begun preparing bachelor and master students in this area. Experts at the National Research University Higher School of Economics in Moscow have thoroughly studied the experience of American and European universities with bachelor's and master's programs in business informatics. This university was actively involved in the development of the Federal Education Standard for Business Informatics [13] upon the request of the Ministry of Education and Science.

A Federal State Educational Standard is an aggregate of requirements mandatory for implementation of basic educational programs of higher professional education by nationally accredited educational institutions. Each standard includes three groups of requirements:

— for results of completing basic educational programs: objects and fields of professional activities; career opportunities and professional tasks graduates can deal with;

— for the structure of main educational programs, including requirements for the balance between parts of a basic educational program and their scopes, as well as to the relation between the mandatory part of a main educational program and the part authored by participants of educational process;

— for conditions of implementation of main educational programs including HR, financial, material and technical, and other conditions.

Federal State Educational Standards were developed using the competency-based approach, which focuses on the results of education, and the result is understood not as a total volume of obtained knowledge, but as an individual's ability to act in different situations. A standard lists professional objectives according to which the competencies are formed, which a graduate needs to successfully accomplish. Competencies are combined into two groups - general and professional ones.

As of today, over 7 years have passed since the beginning of the implementation of educational programs in accordance with the federal standards; however, in the near future significant changes are possible in their structure and content.

Students in Business Informatics

Students in Russia

Russian students enter universities at the age of 17-18 after successfully finishing school. In Russia, a typical school program lasts for 11 years. At the end of their school education, Russian school graduates have to pass the *EGE* (Unified State Exam), which serves as both school finals and university entrance examinations. Universities have some level of flexibility in choosing EGE-tests that will be accepted as entrance exams for bachelor's programs. For business informatics it is obligatory to pass three or four exams including mathematics and Russian language. For the third and fourth exams universities typically choose from informatics, English language and social science.

A bachelor's degree gives graduates the opportunity to start a professional career or to enhance one's educational level and specialization by pursuing any master's program in Russia or abroad. According to our estimates up to 60% of bachelor graduates continue their education on master's programs. Master students typically combine study and work on starter positions in the field of business informatics. Most graduates in business informatics deal with development and application of theories, models, methods and tools for analyzing, designing, and using information systems.

Students in Germany

Before entering bachelor's programs at universities in Germany students have to successfully pass their "Abitur", which is the secondary school leaving examination. The Abitur is the general qualification for university entrance. In Germany, students usually

do not have to pass any standard examination before being admitted to a university. Particular universities may choose to select students by offering entrance examinations, however not all universities perform such examinations. German students usually enter universities at the age of 17—19 years after they have been educated at school for 12 or 13 years.

After successfully finishing their bachelor studies students may choose whether they start professional activities in a company or public authority or continue their studies by entering a master's program. According to our observations most students in Wirtschaftsinformatik continue their studies in a master's program. Some students stay at the same university, other students switch to other universities.

Time Scales and Grading Scales

Time Scales and Grading Scales at German Universities

The common timescale at German universities is 6 semesters for bachelor's programs and 4 semesters for master's programs. An academic year is divided into two semesters. The so-called winter semesters usually begin at the first of October and finish at the end of March. The period in which lectures are held varies from university to university, however, a common lecture period lasts from mid-October to the beginning of February. Students take examinations in February and March. Summer semesters usually begin at the first of April and finish at the end of September. The common period in which lectures are held lasts from the beginning of April to mid-July. Students take examinations in July and September.

The grading scale at German universities is structured as follows: very good <1>, good <2>, satisfactory <3>, sufficient <4>, not sufficient <5>. Grade 5 (not sufficient) indicates that the student has accomplished less than 50 % of the maximum performance that could be achieved in this specific examination. The grading scale is used for single examinations as well as for the final grade. The number of credit points which can be obtained by successfully passing an examination is used for weighting the grades when calculating the final grade when finishing a bachelor's or master's program.

Time Scales and Grading Scales at Russian Universities

At Russian universities the length for bachelor's programs is 4 academic years and 2 academic years for master's programs.Traditionally, the majority of universities follow the pattern of two academic semesters within one academic year, the fall semester lasts from early September till the end of January, the spring semester from mid-February till the end of May. Students take examinations in January and February in the fall semester, and in June and September in the spring semester.

There are two types of grading scales in Russia: The first scale distinguishes passed and didn`t pass. A second scale is structured as follows: very good <5>, good <4>, sufficient <3>, not sufficient <2>. Grade 2 (not sufficient) indicates that the student had fulfilled less than 50% of tasks in the examination. The same grading scale is used for the final exam. Some disciplines are graded according to the "passed/didn`t pass" scale. The result

"didn`t pass" shows that a student fulfilled less than 70% of the requirements for the current semester. As a rule, the disciplines which show the result "pass/didn`t pass" assume a large number of practical tasks during the semester.

Structure of Teaching Plans

Structure of Teaching Plans in Russia

In Russia, according to the Educational Standard, universities develop competency-based curricula for educational programs. The Educational standard allows for slight flexibility in creating the optional part of a curriculum. Studying that very elective part is of highest interest in this research because it reflects the peculiarities of the program, and can determine its appeal for prospective students.

The body of knowledge, skills, and abilities united in the notion of competency determines the structure of educational programs. The bachelor's educational standard in the area of business informatics comprises the following disciplines and other activities units:

— liberal arts, social science, and economics;
— mathematics and natural sciences;
— professional courses;
— term papers and vocational classes;
— the state final examination.

An educational standard determines the number of credits that a student must earn within each unit, sets the general workload of the program at the 240-credit level, which a student must earn in the program with a standard duration of 4 years. Calculation rules for workload are defined in the Law on Education. One credit corresponds to 36 hours including a student's classroom and independent work (3).

An educational standard also declares the set of competencies that a student must have after the completion of each unit's disciplines. The educational standard determines disciplines mandatory for students and lists disciplines recommended for the optional part. The educational standard contains the following important requirements:

— ratios of lectures and lab classes within the framework (no more than 40% of lecture hours);
— maximum number of classroom hours per week (no more than 24 clock hours);
— minimum workload share of academic disciplines selected by students (at least 30% of the optional part);
— minimum workload share of classroom sessions conducted in interactive formats (at least 20%).

In addition to the structural requirements and contents of educational programs, the educational standard governs the conditions of their implementation. In terms of personnel policy, the educational standard also contains requirements for instructors for purposes of basic education: the share of those holding a postgraduate degree is at least 60%, the share of instructors without a postgraduate degree but with practical experience is no more than 10%.

Structure of Teaching Plans in Germany

German universities structure their teaching plans for Wirtschaftsinformatik according to the guidelines described above [1].

Generally, bachelor studies comprise courses in business administration, informatics/computer science, Wirtschaftsinformatik, and another component consisting of mathematics, statistics, law and behavioral sciences.

Students can obtain 30 credit points per semester on average. In other words, successfully studying in a bachelor's program for six semesters results in 180 credit points.

In Germany there are no standardized ratios of lectures and seminars, no fixed minimum or maximum numbers of hours that students spend in classes, and no minimum workload share of classroom sessions conducted in interactive formats. Each university may choose how to structure the specific features of the courses of studies.

Lectures and seminars are usually held by professors or post-docs, tutorials by scientific assistants.

Research Method

We focussed on universities in Germany and Russia which offer bachelor courses in business informatics. As the number of these universities is too high (more than 40 universities in Germany and more than 100 in Russia) for a complete survey, we decided to select ten universities in each country for an in-depth analysis. We first selected the authors' home universities, one in Germany and one in Russia, and then selected nine further German and nine more Russian universities. Table 1 shows the universities included in our study.

Table 1

German and Russian Universities included in the Study

German Universities included in our Study	Russian Universities included in our Study
Carl von Ossietzky Universität Oldenburg	Chelyabinsk State University
Martin-Luther-Universität Halle-Wittenberg	Kazan Federal University
Otto-von-Guericke-Universität Magdeburg	Moscow State University of Economics, Statistics and Informatics
Technische Universität Darmstadt	Northern (Arctic) Federal University, Arkhangelsk
Technische Universität Ilmenau	Novosibirsk State University of Economics and Management
Technische Universität München	Russian University of Economics, Moscow
Universität des Saarlandes	St. Petersburg State University
Universität Hamburg	St. Petersburg State University of Economics
Universität Leipzig	St. Petersburg ITMO University
Universität Regensburg	Rostov-on-Don Southern Federal University

In the next step, we collected documents describing details of the bachelor's programs at the selected universities. Most documents were retrieved from the websites of the 20 universities. In some cases, when we could not identify relevant document on the web we contacted university officials by E-Mail or by telephone and asked for the documents.

Subsequently, we analyzed all documents. We identified which faculties are in charge of the bachelor's programs in business informatics and calculated the length of the study programs and the total number of crecit points that students can obtain according to the European Credit Transfer System (ECTS).

We then identified subjects of lectures, seminars, and tutorials and the work breakdown structure, i.e. the proportion of the subjects in the entire study program. Bachelor studies at the 20 universities included in our analysis consist of various subjects. In order to maintain an overview and not getting lost in too many details, we decided to frame our analysis with the help of subject groups or categories, respectively. We have structured our analysis into the following subject categories: business administration (or management, respectively), business informatics, computer science (or informatics, respectively), economics, law, mathematics, other subjects (consisting of, e.g., behavioral sciences, foreign languages, soft skills, or extracurricular studies), a mandatory internship and the bachelor thesis.

We then analyzed the average share of these subject categories at each of the universities included in our study and compared the German and the Russian figures.

We also analyzed the options students have to focus on specific areas of specialization, the process of preparing a bachelor thesis and the requirements of completing practical trainings / internships in companies or public authorities.

Findings of Our Analysis

In the following sections we present findings of our analysis. We explain details of bachelor studies in business informatics at German and Russian universities and highlight similarities and differences.

Faculties in Charge of Business Informatics

At seven German universities faculties of economics/business/ management/law and at three universities faculties of informatics/computer science are in charge of courses in Wirtschaftsinformatik.

At three Russian universities business informatics programs are implemented at faculties of economics/management, at five universities at computer science faculties and at two universities at faculties of applied mathematics.

Length of the Studies and Total Number of ECTS

The length of the bachelor's programs is six semesters at nine German universities, and seven semesters at one university included in our sample. Students may obtain 180 credit points during a period of six semesters (which is the standard period of study at nine German universities) or 210 credit points during seven semesters (at one German university included in our study).

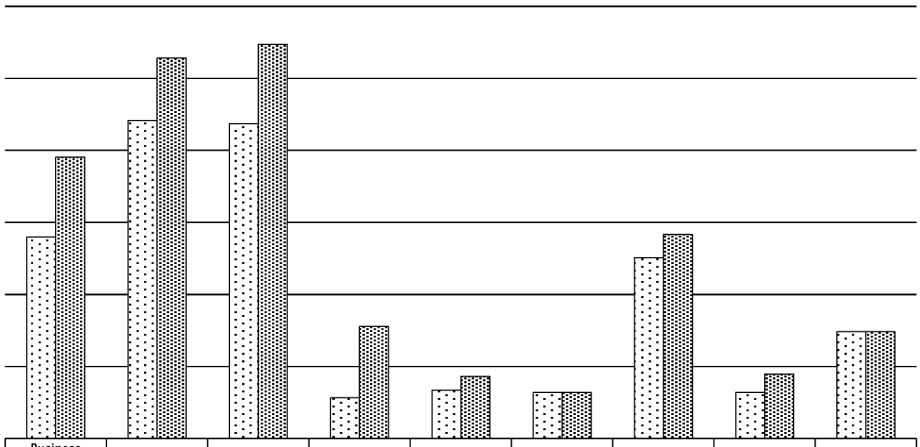
In Russia the length of the bachelor's programs is eight semesters. Students should obtain 240 credits during this period. The length of studies and obligatory amount of credits are defined by the State Educational Standard for Business Informatics.

Russian bachelor's programs in business informatics are longer (eight semesters) than German programs (six or seven semesters). This can be explained with different lengths in school education. As previously mentioned, German students applying for university admission, have usually completed twelve or 13 school years, whereas Russian students have completed eleven school years.

Subjects and Work Breakdown Structure

Students studying business informatics at universities in Germany or Russia attend lectures and seminars in business administration (or management, respectively), business informatics, computer science (or informatics, respectively), economics, law, mathematics and some other subjects (e.g., behavioral sciences, foreign languages, soft skills, or extracurricular studies). Furthermore, they have to successfully finish a bachelor thesis and many universities require students to complete a mandatory internship.

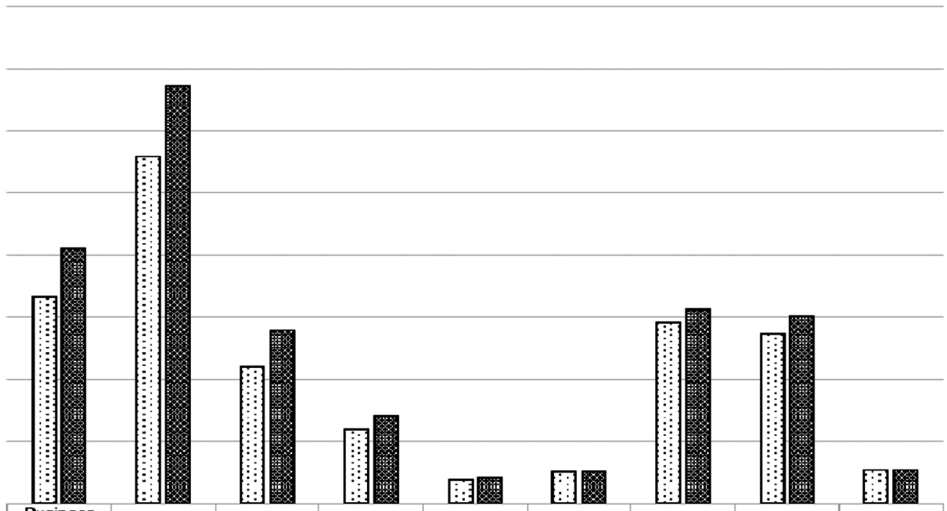
However, as already stated above, most universities allow students to lay a focus on specific subject groups while placing less emphasis on others. Usually, students are not allowed to completely bypass one of the subject groups mentioned above. As a consequence, we calculated for each of the subject groups the minimum and the maximum number of credit points (ECTS) which students may obtain at each of the universities. We then calculated the average percentage points for the minima and maxima of credit points in each of the subject categories. Figure 1 shows the results for the ten German universities.



	Business Administration / Management	Business Informatics	Computer Science	Economics	Law	Mandatory Internship	Mathematics	Other	Thesis
Average % of min ECTS	13,96%	22,06%	21,84%	2,82%	3,34%	3,19%	12,55%	3,18%	7,40%
Average % of max ECTS	19,52%	26,41%	27,36%	7,77%	4,30%	3,19%	14,16%	4,46%	7,40%

Figure 1: Average minimum and maximum shares of subject categories at ten German universities.

Similar calculations were made for the Russian study programs. The results are presented in figure 2. A brief comparison of the two figures shows the overall similarity in the structure of the programs. However, there are significant deviations in the number of credit points allocated to computer science, business informatics, other subjects, and the bachelor thesis. The difference in the number of credit points for computer science and business informatics may be due to the fact that the boundaries of the two subject groups overlap and the assignment of a specific module to one of the subject groups is often ambiguous. The difference in the number of credit points for the subject category "other subjects" may be explained with the fact that in Russia more teaching hours and credits are allocated for learning foreign languages (mostly English). On average, German students have a longer time frame for preparing a bachelor thesis. This may be the reason why German universities on average award more credit points for the bachelor thesis.



	Business Administration / Management	Business Informatics	Computer Science	Economics	Law	Mandatory Internship	Mathematics	Other	Thesis
Average % of min ECTS	16,62%	27,91%	10,94%	5,94%	1,90%	2,53%	14,59%	13,64%	2,66%
Average % of max ECTS	20,54%	33,65%	13,91%	7,06%	2,01%	2,53%	15,67%	15,02%	2,66%

Figure 2: Average minimum and maximum shares of subject categories at ten Russian universities

Areas of Specialization

One of the German universities included in our survey does not offer any area of specialization for bachelor students in Wirtschaftsinformatik. This implies that all bachelor courses are mandatory courses at this specific university. Nine German universities offer areas of specialization. However, the number of specializations which students may select and the number of credit points that can be obtained by registering for these specializations varies substantially: One university offers one area of specialization with a maximum of 5 credit points, other universities offer as much as six areas of specialization with a maximum of 84 credit points.

Six of the ten Russian universities don`t explicitly specify any area of specialization in the curriculum and three universities offer only one area for their bachelor's programs in business informatics. The programs at these universities contain elective courses, however, students have to choose courses from a defined subject group. These courses need to have the same amount of credits. Only one of the Russian universities included in our survey offers two areas of specialization with 35 credit points for disciplines of specialization.

Bachelor Theses

A bachelor thesis is a written document that describes the student's research and findings. The bachelor thesis should demonstrate that the student is able to individually solve a problem by using scientific methods within a limited time frame. At German universities, a bachelor thesis is usually 40—60 pages long. The time frame during which students prepare and finalize their thesis ranges from two months to 5.75 months.

In some German universities the written assignment is complemented by a bachelor colloquium. In a colloquium the author of the bachelor thesis defends her or his work. In some universities students may obtain additional credit points for the colloquium, in other universities credit points for the colloquium are included in the sum of the credits for the bachelor thesis. In some universities bachelor theses can be combined with projects, internships or practical courses.

The number of credit points that students may obtain by successfully finishing their bachelor thesis varies from 10 to 15 credit points (10 credit points at two universities, 12 credit points at six universities, and 15 credit points at two German universities).

Russian students are supposed to pass a final procedure, including a final multidisciplinary exam and a bachelor thesis defense. The final exam usually takes place after passing all exams and a month before the bachelor thesis defense. The final exam includes theoretical questions (which are answered in written form) and practical tasks (solved on computers) in mandatory disciplines. The amount of credits for the final exam is six in all Russian universities included in our study.

A bachelor thesis is a written document that describes the student's research and findings, and should contain the formulation of the problem and project implementation in a public authority or in a company. At Russian universities a bachelor thesis is usually 40—60 pages long. The subject of the thesis and the scientific advisor are approved by the university at the beginning of the 7th semester. The time frame during which students finalize their thesis is two months. Usually, a bachelor thesis is connected with an internship.

The procedure of a thesis defense is obligatory for all universities. At the defense procedure a student presents major results before a special certifying commission. The bachelor thesis defense is an open procedure and all participants may ask questions. The number of credit points that a student may obtain by successfully finishing her or his bachelor thesis is defined by the State Educational Standard: 6 credit points.

Practical Training / Internships

Students at six German universities have to complete mandatory internships. With completing these practical trainings / internships in companies or public authorities students can obtain 6 credits at one university, 10 credits at three universities and 18 credits at one university.

Students of all Russian universities are supposed to pass a mandatory internship in public authorities or companies on the position corresponding to their future qualification. At the end of the internship students submit a report and present the results. By completing an internship students may obtain three credits at one university, six credits at four universities, and nine credits at five universities.

Conclusion

The aim of this study has been to explore the historical development of business informatics as a field of research and study in Russia and Germany and to compare the current situation. The analysis of bachelor's programs in universities from both countries shows that competences obtained by students are similar and, what is more important,

the approach for teaching students is almost identical. The results contain at least one positive message: there is a predisposition for German and Russian universities to cooperate in implementing double-degree programs in business informatics, for sharing experiences in teaching and for carrying out scientific research.

In our study we have focused on comparing bachelor studies in both countries. It would be interesting to also compare master's programs at universities in Russia and Germany.

NOTES

(1) Some universities in the former German Democratic Republic, e.g., in Berlin, Dresden, Halle and Ilmenau, also offered courses of studies called Wirtschaftsinformatik before 1989. However, to the authors best knowledge there is not any publication that gives an overview of Wirtschaftsinformatik in the former German Democratic Republic.

(2) The Russian "higher education system" denotes several types of institutions that give students the opportunity to receive a higher educational degree: universities, academies, and other institutions. In this paper we denote all institutions of the "higher education system" with the term "universities".

(3) This is a difference to the situation in Germany where one credit point is equivalent to a student's workload of 30 hours.

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СРАВНЕНИЕ ПОДХОДОВ К РЕАЛИЗАЦИИ ОБРАЗОВАТЕЛЬНЫХ ПРОГРАММ ПО НАПРАВЛЕНИЮ «БИЗНЕС-ИНФОРМАТИКА» В РОССИИ И ГЕРМАНИИ

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Бизнес-информатика является относительно молодой научной дисциплиной. За последние годы появилось несколько исследований, посвященных сравнению немецкой дисциплины Wirtschaftsinformatik с англо-американской «Информационные системы». Эти исследования посвящены научно-исследовательской деятельности; и не рассматривают соответствующие образовательные программы. С изменением политической и экономической системы в странах бывшего Советского Союза и появлением образовательных программ по направлению «Бизнес-информатика» в России стал актуальным сравнительный анализ немецкого и российского подходов к реализации образовательных программ по указанному направлению.

Целью данной работы является сравнение образовательных программ по уровню бакалавриат по направлению «Бизнес-информатика» в университетах России и Германии.

В работе представлен ретроспективный обзор бизнес-информатики как научной дисциплины в России и Германии, дана характеристика направлений деятельности соответствующих профессиональных сообществ, профессиональных и образовательных стандартов.

Особое внимание в статье уделяется анализу результатов исследования, проведенного на базе университетов России и Германии, реализующих образовательные программы по направлению «Бизнес-информатика». Статья содержит анализ учебных планов, сравнение сроков обучения, шкал оценивания студентов. В работе предлагается классификация дисциплин обучения, которая позволяет проводить сравнение структур образовательных программ. Введенные показатели оценки учебных планов позволяют авторам сделать детальный анализ подходов к реализации образовательных программ и дать развернутое объяснение выявленных различий.

Ключевые слова: бизнес-информатика, бакалавр, образование в области бизнес-информатики, сравнение подходов к обучению бизнес-информатике, история бизнес-информатики