To THE TEACHING AND SCIENTIFIC COUNCIL OF THE FACULTY OF ENGINEERING

To THE COUNCIL FOR TECHNICAL AND TECHNOLOGICAL SCIENCES OF THE UNIVERSITY OF KRAGUJEVAC

At the session of the Teaching and Scientific Council of the Faculty of Engineering, University of Kragujevac held on 19.01.2023. (decision number: 01-1/74-12) and at the session of the Council for Technical and Technological Sciences of the University of Kragujevac held on 22.02.2023. (decision number: IV-04-82/6) we were appointed as members of the Commission for writing the report on the evaluation of scientific basis of the doctoral dissertation proposal entitled:

"ASSESSMENT AND ENHANCEMENT OF ORGANIZATIONAL RESILIENCE IN COMPLEX INDUSTRIAL ENTERPRISES IN UNCERTAIN ENVIRONMENT"

and fulfillment of the requirements of the candidate Michael Huber, Master of Business Engineering, and the proposed mentor for the preparation of the doctoral dissertation. The doctoral dissertation belongs to the scientific field of Engineering management. Based on the information at our disposal, we submit the following

REPORT

1. **The scientific approach to the problem of the doctoral dissertation proposal and evaluation of the scientific contribution of the outcome of the dissertation**

The execution of successful business indicates that the ongoing business activities must continuously adapt to market conditions, although sometimes significant disruptions can occur (the COVID-19 pandemic, geopolitical instability, inflation, etc.). In that case, adaptation is not enough, so organizations must demonstrate the ability to be resilient to overcome the bad current situation and continue to function as before or with improved performance.

This dissertation aims to propose a model for assessing organizational resilience at the level of one business process by establishing mutual connections between Key Performance Indicators (KPIs) of the process and Resilience Factors (RFs) using fuzzy sets theory, Multi-Attribute-Decision-Making (MADM) techniques, and fuzzy Delphi.

This scientific contribution may be presented as follows.

The conceptualization of the new model for organizational resilience. Its assessment will be based on resilience indicators that are suitable for complex manufacturing organizations. The unique list of organizational RFs in compliance with GRI guidelines will be defined for complex manufacturing organizations and their supply chain. Defining the RFs at three levels (generic, industry branch-specific, and subprocess-specific ones) and assessment of organizational resilience when (a) exposed to an assumed emerging risk or threat (e.g. a disruption in the supply chain) and (b) over the operating time. The RFs will be defined, and an assessment will be done at the level of the identified subprocess.

The methodology for the assessment of organizational RFs defined by the proposed model. This will be executed at the level of each identified subprocess in the scope of realization of physical products by applying fuzzy Delphi since the traditional Delphi technique will be improved.

The proposal of a finite set of KPIs that are monitored at the level of subprocesses of a generic process in a complex company. The selection of KPIs will be executed at the level of a realization of physical products. The variable of interest for the dissertation is their time needed for recovery after a significant disruption.

The analysis of the relationship between RFs values and the time needed for KPIs recovery. The scatterplot analysis of RFs' aggregated value at the level of each KPI and the time needed to recover each KPI by applying regression and correlation analysis.

The developed new optimization model for the selection of methods for RFs level enhancement. After analysis of the relationship between RFs values and the time needed for KPIs recovery, the RFs with the lowest value will be appointed for enhancement by different management methods. Those methods will be chosen by applying the proposed optimization model.

Connection with previous research

If put in the context, „resilient decision-making" may be interpreted as the following: "Well succeeded decisions adopted to guarantee a system's dynamic equilibrium, so as to correct, minimize or even avoid the effects of an unforeseen event" [1]. Over the previous decades, resilience-scoped research has been conducted through different perspectives: resistance and recovery, adaptation, and anticipation[2]. Also, as the research interest has grown over years, there is little consensus about what resilience means or how it is designed[3]. During a period of stable business conditions, organizational performance indices do not have significant oscillations. On the other hand, if severe disruptions occur, a sudden drop in performance might happen[4]. Common sense implies that more resilient organizations will recover faster compared to those organizations which are not so resilient.

Key performances of the production companies may be denoted as: quality, flexibility, cost, speed, innovativeness, and dependability[5]. As performances may be analyzed through the different dimensions, it may be considered that each one of them may be interpreted through the definition of KPIs that correspond to the treated performance[6]. From the perspective of production systems, the

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[1] dos Reis, M. Í., Borges, M. R., & Gomes, J. O. (2008). Identifying resilient actions in decision making during emergencies. *In Encyclopedia of Decision Making and Decision Support Technologies* (pp. 434-442). IGI Global. DOI: 10.4018/978-1-59904-843-7.ch050

[2] Duchek, S. (2020). Organizational resilience: a capability-based conceptualization. *Business Research*, *13*(1), 215-246. https://doi.org/10.1007/s40685-019-0085-7

[3] Hepfer, M., & Lawrence, T. B. (2022). The heterogeneity of organizational resilience: exploring functional, operational and strategic resilience. *Organization Theory*, *3*(1). https://doi.org/10.1177/26317877221074701

[4] Beuren, I. M., dos Santos, V., & Theiss, V. (2022). Organizational resilience, job satisfaction and business performance. *International Journal of Productivity and Performance Management*, *71*(6), 2262-2279. https://doi.org/10.1108/IJPPM-03-2021-0158

[5] Okoshi, C. Y., de Lima, E. P., & Da Costa, S. E. G. (2019). Performance cause and effect studies: analyzing high performance manufacturing companies. *International Journal of Production Economics*, *210*, 27-41. https://doi.org/10.1016/j.ijpe.2019.01.003

[6] Parmenter, D. (2019). *Key Performance Indicators: Developing, Implementing, and Using Winning KPIs*, 4th ed.; Wiley: Hoboken, NJ, USA, ISBN 978-1-119-62077-8

formal KPIs may be distinguished[7,8]. The process of delivering physical products in manufacturing companies can be decomposed into the corresponding sub-processes[9]. The sub-processes are identified and defined using the APQC's Process Classification Framework. In compliance with the APQC framework, the business process of Deliver of physical products may be presented through the four subprocesses: (1) Plan for and align supply chain resources, (2) Procure materials and services, (3) Produce/Assemble/Test product, (4) Manage logistics and warehousing.

As organizational resilience models, as well as business processes, are complex in their nature, their evaluation cannot be performed in a direct way. This implies that they require evaluation models based on the judgments of decision-makers[10]. This feature is important because in a variety of management problems, it is not possible to directly measure the variables of interest. This is because those variables are subject to a certain degree of uncertainty[11]. At the same time, it is closer to human thinking to use linguistic variables for assessment. Many mathematical theories support the description of linguistic expressions in a quantitative way. Since the theory of fuzzy sets is used in many research areas to describe the uncertainty that exists in many decision-making processes, Type I of fuzzy sets will be used in this dissertation. Several decision-makers will be involved during the evaluation process. This type of evaluation implies that decisions are made in a qualitative manner. Considering all the issues raised, methods such as Delphi with type I fuzzy sets are used to solve this type of problem[12]. The research will address the problems where decision-makers make their decision by using comparison matrices. The representative method for this approach is the best-worst approach[13].

Simple Additive Weighting (SAW) is a very commonly used technique embracing a weighted summation[14] so it will be employed to obtain the aggregated resilience value at the level of the proposed set of KPIs. The selection of the optimal number of management methods whose implementation will lead to the enhancement of RFs can be delivered through a heuristic approach[15].

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[7] Kang, N., Zhao, C., Li, J., & Horst, J. A. (2016). A Hierarchical structure of key performance indicators for operation management and continuous improvement in production systems. *International journal of production research*, *54*(21), 6333-6350. https://doi.org/10.1080/00207543.2015.1136082

[8] ISO 22400-2:2014; Automation Systems and Integration—Key Performance Indicators (KPIs) for Manufacturing Operations Management—Part 2: Definitions and Descriptions. ISO: Geneva, Switzerland, 2014

[9] APQC, "Process Classification Framework V6.11", 2015

[10] Macuzić, I., Tadić, D., Aleksić, A., & Stefanović, M. (2016). A two step fuzzy model for the assessment and ranking of organizational resilience factors in the process industry. *Journal of Loss Prevention in the Process Industries*, *40*, 122-130. http://dx.doi.org/10.1016/j.jlp.2015.12.013

[11] Tadic, D., Gumus, A. T., Arsovski, S., Aleksic, A., & Stefanovic, M. (2013). An evaluation of quality goals by using fuzzy AHP and fuzzy TOPSIS methodology. *Journal of Intelligent & Fuzzy Systems*, *25*(3), 547-556. http://doi.org/10.3233/IFS-120659

[12] Aleksić A., Nestić S., Tadić D., Komatina N., Determination of organizational resilience level within business processes in production companies, 6th International Scientific Conference:"Conference on Mechanical Engineering Technologies and Applications - COMETa 2022", Jahorina, Bosnia and Herzegovina, Republic of Srpska, 2022, 17th - 19th November, pp. 750-757, ISBN 978-99976-947-6-8

[13] Rezaei, J. (2015). Best-worst multi-criteria decision-making method. *Omega*, *53*, 49-57. https://doi.org/10.1016/j.omega.2014.11.009

[14] Kaliszewski, I., & Podkopaev, D. (2016). Simple additive weighting—A metamodel for multiple criteria decision analysis methods. *Expert Systems with Applications*, *54*, 155-161. https://doi.org/10.1016/j.eswa.2016.01.042

[15] Senvar, O.; Turanoglu, E.; Kahraman, C. Usage of metaheuristics in engineering: A literature review. In Me-ta-Heuristics Optimization Algorithms in Engineering, Business, Economics, and Finance; IGI Global: Hershey, PA, USA, 2013; pp. 484–528.

Besides the analyzed scientific papers mentioned in the section *Connection to the previous research*, in order to achieve set goals and test defined hypotheses, the candidate will perform research activities that will rely on the referent literature:

- Bui, T. D., Tsai, F. M., Tseng, M. L., & Ali, M. H. (2020). Identifying sustainable solid waste management barriers in practice using the fuzzy Delphi method. *Resources, conservation and recycling*, *154*, 104625. https://doi.org/10.1016/j.resconrec.2019.104625
- Heiko, A. V. D. G. (2012). Consensus measurement in Delphi studies: review and implications for future quality assurance. *Technological forecasting and social change*, *79*(8), 1525-1536. https://doi.org/10.1016/j.techfore.2012.04.013
- Islam, D. M., Dinwoodie, J., & Roe, M. (2006). Promoting development through multimodal freight transport in Bangladesh. *Transport Reviews*, *26*(5), 571-591. https://doi.org/10.1080/01441640600576902
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual review of ecology and systematics*, *4*(1), 1-23.
- Ma, Z., Xiao, L., & Yin, J. (2018). Toward a dynamic model of organizational resilience. *Nankai Business Review International*. *9*(3), 246-263. https://doi.org/10.1108/NBRI-07-2017-0041
- Singh, P. K., & Sarkar, P. (2020). A framework based on fuzzy Delphi and DEMATEL for sustainable product development: A case of Indian automotive industry. *Journal of Cleaner Production*, *246*, 118991. https://doi.org/10.1016/j.jclepro.2019.118991
- Dawood, K. A., Sharif, K. Y., Ghani, A. A., Zulzalil, H., Zaidan, A. A., & Zaidan, B. B. (2021). Towards a unified criteria model for usability evaluation in the context of open source software based on a fuzzy Delphi method. *Information and Software Technology*, *130*, 106453. https://doi.org/10.1016/j.infsof.2020.106453
- Mabrouk, N. (2021). Green supplier selection using fuzzy Delphi method for developing sustainable supply chain. *Decision Science Letters*, *10*(1), 63-70. https://doi.org/10.5267/j.dsl.2020.10.003
- Kumar, A., Mangla, S. K., Luthra, S., Rana, N. P., & Dwivedi, Y. K. (2018). Predicting changing pattern: building model for consumer decision making in digital market. *Journal of Enterprise Information Management*, *31*(5), 674-703. https://doi.org/10.1108/JEIM-01-2018-0003
- Habibi, A., Jahantigh, F. F., & Sarafrazi, A. (2015). Fuzzy Delphi technique for forecasting and screening items. *Asian Journal of Research in Business Economics and Management*, *5*(2), 130-143. https://doi.org/10.5958/2249-7307.2015.00036.5
- Tsai, H. C., Lee, A. S., Lee, H. N., Chen, C. N., & Liu, Y. C. (2020). An application of the fuzzy Delphi method and fuzzy AHP on the discussion of training indicators for the regional competition, Taiwan national skills competition, in the trade of joinery. *Sustainability*, *12*(10), 4290. https://doi.org/10.3390/su12104290
- Aleksić, A., Stefanović, M., Arsovski, S., & Tadić, D. (2013). An assessment of organizational resilience potential in SMEs of the process industry, a fuzzy approach. *Journal of Loss Prevention in the Process Industries*, *26*(6), 1238-1245. https://doi.org/10.1016/j.jlp.2013.06.004
- Pescaroli, G., Velazquez, O., Alcántara-Ayala, I., Galasso, C., Kostkova, P., & Alexander, D. (2020). A likert scale-based model for benchmarking operational capacity, organizational resilience, and disaster risk reduction. *International Journal of Disaster Risk Science*, *11*, 404-409. https://doi.org/10.1007/s13753-020-00276-9
- Dubois, D., Prade, H. (1980). Fuzzy Sets and Systems: Theory and Applications. Academic Press, Inc (London) Ltd.

2. Explanation of the subject, method, and goal that convincingly indicate that the proposed topic is important for the development of science

The subject, objectives, and hypotheses of this dissertation include

From time to time, it may be considered that unpredicted events shape reality and business trends[16]. Recently, some of those manifested, such as covid 19 pandemic or destabilization of the geopolitical situation in different parts of the world. During periods of crisis and disruptions, organizational resilience is usually seen as a crucial feature of any company. Although there is a significant number of papers in the literature, still there is no consensus on whether organizational resilience is a feature, ability, or capability of an organization, or something else[17]. In compliance with that, there are attempts to define it in a way that might be suitable for the assessment or management.

The main aim of the dissertation will be to propose a model for assessing organizational resilience at the level of one business process by establishing mutual connections between KPIs of the process and RFs using fuzzy sets theory, Multi-Attribute-Decision-Making (MADM) techniques, and fuzzy Delphi. This scientific goal will be realized through the following partial goals:

- The selection of the organizational resilience model that is suitable for complex manufacturing organizations and assessment of organizational resilience factors at the level of each identified subprocess in the scope of realization of physical products by applying fuzzy Delphi.
- The selection of KPIs that are managed at the level of subprocesses of generic process appointed as a realization of physical products and the determination of time needed for recovery of each identified KPI after the manifested disruption.
- The determination of RFs' aggregated value at the level of each KPI by applying the fuzzy Multi-Attribute Decision-Making and fuzzy aggregation operators.
- The scatterplot analysis of RFs' aggregated value at the level of each KPI and the time needed to recover each KPI by applying regression and correlation analysis.
- The development of an optimization model for the selection of methods for RFs' level enhancement.

For the needs of the resilience assessment:

- The ISO 310xx and 223xx series of standards for risk and resilience and in particular the new ISO 31050 (CD/TS, emerging risks and resilience) will be taken as a reference.
- The indicators will be defined and structured referring to the GRI[18] structuring and definition (in order to have an RFs list comparable to other GRI lists).
- The OECD composite indicator methodology[19] will be used as a reference methodology.
- The Steinbeis ResilienceTool will be used[20]

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[16] Stonehouse, G. H., Konina, N. Y. (2020, February). Management challenges in the age of digital disruption. In 1st International Conference on Emerging Trends and Challenges in the Management Theory and Practice (ETCMTP 2019) (pp. 1-6). Atlantis Press.

[17] Hillmann, J., & Guenther, E. (2021). Organizational resilience: a valuable construct for management research?. *International Journal of Management Reviews*, *23*(1), 7-44. https://doi.org/10.1111/ijmr.12239

[18] https://www.globalreporting.org

[19] https://www.oecd.org/els/soc/handbookonconstructingcompositeindicatorsmethodologyanduserguide.htm

[20] https://resiliencetool.eu-vri.eu/

The models will be tested on real data from a manufacturing company. Verification and validation of the proposed research will be carried out directly in selected organizational units and company subdivisions of the production company.

The proposed research will test the following hypotheses:

H1 - By applying the hybrid fuzzy model, it is possible to determine the aggregated value of RFs that impacts each identified KPI in an exact way.

H2 - There is a negative correlation between the aggregated value of RFs and the recovery time of KPI.

H3 - By applying the heuristic method, it is possible to choose the optimal set of methods for the improvement of RFs in one complex company.

Research methods

- In this dissertation, the input data will be collected using a survey method.
- The Hierarchy-Input-Process-Output model (HIPO) technique will be used for modeling business processes.
- Fuzzy sets will be used in the dissertation to model uncertain and imprecise data (values of RFs at the level of each identified sub-process, the relative importance of the impact of RFs on each KPI, and other variables).
- The Fuzzy Delphi method will be used to determine the value of RFs.
- The fuzzy best-worst method will be used to determine the relative importance of the impact of the RFs on each KPI.
- Various fuzzy aggregation operators will be used to determine the overall weighted value of resilience at the level of each KPI.
- To solve the problem of selecting the optimal number of quality methods to improve the RF values, heuristic methods will be used.

Outline the content of the doctoral dissertation

The dissertation will include the following chapters:

1. Introduction
2. Literature review
3. Research Methodology
4. Case study
5. Discussion and implication of the work
6. Conclusion
7. Literature

The first chapter will deal with the analysis of the problem which will be treated in the scope of the dissertation. The management system of past years is undergoing a major change in almost all agile-acting companies. Challenges are, on the one hand, the complex, (partially) autonomous, and decentralized organizational structure (with internal and external partners) and, on the other hand, the diversity of the product portfolio and the resulting diversity of variants within the group. In this context, all interested parties must meet the customer-specific and, above all, the increasing regulatory (normative, metrological, and legal) requirements.

The second chapter will deal with the analysis of relevant literature that will be used in the doctoral dissertation emphasizing the importance of the following areas: (1) business activities description - business models, business process frameworks, KPIs, (2) Organizational resilience description - models and assessment frameworks, (3) Description of the decision-making process - modeling by using fuzzy sets theory, group decision-making problem. The literature analysis will follow the outline content of the dissertation.

In the third chapter, the research methodology will be explained. The model for organizational resilience in the process industry will be the focus of the study, as it is suitable for companies in the process industry. At the same time, the model will be flexible enough to modify the resilience factors by including new ones or excluding obsolete ones. This section describes the evaluation of the organizational resilience model at the Deliver Physical Products process level. Decision-makers will use predefined linguistic expressions to evaluate the relative importance of the variables under consideration. These linguistic expressions will be modeled by fuzzy numbers. The final step of the investigation is to analyze the statistical dependence between the two sets of data: (1) a description of the time required to recover all tracked KPIs, and (2) the total value of RF at the level of each tracked KPI. Improving the values of RF depends on the implementation of management methods. To determine the optimal set of management methods, an optimization algorithm using heuristic methods is proposed.

The fourth chapter will describe the implementation of the proposed model. The model will be tested on data from a complex manufacturing system that deals with the production of complex engineering systems. The model will be verified through statistical analysis.

In the fifth chapter, the analysis of the research results will be discussed. The scientific approach will be considered, describing how the generic business process of physical product delivery depends on the RFs. The scientific and practical contributions of the work will be analyzed.

In the sixth chapter, the conclusions from the conducted research will be presented. Also, the limitations of the proposed model and future research will be analyzed.

In the seventh chapter, the references used in the dissertation will be given.

3. Explanation of the dissertation topic, which enables the conclusion that it is an original idea or an original method of analyzing the problem

Based on the application of the doctoral thesis, the formed Commission brings together the fact that there is a justified need for the development of the hybrid model for the assessment and enhancement of organizational resilience in complex industrial enterprises in an uncertain environment.

The dissertation will bring conceptualization of the new model for organizational resilience which represents a significant scientific contribution. The methodology for the assessment of organizational RFs will follow the proposed model with the analysis of the relationship between RFs values and the time needed for KPIs recovery. This will enable better decision-making processes for the optimization of business activities and achieving business continuity.

The proposed topic, along with the research objectives, is sufficiently focused on making scientific contributions in the dissertation field.

The Commission concludes that the proposed topic of the doctoral dissertation with an explanation of the subject and objectives of the work, scientific goals, scientific contributions, and expected results, resulting from the previous independent research and detailed analysis of available scientific papers, is an original idea in a scientific and professional sense.

4. Compliance with the research subject's definition, basic terms, proposed hypothesis, data sources, and analysis methods with scientific criteria while adhering to scientific principles in the preparation of the doctoral dissertation's final version

Candidate Michael Huber, Master of Business Engineering, will include in his dissertation all the elements of the scientific-research way of working, respecting the basic criteria of science, scientific goals, and methods of analysis, implementing existing and developing original ideas of scientific research.

The subject of research is aligned with the proposed hypotheses and research methods. The proposed scientific and professional literature is appropriate and contemporary.

In the submitted dissertation application, the candidate used the appropriate terminology and the field of engineering management. The definition of the research subject is harmonized with the basic questions, proposed hypotheses, and research methods.

Given that the research objectives stemmed from the perceived need to improve organizational resilience and its enhancement in complex industrial enterprises in an uncertain environment, the obtained results would represent an original contribution to the research field.

5. Review of the candidate's scientific research work

a) Short biography of the candidate

Michael Huber was born on August 27, 1982, in Vilsbiburg, Germany. He has completed a Bachelor of Engineering degree (ECTS 234) at the University of Applied Sciences Rosenheim, Germany. After that, he completed a Master of Business Engineering degree (ECTS 75) with a focus on General Management at Steinbeis University Berlin, Germany.

As part of the project competence studies in cooperation with Mercedes Benz at Steinbeis University Berlin, Germany the following studies abroad took place:

- Study abroad at the University of Agriculture and Technology, Tokyo (Japan) with a focus on business culture, international management, and international marketing
- Study abroad at Sungkyunkwan University, Seoul (South Korea) with a focus on business culture, international management, and international marketing
- Study abroad at Indiana University / Kelley School of Business, Bloomington (USA) with a focus on strategy, advanced marketing strategy, and management
- Study abroad at Jönköping University / International Business School, Jönköping (Sweden) with a focus on international management and international marketing

Since 2014, Michael Huber has been working for Mettler-Toledo GmbH, Switzerland. In 2017 he took over the overall responsibility for the Management System (quality, environment, safety and security, and data governance). In 2022, he was also given overall responsibility for Material Compliance of the METTLER TOLEDO Group.

Since 2020, he has been enrolled as a Ph.D. student at the Faculty of Engineering at the University of Kragujevac. He has passed all exams required by the curriculum with an average grade of 9.50 and is working on a dissertation.

b) Scientific research work

Michael Huber has published a total of two papers as an author or co-author in scientific journals and at scientific conferences.

• List of published papers

For journals (M22):

1. Aleksić, A., Nestić, S., **Huber, M.**, & Ljepava, N. (2022). The Assessment of the Key Competences for Lifelong Learning—The Fuzzy Model Approach for Sustainable Education. *Sustainability*, *14*(5), 2686. https://doi.org/10.3390/su14052686

For conferences (M33):

2. **Huber M.**, Aleksić A., & Ljepava, N., Business models in transition - a change for performance enhancement and resilience, Conference on Mechanical Engineering Technologies and Applications" COMETa 2022, Jahorina, Republic of Srpska, Bosnia and Herzegovina, 2022, 17-19th November, pp. 771-778, ISBN 978-99976-947-6-8.

6. **A proposal for a mentor with his references proving the fulfillment of the conditions for mentoring**

The committee proposes that the mentor of this doctoral dissertation be Dr. Aleksandar Aleksić, associate professor at the Faculty of Engineering, University of Kragujevac. Associate Professor, Dr. Aleksandar Aleksić has published 26 papers categorized as M20 and over 60 papers at international and national scientific conferences.

References that prove the fulfillment of the requirements for mentoring:

1. **Aleksić, A.**, Milanović, D. D., Komatina, N., & Tadić, D. (2023). Evaluation and ranking of failures in manufacturing process by combining best-worst method and VIKOR under type-2 fuzzy environment. *Expert Systems*, *40*(2), e13148. https://doi.org/10.1111/exsy.13148 [M22]
2. Gojković, R., Đurić, G., Tadić, D., Nestić, S., & **Aleksić, A.** (2021). Evaluation and selection of the quality methods for manufacturing process reliability improvement—Intuitionistic fuzzy sets and genetic algorithm approach. *Mathematics*, *9*(13), 1531. https://doi.org/10.3390/math9131531 [M21a]
3. Komatina, N., Djapan, M., Ristić, I., & **Aleksić, A.** (2021). Fulfilling external stakeholders' demands—enhancement workplace safety using fuzzy mcdm. *Sustainability*, *13*(5), 2892. https://doi.org/10.3390/su13052892 [M22]
4. Nestic, S., Lampón, J. F., **Aleksic, A.**, Cabanelas, P., & Tadic, D. (2019). Ranking manufacturing processes from the quality management perspective in the automotive industry. *Expert Systems*, *36*(6), e12451. https://doi.org/10.1111/exsy.12451 [M22]
5. **Aleksic, A.**, Komatina, N., & Tadić, D. (2019). Advanced risk assessment in reverse supply chain processes: A case study in Republic of Serbia. *Advances in Production Engineering and Management*, *14* (4), 421–434. https://doi.org/10.14743/apem2019.4.338 [M22]

Based on everything mentioned in the preceding sections of this report, the Commission makes the following

CONCLUSION AND PROPOSAL

Michael Huber, Master of Business Engineering, met all of the requirements for approval of the doctoral dissertation preparation.

The proposal doctoral dissertation is original and scientifically based. The proposed methodology for preparing the doctoral dissertation is in accordance with scientific principles. The expected results of the doctoral dissertation should represent an original scientific contribution to the scientific field of **Engineering management** and industry.

The Commission proposes to the Teaching and Scientific Council of the Faculty of Engineering, University of Kragujevac, and the Council for Technical and Technological Sciences of the University of Kragujevac to accept the proposed topic for the doctoral dissertation entitled:

"ASSESSMENT AND ENHANCEMENT OF ORGANIZATIONAL RESILIENCE IN COMPLEX INDUSTRIAL ENTERPRISES IN UNCERTAIN ENVIRONMENT"

and to approve its preparation for the candidate **Michael Huber, Master of Business Engineering**. The Commission suggests that the mentor of the proposed doctoral dissertation would be **Dr. Aleksandar Aleksić, Associate Professor** at the Faculty of Engineering, University of Kragujevac.

In Kragujevac, Berlin and Belgrade
Date: 02.03.2023.

THE COMMISSION

1. _____
Dr. Aleksandar Aleksić, Associate Professor – President of the Commission
Faculty of Engineering, University of Kragujevac,
The narrow scientific field: Engineering management, the election date to the position of associate professor 09.06.2021.

2. _____ Prof. Dr. Aleksandar JOVANOVIĆ cn=Prof. Dr. Aleksandar JOVANOVIĆ, o, ou, email=jovanovic@risk-technologies.com, c=DE 2023.02.26 17:05:17 +01'00'
Dr. Aleksandar Jovanović, Full Professor - member
Steinbeis-Hochschule Berlin
The narrow scientific field: Technical risk management, the election date to the position of full professor 01.07.2016.

3. _____
Dr. Danijela Tadić, Full Professor - member
Faculty of Engineering, University of Kragujevac
The narrow scientific fields: Production Engineering, Industrial Engineering, the election date to the position of full professor 28.02.2013.

4. _____

Dr. Snežana Nestić, Associate Professor - member
Faculty of Engineering, University of Kragujevac
The narrow scientific field: Engineering management, the election date to the position of associate professor 15.07.2020.

5. _____

Dr. Mladen Đurić, Associate Professor - member
Faculty of Organizational Science, University of Belgrade
The narrow scientific field: Quality management, the election date to the position of associate professor 01.12.2020.