Erasmus+

Cooperation for innovation and the exchange of good practices sub-programme

TECHNICAL REPORT form

Programme	Erasmus+
Sub-Programme	Cooperation for innovation and the exchange of good practices
Action	Capacity Building in higher education
Sub-Action	Joint Projects
Call for Proposal	EAC-A05-2017
Project number	598829-EPP-1-2018-1-RS-EPPKA2-CBHE-JP
Agreement/decision number	20182576
Project Title	Advanced Data Analytics in Business

Contractual Data

Dates and Beneficiaries

Dates

Project Start: 15/11/2018	Project End: 14/11/2022
Activities Start:	Activities End:
Project Duration(months): 48	

Beneficiary Data

Role	PIC	Name	Country
Co-Beneficiary / Partner	921572169	SRPSKA ASOCIJACIJA MENADZERA	Serbia
Co-Beneficiary / Partner	998850323	UNIVERZITET U KRAGUJEVCU	Serbia
Co-Beneficiary / Partner	998833736	UNIVERZITET U NISU	Serbia
Co-Beneficiary / Partner	999641843	UNIVERZITET U BEOGRADU	Serbia
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Co-Beneficiary / Partner	999616138	WIRTSCHAFTSUNIVERSITAT WIEN	Austria
Co-Beneficiary / Partner	897499873	CY CERGY PARIS UNIVERSITE	France
Co-Beneficiary / Partner	999844864	UNIVERSITA DEGLI STUDI DI ROMA TOR VERGATA	Italy
Co-Beneficiary / Partner	998802502	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	Greece

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Project Summary and Horizontal Issues

Project Description

English - 1	Business analytics is the practice of iterative, methodical exploration of an organization's data, with an emphasis on statistical analysis. The project goal is to fill the existing gap on the labor market and through cooperation with companies and other stakeholders develop sustainable study program with international orientation and to become the leader in business analytics in the region of Western Balkans. The principal project outcomes will be the new courses and master program of advanced data analytics in business at Serbian universities, developed teaching methodology in business analytics and LLL courses for professionals in business analytics. The project is motivated by needs for professionals in the field of business analytics in many branches of economy. This need is justified by all national strategic documents (Strategy for Education Development in Serbia until 2020, National Employment Strategy 2011-2020, etc.). The goal is to educate future experts capable of doing mathematical and statistical analysis, data mining, predictive modeling, multivariate testing, big data analytics, machine learning and text analytics. The use of business analytics will become a key basis of competition and growth for individual firms. Companies and other non-academic stakeholders will leverage data-driven strategies to innovate, compete, and capture value from deep and up-to-real-time information. Well trained professionals in the vast area of applications of mathematics and statistics in business are of great importance for economic and social development. Participation of four largest universities in Serbia and several large companies as non-academic partners in this project will generate a significant impact on the national level while the EU partners will provide experience and know-how necessary for fast and successful achievements of the project's goals. Sustainability of the project results will provide a permanent impact at the national and regional levels.

Horizontal Issues

Previous recommendations/follow-up

There were no any recommendations so far. We did not have any monitoring visit of follow up. Anyway, on our initiative, we have consulted Tempus Foundation (National Erasmus Office) regarding the structure of our master study program Advanced Data Analytics in Business. At University of Novi Sad we have expanded the program and made the master with total of 120 ECTS, lasting two years, instead of previous proposal of 90 ECTS and one and a half year, in order to provide easier enrolment of international students. We have introduced additional courses and increased the number of hours and ECTS for already existing courses. The transformation has been implemented at University of Novi Sad, while University of Belgrade and University of Nis have decided to continue with 90 ECTS program, as planned originally in the project proposal.

Transversal issues

The project addresses several transversal (/cross-cutting) issues relevant for the EU and its partner countries: unemployment and gender balance.
ADA project is motivated by needs for professionals in the field of business analytics in many branches of Serbian economy. This need is justified by all national strategic documents. SWOT analysis in the "Strategy for Education Development in Serbia until 2020" is stressing the shortage of highly skilled professionals in the economy. Also, the accent is on analytical skills for problem solving and familiarity with digital technology (National Employment Strategy 2011-2020). Therefore, accent should be on investment into education and training to face the challenges of fast changing labour market. This is also in line with Europe 2020 strategy, where Agenda for New Skills and Jobs (2010) is underlying the significance of modern education for development of new competences necessary for modern society.
In order to develop professionals with right competences, during first half of the project we have organized several meetings with companies from the field of data science and business analytics. Through survey and intensive dialogue, we have discovered what kind of experts they need. The most important meeting was organized with help of SAM (Serbian Association of Managers) where we have organized survey on employers and focus group in order to collect information about companies and their attitudes regarding data science and competences of experts in that field. More information on the following links:
- Survey results (1.1.3) : http://www.ada.ac.rs/results-and-reports/
- SAM website: http://sam.org.rs/dogadjaji/aktivnosti/28105/rezultati-istrazivanja-stavova-menadzera-u-erasmus-projektu-advance-data-analytics-in-business--ada.html
- Instagram: https://www.instagram.com/p/BxPg6b9Icnc/?utm_source=ig_web_copy_link
- LinkedIn: https://www.linkedin.com/feed/update/urn:li:activity:6532539559878766592
 Ultimately, therefore, this project will result in increase of employment of Business Analytics graduates on labour market in the country and Western Balkan region.

Involvement of people with fewer opportunities

Second issue is related to gender balance. Position of women is unfavourable when it comes to their employment in the IT sector as a whole. Having that in mind, ADA consortium is trying to improve the position of women through continuous dialogue with stakeholders and promotion of gender balance in IT sector. Also, starting from June 2019 we are cooperating with R-Ladies Serbia, as part of R-Ladies Global. This is worldwide organization whose mission is to promote gender diversity in IT sector. They are seated in Novi Sad, which is very convenient for future cooperation between them and University of Novi Sad. So far we have promoted ADA project at their meetings and one of our teachers is the member of R-Ladies Serbia with the task to promote gender balance in Business Analytics (http://www.ada.ac.rs/2019/04/26/first-women-in-data-science-conference-in-serbia/; http://www.ada.ac.rs/2019/06/25/ada-at-r-ladies-meeting-in-novi-sad/).

Award Criteria

Assessment Criteria

Relevance of the project

Relevance to the objectives

The project is motivated by needs for professionals in the field of business analytics in many branches of Serbian economy. This need is justified by all national strategic documents. SWOT analysis in the "Strategy for Education Development in Serbia until 2020" is stressing the shortage of highly skilled professionals in the economy. Also, the accent should be on analytical skills for problem solving and familiarity with digital technology (National Employment Strategy 2011-2020). Therefore, accent should be on investment into education and training to face the challenges of fast changing labour market. This is also in line with Europe 2020 strategy, where Agenda for New Skills and Jobs (2010) is underlying the significance of modern education for development of new competences necessary for modern society.

According to list of accredited study programs (Commission for Accreditation and Quality Assurance, Guide for Students, March 2020) there is only one study program in business analytics, where mathematics, statistics and computer science are combined in such way to educate future professionals with such comprehensible set of skills and competencies. The consequence is that, instead of graduate professionals in the field of business analytics, other specialists as mathematicians or computer scientists that are not educated in business analytics, have been employed. This repeating practise has bad consequences from many aspects. This is the situation not only in Serbia, but in the entire region of Western Balkans.

We wish to educate future experts capable of doing statistical and quantitative analysis, data mining, predictive modelling, multivariate testing, big data analytics, text analytics, data visualization, business intelligence reporting, and using self-service analytics platforms. The use of business analytics will become a key basis of competition and growth for individual firms. Companies will leverage data-driven strategies to innovate, compete, and capture value from deep and up-to-real-time information. Modern business is spreading throughout Eastern Europe looking for analysts capable of using statistical and quantitative methods, IT technology and predictive models to make data-driven decisions. Even in the well developed countries of the world, there is shortage of people with deep analytical skills.

The need for experts in business analytics is visible at the labour market in Serbia: such experts are welcomed in all branches of the economy. Let us also mention new programs for lifelong learning, belonging to priorities in educational reform. Studies in business analytics are indeed an important aspect of such knowledge and skill improvements, particularly for former graduates involved in new jobs. Therefore, in addition to students enrolling the study program in business analytics and teachers improving their knowledge and skills, target group consists also of professionals already working in wide range of companies having needs to upgrade their capacities regarding big data, mathematics, statistics, predictive modelling, data visualization, business intelligence reporting, self-service analytics platforms etc.

Relevance of the project objectives is confirmed through dialogue with stakeholders and survey on companies in the field of IT and business analytics (Survey results (1.1.3) : http://www.ada.ac.rs/results-and-reports/).

EU Education, Cooperation & Development policies

ADA project contributes significantly to the EU Cooperation & Development policies, to dissemination of EU Higher Education policies, the tools attached to them in the partner countries, and to visibility and attractiveness of the EHEA (http://www.ada.ac.rs/activities/).

This project targets the main issues concerning the employability of students and graduates which is in line with national strategy for increasing the employment rate of young population. This proposal directly corresponds to relevant CBHE EU policies and national priority for Serbia which is "Modernisation of curriculum by developing new and innovative courses and methodologies" (Category 1): Mathematics and statistics, Information and Communication Technologies, and Education (Teacher training with subject specialisation). Additionally, the ADA project corresponds to priorities in Category 3 for Serbia: Lifelong learning and University-enterprise cooperation. This is curriculum development project that is compatible with three-cycle competency based degree programmes, credit transfers, diploma supplement etc., learning and teaching tools, methodologies and pedagogical approaches including learning outcomes and ICT-based practices, and multidisciplinary approach. Education in advanced business analytics will not be limited only to master students. LLL program will also be organized at all Serbian universities participating in the project for professionals already working in different areas of economy. Professionals from Serbian companies, public sector, and science will also participate at LLL seminars. Choice of suitable topics will be done during the consortium meetings where also representatives from different stakeholders will be present and which will share their opinion on suitable topics for LLL seminars. Companies, professionals, public sector, policy makers and other non-academic stakeholders are involved into project activities mostly through network of Serbian Association of Managers (SAM) and associated partners. In order to take into account labour market needs, the project team, within WP1, has organized survey and roundtable discussions with representatives of employers, organized by the SAM. The research was conducted in partnership with the Data-Do, a company which specializes in the application of business data to ensure external and internal monetization. Also, research findings were presented to the participants on separate event organized in the premises of SAM on May 8th 2019 (http://www.ada.ac.rs/2019/05/13/survey-on-employers-and-focus-group/). In the second half of the project, one-day seminars for presentation of LLL program to professionals will be organized at four universities in Serbia. Companies will be invited to consortium meetings and final conference. Additionally, companies will participate in practical training of our students.

Up to now the HEIs in Serbia based their endeavour to increase the graduates' employability on modernizing and adjusting study programmes in order to transfer the knowledge required by the employers without including them into the study programme development process. That didn't bring the expected results in making the graduates attractive enough on labour market. Bearing that in mind, the consortium examined the effects of existing education EU policies/initiatives and existing education study programmes in the field of data science, big data and business analytics and drew parallels between the current situation in Serbia and the situation in other countries before development of ADA master study program.

Quality of the project implementation

Description of the implemented activities

All project outputs are uploaded at http://www.ada.ac.rs/results-and-reports/ .

1.1 Analysis of best practise and comparative analysis was done after the kick off meeting. We did also an overview of related courses to business analytics in Serbia (Deliverables 1.1.1 and 1.1.2). Survey on stakeholders in Serbia about the status of BA and their needs was carried out also (Deliverable 1.1.3).

1.2 Development of learning outcomes and competencies finished. The booklet (Deliverable 1.2) contains definition of learning outcomes and competencies of any business analyst.

1.3 Development of program, modules, syllabi of all courses and ECTS is finished (http://www.ada.ac.rs/study-programs/). Project team worked with companies on this result. Since three universities in Serbia are developing their own study programs, there are differences in curriculums. Universities of Novi Sad and Niš are developing study programs at faculties of economics, while at University of Belgrade the program will be at university level and with modules. University of Kragujevac is participating in the development of LLL courses only. During development, other important issues were discussed too: student internship, career development measures and attention that should be given to vulnerable groups. When it comes to student internship, there is initiative from EISTI to provide several internship places for our students in French companies. Special attention is focused on the engagement of teachers from partner universities in EU.

2.2 Organization of workshop in Serbia concerning teaching methodology. The workshop was planned for May 2020 in Belgrade. This activity will be organized as soon as pandemic is over.

2.4 Study visits of staff from Serbia to EU. All planned study visits were organized and conducted on time. On every study visit 10-15 teachers from Serbia has participated and study visits were followed by reports, pictures, saved presentations, attendance sheets etc. (http://www.ada.ac.rs/activities/).

2.5 Preparation of the courses and teaching material. All courses for ADA master programs were already prepared (http://www.ada.ac.rs/study-programs/) although this activity is due 30/08/20, because it is mandatory to be ready before submission for accreditation (in Serbian and English).

3.1 Accreditation of master study program.

UNS: After consultations with Tempus office, stakeholders and EACEA, we have changed the structure of the program. The reason is that we want to enable foreign students to be enrolled more easily, because most of them will come to us with 180 ECTS. We have expanded the program and make the master with total of 120 ECTS, lasting two years, instead of previous proposal of 90 ECTS. We have introduced additional courses and increased the number of hours and ECTS for already existing courses. The transformation has been implemented at UNS, while UB and UNI have decided to continue with 90 ECTS program, as planned originally in the project proposal. The program was submitted for accreditation to National Accreditation Body on June 18th 2020.

UB has developed its new ADA master study program. It primarily targets students interested in technology of advanced data analytics, as well as those interested in applications related to medicine, social sciences and scientific computation. The program has been officially approved by the Senate of the UB and is now getting ready for submission for accreditation.

At UNI, the materials will be submitted to National Accreditation Body, right after the approval of the Senate. Having in mind recent development of situation with Covid19 pandemic, it is expected that the enrollment of first generation at ADA in Business master courses will be postponed to October 2021.

Quality assurance

QA in ADA project is performed during the whole project lifetime. The basic document for this activity is Quality and Assessment Plan (http://www.ada.ac.rs/results-and-reports/), which defines roles and responsibilities for all participants, and a clear procedure for QA. The Plan determines and describes quality expectations and quality metrics of project outputs and outcomes and project-related activities, as well as the key aspects and procedures for internal and external monitoring and risk management.

The key role in QA belongs to Quality Control Committee (QCC), established at kick-off meeting. QCC consists of one representative per each project partner. The duty of the QCC is to monitor and evaluate the progress of the project and to ensure that all its activities are carried out properly and following QA guidelines, within time and budget constraints. The work of QCC is coordinated by the leader of WP5 Quality control and monitoring. QCC members communicate on regular basis, and discuss and resolve all quality issues. Other responsibilities include: preparation of Quality and assessment plan, preparation of metrics and indicators for quality control and monitoring, together with WP leaders and Project Coordinator monitor and evaluate the quality of project deliverables and suggest improvement strategies, preparation of internal quality reports on regular basis, etc.

Internal monitoring is an important day-to-day activity. The responsible person for this activity is QCC representative of each institution. QCC member with local team, on regular basis (3-4 months' period) prepare internal quality report, on all project activities performed on its institution in evaluated period and note all quality-related issues and actions. QCC member, in coordination with WP leader, also evaluate the quality of the implementation of WP his/her institution is in charge of, and recommends corrective measures. Possible weaknesses, problems and recommendations should be identified through these reports. The reports are sent to the QCC Coordinator, who collects reports of all partners and combines them in one report. This report is then reviewed and elaborated by QCC, and after potentially suggested improvements, forwarded to SC for acceptance. Periodical internal reports reflect the progress and achievements as well as potential shortcomings and problems followed by suggestions and recommendations. The reports are disseminated to all partners, in order to ensure their engagement in the QA processes and to be discussed at SC meetings. In addition, they will be the base of the final Internal QA Report. Two internal quality reports were prepared so far.

SC on March 2020 adopted the Metrics for ADA (http://www.ada.ac.rs/results-and-reports/), which defines the list of metrics and indicators for the quality of the accreditation of study programs, training of teachers, student enrolment, operation of the master programs, learning analytics, cooperation with companies and student internships, LLL courses, cooperation with companies, satisfaction of attendees with the programs, and employability of students. These indicators will be used for the quality assessment of study programs.

Finally, external evaluation of developed study programs will be organized. Two independent external experts will be subcontracted in order to evaluate the quality of the developed master programs. Based on the report of these external experts, fine-tuning of master study programs will be performed.

Visibility

Dissemination Plan, project logo and motto were adopted by the end of January 2019. On December 14, 2018 the logo proposed by UNS was selected as official mark of the project, and it has been used in all project outputs. The project team also selected the project motto: "Transforming data into solutions". Project logo and motto can be seen at the project website http://www.ada.ac.rs/).

The project website, as one of the main tools for project visibility and dissemination of project results, was launched already in November 2018. The analysis of Erasmus+ project websites was performed and based on this analysis, the initial website structure was designed. Through Academic network of Serbia, the project website domain was registered as http://www.ada.ac.rs/. The website was build using WordPress, the most popular open-source platform for website design and set-up. The website is hosted at the premises of UNIKG, project partner responsible for dissemination. Following suggestions collected during SC meetings, the website has been constantly improved.

The website contains menu, with links to the most important details of the project, such as Events and Activities (with all project-related activities, including study visits, promotional events (both with photo galleries), significant achievements, etc.), Project description (with details on its objectives, work packages and participants), Results and reports (where all developed project deliverables are presented in electronic form and can be accessed and downloaded), etc. Central part of the website homepage presents most recent project events and activities, while at the bottom of the page logos of all project partners, hyperlinked to their websites, are presented. The project website is regularly updated and maintained by UNIKG. The website is registered to Google Analytics, in order to monitor website traffic statistics. Additionally, Google Drive is used for the file sharing and distribution of all necessary material (minutes of meetings, reports, surveys, draft deliverables, etc.) and collaborative work. It also holds necessary project templates: PowerPoint presentations, Deliverable/Report, Agenda, Attendance list, Participant feedback form, Event report, Internal report, Risk monitoring sheet, etc. So far, the website has more than 1800 visits and more than 400 uploads of documents.

Having in mind the popularity of social networks, particularly among perspective students as key target group, we have created accounts on four most significant social networks and distributed the responsibilities (account setup and maintenance) among Serbian HEI partners: Facebook (UNS), Instagram (UNI), Twitter (UB), LinkedIn (UNIKG). All social network accounts are linked to the project website (top right corner of the homepage). All of them are used for project visibility and promotion, and communication to all stakeholders and target groups. All social networks combined, ADA project has more than 500 followers.

All project partners also promote ADA project on the official websites of their institutions and social network profiles by providing short description of the project, logo and link to the ADA project website.

All Project publications and results, including project website, follow the project visibility recommendations of EACEA (project Logo, Erasmus+ Logo, project title and reference number, disclaimer of the EC).

Based on the Project Application and Grant Agreement, the coordinator of WP4: Dissemination and exploitation of project results - UNIKG continually coordinates activities on dissemination events and outputs of all partners as well as the visibility of the ADA project.

Equipment

Procedure for the purchase of equipment started in April 2019. University of Novi Sad led the joint public procurement for all four universities. Serbian law defines the time frame for the tendering procedure so that the bids are submitted within 30 days of publication of invitation and the contract may be concluded at the earliest 10 days after the bid opening and consequent contract award declaration.

Because of the changes of prices on the market, and also because of our conservative assessment of market prices, every partner has saved certain amount regarding the budget for equipment in EUR after the public procurement: UNS 8,685; UB 6,442; UNI 3,186; UNIKG 3,167; Total 21,479. Since UNS will expand the study program to last two years with 120 ECTS points (instead of previously 18 months and 90 ECTS), we got the approval from our project officer in EACEA to use the saved money to buy additional equipment in order to support the increased number of courses and work on the study program. Additional reason, which holds for all partners in the consortium, is that we have realised that additional equipment will be more than useful in order to conduct LLL courses in more efficient way. UB will use the opportunity to replace some old equipment planned also for ADA master: "The computer equipment used currently in UB labs for teaching is already years old and it happens that students have trouble using it when it comes to accessing online material. Time after time, computers simply block. This can be especially critical in courses to be given as part of the new ADA study program, since several courses will be working with large datasets.". The second joint public purchase started in June 2020 and it will be finished before the start of the new school year in October.

The recapitulation of the first public purchase:

UNS signed the contract with vendors on August 2019. The value of the contract was 45,315 EUR. All equipment was delivered and installed in February 2020. One classroom at the Faculty of Economics was equipped with All-in-one computers, software, and accompanying equipment for teaching the ADA master. Laptops and printers are distributed to teachers for the preparation of teaching materials for the study program. When it comes to the equipment, everything is ready for the start of ADA master in October 2020.

UB signed the contract with the vendor in September 2019. The value of the contract was 47.558,24 EUR. The equipment was delivered and installed in August 2020. There have been administrative delays in the process of signing the contract (30.9.2019.), then UB had to wait for the supplier to assemble all the equipment, but in the meantime the supply channels from China got disturbed due to Corona epidemic (then in China only) so it was necessary to wait for a few items that were not available at the time. During this process, the global pandemic lockdown started, and UB had to wait for the equipment supply channels to recover.

The procurement at UNI is completed. The contract with vendors was signed in October 2019 (47,814 EUR). The equipment was installed at Faculty of Economics in Niš in February 2020. One classroom was equipped with computers, smart board, projector and other accompanying equipment. Laptops and printers are distributed to teachers for the preparation of teaching material.

University of Kragujevac has completed the procurement. The value of the contract was 26,728 EUR and it was signed in September 2019. Due to Corona virus pandemic which has affected supply chains from China, vendor was not able to deliver purchased equipment on time defined by the contract, but it was delivered and installed in June 2020.

The project includes activities relating to curriculum development

⦿ Yes

HIGHER EDUCATION: Promoting internationalisation, recognition and mobility, supporting changes in line with Bologna principles and tools.

The new ADA master curriculum takes into account the principles set out in the Bologna process completely (integration in the 3 cycles, definition of learning outcomes in accordance with a national and European Qualification Framework EQF, application of student-centred approaches, compatibility with European Credit Transfer System ECTS and with the European Standards and Guidelines ESGs for QA).

International orientation of ADA master study program is also one very important aspect, because in Serbian higher education there is very small number of foreign professors and international students. According to latest available data from Tempus Foundation in Serbia, the number of foreign students (without students from ex-Yu countries) in 2019 in Serbia is only 519 (degree mobility) and 335 (credit mobility), and the major part of foreign students are actually students from ex-Yu countries: Bosnia, Montenegro and Croatia. They continue to study in their native language and without gaining any real international experience. This is why we want to develop study program in English, with international staff and international students from any part of the World.

The project team already took the measures of promoting ADA master internationally, and all information that we are distributing are in English and languages in WB region. Additionally, in the project team we have included staff from international office at UNS in order to help us to provide easier enrolment of foreign students. Their task is to make recommendations for foreign students planning to study business analytics in Serbia, in form of booklet or guide. Also, through Erasmus Mundus program we will provide long term staff mobility of teachers from Italy, Greece, Austria, Germany, and France, as visiting professors at ADA master.

New/updated courses

University of Novi Sad

New (13): Quantitative Fundamentals, Managing, Storage and Visualising Big Data, Social Media Analytics, R for Data Science, Machine Learning, Big Data Fundamentals, Business Cases, Designing communication of results, Academic Writing, Business & Decision Modelling, Advanced Analytics with SPSS, Transaction-based analytics & Recommendation systems, Deep Learning. Updated (5): Time Series, Supply chain & Operational Analytics, Digital Marketing Analytics, Financial Analytics, Advanced Econometrics. All courses have 7 ECTS and they are 100% finished.

University of Belgrade

All 22 courses are new, finished 100%. 10 ECTS: Mathematical foundations of data analysis, Discrete mathematical structures, Analytics and optimization, Introduction to statistical inference, Models of statistical learning, Introduction to complex networks theory, Artificial intelligence / Machine learning, Programing, Databases, Big Data analytics, Data visualisation, Neural networks and deep learning, Text mining, Social network analysis, Introduction to time series analysis. 7 ECTS: Data analysis in fundamental and clinical medicine, Data analysis in biological sciences, Big Data in social sciences, ADA in social sciences, Analysis of international research datasets, Big Data in space science and its analysis, Practical analysis of noisy and uneven time series.

University of Niš

All 16 courses have 6 ECTS and they are 100% finished: Programming for Business Applications 1, Introduction to Machine Learning in Business, Optimization and Business Decision-Making, Research Design and Data Visualization Techniques, Marketing Intelligence, Text Processing, Mathematics and Statistics in Business Analysis, Fundamentals of Accounting and Business Finance, Time Series Forecasting, Applied Econometrics, Quantitative Finance, Programming for Business Applications 2, Advanced Big Data Analytics, Network and Online Business Analytics, Data Acquisition, Academic writing.

Accreditation procedure of every study program needs the approval from the following decision bodies: Department – Council of Teachers – Validation through software of NAT – University Quality Committee – Expert Council – University Senate – submission to National Accreditation Body (NAT). Accreditation process is fully in accordance with the EQAR Guidelines. NAT is member of the EQUAR.

Procedure at NAT: Reception of full documentation on study program – Nomination of peer reviewers by Director (usually 2 for study program) – Per review procedure (2 months maximum) – Decision of Accreditation Committee on the basis of the reports from peer reviewers.

The plan was to make submissions by the end of March 2020, and after the accreditation enrol the first students in October 2020. Unfortunately, due to recent development of situation with Covid-19 virus, we can expect that work of University administration and NAT in Serbia will be delayed, which means that we must postpone the enrolment of first generation at ADA master to October 2021. UNS has submitted the program for accreditation, while UNI will submit study program to NAT right after the Senate approval.

The Senate of UB has approved the ADA master. An important detail of this study program is that the program will be accredited at the university level. According to regulations, in order for teachers to participate in university-level study programs it is necessary to get approvals from their faculties. The teachers who will participate in the ADA master at UB have got these approvals in early 2019, but due to administrative changes they have to obtain new ones now, before the program is submitted for accreditation. It is an ongoing process, largely affected by the COVID-19 situation.

○ No

Teaching / Training Activities

◉ Yes

Mobility for Teaching, Training and/or project research activities

Within the project, 4 study visits already took place. The study visits took place at the premises of partners with experience in data science and business analytics. During these visits, local experts are invited to contribute lessons learned and best practices with Serbian teachers from four largest universities in the country. The study visits were the following:

France, Cergy 18-20/03/2019: The most interesting part of the visit were presentations of companies cooperating with EISTI: JEMS group, Teradata, Ecxilys, Smartteem, description of internship of IT students in companies and participation at lectures to IT students at EISTI.

Greece, Thessaloniki 01-02/07/2019: Selected presentations and tours: Introduction to smart cities with regards to the transport domain, Transport modelling supporting smart cities, Back-office infrastructure, Innovative transport services in smart cities, Practical case studies from CERTH-HIT experience in passenger and freight transport, Tour to the Thessaloniki Smart Mobility Living Lab, etc.

Italy, Roma 18-20/11/2019: Selected presentations: Presentation of the Master in Big Data in Business (board, teaching staff, programme structure), Business Pillar at UNITOV, Focus on Data Security, Networking Pillar, etc.

Austria, Vienna 10-12/03/2020: Selected presentations: AI, ML and Data Science – Introduction, From Data Science back to Decision Science, The AI Model Complexity Paradox, Feature Engineering, etc.

Reports on study visits and agendas were uploaded at the project website: http://www.ada.ac.rs/results-and-reports/.

According to project proposal, in the second half of 2020 we are planning to organize the training of teaching staff in EU partner institutions, on specific courses related to business analytics. For example, training on R programming and deep learning will be organized at Vienna University of Economics and Business (WU), big data fundamentals at Graduate school in computer science and mathematics engineering (EISTI), Designing communication of results at University Tor Vergata (UNITOV), Supply chain & Operational Analytics at Centre for Research and Technology Hellas (CERTH), etc.

○ No

Quality of cooperation

Project management

Project management is carried out at the overall (consortium) level and at the local level including only Serbian partners. All aspects of project implementation are followed and managed through reporting system. All consortium partners participate in project management.

The process for finalizing the Partnership Agreement was conducted in time with all partners. The process of signing the partnership agreement was organized by the project coordinator. Each partner has received a draft of PA, where all responsibilities of the partner according to the Project Description were added. The partners had an opportunity to communicate these responsibilities before signing PA.

The major decision-making body of the project is Steering Committee (SC) which consists of representatives from program countries and Serbian partner organizations. It monitors all project activities, evaluate deliverables, produce detailed reports on implementation and suggests further activities. The Steering Committee coordinates the creation of quality and evaluation strategy, dissemination and exploitation plan, and also provides an input into strategic and organizational issues and define the project standards and agree on all project policies that must be formally and explicitly stated. Tasks assigned to consortium partners are becoming contractual obligations. The Steering Committee has met 5 times so far. Including the kick-off meeting, SC meeting was organized during study visits, in order to save financial resources and to meet in person.

The responsibilities of the SC are to: (1) Review project progress and control the activities; (2) Ensure that the project maintains its relevance; (3) Be aware of relevant activities in other projects; (4) Resolve any technical administrative or contractual issues, which have not been resolved by other means within the project; (5) Be the overall quality manager of the project. Decisions are taken on a consensual basis. In case of disagreement, the Steering Committee is making the final decision.

The internal communication is conducted by emails, phone, Skype, Google pool, etc. For collecting information, a shared folder with predefined structure in Google Drive was organized by the project coordinator. The folder structure consists of project documents, reporting documents, deliverables, study visits, SC and LC meetings, and documents and templates related to visual identity of ADA project. Each partner has full access to each folder.

For the internal project communication, a mailing list and Skype are widely used by all partners. The consortium meetings are conducted in English. English also is used for the mailing lists announcements.

Local Committee (LC) monitors implementation and organization of activities in Serbia, and actively participate in dissemination of project results. Seven LC meetings in total are planned during the project realization. So far, LC meetings are organized jointly with SC meetings.

A detailed allocation of resources and distribution of tasks within the project is carried out equally between the partners and in accordance with the requirements for the implementation of each working package. All partners are engaged in certain activities of each WP. The issue of the ownership of the project results is discussed at the Consortium meeting and it is defined in the Consortium Agreement.

One of our partners, Graduate school in computer science and mathematics engineering (EISTI), has been changing its legal status and becoming the part of CY - Cergy Paris Université. We have informed our project officer in March 2020, and by her recommendations we are taking all necessary steps to make this transformation in our consortium officially.

Involvement of partners and stakeholders

Responsibilities between partners are equally distributed. For six WPs, five different partners are leading organisations: WP1: University of Novi Sad, WP2: University of Belgrade (UB), WP3: University of Niš, WP4: University of Kragujevac, WP5: Vienna University of Economics and Business and University of Kragujevac, WP6: University of Novi Sad. Partners from Serbia are especially engaged in the development WP since development of ADA master, its implementation and LLL courses should be conducted in Serbia. All partners from Serbia are participating in consortium meetings, meetings of local coordination team (LCT), and study visits where they are networking, learning and raising their capacities in the field of business analytics.

Less experienced partners, like Serbian Association of Managers (SAM) and Graduate school in computer science and mathematics engineering (EISTI) are contributing to the fulfilment of project goals through tasks where their expertise is very useful. SAM is significantly supporting the cooperation of project consortium with companies in Serbia and contributing to the better dissemination of project results. Through SAM and very influential and renowned associated partners like INFOSTUD, more than 28.000 managers and their companies across region are and will be reached in dissemination activities. EISTI is very successful when it comes to internationalization (over 77 partnerships have been tied with establishments in 36 countries), and cooperation with enterprises, where their students are having their internships in leading IT companies across the world. These partners are also involved in other working packages, like Dissemination and Exploitation, Quality Plan, and Management.

EU partners chosen are the best ones to fulfil the aims of the project. Important factor in choosing partners from EU was the need to have partners with developed programs in the field of business analytics, big data or data science, and developed cooperation with companies in the field of BA. For example, during study visits, Serbian partners had the opportunity to learn about implementation of data science in Thessaloniki through smart-city project runned by our partner Centre for Research and Technology Hellas, management of successful big data master program at University Tor Vergata, real-life problems through Personalized Recommendation Systems (purely) based on AI (experience of Vienna University of Economics and Business), and many other new and valuable information and know-how in the field of business analytics.

Partner country needs regarding development of BA master studies are taken into account through participation of representatives of different target groups: companies, universities, teaching staff, students, and policymakers. At the beginning, large survey on companies was conducted in order to explore the opinion about competences that professionals in BA must have. Also, representatives of different stakeholders are actively participating at the meetings where they are exchanging their ideas with project team. On the other side, project team members are participating in the meetings of various stakeholders (IT company Infostud, R-Ladies community, Data Science Serbia association, etc.).

Students are very important stakeholder and they are not involved in project management, but they are reached through several associations like R-Ladies community and Data Science Serbia, and also through regular dissemination activities at four largest universities in Serbia. Participation of students will be crucial in the implementation phase of master ADA study programs. Both with representatives of companies they will participate in the quality monitoring of study programs and the project as a whole.

Management of the grant

Budget for ADA project is balanced, harmonized among partners and among work packages. The timely and cost-effective accomplishment of outcomes is secured primarily by efficient management within the work packages and by the strict control of performed academic activities and of the financial flow. To secure the timely realization of outcomes, the Steering Committee (SC) and the project coordinator closely monitor the performance of partners during the project realization. The transfer of funds to the partners depend on their delivery of expected outcomes and submitted reports. On every Steering and Local Committee meeting, the project management team defines measures for overcoming problems or obstacles in realization of the project and revise the work plan if necessary, to ensure timely realization of the project. All equipment purchases for the purpose of project realization, regardless of the equipment value, are done through tendering or on the basis of three competitive bids. Mobility in the project are defined in a way that guarantees performing multiple tasks whenever possible (study visit + SC meeting + LC meeting). The financial management of the grant is conducted according to the defined Quality and Assessment Plan, where the contents of all documents and forms are defined. Furthermore, the universities in Serbia apply strict policies in order to make legal decisions to regulate the financial management within the institutions. Project co-financing will be provided by additional work of project staff members for the purpose of obtaining desired outcomes. If the right conditions are fulfilled, the organization of the final conference, banking fees and cost of money transfer will be co-financed also. The total budget (EU grant) of the project is 750,609.00 EUR. The total staff cost (292,739.00 EUR) is planned according to the distribution of activities to all project partners and necessary work to be done. The planned travel costs are 65,700.00 EUR and costs of stay equals 140,520.00 EUR. Equipment costs (188,900.00 EUR) are planned according to the needs of all participating HEIs from Serbia, with constraint of 30% of the project budget. The equipment is needed for starting and running ADA master program at three HEIs and LLL courses at four HEIs in Serbia. This equipment will allow HEIs to provide students with appropriate lab conditions for practical work in business analytics, similar to the equipment used by companies were students realize their internships. Subcontracting costs (62,750.00 EUR) are planned for each partner according to the planned WP activities of the partner. The subcontracting costs cover project auditing, accreditation cost, printing dissemination products, conference proceedings, translation services etc. Roughly, there are three groups of partners having the balanced budget:

a) HEIs from Serbia: total budget amount ranging from ca. 86,000.00 to 155,000.00 EUR
b) Partners from EU countries: total budgets ranging from ca. 42,000.00 to 71,000.00 EUR
c) Non-HEI partners from Serbia: Serbian Association of Managers with ca. 28,000.00 EUR.

At the moment, institutions from Serbia participating in the project realization, have spent their budget predominantly on the equipment, travel and costs of stay budget lines – and the staff costs will be compensated after the second pre-financing (it is expected that 70% of the first pre-financing will be spent in next couple of weeks, depending mostly on Covid-19 lock-up and consequently on delivery of equipment by vendors). The detailed summary of the current state of the Projects' finances is presented in the Financial Statement accompanying this Report.

IMPACT AND SUSTAINABILITY

Awareness raising, dissemination, sustainability and exploitation of the project results

Actions already taken: Dissemination and Exploitation Plan, logo and motto were defined at the beginning of the project; Project website and profiles on social networks were created. Project members have participated at large number of meetings, media events, workshops, summer schools, raising awareness about the ADA project and ADA master. More intensive promotional activities are planned for the second part of the project, after accreditation of the study programs, when all available promotional channels and paid promotion on social networks will be used to attract students and to raise awareness of broader audience. So far, ADA has more than 500 followers on social networks and more than 1800 visits to project website.

At HEIs, partners are regularly informing students, teachers, and policy makers at various meetings (lectures, staff meetings, decision bodies meetings, meetings with members of other faculties). Study trips also gave an excellent opportunity to ensure the visibility within and outside each organization. Through Serbian Association of Managers and their dissemination channels we are raising awareness through network of 28.000 managers in Serbia and Balkan region. Stakeholders can have an access to project information through the website, social networks, conferences and publications. HEIs participating in the project are all very active internationally and they have many partner institutions in different countries, which are informed about the project and its outcomes.

Sustainability: Developed teaching materials, course syllabi, curricula, and methodology guides produced in the next phase of the project will contribute to the sustainability of the project beyond project lifetime. The support of decision makers and employers ensures the sustainability of project outcomes in the future. Participants from universities are also researchers: they have published already and they will have presentations on data science and business analytics in the future, too.

We have included staff members of international offices in our teams for our visiting professors to be included into Erasmus Mundus mobility program in order to provide long-term engagement of foreign teachers after the project is finished.

We have in mind three potential financial sources after the end of the project. Once the program is accredited it could be financed as any other accredited program. It means that we will apply for state financed tuition fees for our students. Since Serbian Ministry for HE has recognised ICT education as priority, the probability of obtaining financial funds from state budget is very high. In 2019 the Ministry announced public call for financing master study programs in IT sector, and they are planning to repeat the same action every year (http://www.mpn.gov.rs/predstavljeni-interdisciplinarni-programi-master-4-0/). Additionally, since study programs at UNS and UNI are developed at faculties of economics, it contributes to sustainability even more, because teaching staff is already employed and payed at the faculty to teach on all study programs accredited at the institution for a long term.

Second source are tuition fees from students. The priority for us is to attract students from the region, because we will be the only institution offering the education in BA. We will promote this study program on the wider market through regional network of Serbian Association of Managers and our international connections, because Serbia has many comparative advantages regarding international students: low staying costs, no visa requirements for Chinese and Russian citizens, political stability etc.

Third source are LLL courses. Many companies in the region will be interested to raise the competences of their staff in the field of

Statistics and Indicators

Type of equipment:

- [ ] books and pedagogic material
- [x] audio-visual equipment
- [x] Computers and software
- [ ] lab material
- [ ] Other

For Curriculum Development projects

- (•) Yes

Courses updated (/developed/accredited) in line with Bologna principles.	to a very high extent
Number of new/updated courses DEVELOPED	56
Number of new/updated courses RECOGNISED/ACCREDITED	0
Number of new/updated courses IMPLEMENTED/DELIVERED	0

Level of new/updated courses:

- ☐ Short cycle
- ☐ 1st Cycle (e.g. Bachelor)
- ☑ 2nd Cycle (e.g. Master)
- ☐ 3rd Cycle (e.g. Doctoral)
- ☐ Vocational Education and Training

Type of recognition:

- ☑ HEI Degree
- ☑ National degree
- ☐ Multiple Degree
- ☐ Joint Degree

Volume (in ECTS) of new/updated courses	421

The new study programme includes:

- ☑ Placements/internships for students
- ☐ Career orientation service
- ☑ Career development measures

Number of learners / trainees enrolled (per intake / course delivery)	

Type of skills/competence developed:

- ☐ Transversal/behavioural skills
- ☑ Technical /academic /scientific / research skills
- ☑ Linguistic competences

% of the new curriculum taught in foreign language of the the total of new curriculum developed by the project	**100**

For Training/Mobility Activities

Number of partner country "HEIs' students" trained	**0**
Number of partner country "HEIs' academic staff" trained	**25**
Number of partner country "HEIs' administrative staff" trained	**4**
Number of partner country "non-HEI individuals" trained (priv. sector, NGOs, civil servants, etc.)	**0**

IMPACT AND SUSTAINABILITY

Impact at individual level

Extent of attention given to vulnerable groups	to a high extent
Number of direct beneficiaries in the Partner country(ies) per year: academic staff from HEIs	**50**
Number of direct beneficiaries in the PCs (/year): administrative staff from HEIs	**8**
Number of direct beneficiaries in the PCs (/year): HE students	**75**
Number of direct beneficiaries in the PCs (/year): non HE individuals	**20**

Impact at institutional level

Extent of impact at institutional level: for instance new courses / strategies (policies, regulations) / services (units, centres)	totally accomplished

Potential of planned project measures to contribute to new national cooperation activities in the Partner countries HEIs as a result of the project (Memorandum of Understanding /research projects / joint publications /participation in networks or associations etc.)	totally accomplished
Potential of project to contribute to new international cooperation activities in the Partner countries HEIs as a result of the project (international agreements / Memorandum of Understanding / research projects / joint publications / participation in networks or associations, etc.)	totally accomplished

Impact on the HE Sector

Potential of project to contribute to new (/updated) national or regional policies / laws / regulations in HE	to a small extent
Potential of project to contribute to the establishment (/ further development) of external bodies (/associations /agencies)	to a small extent
Potential of project to contribute to improve the excellence / competitiveness / attractiveness of the Higher Education institutions	totally accomplished
Innovative character of the planned results (i.e. the courses developed; the new tools, services, procedures delivered; the strategies implemented for reaching the target groups; etc.)	totally accomplished

Impact on the society as a whole

Potential of the project to pay particular attention to least developed countries	totally accomplished
Potential of the project to engage Partner Countries HEIs in new means of cooperation with employers and other stakeholders (e.g. NGOs, associations, etc.)	totally accomplished
Measures contributing to improving lifelong learning approaches in the Partner Country HEIs	totally accomplished

Sustainability

Institutional support for Partner Country HEIs to sustain project results	totally accomplished

Measures to collect Sources of financial (/logistic) support for sustaining the project results from:

- ☑ Partner HEIs

- ☑ Public authorities in Partner countries

- ☐ NGOs

- ☑ Private sector

- ☐ European Union

- ☐ Other

QUALITY OF PARTNERSHIP & COOPERATION

Involvement of students in the project implementation	totally accomplished
Involvement of non-educational stakeholders in the project implementation	totally accomplished

RELEVANCE in relation to project objectives

To what extent the project contributes to the policy objectives of the Partner Countries	totally accomplished

Project potential to promote EU's horizontal policies

- ☐ Agriculture, fisheries and foods

- ☑ Business

- ☐ Climate action

- ☐ Cross-cutting policies

- ☐ Culture, education and youth

- ☐ Economy, finance and tax

- ☐ Employment and social rights

- ☐ Energy and natural resources

- ☐ Environment, consumers and health

- ☐ External relations and foreign affairs

- ☐ Justice, home affairs and citizens' rights

- ☐ Regions and local development

- ☑ Science and technology

- ☐ Transport and travel

Meetings,Training and Mobilities

Meetings, Trainings and Mobilities

Estimated dates of consortium meetings until the end of the projects

Venue country	Venue city	Date of Meeting
Serbia	Novi Sad	26/11/2018
France	Cergy	18/03/2019
Greece	Thessaloniki	01/07/2019
Italy	Rome	18/11/2019
Austria	Vienna	10/03/2020
Serbia	Belgrade	18/05/2020
France	Cergy	14/09/2020
Austria	Vienna	16/11/2020
Italy	Rome	18/01/2021
Greece	Thessaloniki	15/02/2021
Serbia	Nis	15/03/2021
Serbia	Kragujevac	12/04/2021
Serbia	Belgrade	17/05/2021
Serbia	Kragujevac	20/09/2021
Serbia	Nis	01/11/2021

Training and Mobilities

Event	Purpose	Type of participants	Gender	Number	Country of Origin	Country of destination	Duration (in weeks)	%compared to objectives

Attachments

Type of File	Name of the File
Budget Table	ADA_Financial statement, total 11.08.2020..xlsm
Declaration of Honour	ADA_2020_08_20_Declaration on Honour.pdf
Table of achieved results	ADA Table of achieved results.pdf
Dissemination/Exploitation Plan	4.1 Dissemination and Exploitation Plan.pdf
Quality Assurance Plan	5.1 Quality and Assessment Plan.pdf
Request for Payment	ADA_2020_08_20_Request for payment.pdf