



7TH INTERNATIONAL CONFERENCE

Actual Economy

SOCIAL
CHALLENGES
AND FINANCIAL
ISSUES IN XXI CENTURY



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TABLE OF CONTAIN

Conference agenda	7
Chapter 1.	
Problems of economic integration and SME development in ASEAN region	19
Equity and efficiency: factors of interdependence in modern social and economic dynamics	
	<i>Prateep Wajeetongratana</i>
Thailand's SMEs Competitiveness within ACE: prospects, problems and opportunities	20
	<i>Kunphattra Patarapongsathon</i>
Management style and Employee' s Job Satisfaction (the case of Local and International hotels chains in Thailand)	25
	<i>Chanpen Meenakorn</i>
Marketing Mix of Thai Cooking and Thai Massage Teaching Service for Foreign Tourists	29
	<i>Thammamonr Khunrattanaporn</i>
Affecting Factors of the Palm Oil Price and AEC Trade Impact	36
	<i>Pichamon Chansuchai</i>
Consumer Behavior and Marketing Mixed Factor Effect on Consumer Decision Making for Thai Movies Presented in EGV Seacon Bangkae cinema	43
	<i>Pongsawee Supanonth</i>
Development of Trading Service on Thai Border Transport in ASEAN Free Trade Area : Case Study Ranong Province	48
	<i>Sakapas Saengchai</i>
Factors Affecting the Organizational Performance of Direct Sales Business in Thailand	52
	<i>Nattapong Techarattanased</i>
Investigating Innovative Organizational Performance of Small and Medium Enterprises in Thailand	57
	<i>Bundit Pungnirund</i>
An Investigate on the Antecedents Influencing Online Brand Equity of E-Marketplace in Thailand	64
	<i>Wanida Suwunniponth</i>
Insuring Consumption Against The Health Shocks: A case of Thailand	70
	<i>Yuthapoom Thanakijborisut</i>
Factors of consumers' preferences: analyzing and predicting to increase sales of organic food (the case of Thailand)	76
	<i>Rewadee Waiyawassana</i>
Digital economy as a factor of Small Medium Enterprise Empowering (the case of Indonesia)	80
	<i>Supaporn Prajongsai</i>
	<i>Somtop Keawichuan</i>

Actual Economy: Social Challenges and Financial Issues in XXI century

The Model of Ethical Standard for Communication Arts Students	<i>Supralee Wattanasin</i>	90
Thailand Contemporary History of Newspaper: From the Revolution to Reformation Era	<i>Surasit Vithayarat</i>	94
Chapter 2.		
International labor market development and modern HR-practices		
Gender Pay Gap of the Thai Labor Market	<i>Siriwan Saksiriruthai</i>	100
Corporate organizational management in modern innovative business	<i>Punrapha Praditpong</i>	103
Entrepreneurial Leadership and Effective Management in tactical development of SME (the case of Thai silk industry)	<i>Supaporn Wimonchailerk</i>	107
National Human Resource Development Strategy in context of ACE formation	<i>Preecha Pongpeng</i>	111
Foreign Labor Force as a reason for National budget Loss (the case of Indonesia)	<i>Routsukol Sunalai</i>	114
International Labor Migration as a Factor of Economic Growth	<i>Kanokwan Kaewprasert</i>	117
Urbanization as a factor for ASEAN economic development (example of Indonesia)	<i>Prapoj Na Bangchang</i>	120
Innovative Approaches to Cooperation within the Innovative Education Chain	<i>Ladaporn Pithuk</i>	126
The Comparison of Saving Factors in the Employed Population	<i>Chin Tangtarntana</i>	128
School performance and Financial Adequacy: Evidence from Thailand	<i>Varangkana Chitraphan</i>	131
Economic regulation in terms of the multinational entrepreneurship development	<i>Runglaksamee Rodkam</i>	133
Innovations in Thailand banking Industry development: unlimited source or endless problems	<i>Wipanee Maen-in</i>	137
Mathematics in Economic Analysis: What is its Role?	<i>Charawee Butbumrung</i>	142
The Marketing Communication Strategy of Thai film: Case of GTH's Studio	<i>Pittaya Klongkratoke</i>	144
	<i>Prakaikavin Srijinda</i>	

Chapter 3.

Tourism and service markets' development: issues, problems and solutions	147
Destination Branding As A Tool For Effective Tourism Macro-Marketing (The Case Of Bangkok, Thailand)	<i>Pisit Potjanajaruwit</i> 148
Implementation of Servuction Service Model: instruments, issues, prospects (the case of Zenith Hotel, Bangkok, Thailand)	<i>Supattra Kanchanopast</i> 153
Cashless Payment: new technologies Application in Thai tourism industry	<i>Ratsamee Ratana-u-bol</i> 156
Mega-event promotion and organization as tools of National Image- Building	<i>Narong Anurak</i> 160
Travelers' Motivation: impact of information factors in Tourists Visiting Intentions	<i>Nareenad Panbun</i> 163
Studying Motivation to develop tourists satisfaction (the case of Russian visitors of Pattaya, Thailand)	<i>Phakit Treesukol</i> 167
Passengers' Pre-Flight Expectations and overall quality of airlines services: functional role and current influence	<i>Suwimol Apapol</i> 171
Tourist Threats To Cultural Heritage: An Investigation Of Tourist Behavior Violating The Culture of Wat Pho	<i>Poramatdha Chutimant</i> 176
Factors Influencing Consumers' Repurchase Intention of Low-Cost Airline: A Case Study of Thai AirAsia	<i>Siri-Orn Champatong</i> 182
Managing Customer loyalty: A study of Budget Rent A Car in Bangkok, Thailand	<i>Mananya Meenakorn</i> 189
International Business Trends Under Impact Of Innovative Modernization	<i>Somchai Buroong</i> 193
Economy of Thailand North-East (Isarn): local advantages and global prospects	<i>Suvimon Wajeetongratana</i> <i>Huda Wongyim</i> 196
News Values of Thai Mass Media in Convergence Journalism Era, in Attitudes of the People in Bangkok	<i>Wiroj Srihiran</i> 200
Challenges of Thailand Digital Economy Towards Community Tourism Development: Case Study of Baan Yafu, Maeyao District, Chiangrai Province	<i>Niracharapa Tongdhamachan</i> 205

Actual Economy: Social Challenges and Financial Issues in XXI century

Using 3D Animation in Promoting Tourism in Baan Yafu, Thailand <i>Siridej Sirisomboon</i>	207
Chapter 4.	
New sources for effective economic and social development	210
State-of-the-Art and further developments in Business Model Research for Industry 4.0 <i>Richard Stechow, Magdalena Miffler-Behr</i>	211
An Investigation into the Reduction of Supply Chain Risks of Supplier and Producer due to Industry 4.0 <i>Katharina Hobusch, Magdalena Miffler-Behr</i>	217
Methodological Features Of Modeling GRP Production In The Northern And Arctic Regions <i>Tatiana Skufina, Sergey Baranov, Vera Samarina</i>	222
Estimation of projected changes in the geological environment that affect the economy: new formulation of the problem and results of the study <i>Tatiana Skufina, Sergey Baranov, Vera Samarina</i>	226
Corporate tax as a direct tool for supporting the public sector in the Slovak Republic <i>Jana Kušnirová</i>	229
City as an Object of Ecological and Economic Researches: the Example of Russian Cities <i>Shcherbakova Nadezhda Viktorovna, Khaikin Mark Mikhailovich</i>	232
Matrix Structures of Science and Technology Innovation Development and Implementation Trajectory <i>Mokeeva Tatiana Vasilievna</i>	235
Investments in human capital: Effectiveness of investment in higher education in Russia <i>Y.Y. Kuporov, EA Avduyevskaya</i>	236
Aspects of Globalization Impact on Economic and Financial Processes <i>Volkova Nadejda V., Guzikova Ludmila A., Olga S. Nadezhina</i>	240
A Model Of Economic Growth, Including Taxation And Public Sector <i>Chernogorskiy Sergey A., Shvetsov Konstantin Vladimirovich</i>	241
Chapter 5.	
National eco-social system progress: challenges and promising	243
Illicit Capital Flow: Evaluation And Forecasting <i>Guzikova Ludmila, Lukevich Igor, Smirnova Olga</i>	244
Optimization of the Innovation Process Management at a Manufacturing Enterprise <i>Daniel S. Demidenko, Ekaterina D. Malevskaia-Malevich, Yulia A. Dubolazova</i>	247
Investigation of the Interrelation between Diversification of the Enterprise's Operations and its Financial Stability <i>Sokolitsyn Alexander Sergeevich, Ivanov Maxim Vladimirovich, Sokolitsyna Natalya Alexandrovna</i>	256

Actual Economy: Social Challenges and Financial Issues in XXI century

Contradictions In Regional Innovative Activity And Ways To Overcome Them		
	<i>Degtereva Victoriia, Goncharova Natalia</i>	260
Electronic Tax Administration: Development Trends	<i>N.G. Victorova, E.N. Yevstegneev, D.U. Yablokov</i>	260
Assessment of the Housing Policy Efficiency in Russia	<i>L.A. Guzikova, A.V. Bataev, E.V. Plotnikova</i>	262
Problems of Trade Financing in the Russian Federation	<i>L.V. Nikolova, M.D. Velikova, P.S.Serov</i>	265
Environmental protection by environmental taxes	<i>Juraj Válek</i>	268
The VAT Revenue Losses and Increasing Efficiency of VAT Collection in the Slovak Republic	<i>Marcela Rabatinová</i>	272
Influence of Cultural Dimensions "Individualism" and "Power Distance" on Entrepreneurial Activity	<i>Kovaleva E.A., Bogacheva T.V., Kutlyeva G.M.</i>	276
Chapter 6		
Actual economy: local solutions for global challenges		
The Innovation Development in the Slovak Republic in the Context of the Europe 2020 Strategy and Initiative Innovation Union	<i>Gonda Vladimír, Adamovský Peter</i>	280
Assessing The Impact Of Fossil Fuel Production On Territorial Economic Development	<i>O. E. Kichigin</i>	283
The Microeconomic and Macroeconomic Contexts of Remittances	<i>Magdaléna Přivarová, Andrej Přivara</i>	286
Impact of fiscal measures on the costs and consequences of unemployment	<i>Marta Martincová</i>	288
Alternative Approaches to Fiscal and Monetary Policy in the Course of the Economic Cycle	<i>Ján Lisý</i>	291
The Sustainable Economic Development Of Kazakhstan Through Improving Ecological State Of The Country	<i>I. Onyusheva, S. Kalenova, R. Nurzhaubayeva</i>	293
Comparison Of The Monetary Policy Of The Visegrad Four Countries In Terms Of Its Impact On The Economic Cycle	<i>Veronika Piovarčiová</i>	296
Human capital as an important aspect of the green economy	<i>Anufriev Valery, Kaminov Aitkali</i>	299
Evaluating The State Of Eco-Economy Of Kazakhstan	<i>S. Kalenova, I. Onyusheva, G. Yerzabayeva</i>	301
How Taxation Affects Financial Decisions of a Firm in an Open Economy	<i>S.A. Chernogorskiy, K.V. Shvetsov, L.L. Pokrovskaya</i>	304

Actual Economy: Social Challenges and Financial Issues in XXI century

Chapter 7.	
Environmental issues of global economy development	305
Assessment of the reproduction process of agricultural enterprises	
<i>M. F. Tyapkina, E.A. Iliina</i>	306
Key Performance Indicators in the Public Procurement Management: National Aspect	
<i>E.Zolochevskaya, E.Popova, E.Medyakova</i>	310
The Activation Of The Investment Process In The Agrarian Sector Of The Republic Of Crimea	
<i>Mochalina Olga Sergeevna</i>	314
Adaptability as a Tool for Managing an Enterprise in a Turbulent External Environment	
<i>Alexey Shmatko, Valery Yanovskiy, Lubov' Shamina</i>	314
Change Of Financial Behavior Paradigm Of The Stock Market Subjects	
<i>Kostyntine Malysenko, Vadim Malysenko, Elena Ponomareva</i>	319
Assessment of conditions of stationary state of the cities in the region due to the system approach	
<i>Pakhomova Anna Ivanovna, Buryakov Stepan Anatolyevich, Degtyaryova Tatiana Viktorovna</i>	322
Public-private partnership as a tool for sea-ports' investment attractiveness increasing	
<i>Ostovskaya Anastasiya Andreevna</i>	326
Attractiveness of the Arctic zone and the northern territories of Russia for migrants	326
<i>Druzhinina Irina, Kurushina Elena, Kurushina Victoria</i>	
Government expenditures on education in The XXI century: quantitative evaluation and Limits of rationality	
<i>Kharchenko Ivan, Kharchenko Lana</i>	330
Effective management of coal industry as a condition of rational subsoil	
<i>Aliya Medebayeva</i>	334
MNCs as a factor for governance modernizing in XX century	
<i>Denis Ushakov</i>	335
Small and Medium Business Owners and Constructs of Entrepreneurs: A Case Study of Thai Business Owners in Southern California, USA	
<i>Yingsak Vanpetch, Mahachai Sattayathamrongthian</i>	340

Mathematics in Economic Analysis: What is its Role?

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Abstract

As expressed in many economic researches, mathematical symbols are generally acknowledged as an advantageous matter to support assumptions especially at the stages of reasoning. Not only mathematical symbols are recognized in economics, but mathematical models also seem to be commonly used. However, there have been some debates on the proper use of mathematics in economics. Therefore, the purpose of this paper is to examine what significant role of mathematics is explicitly found in economics. Furthermore, in spite of the fact that there should be no difference in the conclusion of mathematical approach, which uses mathematical symbols and equations, and non-mathematical approach, where words and sentences are used instead in the explanation, this paper presents an evidence how important and how useful mathematics is particularly in an approach to economic analysis.

Key-words Mathematical Economics, Mathematics, Economic Analysis, Economics

Introduction

The application of mathematics and the utility of mathematical symbols can be generally found in many economic researches, especially in the decision making in business and economic analysis. A number of researchers believe that, with the mathematical support, the ability to clarify and explain some economic analysis is taken up to a more assured level of trust (Palasca, 2013). However, there have been some arguments against the importance of mathematics and mathematical tools in economic analysis and in decision making, and the question on whether it is actually necessary to be used (Puiu, 2012). Therefore, this paper examines the significance of mathematics in economic, including the substantial role that mathematics is established and acknowledged in economic analysis, based on a set of articles and studies in the area.

Literature review

In economic studies and researches, there has been a series of literatures that feature mathematics and take mathematical approaches as a basic tool connecting the theoretical economic models' assumptions to their conclusion (Duran, 2007). This can be considered as one of the evidence showing that mathematics has taken a considerable position in economics.

Palasca(2013) observed how the use of mathematics is introduced to economics. It was addressed that Auguste Cournot firstly initiated the utility of simplistic mathematical tools in 1838 and this was mentioned as a new approach used to understand economy more quantitatively. Subsequently, the logical paradigm and mathematical construction were taken into account by Alfred Marshall, J.M. Keynes, and some various Nobel Prize winners. Later, a deeper understanding of mathematical concepts was in numerous researchers' consideration.

Mathematical tools were started to be approached in economic studies and researches at the same as the Econometrics Society was found in the 1930s (Radu, 2012). There has been an evidence presenting that the journal *Econometrica*, which is determined to a consequence of the society and to be one of the most renowned journals in the field of Applied Mathematics, was primarily issued in 1933. This provides confirmation on the development of quantitative economics as an instrument in assisting the economists make better decisions and be able to comprehend complex economic analysis. The initiation of mathematical tools, including some statistical approximation, in economic analysis commenced under the framework of time series analysis, such as the standard Dickey-Fuller test, Augmented Dickey-Fully test and the Philips-Peron test. Researchers believe that the utility of mathematics provide 'greater logical solidity' in economic analysis (Debreu, 1991, p.3). In addition, Radu agrees with this perspective and that the more complicated the mathematical tools are used, the better approaches are taken into account in any economic analysis (2012).

Mathematical Economics vs. Non-Mathematical Economics

According to the arguments on whether the role of the utility of mathematics are pertinent for the decision making in business and economic analysis, the main purpose of this paper is to differentiate the difference between mathematical economics and non-mathematical economics, and examine the significant role of mathematics that has been notified in economic analysis.

Chiang and Wainwright stated clearly in their book regarding the crucial difference between mathematical economics and non-mathematical economics (literary economics) in two points (2005). First, it can be seen broadly that most assumption and conclusions in economic analysis are presented in terms of mathematical symbols rather than words and in terms of equations rather than general sentences. Second, the utility of mathematical theorems is believed to perform better in the reasoning process compared to it performing in literary logic. Mathematical tools are more used to make assumptions obvious at each stage of reasoning because of the fact that most mathematical theorems are displayed in the 'if-then' form, which means the 'if' (condition) part is needed to be explicit before the 'then'(result) part can be developed.

In accordance with the study of Paul Samuelson, he confirmed the necessary perspective of mathematics in economic analysis, in place of verbosity, that 'Mathematics is a language' and mathematical sentences are presented in a natural language with more adequate clarification (1952).

Major advantages of the mathematical approach in economic analysis, compared to non-mathematical approach in economic analysis, are stated in the literature (Chiang and Wainwright, 2005). Initially, the mathematical language is succinct and accurate. Secondly, mathematical theorems are well-used especially in all assumptions. Lastly, mathematical theorem grants us to be able to manage the general n-variable case.

Conclusions

According to the history of the utility of mathematical tools in economic analysis, there has been an obvious direction in its development and advantages especially in reasoning process. There is the evidence found in previous literature on a difference between the economic analysis with mathematical approach and that with non-mathematical approach. This confirmation supports the role of mathematics in economics and its significance in its utility.

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