



BUSINESS ANALYTICS SKILLS FOR THE FUTURE- PROOF SUPPLY CHAINS

SCIENTIFIC PUBLICATIONS



Contents

Scientific Publications as Part of the BAS4SC Project	2
Publications already published	3
Publications in Progress.....	4
Overview of the publications.....	5



Scientific Publications as Part of the BAS4SC Project

As part of the BAS4SC project (Business Analytics Skills for the Future-proof Supply Chains), a series of scientific publications was produced, reflecting both the research achievements of the project team and their contribution to advancing contemporary knowledge in logistics, business analytics, and knowledge engineering. These articles also serve as a channel for disseminating the project's results and attest to the high quality of the conducted research.

Each publication underwent a blind, double-blind peer review process, confirming its reliability, credibility, and relevance to the academic community. The collected publications provide a solid foundation for further analysis and help guide future research in the transformation and digitalization of modern supply chains.

Beyond documenting the project's research outcomes, the publications highlight the increasing importance of analytical competencies and a systems-oriented approach to management in a rapidly changing economic environment. They serve as a valuable source of knowledge for developing innovative solutions in logistics and for educating future specialists. The accumulated scientific achievements also enhance the project's visibility and reinforce its role as a significant research and educational initiative in the field of modern supply chain management.



Publications already published

Among the results achieved were:

- Gumzej, R.; Kramberger, T.; Brglez, K.; Kovacic Lukman, R. (2025) Knowledge-Based Engineering in Strategic Logistics Planning, „Sustainability”, 17(6820)
- Gumzej, R., Kramberger, T., Dujak, D. (2023) A Knowledge Base for Strategic Logistics Planning, 23rd International Scientific Conference Business Logistics in Modern Management, Osijek, Croatia

Both publications meet academic standards, have undergone double-blind peer review, and received positive substantive assessments. This confirms their scientific credibility and the quality of the results obtained. The research findings are multidimensional and based on a broad research sample, providing a solid basis for further studies.



Publications in Progress

Based on the obtained results, two further publications have been prepared, which have received positive reviews (double-blind review), have been presented at scientific conferences, and are awaiting publication in journals:

- Grzybowska, K., Adamczak, M., Cyplik, P., Tobała-Walaszczyk, A., Ragin-Skorecka, K., Siemieniak, K., Jankowski-Guzy, J. (2024) Educational Framework for Business Analytics at Higher Education Level: Curriculum Structure, Subjects and Skills, konferencja InterLOG 2024, Poznan, Poland
- Adamczak, M., Tobała-Walaszczyk, A., Grzybowska, K., Cyplik, P. (2025) Identification of relevance levels in analytical competences for the improvement of higher education programmes in Poland, konferencja InterLOG 2025, Poznan, Poland



Overview of the publications

**Gumzej, R.; Kramberger, T.; Brglez, K.; Kovacic Lukman, R.
(2025) Knowledge-Based Engineering in Strategic Logistics
Planning, „Sustainability”, 17(6820)**

Strategic logistics planning is used by management to define action plans that will enable organizations to always make decisions that are in the organization's best interests. They are based on a knowledge repository of business experiences, which is usually represented by a centralized, organized, and searchable digital system where organizations store and manage critical institutional knowledge. Thus, an institutional knowledge base provides sustainability, making the experiences readily available while keeping them well organized. In this research, the experiences of logistics experts from selected scholarly designs for six-sigma business improvement projects have been collected, classified, and organized to form a logistics knowledge management system. Although originally meant to facilitate current and future decisions in strategic logistics planning of the cooperating companies, it is also used in logistics education to introduce knowledge-based engineering principles to enterprise strategic planning, based on continuous improvement of quality-related product or process performance indicators. The main goal of this article is to highlight the benefits of knowledge-based engineering over the established ontological logistics knowledge base in smart production, based on the predisposition that ontological institutional knowledge base management is more efficient, adaptable, and sustainable.



Gumzej, R., Kramberger, T., Dujak, D. (2023) A Knowledge Base for Strategic Logistics Planning, 23rd International Scientific Conference Business Logistics in Modern Management, Osijek, Croatia

In the paper, a knowledge-based engineering approach to strategic logistics planning is presented. Semantic web technologies for managing a knowledge base of business experiences are used. The proposed knowledge base comprises experiences gained by the SCOR model of logistics planning, according to the Deming's observe, plan, do, study, act cycle. By appropriate structuring of the knowledge base, easy access to the stored experiences for on-line analytic processing is enabled. By the proposed approach an expert system for smart logistics management is founded.

In this article the different forms of knowledge representation and management logistics planning. In the proposed approach smart logistics management (Gumzej, 2021) is supported by semantic Web and online analytical processing (OLAP) technologies. They form a knowledge management system (KMS) based on a logistics knowledge base of experiences, expressed in controlled natural language (CNL). The underlying experiences address the different levels of supply chain management decisions from strategic, over tactical to operational. They are also structured in way which distinguishes the main supply chain management concerns. By the proposed approach, logistics knowledge-based engineering (KBE) can be conducted, based on an appropriately structured logistics knowledge base of supply chain improvement experiences. In future research, a more elaborate example of a knowledge base of supply chain management experiences shall be constructed to provide a first reference point of supply chain management knowledge to practitioners, researchers and students. The main limitations of this research are the use of free and open-source software and the limited knowledge base available.



**Grzybowska, K., Adamczak, M., Cyplik, P., Toboła-
Walaszczyk, A., Regin-Skorecka, K., Siemieniak, K., Jankowski-
Guzy, J. (2024) Educational Framework for Business Analytics at
Higher Education Level: Curriculum Structure, Subjects and
Skills, konferencja InterLOG 2024, Poznan, Poland**

The acquisition of practical knowledge, identified by specific competencies and skills in the field of business analytics is a necessity. Academic universities must keep up with the needs of business. The aim of the paper is to identify the current educational framework for Business Analytics at the higher education level. The work asks three research questions: (RQ1) In which fields of study business analytics issues are included?; (RQ2) What subjects are offered in the field of business analytics at universities?; (RQ3) What key competencies are developed in the field of business analytics at universities? The pedagogical framework, which includes entry requirements, curriculum and subject-specific learning outcomes, was developed based on a review of ECTS cards of selected universities in East-Central European countries.

To sum up the results of the conducted research, two levels of conclusions should be indicated: detailed and general. In the detailed level, it is possible to indicate what subjects and what competencies should be implemented as part of the education of a BA.

In the general level, it is necessary to indicate observations that will lead to the creation of educational programs that are attractive from the point of view of the labour market and entire economies. From the perspective of BA, the following seem to be particularly important in this respect:

- Continuous adaptation of educational programs to changing needs and emerging trends in BA.
- Providing students with access to the latest technologies and analytical tools so that they can develop their practical skills.
- Developing soft skills such as communication, teamwork and creative thinking.



**Adamczak, M., Tobała-Wałaszczyk, A., Grzybowska, K.,
Cyplik, P. (2025) Identification of relevance levels in analytical
competences for the improvement of higher education
programmes in Poland, konferencja InterLOG 2025, Poznań,
Poland**

Data analysis in the era of Industry and Logistics 4.0 solutions is taking on new importance, both quantitatively and qualitatively. Large data sets allow for the identification of non-obvious relationships. As data collection and aggregation tools evolve, so do data analysis methods. Therefore, it is crucial that supply chain management specialists be able to analyze data, draw conclusions, and transform them into a competitive advantage for the company.

The aim of the study was to identify the importance and relationships between analytical competencies from the perspective of managers of logistics and manufacturing companies.

The study utilized a survey approach, and the correlation and Ward's method were used to analyze the results.

The analysis of the results allowed for the following conclusions: mathematical skills are the most universal competencies; having mathematical skills as core competences makes it easier to acquire other competences in the field of business analytics; managerial skills are the most important for business managers in terms of business analytics, managerial skills in business analytics are more important from the point of view of companies.