



Available research topics of BME Doctoral School of Business and Management

Academic Year 2022/2023

for
Stipendium Hungaricum Scholarship Programme

Application

The BME Doctoral School of Business and Management provides doctoral training in the field of social sciences and in the discipline of business and management. The current research topics and supervisors available for supervision in English language can found in this document. **The Doctoral School accepts proposals only in the given topics.**

For submitting a valid application to Stipendium Hungaricum Scholarship Programme, the Applicants are NOT required to provide a statement from the future supervisor. The Doctoral School does not make pre-selection or evaluation during the application process, the application will be examined only during the admission process.

The Applicants are strongly advised to contact the **International Students' Office** (iso@gtk.bme.hu) with their questions. The International Students' Office will answer the questions and provide the Applicants with all the necessary information regarding application and admission.

The **deadline for submitting the complete application**: 15 January 2022 – 23:59 (CET). The online application system can be reached through: apply.stipendiumhungaricum.hu

Please read carefully the “[*Call of the Stipendium Hungaricum Scholarship Programme*](#)” for the basic application documents.

Admission

After the application deadline, Tempus Public Foundation and the sending partners will make a pre-selection. Only applicants nominated by their sending partner will be assessed by the universities.

As a first step of this process, the uploaded materials will be checked by our faculty to see if they meet the requirements. The relevant supervisors will thoroughly evaluate the uploaded materials. After that the applicants have to take an **on-line entrance examination**, consisting of two parts. **Firstly**, an entry assignment will have to be completed and submitted in writing electronically, which needs to be reviewed before the second part of the entrance exam. **Secondly**, an interview will be conducted on-line: the interview inspects the applicant's





motivation and aptitude for research. At the interview, the committee examines the proficiency of the Applicant in the research field, the feasibility of the research plan, and the commitment of the Applicant to the research.

Please note that the order of preference is essential. During the application process, the first selection and examination process will be conducted for the study programmes selected as the first choices of the Applicants. The first priorities will be considered first and then, only the remaining free places will be filled with those applicants who are not approved for their first choice of programmes. In this way, the chances of receive the scholarship are relatively higher for the study programmes selected as first choices because there are more free places at that time.

The decision on admission will be based on the overall assessment of the Applicants, as well as on the number of vacancies in the related area.

Budapest, 19 November 2021

(Sgd.) Prof. Dr. Tamás Koltai

Head of Doctoral School of Business and Management
Budapest University of Technology and Economics





RESEARCH TOPICS

QUANTITATIVE ANALYSIS IN MANAGEMENT AND BUSINESS ECONOMICS

Linear models in production theory and production planning

Supervisor: Dr. Dobos Imre

The aim of the research project is to introduce doctoral students to the linear models and methods that can be applied in management and economics. Such models include Koopmans' linear activity analysis, which is also a theoretical basis for Data Envelopment Analysis (DEA), and Leontief's input-output model. These production theory models can then be applied to production planning.

Modeling issue of dynamic economics

Supervisor: Dr. Dobos Imre

Dynamic economics examines the time evolution of economic processes, mainly using mathematical methods. The questions that arise are aimed at finding the possible trajectories of the economies, as well as their qualitative examination. The main known dynamic models are the Ramsey growth model or the dynamic Leontief model. The research topic assumes that the doctoral student is aware of continuous-time differential equations or discrete-time difference equations.

Efficiency analysis of production and service operations

Supervisor: Dr. Koltai Tamás

To increase the efficiency of production and service system is a continuing effort of management. Objective methods are required to explore the sources of inefficiencies, and to provide direction about improvement possibilities. Data Envelopment Analysis can provide an aggregate measure, which incorporates several input resources and output objectives. The method is widely used for the analysis of manufacturing and service operations in the private and public sector as well. The objective of the research is to develop efficiency models, which can take advantage of the possibilities of advanced information technologies and of big data methods.

Supporting production and operations management decisions with mathematical programming models

Supervisor: Dr. Koltai Tamás

In most cases, the objective of production and operations management decisions is to allocate limited amount of resources considering several decision criteria. This type of problems can generally be described by mathematical programming models. The objective of the research is to explore new areas of application in production, service, and administration areas furthermore to solve the emerging theoretical and implementation problems. A further objective is to incorporate the models in management information systems (MIS) and to provide sensitivity and robustness information of the results.

Analysis of the effect of learning on production and operations management decisions

Supervisor: Dr. Koltai Tamás

There are cases in production and service systems, when the execution time of tasks decreases, as tasks executed more frequently. This phenomenon is described by learning functions. In most cases, decision models ignore the effect of learning and consider task times as constant. Applying modern information technologies, it is possible to describe the learning functions more accurately and to explore some general characteristics of the learning process. The objective of the research is to describe the learning process in some important areas of production, service, and administrative operations, and to explore the effect of learning on management decisions.





Fair representation!

Supervisor: Dr. Kóczy Á. László

The distribution of representatives among counties or states is discussed by the apportionment literature. Different countries use conceptionally and practically different methods. For example, the Hungarian election law allocates list votes following the D'Hondt method, while voting districts are allocated per the recommendation of the Venice Commission. By the analytical, empirical and simulation-based investigation of these methods we understand the choice of method better and can then formulate theory-based recommendations.

Increasing efficiency with optimal resource allocation

Supervisor: Dr. Kóczy Á. László

The allocation of scarce resources is critical for the efficient operation of a complex organization. The literature is full of models including auctions, apportionment methods, solutions from cooperative game theory. These models and especially their properties are compared to the characteristics of actual allocation problems. Once the links between theory and practice are established, it is easy to make practical recommendations.

Cutting your gas bill

Supervisor: Dr. Kóczy Á. László

Renewable energy is the new hype, but due to its flexibility gas demand continues to rise. Gas markets are unique due to the problem transporting gas via a network of pipelines with limited transportation capacities. Pipelines have become political instruments (Russia-Ukraine gas conflicts) where an addition can drastically change the geopolitical power balance and the cost of supplying the country's needs. A complex evaluation of the capacity-constrained transmission network can support decisions on new pipeline projects.

Smart traffic routing

Supervisor: Dr. Kóczy Á. László

Besides the benefits of GPS-based routing tools, the side effects are becoming clear too. These include heavy traffic in residential streets or a traffic jam on the diversion route, while normal traffic on the original alternative. In this project, we propose models where routes are coordinated and are determined cooperatively avoiding the so-called tragedy of the commons. Besides theoretical results, the project may lead to industrial applications and patents.

Breaking up Google in Hungary

Supervisor: Dr. Kóczy Á. László

Since the 1900s, the US has paved the way for regulation with antitrust laws then gradually extending it to environmental and health regulation – with the EU and especially smaller countries lagging behind. Regulators face a dilemma between getting/losing votes and getting/losing the support of the entrepreneurs. In a small economy stricter regulation benefits consumers, thus voters and harms - mostly foreign - owners potentially affecting international relations adding a political dimension to cases against multinationals such as Google.

Sharing responsibility (using game-theoretic methods)

Supervisor: Dr. Kóczy Á. László

The recent financial crisis is a painful example when inappropriate risk management causes widespread cascading damages. The increased attention to containing and managing risk has, on the other hand, increased management costs. In this project methods from cooperative game theory are used to fairly allocate risk among subentities.





The allocation of carbon footprint in supply chains

Supervisor: Dr. Kóczy Á. László

In an effort to reduce CO₂ emissions and pollution in general, new regulation makes producers responsible for their environmental load. With parts of the supply chain located in different countries with very different levels of regulation, allocating the costs of, for instance, carbon taxes are far from obvious. Gopalakrishnan et al (Management Science, 2021) use the Shapley value to allocate the GHG among members of a simple supply chain. Unfortunately, this approach ignores differences in regulation and incentives for vertical (dis)integration (and thereby shifting responsibility across boundaries). The river sharing literature may provide a more general approach.

European gas supply during the green transition

Supervisor: Dr. Kóczy Á. László

Even experts disagree about the foreseeable trends in gas consumption: we should cut the consumption of non-renewable resources and thus reduce the natural gas consumption but at the same time renewable energy production is highly volatile - creating highly volatile price changes right now - and natural gas turbines provide a fairly efficient way to quickly react and step in in case of shortages. While decarbonisation and in particular the electrification of household heating should imply a lower usage of natural gas, the importance of gas turbines in smoothing out renewables production suggests that the usage may, in fact, increase. As a direct result of these market changes, demand for gas may gradually lose its seasonality and may become volatile, too. Using the game theoretic pipeline-network model of Sziklai-Kóczy-Csersik (Energy Policy, 2020) the researcher will evaluate the foreseeable costs and risks of the green transition to the stakeholders in the natural gas markets.





BUSINESS MODELS AND INNOVATION METHODS IN MANAGEMENT AND BUSINESS ECONOMIC

Business model innovation as a result of digital transformation

Supervisor: Dr. Nemeslaki András

This stream of research explores how ICT driven innovation - especially the complex phenomenon which is called the fourth industrial revolution - impacts industries, business functions, managerial areas and value creation.

B2B marketing: Analysing business relationships from interactive network approach

Supervisor: Dr. Szalkai Zsuzsanna

This topic deals with the challenges of business relationships from interactive, network perspectives of B2B marketing. Such major challenges that have effects on business relationships nowadays are digitalization and Industry 4.0. This research topic analysis among others the relationship between digitalization and business relationships in specific industries e.g. the pharmaceutical industry or in specific contexts, e.g. contract manufacturing. The topic has high relevance on international and also on domestic level.

Resource combination from the aspect of B2B marketing

Supervisor: Dr. Szalkai Zsuzsanna

Based on the approach of the Industrial Marketing and Purchasing (IMP) Group business relationships are emerged and maintained by the interactions between actors. Through the interactions between various organizations – and thereby in business networks – not only the existing resources are exchanged, but they are combined and new resources are developed. The focus of this research topic is this resource combination, especially the analysis of knowledge as a resource both on conceptual and on empirical level.

Product Experience

Supervisor: Dr. Lógó Emma

The research topic is the psychological, psychosocial, and physical aspects of Product Experience. Related to the topic is the Design Thinking approach and methodologies of Experience Design.

Shopping Experience

Supervisor: Dr. Lógó Emma

The research topic is the Shopping Experience in different forms of commerce (traditional „bricks and mortar” and online). Design and development of customer experience using Design Thinking methodologies.

Financial Markets with Central- and Eastern Europe focus

Supervisor: Dr. Bethlendi András

The structure of financial intermediation in the region is characterised by bank-based rather than market-based financial systems, low level of intermediation and market capitalization and the lack of market-based banking. Research topics:

- Post GFC banking and/or capital market regulatory and institutional changes.
- Critical evaluation of Covid pandemic related regulatory measures.
- Structure of financial intermediation and its real economy effects.
- The role of foreign ownership in banking and capital market firms, government policies towards foreign ownership.
- What are the barriers to the spread of securitization in the CEE region?





- Evaluation of venture capital in financing innovation.
- The growing share of ESG investments products, its implications.

Monetary policy theories and the operational framework of central banks

Supervisor: Dr. Novák Zsuzsanna

Under the theme offer those theses are welcome which set the objective to give an overview of monetary policy theories, to confront theoretical approaches to monetary rules and /or to investigate their application on practical examples. Beyond monetary policy theories the historical development and current use of central bank instruments, their role played in crisis management if also part of the eligible subjects. The theme offer furthermore expands to the issues of macroprudential and early warning indicators of crisis, exchange rate policy and the relationship between the central bank and public finances and the central bank and securities markets.

Banking: Transactions and Prudency

Supervisor: Dr. Vértesy László

The banking sector transformed in the last two decades, transactions, services develop increasingly complex in line with the digital requirements and are closely intertwined with the insurance and capital markets. The micro- and macroprudential operation involve customers, banks and the financial system as a whole. The government and the supervision play an important role in this at a national, EU and international level. The topic can be further extended to consumer protection, ethical banking, artificial intelligence and green finance.

Insurance: Products and Solvency

Supervisor: Dr. Vértesy László

The insurance sector has transformed recently, more and more life and non-life products are emerging, flexibly adapting to households' and corporations' economic and social challenges: individual and behavioral premiums, on-demand insurance; involving the banking and capital markets. Micro- and macroprudential affects customers and insurers; but the government and supervision also play an important role in this at national and EU level. The topic can be further expanded to consumer protection, risk management and ethical insurance.

Financial, Economic Governance

Supervisor: Dr. Vértesy László

Recent changes in the globalized financial and economic system have posed a number of challenges for market participants and governments. Research can be approached from several directions: (i) a single state, group of countries, or economic organization; (ii) an institution (central bank, tax authority, supervisory, international organizations) or sector (SME, MNCs); (iii) a particular topic (fiscal or monetary policy, financial sector, globalized economy); (iv) new trends (Basel, Solvency, FinTech, sustainable economic development).

Digital two-sided platforms and their applications in finance

Supervisor: Dr. Somogyi Róbert

In the past decade, digital platforms have become widespread in the economy in general, and in finance in particular. These intermediaries connect two distinct groups of agents (e.g., buyers and sellers), taking advantage of the positive cross-group externalities between them. For instance, Visa grew to be one of the largest financial-services firms by connecting the merchants to cardholders.

Many policy-relevant questions arise about the optimal pricing structure of such firms, how they differ from traditional players in their sector, how their practices affect social welfare, and whether and how authorities should regulate them.





Deceptive pricing practices in the financial sector

Supervisor: Dr. Somogyi Róbert

Deceptive pricing practices are ubiquitous in the economy in general, and in finance in particular. Examples include pressure selling tactics, hiding additional fees by drip pricing, and using very complicated contracts that make the comparison of offers hard. For instance, credit card contracts are notoriously complex. Competition authorities and consumer protection agencies around the world seem to be increasingly concerned by these practices. Game theory and industrial economics offer a toolbox that is very well adapted to studying such regulatory issues.

Emotional intelligence at workplaces

Supervisor: Dr. Séllei Beatrix

This research topic is about the usefulness of emotions and emotional intelligence in an organizational context. Leaders' and teams' emotional intelligence play a key role in organizational success, and the research is about the know-how. What emotions are useful, how can managers influence emotional cycles of a group, what are the methods of development of workplace-related EI competencies.

Interdisciplinary study of project management decisions

Supervisor: Dr. Sebestyén Zoltán

The research's primary goal is to explore areas that are closely related to project management and that are integrated into project management but forming self-sufficient disciplines and exploring the synergies between them. The research addresses the project management aspect of these independent disciplines. The Ph.D. aspirant can focus on any project management topic already under research (e.g., risk, success, portfolio) and any topic not yet studied, employing the necessary quantitative methods (operation research or statistics depending on the topic).

The relationship between resilient organizational strategy and certain organizational characteristics

Supervisor: Dr. Bognár Ferenc

The aim of the research is to describe the relationship between resilient organizational strategy, dominant features of organizational culture, and risk assessment of an organization's business processes. The research builds on the use of the OCAI (Organizational Cultural Assessment Instrument) survey tool developed by Cameron and Quinn and the IRIS (Improvisation Readiness Index Score) developed by Hughes et al. The research covers the SME sector and, in addition to the domestic analysis, it also includes an international perspective.





SOCIAL ASPECTS OF MANAGEMENT AND BUSINESS ECONOMICS

Sustainability and adaptation in different sectors and regions

Supervisor: Dr. Szalmáné Csete Mária

The expected impacts of climate change are difficult to forecast with total certainty, creating challenges for the analysis of the capacity and willingness to adapt in different social and economic systems. Adaptation and sustainability are closely interconnected and reinforce each other. Innovating for sustainability and climate change can play pivotal role on global and local levels as well especially in the era of IoT. Globalization, urbanization processes lead to the development of more frequent and intense bottom up approaches in several communities worldwide also related to climate issues especially focusing on smart urban, rural and sectoral solutions. The possible impacts of climate change make the transition towards sustainability more complicated especially in the preparation for expected impacts, prevention, management and recovery. Climate change related consequences can also have significant influence on different sectors in a given area for instance related to the quality of life, innovation potential, competitiveness income, health etc., which can make up the basis for regional sustainability.

Business and sustainable development: the environmental and social aspects of business organisations

Supervisor: Dr. Zilahy Gyula

Businesses increasingly have to consider the environmental and social implications of their activities and adjust their strategies and business models to changing expectations. Research topics in business sustainability include the management aspects of internal operations, as well the whole supply chain; the CSR activities of companies; the strategies towards climate change and the business models of innovative businesses such as the sharing economy. The topic also includes the policy aspects of sustainability as well as issues relating to sustainable consumption.

Economic aspects of sustainable growth

Supervisor: Dr. Gilányi Zsolt

Market economies produced outstanding economic development with its positive and negative effects. Many theorists see a clear relationship between economic growth and negative effects. Ecologists questioned the sustainability of the system. They believe that even the present resource consumption is unsustainable, therefore zero growth would be necessary after a transitory degrowth period. This ecological problem induced by physical boundedness generated a theoretical debate in economic science: may market economic system exist with zero growth?

Institutions and economic development

Supervisor: Dr. Kapás Judit

The view that "institutions matter" in economic development is based on a consensus among economists. Accordingly, the various lines of research within institutional economics center on the question of "how institutions matter". This broad research question allows us to formulate specific theoretical and/or empirical questions concerning how the various economic, political, legal, and regulatory institutions affect long-run economic performance (long-run income, productivity, innovativeness) of an economy. Besides the above-mentioned formal institutions, research into the impact of informal institutions (e.g. trust, culture, values) may be given special emphasis.

The evolution of the firm in the knowledge economy

Supervisor: Dr. Kapás Judit

Various new phenomena that characterize today's firms, such as outsourcing, franchising, flattening of organizational structure, virtual firms or intrapreneurship cannot be fully explained in the framework of





the mainstream contractual theories of the firm which have developed by following Coase (1937). These phenomena indicate that the "nature" of the firm has to be understood in a more nuanced way. It is possible to formulate - within the theory of the firm - more specific theoretical and/or empirical questions to better explain the firm in the knowledge economy.

Globalizations and institutions

Supervisor: Dr. Kapás Judit

Economic globalization is intertwined with institutional changes, at two levels. On the one hand, globalization may require institutional changes at national level, and at the same time it may lead to institutional changes. On the other hand, globalization may result in building new institutions at international level. This broad topic allows us to formulate various specific theoretical and empirical research questions in the field of the interplay between FDI, international trade and international labour movements on one hand, and economic, political, legal and regulatory institutions, on the other. Special emphasis might be given to the role of informal institutions (culture, values) in the process of globalization.

The platformisation of cultural production

Supervisor: Dr. Barna Róza Emilia

The aim of the research is the analysis, through a selected case, of the role played by digital platformisation in the cultural industries, such as the music industry, the film industry, gaming, or the fashion industry. A potential focus is the emergence, and gaining power, of major "tech" companies such as Google, Apple, Amazon, or Facebook, or smaller new entrants, in cultural production, distribution, and consumption, as well as their role in shaping practices of cultural intermediation and gatekeeping, or in cultural labour.

Big data, the new economics?

Supervisor: Dr. Bíró Gábor István

The aim is to analyze the theoretical, methodological and technical components of *big data* to find out whether and to what extent big data has started to become a discipline, and perhaps a new kind of economics. The topic covers making inquiries into the explicit and implicit philosophical commitments of big data and offers a comparative sociological study of big data using communities and scientific communities in general. The topic can be approached by using the *boundary work* concept of science and technology studies (STS).

Socio-cultural innovations, sustainable local/urban development and regional branding

Supervisor: Dr. Orbán Annamária

We study the role of socio-cultural innovations in sustainable urban/local development, their relation to social economy, social capital, their impact on citizens' quality of life and well-being; their role in regional and/or city branding. Cities are "social laboratories", where these innovations can be tested, as many cities today are unhealthy living habitats both in physical and metaphysical sense. The aim is to find those 'healing solutions', which make our cities more sustainable and the citizens more satisfied with their life.

Smart cities, smart villages, smart communities. Urban-rural coexistence from a regional policy perspective

Supervisor: Dr. Orbán Annamária

Despite the fast urbanization process globally, the future of rurality, development of rural areas should be among the prioritized development goals world wide. There cannot be smart cities without smart villages, where "smartness" means future conscious strategic thinking and devoted attachment of the community to their living place. The future of agriculture and culture of food – a very important





dimension of sustaining local culture - depend on smart urban-rural co-existence, planned and regulated on regional level. Therefore, regional policy and innovative regional governance initiatives, structures play a crucial role in the future.

Methodological and Philosophical Presuppositions of Mainstream Economics

Supervisor: Dr. Danka István

Critiques of mainstream economics theories claim the 2008 economic crisis to be an indicator of the deficiencies of those theories because the crisis could not be foreseen, managed, and even explained in the traditional conceptual and methodological framework. The project aims at investigating the philosophical presuppositions and methodological commitments (incl. idealisation, rational agents, transitive preferences, etc.) of rational choice theory as a background theory for mainstream economics, in order to explore the problems and develop a response to the criticism.

Management decisions about R+D projects

Supervisor: Dr. Héder Mihály

Management decisions about R+D projects rely on assessing how far a given concept is from an actual product. The most common gauge is the Technology Readiness Level (Héder 2017), adopted by various important organisations, most notably the European Commission. The PhD topic involves analysing the TRL scale and exploring better alternatives based on more plausible epistemic assumptions. Héder, M. (2017). From NASA to EU: the evolution of the TRL scale in Public Sector Innovation. *The Innovation Journal*, 22(2), 1-23.

Newcomb's Dilemma

Supervisor: Dr. Ziegler Zsolt

Newcomb's dilemma is a mathematical, philosophical, and decision-theoretical paradox, which aims to show that the two leading theories of rational choice are contradictory because, in the case of the dilemma, evidential decision theory and causal decision theory prescribe different actions to be rational. Macroeconomic and microeconomic theories rely heavily on the notion of the rational actor. The project aims to explore these theoretical links between rational decision theory models and micro- and/or macroeconomic theories.

Information and security management aspects of Industry 4.0

Supervisor: Dr. Szádeczky Tamás

Industry 4.0 links the information generated during production processes and possibly the production process itself with corporate information systems and traditional IT systems. This can significantly increase the business value of industrial processes, the transparency, the instant usability of data, and the quality of the process. On the other hand, every new technology brings new security threats. Thus these technologies need to be implemented with appropriate risk management and mitigating controls.

