

BIALYSTOK UNIVERSITY OF TECHNOLOGY
FACULTY OF ENGINEERING MANAGEMENT



ISMSME
International Society for Manufacturing,
Service and Management Engineering

ENGINEERING MANAGEMENT IN PRODUCTION AND SERVICES

VOLUME 15 • ISSUE 1 • 2023

FREQUENCY

ECONOMICS AND MANAGEMENT
is published quarterly since 1998

As of the beginning of 2017 the journal
is published under a new name:
ENGINEERING MANAGEMENT
IN PRODUCTION AND SERVICES

PUBLISHER

Bialystok University of Technology
Wiejska 45A, 15-351 Bialystok, Poland

The International Society
for Manufacturing Service
and Management Engineering (ISMSME)

EDITOR-IN-CHIEF

JOANNA EJDYS

Bialystok University of Technology
Faculty of Engineering Management
Wiejska 45A, 15-351 Bialystok, Poland
Phone: (+4885) 746 9802
Fax: (+4885) 663 1988
e-mail: j.ejdys@pb.edu.pl

DEPUTY EDITORS-IN-CHIEF

ŁUKASZ NAZARKO
e-mail: l.nazarko@pb.edu.pl

KATARZYNA HALICKA
e-mail: k.halicka@pb.edu.pl

EDITORIAL OFFICE

Bialystok University of Technology
Wiejska 45A, 15-351 Bialystok, Poland
Phone: (+4885) 746 9825
Fax: (+4885) 663 1988
www.empas.pb.edu.pl

SUBMISSION

Papers for submission should be prepared
according to the *Authors Instructions* available
at www.empas.pb.edu.pl

All papers should be submitted through
the electronic submission system

INDEXATION

Journal is indexed in SCOPUS, Ei Compendex,
EBSCO Business Source Ultimate (Complete),
Norwegian Register for Scientific Journals, Series
and Publishers, Index Copernicus, ERIH PLUS,
Google Scholar, Central European Journal of Social
Sciences and Humanities, Research Papers in Eco-
nomics (RePEc), BazTech and BazEkon databases

SCIENTIFIC SECRETARY

DANUTA SZPILKO

Bialystok University of Technology
Faculty of Engineering Management
Wiejska 45A, 15-351 Bialystok, Poland
Phone: (+4885) 746 9880
e-mail: d.szpilko@pb.edu.pl

TECHNICAL EDITORS

KRZYSZTOF STEPANIUK
e-mail: k.stepaniuk@pb.edu.pl

TOMASZ TROCHIMCZUK
e-mail: t.trochimczuk@pb.edu.pl

© 2023 BIALYSTOK UNIVERSITY OF TECHNOLOGY

The Engineering Management in Production
and Services is licensed under the under the [Creative
Commons BY-NC-ND 4.0 License](https://creativecommons.org/licenses/by-nc-nd/4.0/).



EDITORIAL REVIEW BOARD

EDITORS

Production Engineering

Katarzyna Halicka
Białystok University of Technology, Poland
Kriengsak Panuwatwanich
Thammasat University, Thailand

Service Engineering

Wiesław Urban
Białystok University of Technology, Poland
Hao Wang
Ningbo Tech University, China

Engineering Management

Alicja Gudanowska
Białystok University of Technology, Poland
Jurgita Antuchevičienė
VilniusTechUniversity, Lithuania

Logistics Management

Katarzyna Kuźmich
Białystok University of Technology, Poland
Erwin Pesch
Universität Siegen, Germany

Technology Management

Andrzej Magruk
Białystok University of Technology, Poland
Zdzisław Klim
Bombardier, USA

Technology Assessment

Lukasz Nazarko
Białystok University of Technology, Poland
Jelena Stankevičienė
VilniusTechUniversity, Lithuania

Strategic Foresight

Anna Kononiuk
Białystok University of Technology, Poland
Elina Hiltunen
What's Next Consulting Oy, Finland

Industrial Marketing

Dariusz Siemieniako
Białystok University of Technology, Poland
Gregor Pfajfar
University of Ljubljana, Slovenia

Statistical Editor

Justyna Kozłowska
Białystok University of Technology, Poland

Linguistic Editor

Jūratė Griškėnaitė

INTERNATIONAL ADVISORY BOARD

HEAD

Joanicjusz Nazarko

Białystok University of Technology, Poland

MEMBERS

Gianita Bleoju

Dunarea de Jos University of Galati, Romania

Zhen-Song Chen

Wuhan University, China

Joanna Cygler

Warsaw School of Economics, Poland

Marek Drużdżel

Białystok University of Technology, Poland

Józef Gawlik

Cracow University of Technology, Poland

Romualdas Ginevičius

VilniusTechUniversity, Lithuania

Qinghua (Daniel) He

Tongji University, China

Chien-Ho Ko

University of Kansas, USA

Tsai-Ching Lu

HRL Laboratories, USA

Bojan Lalić

University of Novi Sad, Serbia

Dirk Meissner

Germany

Miloslav Novotný

Brno University of Technology, Czech Republic

Lanndon A. Ocampo

Cebu Technological University, Philippines

Magdalena Pichlak

Silesian University of Technology, Poland

Rafael Popper

Foresight Diamond, Ltd.

Mladen Radisic

University of Novi Sad, Serbia

Mirosław Skibniewski

University of Maryland, USA

Włodzimierz Sroka

WSB University, Poland

Leonas Ustinovičius

VilniusTechUniversity, Lithuania

Andrzej Wasiak

Białystok University of Technology, Poland

Samuel Yen-Liang Yin

National Taiwan University, Beijing University, China

Edmundas Kazimieras Zavadskas

VilniusTechUniversity, Lithuania

Hongyan Zhang

The University of Toledo, USA



DOFINANSOWANO ZE ŚRODKÓW BUDŻETU PAŃSTWA

Program „Rozwój czasopism naukowych”

Projekt: Rozwój czasopisma naukowego Engineering Management in Production and Services

Kwota dofinansowania: 80 000,00 zł

Całkowita wartość zadania: 80 000,00 zł

Projekt ma na celu rozwój czasopisma naukowego Engineering Management in Production and Services, poprzez publikację ośmiu numerów w języku angielskim oraz upowszechnienie i zabezpieczenie oryginalności publikowanych w nim artykułów.

PROJECT FUNDED FROM THE STATE BUDGET

"Development of scientific journals" Programme

Project: Development of the Engineering Management in Production and Services scientific journal

Amount of funding: PLN 80,000.00

Total value of the task: PLN 80,000.00

The project aims at developing the Engineering Management in Production and Services scientific journal by publishing eight issues in English, disseminating and ensuring the originality of the published articles.

TABLE OF CONTENTS

Ramunė Čiarnienė, Milita Vienažindienė, Rūta Adamonienė Teleworking and sustainable behaviour in the context of COVID-19: the case of Lithuania	1
Khaled Jameel Aladayleh, Shatha Mustafa Abdallah Al Qudah, José Luis Fuentes Bargas, Pablo Ferrer Gisbert Global trends of the research on COVID-19 risks effect in sustainable facility management fields: a bibliometric analysis.....	12
Katarzyna Tworek IT reliability as a source of sustainability for organisations operating during the COVID-19 pandemic	29
Mehreen Kausar Azam, Syed Mehmood Hasan, Sheheryar Mohsin Qureshi Exploring the critical success factors of a resilient supply chain	41
Rui M. Lima, Ingrid Souza, Eduarda Pereira, Ana Cristina Belém, Cátia Marlene Pinto, Joana Lazzaris, Pedro Fonseca Characterising project management of lean initiatives in industrial companies — crossing perspectives based on case studies.....	57
Sultan Tarawneh, Anoud Fawwaz Almahmoud, Hassan Hajjeh Impact of cash flow variation on project performance: contractors’ perspective	73
Anna Baj-Rogowska, Marcin Sikorski Exploring the usability and user experience of social media apps through a text mining approach	86