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Economics of Natural Resources and the Environment 9th Conference, 8 – 9 December 2023

HYBRID



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Co-organized by:

- Laboratory of Operations Research, UTH.
- Laboratory of Forest Economics, AUTH.

SCOPE

Main issues that concern the Economics of Natural Resources and the Environment with emphasis on the various environmental problems and their management and solution policies.

AIM

Highlight the interdisciplinary nature of environmental research through the exchange of views and experiences of researchers from different scientific fields and the finding of common components of research approaches.









Co-organization of the Conference





Laboratory of Forest Economics Faculty of Agriculture, Forestry, and Natural Environment.

School of Forestry and Natural Environment Aristotle University of Thessaloniki







WELCOME

Dear,

Invited guests, Colleagues, and Students.

On behalf of the Scientific and Organizing Committee I welcome you at the: 9th Conference on "**Economics of Natural Resources and the Environment**".

The 9th ENVECON Conference co-organized on 8 - 9 December 2023 by the Laboratory of Operations Research of the Department of Economics, University of Thessaly and the Laboratory of Forest Economics of Aristotle University of Thessaloniki and its director associate professor *Konstantinos G. Papaspyropoulos*. The 9th ENVECON theme: "Novel perspectives on Forest, Water, and Urban Ecosystems".

The conference aims to present the main issues that concern the Economics of Natural Resources and the Environment and the recent scientific research on the field. The main focus will be given on sustainability and effective environmental management, while research on the environmental and social impacts of the recent weather-related environmental hazards due to climate change will also be presented. The conference aims to promote the exchange of views and experiences of researchers from different scientific fields and the finding of common components of research approaches, since the environment is governed from interdisciplinarity.

I would also like to wholeheartedly thank the keynote speakers of the conference: Prof. *Eftichios Sartzetakis, Emmanuel Kontekakis*, and Prof. *Anastasios Xepapadeas* who accepted the invitation to present their long-term remarkable research experience on topics relevant to the conference.

I would also like to thank the participants, not only of the current conference but of the previous ones as well. Their support to this scientific effort is significantly important and fosters even more our efforts to contribute to the development of Economics of Natural Resources and the Environment. Personally, I promise to continue the conference at the highest possible level at a time, continuing to promote important research findings regarding sustainable development, environmental protection and natural resources management, at both theoretical and applied levels.

I hope that all academics, researchers, and students, who participate in the Conference and who either present their research results or learn and value the work of other researchers, have a pleasant and constructive experience of the attendance of the Conference.



Conference Scientific Coordinator Professor George E. Halkos Laboratory of Operations Research Department of Economics School of Economics and Business University of Thessaly, Volos, Greece







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9th Conference Economics of Natural Resources & the Environment







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- Skourtos Michail, Professor, University of the Aegean
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- Zouboulakis Michel, Professor, University of Thessaly
- Balsalobre-lorente Daniel , Associate Professor, University of Castilla-La Mancha, Spain
- Bampatsou Christina, Associate Professor, Ionian University
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Organising Committee

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Technical Support

Iatridis Alexandros, University of Thessaly







	oncise conference Programme
Time	Sessions-Topics
(Greek Time)	Day 1 – Friday 08/12/2023
09:45-10:00	OPENING – WELCOME
10.00 12.00	Session 1: Chairperson: Assc Professor Trung Thanh Nguyen
10.00-12.00	Agricultural production and food consumption for a more sustainable Asia.
12:00-12:30	Keynote Speaker Prof. Eftichios Sartzetakis
12:30-12:35	Coffee Break
12:35-14:15	Session 2: <i>Chairperson: Assc Professor Konstantinos G. Papaspyropoulos.</i> Forest Economics.
12:35-14:15	Session 3: <i>Chairperson: Professor Zacharoula Andreopoulou</i> . Environmental Risks.
14:15-15:00	Break
15.00 16.40	Session 4: Chairperson: Professor George Halkos.
13.00-10.40	Climate Change and Urban Environment
15:00-16:40	Session 5: Chairperson: Assc Professor Konstantinos Evangelinos.
16.40 17.00	Coffee Breek
10.40-17.00	Session 6: Chairperson: Dr. Jaime Moll de Alba
17:00-18:40	Circular Economy
17.00 18.40	Session 7: Chairperson: Professor Vassilios Profillidis.
17.00-10.40	Sustainable Transport
18:40-19:10	Keynote Speaker
	Mr. Emmanuel Kontekakis
	Day 2 - Saturday 09/12/2023
00.30 10.50	Deta Science & Artificial Intelligence: Improving Health Equity and Urban
07.30-10.30	Environments
00.20 10.50	Session 9: Chairperson: Assc. Professor Amílcar Oliveira
09:50-10:50	Big Data in Environmental Risk Analysis
10:50-12:50	Session 10: Chairperson: Professor Roido Mitoula
	Welfare – Regional Development
10:50-12:30	Sustainable Water Management – Social and Natural Capital
12:50-13:30	Break
13:30-14:00	Keynote Speaker
	Prof. Anastasios Xepapadeas
14:00-15:40	Ouantitative Methods – Environmental Efficiency
	Session 13: Chairpersons: Prof. Ioannis Nikolaou & Asst. Prof. Antonios
14:00-15:40	Skouloudis
	Sustainable Tourism– Circular Economy II
15:40-16:00	CLOSING & FINAL GIVEAWAYS







Keynote Speakers

"Environmental Regulation with preferences of social status"

Prof. Eftichios Sartzetakis

Prof. of Environmental Economics, Department of Economics. Dean School of Economic and Regional Studies, University of Macedonia.

"Corporate perspectives of the Titan Group in Biodiversity"

Mr. Emmanuel Kontekakis

Quality & Environmental Assurance Systems Administrator QA/QC Manager Aggregates Operations, Greece. Titan Group.

"The evolution of Research in Economics of Natural Resources and the Environment"

Prof. Anastasios Xepapadeas

Prof. of Economics, University of Bologna. Prof. Emeritus Athens University of Economics & Business.







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9th Conference Economics of Natural Resources & the Environment







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Conference Schedule

9th Conference Economics of Natural Resources & the Environment



Friday 08 December 2023

Opening – V	Opening – Welcome 09:45-10:	
1 st Session –	Tsoumis Room 10:00-12:00	
Topic:	Agricultural production and food consumption for a more sustainable Asia	
Chairperso	on: Assc Professor Trung Thanh Nguyen	
10:00-10:20	Smallholders' crop commercialization and agriculture's structural change in Southeast Asia. Manh Hung Do, Trung Thanh Nguyen, Ulrike Grote	
10:20-10:40	Internet use, non-farm employment and investment in agriculture: Evidence from Thailand and Vietnam Nguyet Tran Thi Minh, Trung Thanh Nguyen, Manh Hung Do	
10:40-11:00	Can sustainable intensification boost productivity and fertilizer use efficiency? Insights from wheat systems in the eastern Indo-Gangetic Plains Gokul P. Paudel, Jordan Chamberlin, Trung Thanh Nguyen	
11:00-11:20	Natural Resource Extraction and Poverty in Thailand and Vietnam Alexander Oetjen	
11:20-11:40	Farmingefficiencyandagriculturaltransformation:Evidence from panel data for ThailandKasem Kunasri , Trung Thanh NguyenKasem Kunasri , Trung Thanh Nguyen	
11:40-12:00	Promoting artificial meat to improve food security and reduce resource- environment pressure: Is it practicable in China? Shi Min, Minda Yang, Trung Thanh Nguyen, Ping Qing	



2nd Session – Tsoumis Room

Topic:	Forest Economics
Chairpersor	a: Assc Professor Konstantinos G. Papaspyropoulos
12:35-12:55	History, trends, and gaps in forest economics research Konstantinos G. Papaspyropoulos
12:55-13:15	Relationship of Material Flow Cost Accounting and Bioeconomy in the Forest Industry sector Marina-Vasiliki Andreadou & Konstantinos G. Papaspyropoulos
13:15-13:35	Implementing focus groups for studying citizens' opinions for wood biofuels Marina-Vassiliki Andreadou, Maria Gkirtzimanaki, Victoria Datsi, Antonios Zafeiroudis & Konstantinos G. Papaspyropoulos
13:35-13:55	Development of Forest Experience using ICT Georgilas Argyrios & Zacharoula Andreopoulou
13:55-14:15	Circular Economy in the European Forest Sector through the Sustainability Reports of the Leading Forestry Companies Dimitra Panori & Konstantinos G. Papaspyropoulos

9th Conference Economics of Natural Resources & the Environment

Programme of the Conference

Topic: "Environmental Regulation with preferences of social status"

Eftichios Sartzetakis

Professor of Environmental Economics, Department of Economics Dean School of Economic and Regional Studies, University of Macedonia



12:00-12:30

12:30-12:35

12:35-14:15



3rd Session – Amphitheatre

12:35-14:15

Topic: Environmental Risks	
Chairperson	: Professor Zacharoula Andreopoulou
12:35-12:55	Flood risk assessment and catastrophe analysis of cropland of the Central Macedonia water district. Alexandros Tzavidis & Dionysios Latinopoulos
12:55-13:15	Green digital finance nexus with traditional investments during crises. <u>Nikolaos Kyriazis</u>
13:15-13:35	Global Water Players, usage behavior and economic power classification. Theodore Krintas
13:35-13:55	A dynamic approach of climate change performance and weather-related environmental hazards: The effect of macroeconomic factors to climate indicators. George Halkos & Argyro Zisiadou
13:55-14:15	Assessment of vulnerability to reaction of forest fires in wildland urban interface. A Case study of Regional Unit of Zakynthos. Kapsopoulou E. & Latinopoulos D.

Break

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14:15-15:00



4th Session – Tsoumis Room

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15:00-16:40

Topic:	Climate Change and Urban Environment
Chairperso	on: Professor George Halkos
15:00-15:20	Novel Methodologies with Virtual Reality Applications in Environmental Economics: The Arsinoe Project. George E. Halkos, Phoebe Koundouri, Conrad Landis, Lydia Papadaki and Panagiotis – Stavros Aslanidis
15:20-15:40	Comparing Air Pollution levels in Greece: The case of Athens and Salonica Christos P. Kitsos C-S. Nisiotis
15:40-16:00	Pathways2Resilience. Co-developing pathways towards climate resilient regions in Europe. Phoebe Koundouri, Konstantinos Dellis, Kit England, Conrad Landis, Angelos Plataniotis, Paul Watkiss, Argyro Zisiadou
16:00-16:20	Hydrological Assessment and Sustainable Development Prospects: Insights from a Training Course on Municipalities with Rivers. Maria Kapouniari, Anastasia Katsoulea, Antigoni Zafeirakou, Eleni Papadopoulou
16:20-16:40	Smart Sustainable Cities: A Greek Case Study. Paraskevi Boufounou, Ilias Moustairas, Kanellos Toudas & Chrysovalantis Malesios







5th Session – Amphitheatre

15:00-16:40

Topic:	Corporate Social Responsibility – Environmental Psychology
Chairperso	on: Assc Professor Konstantinos Evangelinos
15:00-15:20	Corporate Social Responsibility CSR and the effects on employees' mental health. Kristina Kucheruk & Konstantinos Evangelinos
15:20-15:40	The significance of stakeholder engagement for promoting the Energy Efficiency First Principle (EE1st) in regional energy policy. Stavros Spyridakos, Stefania Zourka, Sofia-Natalia Boemi, Stefanos Dodouras, Nikolaos Ntavos & Ioannis Fallas
15:40-16:00	Integrating Environmental Education Techniques for Organizational Employees: A Sustainable Approach to Corporate Responsibility. Kristina Kucheruk & Pavlina Papilia & Konstantinos Evangelinos
16:00-16:20	The Psychology of non-market Environmental Valuation: research evidence, theoretical insights, and policy considerations. <u>Anastasia Gkargkavouzi & George Halkos</u>
16:20-16:40	Environmental psychology of religion and environmental crisis. Georgios Fountoulakis

Coffee Break

16:40-17:00







6th Session– Tsoumis Room

17:00-18:40

Topic:	Circular Economy
Chairperso	n: Dr. Jaime Moll de Alba
17:00-17:20	Circular economy in European Fashion Industry. George E. Halkos, Jaime Moll de Alba and Panagiotis – Stavros C. Aslanidis
17:20-17:40	Fast Fashion and Circular Economy. Kristina Kucheruk & Konstantinos Evangelinos
17:40-18:00	Local products entrepreneurship as a tool for sustainable regional development: the case of N. Chalkidiki. Varvaris I., Strantzali P., Varvari E., Andreopoulou Z.
18:00-18:20	Study of the impact of using SRF/RDF alternative solid fuels on the cement industry environmental footprint. Nikolaos Morfopoulos & Maria C. Samolada
18:20-18:40	Forest road pavement construction based on recycled materials is an economicand environmental neutral footprint implementation?StergiadouAnastasia,TampekisStergios,KolkosGeorge,Moutsopoulos Dimitrios,Stergiadis Charalampos







7th Session – Amphitheatre

17:00-18:40

Topic:	Sustainable Transport
Chairperso	n: Professor Vassilios Profillidis
17:00-17:20	Forecasting Greenhouse Gas Emissions of Passenger Traffic to the Aegean Islands with the Use of Machine Learning. Konstantinos Christidis, Vassilios Profillidis, George Botzoris, Lazaros Iliadis, George Nellas.
17:20-17:40	Integrating bike paths into peri-urban environment: the case of Serres. Foteini Mikiki, Vassilios Hortomaris & Athanasios Galanis
17:40-18:00	Investigation of bicycle travel conditions in the cities of Thessaloniki and Lamia. Athanasios Galanis, Artemis Gioldasi, Anna Rinota, Stavros Papaioannou, George Botzoris & Panagiotis Lemonakis
18:00-18:20	Predicting the Societal Acceptance of Mega Road Infrastructure Projects in Greece: A Statistical Model Anchored in Sustainable Development Principles. Angelos Papavasileiou, Roido Mitoula, Alexandros Zangelidis, Panagiotis Kaldis
18:20-18:40	The Role of Big Data in Environmental Sustainability of Aviation: A Literature Review Athanasios Georgakis, Vassilios Profillidis, George Botzoris

Keynote Speaker – Tsoumis Room

18:40-19:10

Topic: "Corporate perspectives of the Titan Group in Biodiversity"

Emmanuel Kontekakis

Quality & Environmental Assurance Systems Administrator QA/QC Manager Aggregates Operations, Greece. Titan Group.







Saturday 09 December

Online

8 th Session 09:30-	
Topic:	Data Science and Artificial Intelligence Improving Health Equity and Urban Environments
Chairperso	on: Assc. Professor Teresa A. Oliveira
09:30-09:50	Bridging the Gap between Artificial Intelligence and Information Geometry: A Path to Efficient Decision-Making Teresa A. Oliveira & Carla Cardoso
09:50-10:10	Exploring statistical control methods in epidemiological scenarios and process management: A comparative study. Gleice Leidenfrost, Elisa Henning & Teresa Oliveira
10:10-10:30	Exploring Dental Health, Immunity, and HDL: A Comparative Study Using GAMLSS and PPR Models J.A. Pereira, Luzia Mendes ¹ & Teresa A. Oliveira
10:30-10:50	A Statistical contribution to Decision Making: On Preventing Covid-19 in Mozambique selected regions. M. Filomena Teodoro, Teresa Oliveira & Francisco Arune



9th Session

09:30-10:50

Topic:	Big Data in Environmental Risk Analysis
Chairperso	on: Assc. Professor Amílcar Oliveira
09:30-09:50	Big data sets in environmental studies Amílcar Oliveira
09:50-10:10	Entropy and Uncertainty: Theoretical Framework and Fuzzy Logic for Environmental Economics. George Halkos & Christos P. Kitsos
10:10-10:30	A Review on the Impact of ESG on the Economy and Financial Risk Catarina Seruca, Ana Gomes, Débora Nascimento, Rui Prata, Afshin Ashofteh
10:30-10:50	Analysis of the inequality into distributions. An alternative approach to the Gini index applied to the environmental spending in EU. A.Seijas-Macias, A. Oliveira & T. A. Oliveira



10th Session

10:50-12:50

Topic:	Welfare – Regional Development
Chairperso	on: Prof. Roido Mitoula & Assc Prof. Eleni Sardianou
10:50-11:10	Consumer barriers to bio-based transitions: A study on food products. Skouloudis Antonis, Malesios Chrysovalantis & Lekkas Demetris-Francis
11:10-11:30	Assessing the feasibility of the Bellagio Process in the European Union. Vasilis Nikou, Eleni Sardianou
11:30-11:50	The Determinants of Heating Oil Consumption in the Household Sector. Charitomeni Markantonaki, Eleni Sardianou, Roido Mitoula, & Ioannis Kostakis
11:50-12:10	Millennials' Perspective on Sustainable Banking Practices. Eleni Sardianou, Athanasia Stauropoulou, Ioannis Nikolaou & Konstantinos Evangelinos
12:10-12:30	Environmental multipliers in Sraffian frameworks: derivation, implications, and empirical illustration. Theodore Mariolis & Christos Tsirimokos
12:30-12:50	Evaluation of Indoor Environmental Quality (IEQ) of Transport Cabins Using an Optical Particle Counter. Bertrand Tchanche, Sotirios Papathanasiou, Anil Namdeo



11th Session

10:50-12:30

Topic:	Sustainable Water Management – Social and Natural Capital
Chairperso	on: Professor George Halkos
10:50-11:10	Impact of Fuel Costs on Fish Prices: An Econometric Analysis in the Ionian Sea. George Halkos, Phoebe Koundouri, Angelos Plataniotis, Vassiliki Vassilopoulou, Angelos Liontakis
11:10-11:30	The dependence of the industries of the Greek economy from the fisheries and aquaculture sector. Christos Tsirimokos, Irene Tzouramani, Angelos Liontakis, Stamatis Mantziaris & Alexandra Sintori
11:30-11:50	The economic aspects of water management practices in Classical Athens. George E. Halkos & Emmanouil M. L. Economou
11:50-12:10	Exploring links between local social capital and social effectiveness of protected areas. Nikoleta Jones & Chrisovaladis Malesios
12:10-12:30	The geography of environmental migration. Greece: Case studies and affected areas. Polyxeni Soufla, Dritsas Sofoklis, Matsiori Steriani, Paraskevopoulos Stefanos

Break

12:50-13:30



Keynote Speaker

13:30-14:00

Topic: "The evolution of Research in Economics of Natural Resources and the Environment"

Professor Anastasios Xepapadeas

Professor of Economics, University of Bologna. Professor Emeritus Athens University of Economics and Business.

12th Session

14:00-15:40

Topic:	Quantitative Methods – Environmental Efficiency	
Chairperson	airperson: Prof. K. Tsekouras - Assc Prof. K. Kounetas	
14 :00 - 14:20	Dynamic Modeling of Environmental Quality with Embodied Technological Progress. George Halkos, George Papageorgiou, Emmanuel Halkos, John Papageorgiou	
14:20 - 14:40	European firms productivity growth and environmental regulation. Re-examining the Porter hypothesis. Tsekouras Konstantinos, Kounetas Konstantinos, Capasso Salvatore, Rigas Nikos	
14:40 - 15:00	Testing the Environmental Kuznets Curve hypothesis in the case of tourism in the Eurozone member states. George Ekonomou & George Halkos	
15:00 - 15:20	Are climate change policy instruments the sword of Damocles on fostering green technology independence to achieve green growth and sustainability in Europe? <u>Nikos Chatzistamoulou, Andriana Dimakopoulou</u>	
15:20 - 15:40	Suitability evaluation of broadleaved wood for multiple uses with the application of PROMETHEE II method Stefanos Tsiaras & Marina Chavenetidou	



13th Session 14:00-15:40 **Topic:** Sustainable Tourism – Circular Economy II **Chairperson:** Prof. Joannis Nikolaou & Asst. Prof. Antonios Skouloudis Exploring the role of tourism in environmental degradation 14:00 - 14:20 George Ekonomou & George Halkos Tourism *Development* and Destination Local Management The sustainability of small and medium-sized tourism enterprises and the 14:20 - 14:40 environment in which they are based. Ioanna Grigoriadou, Georgios Tsekouropoulos, Ourania Gouna, Sotirios Mandalidis Local Tourism Development and Destination – The buying behavior of the consumer-tourist based on the organizational culture for the environmental 14:40 - 15:00 footprint of the enterprise. Ioanna Grigoriadou, Georgios Tsekouropoulos, Ourania Gouna, Greta Hoxha, Dimitrios Theocharis Developing and implementing Corporate Social Responsibility and Circular Economy strategies in the Hotel Industry. Panagiotis Vouros, Peni Lamprou, Christos Mitsokapas, Petros Dallas, Akrivi 15:00 - 15:20 Vagena, Panagiotis Tridimas, Konstantinos Evangelinos & Panagiotis Grammelis A Methodological Framework and Typology to classify the regulatory- or proactive-driven corporate environmental and social behavior. 15:20 - 15:40 Ioannis Nikolaou, Nikolaos Trevlopoulos, Konstantinos Evangelinos and Thomas Tsalis

Closing

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15:40-16:00

Topic: Closing & Giveaways

Professor George Halkos

Department of Economics, School of Economics and Business Administration, University of Thessaly

9th Conference Economics of Natural Resources & the Environment









Book of Abstracts









Session 1

Agricultural production and food consumption for a more sustainable Asia



Smallholders' crop commercialization and agriculture's structural change in Southeast Asia

Manh Hung Do^{a,*}, Trung Thanh Nguyen^a, Ulrike Grote^a

^a Institute for Environmental Economics and World Trade, Leibniz University Hannover, Koenigsworther Platz 1, 30167 Hannover, Germany
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Abstract

Given the importance of understanding the impacts of agricultural commercialization on agriculture's structural change and equality at the micro level, we examine the effects of smallholders' crop commercialization on structural change and assess how the impacts of crop commercialization on smallholders' income are distributed across farm and household income quantiles. To address these research issues, we use balanced panel of 2,867 rural smallholders collected in three survey waves from two middle-income countries in Southeast Asia for empirical analysis. For the first research issue, our results from a simultaneous equation model show that crop commercialization has a positive interrelationship with crop mechanization. Besides, the results from panel fixed-effects with control function approach indicate that crop commercialization has a positive influence on two indicators of structural change, namely the share of livestock income and the share of non-farm laborers. For the second research issue, results from an unconditional quantile regression model point to the fact that smallholders in the poorest quantile groups benefit the most from crop commercialization.

Keywords:panel data; simultaneous equation; fixed-effects with control function;income inequality.

JEL codes: C33; Q00; Q12.



Internet use, non-farm employment and investment in agriculture: Evidence from Thailand and Vietnam

Nguyet Tran Thi Minh, Trung Thanh Nguyen, Manh Hung Do

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Abstract

Using data from the Thailand Vietnam Social Economic Panel (TVSEP) in 2016 and 2017, we analyze the relationship between internet use and non-farm employment indicators. This step employs the instrumental variable fixed-effect regression to address the endogeneity issue of internet use. We further examine the impacts of non-farm income on farm expenditure (e.g., hiring labor, family labor, hiring machinery, and fertilizer) and agricultural investment (e.g., machinery, livestock, and farm expansion) by applying the heteroscedasticity-based instrument approach. Our results show that internet use increases the probability of non-farm participation, the number of laborers, and per capita non-farm income. Higher education of household members increases income from non-farm employment. Furthermore, findings reveal that rural households utilize their non-farm earnings to invest in long-term machinery and farm expansion but move out of crop production. The effect of moving out of cropping is stronger among the ethnic groups with higher income from non-farm employment. We recommend facilitating internet use among rural households and promoting education as these factors provide rural members opportunities and higher earnings from non-farm employment. Moreover, target policies may be addressed to stimulate the positive effect of non-farm income on investment in machinery and farm expansion to promote agriculture.

Keywords:Internet; Non-farm employment; Agricultural investment; Instrumental
variable fixed-effect estimation; Hetero-based instrument.

JEL Codes: D13, O33, O53, Q12.



Can sustainable intensification boost productivity and fertilizer use efficiency? Insights from wheat systems in the eastern Indo-Gangetic Plains

Gokul P. Paudel, Jordan Chamberlin, Trung Thanh Nguyen

Abstract

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Sustainable intensification (SI) has been promoted within smallholder farming systems to improve agricultural productivity and reduce negative environmental externalities associated with agri-food production. However, limited knowledge exists regarding the impact of SI on crop productivity and fertilizer use efficiency in the Indo-Gangetic Plains of South Asia. This study assesses the impact of early sowing of wheat on productivity, nitrogen, phosphorous, and potash use efficiency in eastern India. We use an instrumental variable approach to control the potential endogeneity that arises from both observed and unobserved sources of heterogeneity. We find that early sowing enhances wheat productivity, nitrogen, phosphorus, potash, and combined fertilizer use efficiency. However, these impacts are unevenly distributed. Early sowing on large farms and farms applying doses of nitrogen exceeding the recommended levels are negatively associated with productivity and fertilizer use efficiency. Our findings suggest that while SI has potential to enhance crop productivity and fertilizer use efficiency, significant policy initiatives are required to minimize the over-application of fertilizers and mitigate the negative environmental externalities associated with agri-food systems in India.

Keywords: Sustainable intensification; Agricultural productivity; Environmental externalities; Nitrogen use efficiency; Impact heterogeneity; South Asia.

JEL Codes: O13; Q01; Q12; Q15.



Natural Resource Extraction and Poverty

in Thailand and Vietnam

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Abstract

Rural poor households are highly reliant on natural resource extraction. Understanding the relationship between poverty and environmental resources can help implement effective policies that lift households out of poverty. This study identifies factors driving the decision to extract natural resources in rural Thailand and Vietnam and explores its effect on household welfare and welfare distribution. The data is derived from a survey of 4400 households in 6 provinces in Thailand and Vietnam undertaken in 2010, 2013, and 2016. A Heckman model is conducted to identify the factors driving a households' decision to extract natural resources. To identify welfare effects of natural resource extraction on different welfare measures, an endogenous switching regression is used. Lastly, quantile regression gives insights in the welfare distribution of households extracting natural resources. The results demonstrate that the poor are more reliant on natural resources and that extraction reduces household welfare. Further findings of this study suggest that promoting off-farm employment, education, and other livelihood opportunities reduces the extraction of environmental resources.

Keywords: Poverty, environmental income, multidimensional poverty, regression models, Thailand, Vietnam.

JEL Codes: Q57; Q20; Q12.



Farming efficiency and agricultural transformation: Evidence from panel data for Thailand

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Abstract

In this study, we explore the relationship between farming efficiency and agricultural transformation at the micro-level. We utilize a panel dataset of more than 1,400 rural households collected between 2007 to 2019 in three provinces of Thailand. We first assess farming efficiency by employing a true random-effects model with Mundlak's adjustments (CRE). We then examine the association between farming efficiency and agricultural transformation indicators using a two-stage least squares (2SLS) instrumental variables (IV) regression approach. In addition, we employ a random-effects probit model to analyze how farming efficiency influences the transition of households from full-time farming to part-time farming. Key findings show that farming efficiency is a driver of agricultural transformation, and that it relieves labour from the farm to non-farm sectors. We suggest measures for supporting farmers to increase their farming efficiency through, for example, promoting knowledge transfer and technical training.

Keywords: Agricultural transformation, Farming efficiency, Thailand.

JEL Codes: D04; F16; Q12;O12







Promoting artificial meat to improve food security and reduce resource-environment pressure: Is it practicable in China?

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Abstract

This study aims to understand the practicability of promoting the consumption of artificial meat to achieve the dual goals of improving food security and reducing resource-environment pressure by evaluating Chinese consumers' willingness to pay (WTP) for artificial meat. A conjoint choice experiment was conducted to state consumers' preferences and WTP for artificial meat, including plant-based and cultured meat. The estimation results show significantly lower WTP of consumers toward both cultured meat and plant-based meat than farm-raised meat, while consumers' WTP for plant-based meat is relatively high compared to that for cultured meat. The intervention of positive information regarding artificial meat significantly narrows the disparity in the WTP for artificial meat in China is confronting a considerable challenge, while the practicability of promoting artificial meat consumption to achieve the dual goals of improving food security and reducing resource-environment pressure is poor at present. Several policy recommendations are proposed to promote artificial meat consumption in future. The study supplements the literature about Chinese consumers' attitudes toward artificial meat, while the findings provide an essential reference for policy design of promoting the consumption of artificial meat.

Keywords: Willingness to pay; Choice experiment; Information intervention; Artificial meat.

JEL Codes: P36; Q56.







Session 2 Forest Economics

9th Conference Economics of Natural Resources & the Environment



History, trends, and gaps in forest economics research

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Abstract

Forest Economics is a scientific field that belongs to the wider Forestry science and is related to the methods and tools aimed at the optimal economic distribution in society of forest ecosystem services, which are in short supply. Forest Economics dates back to 1849, when the German Forester Martin Faustmann published his work on calculating the maximum value of forest land and the time for which it is economically optimal (maximizing profit) for the owner of a forest (forest owner) the felling of a plantation-culture with forest trees, or a forest stand. Faustmann's Forest Economics dominated the research of this scientific field for many years. In the last 20 years, the post-Faustmann Forest Economic has been added to the classical Forest Economics which deals with the economic valuation of forest resources and forest ecosystem services, neuroeconomics, game theory etc.), by examining issues related to the forest industry, such as Corporate Social Responsibility, Sustainability Reporting and Cost Accounting, circular economy and bioeconomy. The bioeconomy, as an economy based solely on renewable natural resources, concerns both classical and post-Fasutmann Forest economics. This research discusses the gap in the literature on combining Faustmann's model with the Bioeconomy and presents other current trends in Forest Economics research.

Keywords: Faustmann model; Bioeconomy; Economics of Forest Resources; Sustainability Reporting.

JEL Codes: M14; Q23; Q51; Q57.



Relationship of Material Flow Cost Accounting and Bioeconomy in the Forest Industry sector

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Abstract

The bioeconomy is based on the concept of applying biological principles and processes to all sectors of the economy and gradually replacing fossil-based raw materials with bio-based resources and principles. To understand how and how much biomass and bio-based materials are produced, how interconnected the bio-based value chains are, and what sustainability effects bio-based value chains or products have, a thorough understanding of the bioeconomy's material and energy flows is required. Official statistics on the production and processing and flow of materials as organic products are available, but the indicators provided do not have a requirement to calculate the flows of organic materials processed at different stages of the value chain. For this reason, the material flow cost accounting (MFCA) method was created, for which research shows that it brings many economic but also environmental advantages to the companies that use it. The present research utilized a questionnaire sent to 90 European forest industries to capture opinions regarding MFCA (Material Flow Cost Accounting), its relationship with the bioeconomy, whether it is being utilized, and if not, what factors are considered deterrents to its usage. As 24.4% responded to the questionnaire, an attempt was made to gather the same information from the companies' websites to cover the shortfall. Consequently, the responses from the websites did not differ from those obtained from the companies that responded to the questionnaire.

Keywords:Material Flow Cost Accounting; Bioeoconomy; Environmental
Management Accounting; Forest industries; Europe

JEL Codes: Q00; Q50; Q23; Q56; Q59.



Implementing focus groups for studying citizens' opinions for wood biofuels

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Abstract

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Wood-based energy products represent a significant category for energy conservation and reducing our dependency on traditional fuels. As an alternative fuel, these products are derived from sustainable sources like forests and can be used for energy production through combustion. Their usage contributes to reducing greenhouse gas emissions and promotes a more sustainable approach to energy production. Furthermore, the utilization of wood-based energy products underscores the importance of renewable energy in addressing our energy needs in a more environmentally friendly manner. In the present research, we examine the opinions of citizens on wood-based energy products as an alternative fuel. The method employed involved four focus groups, including university graduates with environmental studies aged 25-30, secondary education teachers aged 45-65, private sector employees in secondary education aged 35-45, and employed women aged 30-45 living at Thessaloniki Urban Area. The results indicated that despite the energy crisis, price hikes, and potential natural gas shortages, residents remain dependent on heating sources derived from non-renewable natural resources, making the transition to biofuels relying on the renewable natural resource of wood challenging

Keywords: Marketing; Biofuels; Focus groups; Alternative Fuels.

JEL Codes: L73; M31; O13; P18; Q57; Q13; Q23.


Development of Forest Experience using ICT

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Abstract

Human population growth has created extended needs for goods and services that challenge the utilization of natural resources. The dependence on non-renewable natural resources can jeopardize sustainable development. The huge growth of information and communication technology ICT services sector, lifelong learning along with the development of leisure and tourism services can help achieve sustainable development by presenting opportunities with minimal use of natural resources. Outdoor activities in the forests and and eco-tourism constitute a large proportion of ecosystem services. Their upgrade to tourism forest experience can add value to the rendered services, within the new trend of era experience profit. In the Olympus National Park, investment and infrastructure can change the character of the National Park, and can create increasing pressures on the natural ecosystem. An alternative proposal is the development of experience services using ICT tools and apps given the involvement of local residents. Prioritizing the creation of ICT-based experience services with the lowest possible footprint can further increase the value of ecosystem recreational and tourism services and contribute to the sustainable development of local communities.

Keywords: Ecocystem Services, Tourism, Experience, ICT, Sustainable Development

JEL Codes: Q01, Q26, Q56



Circular Economy in the European Forest Sector through the Sustainability Reports of the Leading Forestry Companies

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Abstract

The current climate and energy crisis, the rapid population growth, and the consequent depletion of natural resources make imperative the implementation of sustainable business practices, such as the adoption of circular economy business models. In Europe, where the forestry sector plays a significant role in the economy, society, and the environment, understanding its relation to circular economy is of paramount importance. The present research conducts a comprehensive examination, through qualitative and quantitative approaches, of the practices employed by Europe's leading forestry companies to promote circular economy, using the information they publish annually in their reports. Specifically, content analysis techniques were used on the reports published by the sample companies for the year 2022. Factors contributing to the implementation of the circular economy, 2) enablers of the circular economy, and 3) GRI indicators related to circular practices. The results show that Europe's forestry sector and the dominant companies representing it, display a familiarity towards circular practices and have the potential to exert strong influence in promoting them. However, it is evident that there are still significant opportunities and prospects for the development of practices that advance the circular economy.

Keywords: Circular Economy, Environmental Accounts, ESG, Global Reporting Initiative, Forest Industry.

JEL Codes: L20; L73; O13; O44; O52; Q01; Q56.









Session 3 Environmental Risks

9th Conference Economics of Natural Resources & the Environment

Programme of the Conference



Flood risk assessment and catastrophe analysis of cropland of the Central Macedonia water district

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Abstract

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The present study focuses on the assessment of the potential economic losses of the agricultural sector due to flood events. For this purpose, the flooding scenarios of the Greek Ministry of Environment and Energy are used as they are prescribed in the official studies of flooding risk management. The flooding scenarios have return periods of T=50,100,1000 years and are associated with flood damage to crops by means of the model AGRIDE-c (AGRIculture DamagE model for Crops). AGRIDE-c, can estimate the expected yield reduction (i.e., the direct crop damage) with flood characteristics such as the maximum flow depth and the flood duration. Furthermore, the biological stage of the crops during a flood event is also taken into account by associating the calendar months with them. In order to estimate the economic impact of each flood scenario on farmers' income, the cost of production and the revenue of each crop is calculated. Finally, the analysis yields the expected: (a) damage costs, (b) profit loss and (c) destroyed production based on flood risk management plan of the Central Macedonia Water District of Greece. The results of the study can contribute to better understanding the impacts of a flooding event to the studied district, which can lead to the improvement of flood disaster management.

Keywords: Natural disasters, Floods, Risk assessment, Agriculture

JEL Codes: Q10; Q51; Q54.



Green digital finance nexus with traditional investments during crises

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Abstract:

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This study investigates whether the US dollar index, the S&P500 index, gold and crude oil display dynamic spillover connectedness linkages with ten major green cryptocurrencies. Hedging capacities during the Covid-19 pandemic and the Russia-Ukraine conflict are examined by employing daily data and the cutting-edge Quantile-Vector Autoregressive methodology by Cunado et al. (2023). Findings reveal that 'environmentally-friendly' cryptocurrencies generate spillover impacts on all conventional assets and Algorand, Cardano, IOTA, Powerledger, and TRON constitute the strongest generators. Powerledger is the only significant transmitter in both crises. All conventional assets are mostly receivers of spillover impacts, and gold (oil) is the best net pairwise hedger (transmitter). Notably, gold displays profit-making powers during bear markets while oil is influential on higher income levels during the war. Overall, higher connectedness is found during the conflict at lower or middle quantiles. Green cryptocurrencies are risky high-performers during crises. Enhancing trust, globalization through innovation, and renewable energy leads to higher hedging effectiveness by well-established investments than orientation towards financial services, payments, or business accessibility.

Keywords: US dollar index, S&P500, Commodities, Green cryptocurrencies, Dynamic connectedness, Crises.

JEL Codes: E5, F3, G1

Programme of the Conference







Global Water Players, usage behavior and economic power classification.

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Abstract

Before the 80s, water was considered as a pure natural resource. During the 80s and 90s water suddenly appears as a commodity which must be managed as any other and at the end of 2000 is finally accepted a human right (Hofste and all. 2019 & Canberghe and all 2021). Literature evidence that over 25% of the world population is facing high water stress, which is nowadays leads to the perception that water is a unique resource. In this study we used the full available dataset of "Refinitive Water Market" to answer the following questions: Are companies belonging to the "Water" sector belong to concrete subsectors? Are there differences between these subsectors and as a result between those companies? Are these companies expected to behave the same under different market circumstances or will they present discrete behaviors which will affect their results, overall performance and equity returns? We attempted to classify them according to their economic power and efficiency using Principal Components Analysis (PC). And our initial findings are extremely interesting.

Keywords: Water, water stress, water scarcity, principal components, efficiency, economic power, equity returns

JEL Codes: Q5, Q2, L95, G3, H4, O1







A dynamic approach of climate change performance and weather-related environmental hazards: The effect of macroeconomic factors to climate indicators.

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Abstract

The effects of climate change are getting worse over time. At the same time, there is a significant increase in extreme weather phenomena as well as the negative results caused by these phenomena. One of the most important factors of the extreme weather phenomena studied is the loss of human life as well as the danger to which the inhabitants of each region are now exposed. Having already statically studied the interdependence of the CCPI and CRI indices for the year 2019, as well as their interpretability from macroeconomic variables, we propose the dynamic examination of these indices. It is important to note that the Climate Change Perfomance Index (CCPI) is compiled from the countries that emit a total of 94% of Global Greenhouse Gas emissions, while in line with some other climate change factors, each country receives its overall score and rank. Respectively, the Climate Risk Index (CRI) studies and takes into account the effects of intense extreme weather events that take place in a country, again giving an overall score and rank to each country, however, in this case, the higher the score for a country, the higher the risk. This paper aims to provide evidence regarding the intertemporal correlation and interdependence between these indicators and possible macroeconomic factors.

Keywords: Climate change; climate risk index; extreme weather events; socio-economic factors, emissions

JEL codes: O11, O40, Q20, Q30, Q43, Q54

9th Conference Economics of Natural Resources & the Environment



Assessment of vulnerability to reaction of forest fires in wildland urban interface. A Case study of Regional Unit of Zakynthos.

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Abstract

This paper attempts to answer the question: "what are the main factors that characterize the vulnerability of forest areas in an island and how do these factors may affect future: (a) planning decisions regarding the wildland urban interface (WUI) zones, as well as (b) prevention and preparedness policies?" For this purpose, three dimensions of vulnerability were recognized for the Island of Zakynthos: geographical, social and economic vulnerability. Geographic vulnerability involves assigning weight to both natural and human factors. Social vulnerability differs from geographic vulnerability because society is complex, with different levels of organization and complex linkages. Each dimension of vulnerability is closely interconnected. The economic robustness of a society affects and is affected when natural disasters occur. Therefore, the ability of government and local municipalities to address forest fires issues should be considered as an integral part of spatial planning. The weakness of authorities to implement prevention policies coupled with the lack of proper planning has led to an increased intensity of residential development and the existence of arbitrary (unauthorized) constructions. Consequently, this increases the likelihood of disasters and losses in the event of a fire hazard.

Keywords:wildland urban interface, vulnerability, prevention of forest firesJEL Codes:O21, Q54, R14









Session 4 Climate Change & Urban Environment

9th Conference Economics of Natural Resources & the Environment

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Novel Methodologies with Virtual Reality Applications in Environmental Economics: The Arsinoe Project.

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Abstract

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Great cities are exposed to the global warming phenomenon such as heatwaves and longer periods of droughts. The present multi-crisis has posed a plethora of novel challenges to urban environment, such is the case study 1 of the Arsinoe Project, i.e., the Athens Metropolitan Area (AMA), Greece. AMA is burdened by heatwaves during summers and the urban heat island (UHI) effect aggravates the resilience to these phenomena. A way to understand citizens' opinion is through their willingness-to-pay (WTP) in order to ameliorate their conditions in comparison to the present status quo. This research would try to present the potential of comparing traditional methodologies of environmental economic to novel ones via the adoption of virtual reality (VR) questionnaire. Overall, the economic valuation of the climate change phenomenon in a case study as the AMA can offer a great potential for policymaking in greater city areas that cope with heatwaves and droughts.

Keywords: willingness-to-pay; virtual reality; urban heat island; climate change

JEL Codes: Q51; Q54; Q57

9th Conference Economics of Natural Resources & the Environment



Comparing Air Pollution levels in Greece: The case of Athens and Salonica

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Abstract

This paper continues our last ENVECON work: We extend our method to more pollutants such us CO, NO, NO2, Smoke and SO2 and in two areas of Greece: Athens and Salonica. Therefore we are working towards to investigate similarities and differences within each city, as far as the pollutants concern, and between cities, as far each pollutant or even the total imposed pollution. Of course the structure of the city is essential, but we are only working with the existing data set. The linear Regression models and ARIMA models are considered, while the existed miss organized presentation of the data concerning each city and existed pollutant, create problems to the study - there are not data sets for the same time intervals, at certain time intervals there are not data for all the pollutants of the study. There are not for all the pollutants data (collected from the Greek Ministry of Environment and Enaergy), for the same period, between the cities, there is a uniform study on the provided data sets for specific areas within the city. We are eventually concentrated in Salonica in three areas (Center, Kalamaria, Kordelio) and in Athens also three areas (Center, Patisia, Peristeri). The different obtained models are compared, but one of the main characteristic of our research is that the Big Data Sets, ie to obtain very "long" series of data, do not offer to the next day prediction, as there is a martingale structure to these models. Certainly there are turning points, but such a research needs particular investigation and more reliable data sets.



Pathways2Resilience. Co-developing pathways towards climate resilient regions in Europe

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Abstract

Pathways2Resilience intends to advance a transformative and innovative approach to strengthen climate resilience. More specifically, Pathways2Resilience will: a) mobilize regional interests and networks to leverage political commitment towards the Mission Adaptation, elevate the ambition and capability of regional public administrations and connect innovation agendas, b) trigger wide engagement of citizens and diverse stakeholders in the co-creation of these transformative climate resilience pathways in a way that builds on the best available expertise and multiple understanding of current and future climate risks and opportunities, fosters local ownership and ensures long-term impact, c) facilitate learning and capability development within and across networked regional cohorts and increase knowledge on adaptation options across different Key Community Systems (KCS), tailor-made to local challenges and needs and d) boost enabling conditions, including funding and financing, to develop, test and advance systemic innovative solutions that increase local climate resilience. This European Union Project aims to provide a holistic support to regions in an attempt to recognize their vulnerabilities against climate change and overcome the barriers to adaptation finance.

Keywords: Climate change; regional; adaptation; vulnerability

JEL codes: Q01, Q28, R10, R11, R12







Hydrological Assessment and Sustainable Development Prospects: Insights from a Training Course on Municipalities with Rivers

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Abstract

The present paper draws conclusions from a 40-hour hybrid course titled "Development Prospects of Municipalities with Rivers: Best Practices and Useful Tools" conducted by the Faculty of Engineering of the Aristotle University of Thessaloniki, through the Center for Education and Lifelong Learning, with the participation of 29 Greek Municipalities that are run by rivers. An evaluation of the Municipalities' perspective on their watercourses and the river basins, their flood protection, the land uses surrounding the aqueducts, including the forested areas, and all prospective potential development of the areas, are summarized herein. The research delves into the current state of these regions, examining their correlation with recent flooding events. By scrutinizing the hydrological aspects and emphasizing the significance of forest cover, the paper aims to contribute valuable insights into sustainable municipal development and effective flood risk management strategies.

Keywords: Rivers; Municipalities; flood risk; forests; river basin.

JEL Codes: Q24, Q25, I23, I26

9th Conference Economics of Natural Resources & the Environment



Smart Sustainable Cities: A Greek Case Study

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Abstract

The aim of the present paper is to investigate whether the Regional Unit of Western Attica constitutes a sustainable and smart geographic area, based on the perceptions of its residents, as well as the impact of the COVID-19 pandemic on the sustainable urban development policies it implements. To achieve this goal, quantitative research was conducted, using a questionnaire as a data collection tool, with a sample of 175 residents from the 5 Municipalities of the Western Attica Regional Unit. The research results indicated that the residents of the Municipalities in the Western Attica Regional Unit have a moderate overall level of awareness regarding sustainable and smart urban development issues. Additionally, it was found that the Municipality of Fylis ranked first in all dimensions of sustainable and smart urban development, compared to the remaining 4 municipalities of the Regional Unit of Western Attica, having the highest absorption of funds. Furthermore, the effectiveness of the implemented policies for sustainable and smart urban development in the municipalities of the Western Attica Regional Unit seems to have been significantly affected by the COVID-19 pandemic. The correlation analysis revealed a strong positive correlation between the sample's perceptions on sustainable development and the sustainable development policies implemented by the Western Attica Regional Unit in relation to the environment, economy, society, and culture.

Keywords: Sustainability Policies; Smart Cities; Greece.

JEL Codes: Q56; Q58.







Session 5

Corporate Social Responsibility – Environmental Psychology

9th Conference Economics of Natural Resources & the Environment

Programme of the Conference



Corporate Social Responsibility CSR and the effects on employees' mental health

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Abstract

The concept of corporate social responsibility (CSR) has garnered significant scholarly and professional attention in recent decades, emerging as a cornerstone of contemporary business theory. Notably, extensive research has underscored the positive implications of CSR activities, elucidating their pivotal role in fostering robust relationships with stakeholders, bolstering organizational legitimacy, securing societal endorsement, nurturing competitive advantages, enhancing overall organizational performance, and fortifying corporate reputation.

While existing literature has extensively explored the benefits of CSR strategies, our study uniquely focuses on the intricate interplay between CSR initiatives and their impacts on the intricate fabric of human resources within organizations. This critical investigation delves into the often overlooked dimensions of managing potential negative consequences associated with CSR endeavors, a crucial area that remains largely unexplored in current literature.

By specifically addressing the implications of CSR strategies on the dynamics of human resource management, we seek to offer actionable insights to industry professionals and decision-makers. Particularly, our research aims to deliver practical and applicable outcomes tailored to the context of companies operating within the distinct business landscape of Greece, fostering a nuanced understanding of how CSR can be optimally integrated within the fabric of organizational culture and human resource policies.

Corporate Social Responsibility; Corporate Sustainability; Employee Mental **Keywords:** Health; Organizational Change.

JEL Codes: I21; I31; I38; J28; J81Q01; Q52; Q56.



The significance of stakeholder engagement for promoting the Energy Efficiency First Principle (EE1st) in regional energy policy

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Abstract

The Energy Efficiency First (EE1st) principle embodies a transformative approach within the EU's energy policy, accentuating the significance of energy conservation and demand in policymakers' decision-making process. Although the principle is acknowledged within the EU legal framework, it is not assimilated into the decision- making process at a regional level. Therefore, the engagement of the relevant stakeholders, including regional authorities, is essential in shaping the energy ecosystem and contributing to filling the gap in the implementation of the EE1st at the regional level. The first and most important step is mapping the relevant stakeholders. The acute understanding of stakeholders' influence dynamics and defining the diverse characteristics is fundamental to this cohesive mapping. That includes the stakeholder's influence over energy policies, capacity to mobilise resources, and contribution to the decision-making procedure. The ultimate ambition is to build a holistic and deep understanding of their various needs, requirements, and expectations to develop targeted and personalised information which can lead to the effective understanding and implementation of the EE1st in the stakeholder regional energy ecosystem.

Keywords: Energy efficiency first principle; stakeholders mapping; energy ecosystem; European Union.

JEL Codes: E61; D61; D83; E21.







Integrating Environmental Education Techniques for Organizational Employees: A Sustainable Approach to Corporate Responsibility

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Abstract

The escalating need for environmental awareness and sustainability has emerged as a critical priority amid the array of pressing global challenges characterizing the modern era. This discourse delves comprehensively into the imperative significance of implementing robust environmental education methodologies within organizational frameworks, aiming to instill a pervasive culture of sustainability among employees. Central to this perspective is the vital integration of a comprehensive understanding of ecological systems, climate change dynamics, and the profound ramifications of human activities on the delicate fabric of the environment.

This deliberation particularly underscores the pivotal role of effective educational strategies, emphasizing the efficacy of workshops, meticulously designed training modules, and interactive learning interventions aimed at nurturing a profound and intrinsic sense of environmental stewardship among employees. This approach underlines the importance of adopting innovative pedagogical practices to engender active employee involvement and engagement in the pursuit of sustainable practices.

Furthermore, this discussion accentuates the pivotal role of environmental education in fostering a more sustainable and ecologically responsible work culture, underscoring its far-reaching and positive impact on overall business practices, contributing to the holistic betterment of the global ecosystem.

Keywords:	Education, Environment, Eco-Systems, Staff, Organizations, Corporations, Theory of Change, Sustainability
JEL Codes:	A13; I21; I31; I38; J28; J81; O01; O52; O53; O56; O57



The Psychology of non-market Environmental Valuation: research evidence, theoretical insights, and policy considerations.

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Abstract

The current study sheds light on the psychological insights embedded in environmental valuation research. It attempts to unravel the complex interplay between individuals' psychological considerations and how they value environmental goods, services, and various aspects of natural capital in monetary terms. Drawing on an extensive frame of literature, this work synthesizes how a wide range of psychological factors, including attitudes, environmental values, perceived behavioral control, norms, place attachment, and environmental/climate beliefs are incorporated into environmental valuation studies, especially focusing on the concept of willingness to pay (WTP) for environmental conservation. These psychological attributes have been found to account for a significant variation in peoples' environmental preferences and serve as important predictors of individual behavioral decisions. The review concludes with an integrative theoretical framework of the psychology of non-market environmental valuation. Research evidence highlight several policy implications that enable policy measures aligned with the EU Green Deal, and ultimately pursue environmental conservation and increased public support.

- **Keywords:** Environmental Valuation, Psychological Factors, Willingness to Pay, Environmental Policy.
- **JEL Codes**: A14; Q00; Q51; Q56; Q5; Q58, Q59.







Environmental psychology of religion and environmental crisis

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Abstract

The ecological and environmental crisis is a constant threat to the survival of the human species. This threat is practically dealt with by various methods and ways of adapting to local conditions and on-the-ground know-how, but also with an increased sense of social responsibility. The specific issue of the environmental crisis needs a political or state response which, due to its importance, causes negative effects on people's daily lives. In the turbulent times of the environmental crisis, there are radical ideas such as (deep ecology, ecophilosophy and ecotheology, ecopsychology), which make a strong and absolute critique of anthropocentrism which is considered to be mainly responsible for the threat of the coming destruction of the environmental ethics and business ethics, can help with its findings on the big issue of the climate crisis.

Keywords:Environmental Psychology of Religion, Environmental Crisis,
Ecopsychology, Deep Ecology.

JEL Codes: A13; I21; I31; I38; J28; J81; Q01; Q52; Q53; Q56; Q57.







Session 6 Circular Economy

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Circular economy in European Fashion Industry

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Abstract

The interconnectedness of fashion industry and waste generation is pivotal for policymakers in the circular economy sector. Fashion industry creates a great bulk of waste in an era of rapid consumption and production – the waste crisis. Fast fashion is indeed a conundrum for policymakers and ought to be observed in order to be easily coped with. In the present research we employ a hybrid window data envelopment analysis (WDEA) methodology in order to measure panel data eco-efficiency via the application of moving average principle. The examination of 22 European countries, in the period 2000 – 2021 led to the conclusion that a meso-term plan performs better than a short-year plan on the matter of eco-efficiency. Moreover, the lowest mean performance can be spotted on Czech Republic, Estonia, and Latvia, on the other hand, the highest mean performance can be attributed to Norway, France, and Italy. Geographical disparities can be spotted also, as western Europe has greater eco-efficiency than Eastern Europe and Portugal.

Keywords: Fast Fashion, Circular Economy, Waste Management, eco-efficiency, DEA

JEL Codes: Q53; Q56; Q57.







Fast Fashion and Circular Economy

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Abstract

This discussion explores the potential of the circular economy as a solution to the negative This discussion examines the transformative potential of the circular economy as a panacea for the deleterious impacts wrought by the rapid expansion of the fast fashion industry. Although the democratization of trendy attire has been a boon, the collateral environmental and socio-economic damages are undeniably profound. The circular economy, with its regenerative principles and emphasis on closed-loop systems, emerges as a beacon of hope amid the escalating sustainability crisis. A meticulous case study analysis dissects the multifaceted strategies adopted by key players in the fast fashion sector to integrate circular practices. The empirical insights underscore the undeniable potential of the circular economy to address the negative externalities of fast fashion. However, amidst this optimism, formidable challenges and hurdles loom large on the horizon, demanding urgent attention and collective action. In essence, this study advocates a holistic shift towards a more sustainable and circular fashion paradigm, urging the industry to recalibrate production methods, material sourcing, and consumption patterns. Emphasis is placed on the urgent need for policy reforms and robust regulatory frameworks to incentivize and facilitate the adoption of circular business models. Furthermore, fostering collaboration across the entire value chain, from designers and manufacturers to consumers and waste management stakeholders, is imperative to engender a comprehensive transformation. The study underscores the critical importance of education and awareness campaigns to cultivate a conscious consumer base that actively champions sustainable fashion choices. This research underscores the pressing imperative for continued scholarly investigations and interdisciplinary collaborations to unravel the complexities of implementing circular strategies within the dynamic landscape of the fast fashion industry. While acknowledging the strides made, the study accentuates the enduring nature of the challenges and underscores the dynamic nature of sustainable fashion, necessitating an agile and adaptable approach to address the ever-evolving demands of a more environmentally conscious global community.

Keywords: Fast Fashion, Circular Economy, Reuse, Sustainable Reports, Waste

JEL Codes: A13; J28; J81;Q01; Q52; Q53; Q56; Q57.

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Local products entrepreneurship as a tool for sustainable regional development: the case of N. Chalkidiki

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Abstract

The sustainable development of an area depends on many different factors, such as: the composition and structure of the local community, the sectors that make up the economic activity of the area (e.g., agricultural, touristic, commercial), the morphological and climatic characteristics of the area, etc. It is of primary importance to select and promote policies and actions in a way that gives the best economic results without depleting natural resources. The promotion of the nutritional value of local products and their promotion through businesses operating in the food sector, significantly enhance the development of the local economy. In this thesis, research is carried out on local food businesses in North Chalkidiki.

Keywords:Sustainable Regional Development, Local Products, Food Businesses, North
Chalkidiki Region.

JEL Codes: 013; Q1; Q22.



Study of the impact of using SRF/RDF alternative solid fuels on the cement industry environmental footprint

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Abstract

Environmental footprint is an appropriate indicator to monitor the impact on climate change of various industrial processes via measuring the effective replacement of valuable non-renewable energy sources. A solution to decreasing CO₂ emissions is to replace conventional fossil fuels with solid secondary fuels, such as RDF/SRF, derived from the effective valorization of the residues of the municipal solid wastes management processes. In an eco-friendly and sustainable development context, the cement industry can contribute to environmental protection by lowering its footprint via the effective use of alternative fuels. In this paper, the use of RDF/SRF as an alternative fuel in cement kilns co-processed with conventional fuels is discussed. These alternative fuels following appropriate specifications could be effectively incorporated in cement production, thus covering both the high-energy requirements of the process and contribute to reducing the environmental impact. Following this approach, the goal for the drastic reduction of the landfilled wastes can be finally realized.

Keywords: CO₂ emissions, alternative fuels, SRF, RDF, co-processing, environmental impact

JEL Codes: O3, Q42







Forest road pavement construction based on recycled materials is an economic and environmental neutral footprint implementation?

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Abstract

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The present research addresses the challenge faced by the European Union (EU) to achieve a sustainable low-carbon economy and in particular, to reduce carbon emissions up to 2030, according to the targets set in its "energy and climate package". Forest road pavements are an expensive part of construction or maintenance that require large amounts of resources and materials as a part of transportation infrastructures. The use of recycled materials or aside waste of industry has been shown to lower the carbon footprint of the construction sector. The use of recycled materials can be the solution to natural resource conservation or the reduction of harmful emissions and the minimization of overall costs for pavement construction and maintenance. Is the use of recycled materials economical and environmentally neutral? Life cycle assessment and life cycle cost analysis are two approaches to quantify and assess the environmental performance and the costs based on the selection of materials used to forest road-pavement construction. This research is going to present how different types of recycled material in different quantities can show limitations based on environmental or economic analysis. Tests and evaluations gave the required quality and durability of the pavements under several traffic volumes and loads even in severe climate actions. Based on the trends it is possible for the use of recycled materials to be a part of pavement technology that uses recycled materials for constructing road pavement.

Keywords: recycled waste materials; low carbon forest road pavement; CO₂ emission; economic pavement; environmental neutral footprint

JEL Codes:

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Session 7 Sustainable Transport

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Forecasting Greenhouse Gas Emissions of Passenger Traffic to the Aegean Islands with the Use of Machine Learning

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Abstract

Greenhouse Gas Emissions are a major driver of Climate Change, the effects of which can already be seen around the world. Transport is a major source of GHG emissions, accounting for 15% of all GHG emissions. A significant proportion of transport regards to tourism, which is the leading economic activity in the Greek islands. We examine the case of the selected Cyclades and Dodecanese islands by developing Passenger Traffic Forecasting Models using Machine Learning and then predicting GHG emissions based on forecasted traffic volumes and passenger-km figures. The effectiveness of potential policies for modal shift and the effect of different economic growth scenarios is discussed by comparing different forecasting outcomes.

Keywords: Air Transport, Sea Transport, GHG Emissions, Forecasting, Machine Learning

JEL Codes: R41, R42, R48, Q41, Q42, Q47, Z32



Integrating bike paths into peri-urban environment: the case of Serres

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Abstract

Benefits of cycling as well as of human interaction with nature are well substantiated. Integrating cycling paths into the landscape is a crucial task for engineers, forest scientists and cyclists as well, but can be broadly appreciated by the committed funs and not only. However, services and equipment are needed to enhance cycling in nature and create a strong sport and tourism local potential. This paper presents part of activities undertaken in Serres in Northern Greece, where cycling is gaining ground in the urban setting and beyond. Mapping peri-urban bike paths was undertaken for the first time in the framework of two EU funded projects, accompanied by relevant works in order to provide the users with appealing and useful infrastructure. This work discusses the initiatives of upgrading and promoting cycling paths in the region of Serres and their contribution to local sustainable tourism potential. Moreover, the versatility of the path network and its contribution to other ecofriendly activities like running or hiking provides extra benefits for the local community. Facilitating sustainable forms of tourism can create societal and personal benefits, while economic profitability in an environment-friendly perspective can be the added value generated by such initiatives for the broader region.

Keywords: bike paths mapping, peri-urban environment, sustainable tourism

JEL Codes: O18, R42, Z20, Z32.



Investigation of bicycle travel conditions in the cities of Thessaloniki and Lamia

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Abstract

This study examines the bicycle travel conditions in the cities of Thessaloniki and Lamia in Greece, through a questionnaire survey with 220 participants, 110 in each examined city. The questionnaire is formed of 20 questions, it was distributed in person during the months January and February 2023 and the participants answered the questions anonymously.

The study focuses on the bicycle ownership, the use of shared bicycles, the frequency of bicycle usage during the examined time period (the last months before the study) and the time period of Covid-19 pandemic restrictive measures that implemented in Greece. Furthermore, it examines the existence and use of cycling infrastructure in the examined cities, and the level of bicyclists' safety during daytime and nighttime both on bikeways and urban roads. More questions focus on the construction or expansion of the cycling infrastructure, and the selection of bicycle as a transport mode for daily urban trips in relation to the improvement of cycling infrastructure and travel conditions, and the impact of energy crisis and cost of living. Finally, the participants were asked about their knowledge of the Greek Highway Code related to bicycle use.

The results of this study can contribute to the understanding and improvement of the bicycle travel conditions in the examined cities.

Keywords: Transportation; Bicycle; Cycling infrastructure; Safety; Travel conditions.

JEL Codes: 018; R41.



Predicting the Societal Acceptance of Mega Road Infrastructure Projects in Greece: A Statistical Model Anchored in Sustainable Development Principles

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Abstract

Mega road infrastructure projects and their impact on sustainable development in Greece are examined in this paper. Research focuses on four major road megaprojects: Attiki Odos, Egnatia Odos, Ionia Odos, and Olympia Odos. Utilising a novel statistical model based on the triad of Economy, Environment, and Society, the study aims to forecast societal acceptance of these projects. Data was gathered through questionnaires and archival research. The statistical model employs equations tailored to predict societal perspectives using indicators of economic, social, and environmental sustainability. Empirical findings corroborate that these projects stimulate regional development and employment (Aschauer, 1989; Bannister & Berechman, 2000), enhance public services and quality of life, albeit unevenly across communities, and pose challenges like ecological degradation and carbon emissions (Litman, 2013; Richardson & Bae, 2004). The model reveals a societal paradox: while long-term economic and social gains are acknowledged, reservations about environmental and social sustainability persist, aligning with Flyvbjerg's "iron law of megaprojects" (Flyvbjerg, 2014). The paper advocates for integrated planning, where societal perspectives are central to aligning infrastructure projects with sustainable development goals (WCED, 1987). By applying a statistical model to forecast societal acceptance, the research fills a criticalacademic research gap, providing invaluable insights for policymakers and planners for a balanced approach to future infrastructure projects.

Keywords:RoadProjects, Mega Infrastructure Projects, Sustainable Development,
Societal Acceptance, Greece

JEL Codes: Q01; Q50; Q56; R11; R40; R42;



The Role of Big Data in Environmental Sustainability of Aviation: A Literature Review

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Abstract

This paper offers a comprehensive literature review on the critical role of big data in advancing environmental sustainability in the aviation industry. It explores the sector's use of big data to address major environmental challenges, such as reducing carbon emissions, minimising noise pollution, and optimising energy consumption. The review highlights the potential of big-data analytics in supporting strategic decision-making processes, emphasising its utility in addressing environmental and social issues in aviation. Moreover, it critically examines the inherent challenges and ethical considerations associated with the implementation of big data solutions in this sector, including technical complexities, financial constraints, and regulatory barriers, while also addressing the pivotal issues of data privacy and security. The paper concludes with an insightful discussion on emerging trends and future innovations in big data, emphasizing their potential impact on aviation's environmental sustainability and indicating directions for future research and development.

Keywords: Aviation; Environmental Sustainability; Big Data

JEL Codes: Q55; Q58; Q54; Q56; C55; L93









Session 8

Data Science and Artificial Intelligence Improving Health Equity & Urban Environments



Bridging the Gap between Artificial Intelligence and Information Geometry: A Path to Efficient Decision-Making

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Abstract

Information Geometry (IG) is an emerging field of Mathematics with various applications in the field of Artificial Intelligence (AI). Using geometric and metric concepts, IG provides the necessary mathematical tools to understand the data manipulation, probability distributions and models used in AI, enabling the development of more efficient algorithms in extracting information from complex data and facilitating more informed, accurate and sustainable decision-making. Applications in computer vision and natural language processing will benefit from geometric techniques to boost pattern recognition and semantic understanding. Moreover, the role of IG in network analysis and graphs, will assist in modeling and interpreting complex network structures, and will play a significant setup in autonomous robotics and robot navigation, enabling an efficient environment representation. On the other hand, AI security will be enhanced with the application of IG, by detecting threats and ensuring resilience against adversarial attacks. In an increasingly data-driven and AI-oriented world, IG is a valuable asset and, by joining both areas in close collaboration, it will revolutionize the way of taking advantage of technology to address future challenges. This work presents fundamental concepts and connections between AI and IG, providing a foundational overview for future research development.

Keywords: Information Geometry; Artificial Intelligence; Security; Decision-Making.

JEL Codes: C10; C49; C69; D89.

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Exploring statistical control methods in epidemiological scenarios and process management: A comparative study.

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Abstract

In this study the authors investigate the practical application of statistical control methods in organizational and epidemiological contexts. It explores challenges in business, examines potential benefits in analyzing epidemiological scenarios, and evaluates the understanding of statistical methods among process management professionals in Brazil. It compares the application of statistical control in operational processes and epidemiological studies, emphasizing potential contributions to public health. An introductory exploration delves into the similarity of using these methods, covering the fundamental concepts and techniques.

By effectively managing and controlling the spread of diseases, healthcare systems can save costs related to treatment, hospitalization, and containment efforts. The comparative analysis of different statistical control methods, can contribute to building economic resilience against outbreaks and, by understanding and implementing effective control measures, economies can reduce the duration and severity of health crises, allowing for quicker recovery and minimizing economic damage.

Keywords: Control Charts; Risk Analysis; Public Health; Sustainability.

JEL Codes: C19; I10; L15; Y1.



Exploring Dental Health, Immunity, and HDL: A Comparative Study Using GAMLSS and PPR Models

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Abstract

Our aim in this work is to investigate the link between periodontal health, as indicated by Pocket Probing Depth (PPD), and HDL levels, incorporating factors like age and diabetes status. This can help in identifying potential risk factors and developing preventive measures for periodontal diseases. Moreover, it will facilitate healthcare professionals to identify individuals who are at a higher risk of periodontal diseases and related systemic conditions. Early detection can result in timely intervention and reduced healthcare costs.

Based on a sample of 158 adult individuals, the study employs two advanced statistical methods: Generalized Additive Models for Location, Scale, and Shape (GAMLSS) and Projection Pursuit Regression (PPR). GAMLSS extends traditional models by accommodating varying variances, skewness, and kurtosis, while PPR, a supervised technique, excels in modeling non-linear relationships without predefined assumptions.

The study's findings, derived from both GAMLSS and PPR models, highlight significant interactions between HDL, age, diabetes, and their collective impact on periodontal health. These insights are critical for healthcare professionals, linking oral health to broader systemic health factors. The study also provides a comparative analysis of GAMLSS and PPR, showcasing their respective strengths and complexities in statistical modeling.

This work not only furthers our understanding of the interplay between dental health, immunity, and systemic factors but also demonstrates the effectiveness of advanced statistical methodologies in uncovering such complex relationships. Likewise, a better management of health in general, will be recognized in the fostering of economic benefits, and sustainable healthcare practices.

Keywords: Dental Health; GAMLSS; Projection Pursuit Regression Sustainability; Health Risks.

JEL Codes: A19; C10; C23; I10.

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A Statistical contribution to Decision Making: On Preventing Covid-19 in Mozambique selected regions

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Abstract

In China more than 77,000 cases of COVID 19 were reported, until February 23, 2020 and 60% of confirmed cases have been reported in the city of Wuhan. Similarly to other countries, Mozambique declared state emergency at March 2020 and different prevention measures were implemented to control and provide a timely response to the pandemic, including early diagnosis of disease cases. Regarding the evolution of COVID-19 cases, this work presents the Analysis and Visualization of COVID-19 data for the particular case of Mozambique, considering data from 2020 and 2022 relatively to some selected regions. This theme can be considered in the interdisciplinary areas of statistics, biomedicine, demography, economy and sustainability, and, in particular, on risk analysis. Qualitative and quantitative data analysis are performed, useful to the decision-making, considering the economic sustainability in the health sector, namely on health measures pandemic prevention and, moreover, to infer on the trend of cases and deaths from this disease in the considered regions.







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Big data sets in environmental studies

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Abstract

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The application of Big Data in environmental risk analysis offers a more comprehensive and effective approach to understanding and mitigating adverse environmental impacts. Here are some ways in which Big Data is used in this context: Large-Scale Data Collection: Sensors and Internet of Things (IoT) devices collect real-time data on various environmental variables such as air quality, pollution levels, temperature, humidity and other relevant factors. Real-Time Monitoring: Big Data allows for continuous, real-time monitoring of activities and environmental conditions. This is crucial for quickly detecting anomalous events and responding to environmental emergencies. Predictive models: Predictive analytics algorithms can be applied to identify patterns and predict potential environmental risk events based on historical and real-time data. Data Diversity: Big Data facilitates the integration of data from diverse sources, including geospatial data, meteorological data, information about ecosystems, among others, providing a more complete and holistic view. Machine Learning in Risk Assessment: Machine Learning algorithms can be trained to analyze complex patterns in data and provide insights into environmental risk. This may include predicting impacts of extreme weather events, identifying areas prone to natural disasters, etc. Real-Time Decision Making: In cases of natural disasters or environmental accidents, Big Data allows real-time decision making based on updated data, facilitating the coordination of emergency responses. Environmental Impact Assessment: Big Data enables the creation of simulation and modeling models to assess the environmental impact of different scenarios, contributing to informed decision-making. Emissions Control: Companies and organizations can use Big Data to monitor and control their emissions, ensuring compliance with environmental regulations and reducing legal risks. Transparency and Participation: The use of Big Data can increase transparency in environmental issues, allowing greater public participation and awareness of environmental risks and impacts. Resource Optimization: Big Data can be applied to optimize the use of natural resources, promoting sustainable practices, and reducing the risks associated with uncontrolled exploitation. By integrating Big Data into environmental risk analysis, organizations can make more informed decisions, implement more sustainable practices, and respond more effectively to adverse events, contributing to the preservation and responsible management of the environment.



A Review on the Impact of ESG on the Economy and Financial Risk

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Abstract

This review utilized Scopus, Web of Science, and Google Scholar to address the relationship between ESG, economy, and financial risk. For environmental risk management and sustainability in the banking sector, findings suggest that banking can play a fundamental role in transitioning to a sustainable economy with an influence on investment choices and making a relationship between ESG performance and credit ratings. Additionally, good ESG performance could give firms better access to credit. Regarding the impact of ESG on economic growth, a significant correlation between GDP and CO2 emissions is confirmed. Country sustainability improvements are expected to have a net positive effect on economic prosperity. Regarding corruption risk management and socially responsible practices in financial institutions, the main findings infer that financial institutions are crucial in reducing corruption concerns and fostering socially responsible behavior, which includes building strong internal controls and anti-corruption policies as part of sustainable corporate governance and ESG. The conclusions presented previously led to identifying research gaps in this field, such as which ESG pillar impacts credit ratings, how ESG can affect economic growth, how to conduct corruption risk management strategies, and what measures financial institutions should take to promote sustainability without harming the sector.

Keywords: ESG; Financial performance; Sustainability; Risk management; Financial risk.

JEL Codes: Q01; O44; G30.



Entropy and Uncertainty: Theoretical Framework and Fuzzy Logic for Environmental Economics

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A 1.

Abstract

Entropy describes the disorder (or order, depending on the sign + or - we adopt for it) of a "given system". This system at the early steps pf development was coming from the Thermodynamics. Uncertainty links a real-valued function of events with probability. Recently there is a competition between probability and Fuziness, as Fuzzy Logic, is closer to the real situation and not a binary response situation. Moreover both Uncertainty and Entropy are faced under Fuzzy Logic and we shall present this line of thought as well as the classical one.

In economic theory and not only, a number of sources of uncertainty, such as model choice uncertainty, data uncertainty, the right mathematical framework chosen might cause uncertainty have been worked already extensively discussed

We shall work for the family of the γ –ordrer Generalized Normal distributions $G_{\gamma} = \{N_{\gamma}(\mu, \Sigma), \gamma \in \mathbb{R} - [0,1]\}$ describing the problems of the Environmental Economics under two different theoretical approaches.



Analysis of the inequality into distributions. An alternative approach to the Gini index applied to the spending environmental in EU

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Abstract

The Gini index is the most common tool to measure inequality into two distributions. Traditionally, the Gini index and the curve of Lorenz are focused on inequalities measures in the income distribution between countries or regions. But, in the last years, several authors have shown some limitations of the Gini index. In particular, it's less sensitive to inequality at the tail of income distribution. This type of problem in the Gini index could produce two types of reactions: a new reinterpretation of the Gini index and the proposal of some alternative measures to it. In this paper, we follow the previous work using the Csiszar f-divergence to propose using the α -divergences approach to analyze the differences between the Gini index approach and these alternatives.

The Gini index has been applied to the measure of resource inequalities. The AR-Gini is an areabased measure of resource inequality that estimates inequalities between neighbourhoods regarding the consumption of specific consumer goods (Druckman and Jackson, 2008). The AR-Gini could be a useful tool to monitor the distributional impacts of resource-related interventions, but this indicator presents the same overcomes as the Gini index. We can use the Gini concentration coefficient as a measure of the concentration of distribution of a random variable, especially applied to time series of data.

In recent years, several studies have studied environmental spending in the European Union (EU). We focus our analysis on the distribution of this type of spending between the countries of the EU.

The objective of this study is to show the differences in indexes applied to the study of the distribution of the distribution of monetary resources to environmental conservation and the extension of environmental protected areas into the countries of the European Union (EU). In our comparative study, we use the Gini index and the α -divergence measure and compare the results to get the most accurate measure of the equity of the distribution.

Keywords: Gini Index, Gini coefficient, α -divergences, AR-Gini, Environmental protected areas, Conservation policies.

JEL Codes: C43, D63, H53, Q51.









Session 10

Welfare – Regional Development



Consumer barriers to bio-based transitions: A study on food products

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Abstract

This study investigates the effect of nine consumer barriers to bio-based food products in shaping purchase intentions. A structural model is developed to assess: (i) the influence of prior experience with bio-based products and demographics on the perceived impact of the consumption barriers, (ii) how these nine barriers affect consumers' interest and attitudes to bio-based foods, and (iii) whether the latter are predictors of purchase intention. The proposed model is examined using data collected from a self-administered field survey in Greece (n=308). Findings suggest age, gender and prior bio-based consumption experience have a significant effect on most barriers. Moreover, the nine barriers have a non-uniform effect on consumers' interest and attitudes towards bio-based products but both of these latent variables (interest and attitudes) have significant positive effects on purchase intention. Based on these results, academic contributions to the existing body of knowledge of consumer (green) behaviour are offered with regard to potential structural linkages describing consumer adoption of bio-based food products in Greece. The study offers meaningful insights to policymakers and marketers seeking to increase market penetration of bio-based food products and, thus, endorse more sustainable food systems.

Keywords: Consumer barriers, purchase intention, bio-based products, food products, structural equation modelling, Greece.

JEL Codes: D19; Q01; Q57; Q59.

We acknowledge support of this work by the project "Center of Sustainable and Circular Bioeconomy [Aegean_BIOECONOMY]" (MIS 5045851) which is implemented under the Action "Reinforcement of the Research and Innovation Infrastructure", funded by the Operational Programme "Competitiveness, Entrepreneurship and Innovation" (NSRF 2014-2020) and co-financed by Greece and the European Union (European Regional Development Fund).



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Assessing the feasibility of the Bellagio Process in the European Union

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Abstract

The paper examines the economic, environmental, and social aspects required to achieve a transition towards a circular economy, commonly referred to as the Bellagio process. The analysis endeavors to assess the relationship between environmental sustainability, population density, innovation and circularity rate. A panel data analysis was conducted utilizing various econometric techniques including Ordinary Least Squares (OLS), Fixed Effects, Random Effects and Fully Modified OLS (FMOLS). The study employed a sample comprising 28 EU countries for the period 2010 - 2019. The findings of the analysis indicate a strong and positive relationship between circular activity and factors such as innovation, resource productivity, and recycling. It was observed that higher rates of domestic material consumption often coincide with lower rates of treated waste, leading to reduced levels of circularity across EU countries. The current body of literature lacks comprehensive understanding of the connection between circularity rate and socio-economic and environmental conditions to empirically explain the potential Bellagio process. It is of utmost importance to provide support for innovative projects that prioritize resource efficiency. National initiatives aimed at reducing energy consumption during both production and consumption stages play a vital role. European economies can effectively achieve these objectives by implementing environmental taxes on energy and natural resources, thereby addressing the issue of ecological footprint resulting from resource over-exploitation.

Keywords: CMU, Socioeconomic determinants, Sustainable Development

JEL Codes: Q01; Q53; Q56; Q57.



The Determinants of Heating Oil Consumption in the Household Sector

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Abstract

The subject of this study is analyzing the determinants of residential oil heating consumption. It aims to assess how socioeconomic, demographic and regional variables might affect household oil heating consumption. The case of Greece is taken as an example of our empirical analysis, using cross-sectional data from the Household Budget Survey of the Hellenic Statistical Authority. The results of the empirical analysis demonstrate that household oil heating consumption is positively related to the household's disposable annual income and the household head's educational level. On the contrary, the number of household members is negatively related to the demand for residential oil for house heating reasons. Furthermore, a non-linear relationship between the age of the head and oil heating consumption was estimated. In addition, there is an effect of gender, as well as significant regional heterogeneity of household oil consumption, related to urbanization and weather conditions. The assessment of the empirical findings leads to policy implications in designing energy-saving strategies for the residential sector in the framework of an effective energy policy aimed at decarbonizing fossil fuels.

Keywords:

Household oil heating consumption; Greece; Cross section data; Socioeconomic factors.



Millennials' Perspective on Sustainable Banking Practices

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Abstract

This study adds to our understanding of how the incorporation of sustainability practices in the banking sector affects their customer satisfaction, employing cross section data from Millennials. The results showed that awareness has a significant positive effect on the satisfaction of Millennials toward the environmental practices of banking institutions. Results suggest that the overall corporate image of the banking institution significantly influences Millennials' satisfaction. Examining the outlook of Millennials regarding sustainable banking practices is crucial for predicting future trends, instigating favorable transformations in the banking sector, meeting customer expectations, guaranteeing enduring sustainability, tackling social and environmental issues, encouraging innovation, and advocating for corporate responsibility.

Keywords: sustainability, banks, satisfaction, millennials

JEL Codes: M14; O44; Q50; Q56;



Environmental multipliers in Sraffian frameworks: derivation, implications, and empirical illustration

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Abstract

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This paper develops a theoretical and empirically applicable environmental extension of the Kurz matrix demand multipliers for Sraffian open–with state-economies and, thus, offers an integration of income distribution–value, heterogeneous produced means of production, open economy, effective demand, pollutant emissions and energy use considerations. The overall findings, on the one hand, call into serious question the effectiveness of traditional effective demand and environmental tax policy measures to reduce greenhouse gas emissions, energy use or/and unemployment and, on the other hand, forms an alternative, fairly general and flexible framework for providing policy-oriented analyses at the levels of individual industries and sectors, both nationally and transnationally

Keywords:Demand composition; environment-economy modelling; income
distribution; Kurz multipliers; post-Keynesian-Sraffian theory

JEL Codes: C67, E11, E12, Q43, Q52







Evaluation of Indoor Environmental Quality (IEQ) of Transport Cabins Using an Optical Particle Counter

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Abstract

Africa is experiencing an unprecedented demographic growth since few decades. It is followed by an increasing rate of urbanization in almost all countries. In parallel, we are witnessing a deterioration in air quality, especially in urban areas. Road traffic contributes significantly to atmospheric pollution through unregulated traffic, poor roads' design, and poor fuel quality. The surge in vehicle imports appears as an aggravating factor, as these vehicles are old and use low quality fuels. Roads' densities are very low, most roads unpaved or poorly maintained. Congestion has become frequent in new megacities such as Dar-es-Salam, Lagos, Douala, Abidjan, etc. Literature review shows a focus on outdoors dispersion and impacts and points out exhaust fumes, tyres degradation, and roads condition as main sources of pollutants while studies focusing on in-cabin pollution are still scarce. In this study, we present results of an ongoing evaluation of air pollutants concentration in minibuses in the city of Thiès (Senegal) using a Particle Plus 8301-AQM2 Series handled optical particle counter (OPC). Three different types of sources are identified, as the outdoor air, the vehicle itself and the occupants. Fine particles concentrations, carbon dioxide (CO₂), temperature and relative humidity were recorded in several routes at different periods of the day (morning, afternoon, and evening) and for several days. Recorded data show high concentration of fine particles which increases over time (from 25 up to 300 μ g/m3) depending on outdoor conditions and the areas crossed by the bus. CO₂ concentration (300-900 ppm) varies with the number of passengers during the trip. The temperature was in the range 30-40 °C and the relative humidity, 40-70%. The speed analysis shows frequent variations and was found low, ~ 2.5 m/s. Keeping doors and windows open help in eliminating excess CO₂ but ends in high level of dust concentration in the cabin.

Keywords: African cities; air sensors; OPC, air quality.

JEL Codes: I15; O29; R00









Session 11

Sustainable Water Management – Social and Natural Capital



Impact of Fuel Costs on Fish Prices: An Econometric Analysis in the Ionian Sea

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Abstract

This study, conducted under the SEAwise project, which is funded by the European Union's Horizon 2020 research and innovation programme (grant agreement No 101000318), explores the relationship between fuel costs and fish prices in the GSA20 region, specifically the Ionian Sea in Greece. The paper presents a detailed econometric analysis of four key fish species: Hake, Shrimp, Striped Red Mullet, and Red Mullet. Utilizing comprehensive datasets encompassing catch quantities, average market prices, and fuel prices, the study employs regression analyses and other statistical tools to uncover patterns and correlations. Our findings reveal a complex picture: while Hake and Shrimp prices exhibit a small sensitivity to fuel cost fluctuations, Striped Red Mullet and Red Mullet prices are significantly impacted by changes in fuel costs. These results suggest a nuanced interplay between operational costs and market dynamics in the fisheries sector. The study contributes insights to environmental economics, particularly in understanding how external economic factors, such as fuel prices, can influence marine resource economics. This work not only informs policymaking in sustainable fisheries management but also adds a significant dimension to the ongoing dialogue on the economic sustainability of marine ecosystems under the SEAwise project.

Keywords: Fisheries Economics, Fuel Costs, Fish Prices, Ionian Sea, Market Dynamics

JEL Codes: Q22; Q41; Q56; R11; C51.



The dependence of the industries of the Greek economy from the fisheries and aquaculture sector

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Abstract

The present study investigates the relationships between the productive industries of the Greek economy and the fisheries and aquaculture sector. Specifically, through the Leontief demand-driven and Ghosh supply-driven input-output models, both backward and forward linkages of the fisheries and aquaculture sector in terms of output and employment are estimated. Consequently, the industries on which the fisheries and aquaculture sector relies for the purchases and sales of intermediate inputs are identified. Moreover, the sector's contribution to the Greek economy's efforts to increase employment is emphasized. The main empirical findings of our analysis are as follows: (i) the primary industries on which the fisheries and aquaculture sector depends for its demand of intermediate inputs are the 'Wholesale & Retail Trade' and the 'Coal & Petroleum Refining Products', (ii) the main industries from which the fisheries and aquaculture sector sources the supply of its intermediate inputs are the 'Hotels & Restaurants' and the 'Food, Beverages & Tobacco', and (iii) the fisheries and aquaculture sector has relatively significant backward and forward interindustry employment linkages, indicating that the sector's contribution to the effort to increase total employment is relatively high. The results of our study provide valuable insights into the intricate interindustry dynamics of the Greek fisheries and aquaculture sector, serving as a foundation for formulating effective policies aimed at enhancing the sector's sustainability, fostering economic resilience, and promoting employment growth.

Keywords: Fisheries and aquaculture, input-output analysis, interindustry linkages, employment, Greek economy

JEL Codes: C67, Q22, Q28







The economic aspects of water management practices in Classical Athens

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Abstract

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In this paper, we present the water management practices that were implemented by the Athenian city-state of the Classical times (508 – 323 BC) under an economics perspective. They were based on the diptych: investing on water management infrastructure and introducing effective relative institutions. Infrastructure included extensive public works such as the building of public wells, aqueducts, fountains, springs and cisterns, the building of an underground water supply network and the building of a sewage underground network for wastewater management. Institutions included the introduction of three categories of public magistrates who were assigned to implement the city-states' water management strategy. We further argue that the success of the Athenian water management institutions was based on a combination of motives and disincentives; one the one hand, satisfactory salaries and public honors for the public magistrates who were assigned by the city-state to exercise these institutions, and on the other hand, the imposition of heavy fines and / or dismissal from public office to any of the above magistrates if they provided subpar services. We finally discuss if and how the Athenian water management strategies may be seen as an inspiration for our modern societies on relative environmental issues.

Key words: Classical Athens; water supply infrastructure, public goods; water management institutions; economic institutions

JEL codes: H41; H76; K20; N43; N53; Q28, Q58



Exploring links between local social capital and social effectiveness of protected areas

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Abstract

Protected Areas (PAs) are the most widely used tool for biodiversity conservation globally. In the European Union there are plans to protect 30% of land and 30% of water by 2030. Although PAs were initially proposed as a polity tool with a key aim to protect and restore biodiversity it is now widely recognised that they can also promote local socio-economic priorities. Despite this recognition, there are very limited studies exploring the social effectiveness of PAs and how these areas may deliver benefits for local communities living near them. In this paper I will present results from a European study assessing the benefits of PAs for local communities while also exploring how local social capital interacts with people's perceptions regarding these benefits. The results of the study show that there is a strong link between local social capital and perceived social impacts, revealing the importance of assessing effectiveness of PAs both with ecological and social criteria, and for the latter using subjective and objective indicators. These findings provide a useful and operational framework for PA practitioners and researchers illuminating pathways to increase the level of effectiveness of PAs.

Keywords: EU Biodiversity Strategy; ecosystem restoration; biodiversity, Europe, social capital, governance

JEL Codes: Q24; Q25; Q26; Q28





The geography of environmental migration. Greece: Case studies and affected areas.

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Abstract

The purpose of the present research was to investigate the phenomenon of environmental migration in Greece. Its objectives related to the identification of the main factors driving migration or displacement in Greece, the identification of the affected areas with the highest number of internal displacements due to disasters in the years 2018-2022 and the cartographic performance of the above areas for the aforementioned period. In order to provide answers, the method of multiple case studies was chosen, the cartographic rendering of these studies - using the analog symbols in the ArcGIS 10.4.1 software environment - and the circular frequency diagram in the spreadsheets of the Microsoft Excel application. The main source of data was the data provided by the Internal Displacement Monitoring Centre (IDMC). More specifically, 15 case studies were carried out in affected areas of Greece between 2018-2022, and in which internal displacements were equal to or greater than 500. Thus, with the two criteria (time period and number of internal displacements), the affected areas of the country were identified as case studies. A map was then created with the standards of ArcGIS 10.4.1 software to represent the affected areas as well as the size of the displacements which correspond to each area. The pie chart determined the percentage distribution of the type of disaster in the affected areas. The research showed that environmental migration in Greece exists in the form of internal displacement and the main factors that cause this phenomenon are wildfires, earthquakes, cyclones, and floods. Also, the regions most affected in the years 2018-2022 by the phenomenon were Attica and Evia. Finally, the research demonstrated that internal displacements in Greece may increase in the future.

Keywords: environmental migration, climate change, internal displacement, Greece, GIS

JEL Codes:



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Session 12

Quantitative Methods – Environmental Efficiency

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Dynamic Modeling of Environmental Quality with Embodied Technological Progress

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Abstract

In this paper, we make two assumptions according to which the environment offers at large two distinct services each of a different kind. The first assumption considers that environmental resources may serve as inputs to the production of conventional goods.For example the exploitation of an oil source from which, one firm extracts the oil which in turn is used as a fossil fuel for an industry. The second service provided is the environment itself which offers amenities (i.e. clean air, blue coasts, natural creeks, clean rivers and lakes etc.). Therefore in both cases, environmental quality plays a crucial role in the economic activities of any nation. In this paper, we combine technology adoption with environmental quality taking into account technological progress. To do this combination we set an optimal control model with the multi–stage property, therefore more complicated than a simple optimal control model. The model with a linear function can be solved analytically, otherwise is solved numerically. We obtain that the abatement process jumps upwards right at the moment that adopted the enhanced new technology. Moreover, we found that the social planner cuts down on the abatement process before the enhanced new technology is adopted.

Keywords: Optimal control, Multistage maximum principle, Environmental quality, Technology adoption.

JEL Codes: 044, Q56, Q58



European firms productivity growth and environmental regulation. Re-examining the Porter hypothesis.

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Abstract

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European manufacturing firms have to cope with the new regulations that advocate a greener and more sustainable future with less emissions and at the same time enhance or at least maintain their productivity levels. Thus, it is imperative for economic science to study the effects that newly imposed regulations have on economic growth and suggest any appropriate modifications. We follow a non radial directional distance function where each firm uses a vector of inputs and produces a vector of desirable and also a vector of undesirable outputs. We adopt a non-radial efficiency estimation, which assumes that inputs and undesirable outputs decrease at a different rate as desirable outputs increase. We compute a regulatory impact indicator that provides information about the loss of outputs resulting from new policies. Moreover, we compute environmental productivity growth and its components based on Oh (2010). Environmental productivity growth has the advantage that takes into consideration the incorporation of emissions in the production function (known as Malmquist-Luenberger index) and also addresses the existing problem of heterogeneity by adopting the concept of metafrontier. Finally, we explore the impact of regulatory impact indicator on environmental productivity growth using a panel vector autoregression method. Our findings showcase that the average value of environmental productivity has increased by 0.7% and 0.2% for heavy metals and greenhouse gases respectively, during the 2011- 2017 period. On the contrary, environmental productivity for other gases indicates that neither a catch up nor lagging behind took place. The component of best practice change is the main reason that environmental productivity growth increased on average, since it increased for all pollutant groups on average. Finally, we compute the impact that environmental regulations exert on environmental productivity and find that increasing the index of regulations by 1%, causes an increase of environmental productivity by 0.24% and 0.44% for heavy metals and greenhouse gases groups, respectively. The other gases group does not provide a statistically significant result. We support the "weak" Porter Hypothesis, which attests that well-designed environmental regulations can exert a positive effect on environmental innovation.

Keywords: Metafrontier Malmquist–Luenberger index; Environmental Productivity; Environmental regulations; Technological heterogeneity

JEL Codes:

C14, C44, C67, L20, Q53.



Testing the Environmental Kuznets Curve hypothesis in the case of tourism in the Eurozone member states

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Abstract

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The process of tourism development always constitutes a demanding research subject regarding its impacts on environmental performance, for instance, when investigating the Environmental Kuznets Curve (EKC) hypothesis. Particularly, this is the case in our modern reality, which is characterized by severe changes in v environmental quality levels. From this perspective, the present study investigates the role of tourism spending concerning domestic and international visitors on greenhouse gases (GHGs) and carbon dioxide emissions. In regression models, we include spending for business and leisure purposes as tested variables to confirm or not the EKC hypothesis. Furthermore, we examine if and how renewable energy decreases these environmental quality indicators. We apply panel data analysis for Eurozone member states between 1996 and 2019 by using the Driscoll-Kraay standard errors with fixed effects regression. Research findings evidence the inverted U-shape curve. As a result, the EKC hypothesis is confirmed in both cases of visitor spending and domestic spending for business and leisure purposes. Granger non-causality tests confirm feedback hypotheses for all tested pairs of variables. Practical implications reveal the crucial role of renewables in limiting air degradation levels, whereas they highlight the role of sustainable tourism spending in maintaining a clean and safe environment.

Keywords: Environmental Kuznets Curve, tourism growth, air pollution.

JEL Codes: Q56; Z32; Q5.





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Abstract

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The long-term commitment of the European Union to environmental protection materializing via numerous directives echoes in the European Green Deal. Green growth acts as the means to sustainability transition, despite technological and climate change policy implementation discrepancies exist. We introduce a conceptual framework bringing together the policy framework and country capabilities. Our aim is to explore the effects of climate change policy instruments, environmental policy effectiveness and eco-innovation performance on the relative advantage of the EU-28 in developing green technologies to foster green transition. We compile a unique dataset on the EU-28 from 2010 through 2019, including the climate change mitigation policy rate and environmental policy effectiveness for the first time. Findings from panel quantile robust instrumental regressions show that environmental policy instruments have a differential effect on the relative advantage of the country to develop green technologies while a non-linear effect of eco-innovation performance is documented. Evidence indicates that climate change policy tools influence in an asymmetric way the technology aspect of green growth, hindering environment-related technological independence. Environmental policy effectiveness affects the high technology-dependent countries while green fiscal policy behaves as a mitigator of green technological advantage creation. This study contributes to SDGs 7, 9, 12 and 13.

- **Keywords:** Green Growth & Sustainability Transition; Advantage in Developing Green Technologies; Environmental & Climate Change mitigation policy instruments; Eco-innovation.
- **JEL Codes**: C50, O52, Q55, Q56, Q58.



Suitability evaluation of broadleaved wood for multiple uses with the application of PROMETHEE IImethod

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Abstract

The contribution of forests to Greece's Gross National Product is one of the smallest among the countries of the European Union. Furthermore, Greece imports large quantities of sawn wood timber from abroad. The right choice of tree species in primary and secondary wood processing forestry enterprises, based on specific criteria, could have essential economic benefits for the timber industry in Greece. The aim of this paper was to evaluate the suitability of the most common species of broadleaved trees used in the Greek timber industry, with the use of a Multiple Criteria Decision Analysis approach, considering qualitative and economic criteria. The method PROMETHEE II was used, and five tree species were investigated: beech, chestnut, oak, poplar, and walnut in selected criteria which affect the wood quality and determine the final uses of timber, such as pricing, density, resilience to insects, etc. According to the results, the most suitable tree species was walnut, having the highest ranking (highest net flow) among the alternatives under the specific criteria. Chestnut and oak also had a positive net flow and were ranked as optimal solutions. On the other hand, beech and poplar had negative net flows and were not ranked as optimal solutions. Poplar, in particular, achieved the highest negative flow among the examined tree species and, hence, was unsuitable for the production of technical or sawn timber. Therefore, walnut, chestnut and oak were the proposed species for furniture manufacturing and production of sawn timber, in contrast with beech and poplar.

Keywords: sawn timber;forest products; sustainability; economic benefits;multiple criteria decision analysis.

JEL Codes: Q23;L73;Q01;Q56; D81.







Session 13

Sustainable Tourism – Circular Economy II



Exploring the role of tourism in environmental degradation

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Abstract

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The tourism industry always seeks ways to expand its potential and market share in terms of economic gains. In this course, many environmental problems occur, which should be investigated to advance viable solutions in the long term. To this effort, the present study explores the role of the total contribution of tourism to the Gross Domestic Product (GDP) in the context of the Environmental Kuznets Curve hypothesis (EKC). To conceptualize environmental degradation, we use carbon dioxide emissions and energy-related methane emissions. We also use renewable energy sources and internal travel and tourism consumption as explanatory variables. We put into the process panel data analysis between 1996 and 2019 for the Eurozone countries. We apply the Driscoll-Kraay standard errors with fixed effects regression. Results indicate that the EKC is confirmed concerning tourism's contribution to GDP, whereas renewables limit air pollution. Internal travel and tourism consumption has a negative impact on energy-related methane emissions. Additionally, Granger non-causality tests show that feedback hypotheses are present for all tested variables with the exception of tourism's contribution to GDP that evidence the growth hypothesis. Practical implications stress the importance of advancing the concept of sustainable tourism and becoming more responsible when spending for tourism purposes.

Keywords: Environmental Kuznets Curve, tourism, economic growth, energy, air pollution.

JEL Codes : Q56; Z32; N1; Q42; Q5



Tourism Local Development and Destination Management – The sustainability of small and medium-sized tourism enterprises and the environment in which they are based

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Abstract

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Until recently, natural resources were considered to be inexhaustible in the tourism industry, automatically renewable and offered for free exploitation aiming at economic growth. Nowadays, with catastrophic fires, floods and climatic change, the notion of sustainability of a place is essential. Businesses based on tourism destinations, like big hotels (the most important members of the worldwide tourism chain value) have burdening effects on the environment. Thus, international hotel chains are committed to implement sustainability policies nowadays by incorporating them in their strategic plan and by implementing environmental practices like energy efficiency measures that reduce water consumption, waste and carbon emissions, in order to protect and preserve the flora and fauna and promote the value of unique nature. But what happens with the small and medium-sized enterprises? We investigate the way the employees of those enterprises behave in order to promote the sustainability of the environment they are based on. The conclusions of the research showed that the regional administrations of tourism destinations and local development should educate workers about the environment. That would be a very valuable tool for achieving a positive impact both to the businesses and the environment. Therefore, sustainable goals would come into effect if they are based on professional morale and functional practices.

Keywords: tourism destinations, small and medium tourism enterprises, sustainability, environmental education, tourism destination management

JEL Codes:

Q56, Z32, I26, Q00, Z39



Local Tourism Development and Destination-The buying behavior of the consumer-tourist based on the organizational culture for the environmental footprint of the enterprise

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Abstract

Sustainable development meets the needs of the present without compromising the ability of the future generations to meet their own needs. The first wave of the most popular "green" thinking in the developed countries goes back to the 1960's, when a minority of citizens became interested in the state and degree of use of the natural environment at a local, national and global level. Nowadays, the citizens' awareness about this issue is increasing year after year, especially with regard to the practices and the organizational culture of tourist units about the protection and preservation of the natural environment in which they operate. The choices of many tourism business customers today are based on the profile of the area, its natural features, the activities offered and the nature protection programs implemented in the area. Therefore, we investigated the extent that the potential customers-tourists make their choices based on the environmental footprint of the business. The results about the consumers' behavior are important for the local tourism development and the tourism destination management agencies. That happens because a greater percentage of consumers, compared to previous surveys, refuse to buy the offered tourism product, if the business does not display environmental awareness.

Keywords:Sustainable development, consumer behavior, tourism businesses, tourism
development management, environmental footprint

JEL Codes: Q01, P46, Z32, R11



Developing and implementing Corporate Social Responsibility and Circular Economy strategies in the Hotel Industry.

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Abstract

Corporate social responsibility (CSR) and Circular Economy (CE) is a policy priority both at national and EU level. Furthermore, these have been promoted by both policy makers and consultants on the basis of a number of benefits that are associating their integration. The aim of this research is to assess the challenges and opportunities for implementing CSR and CE in the hotel industry. A case study focusing on Mediterranean SPA hotel in Katerini is being disucssed. Furthermore, the development and implementation of a certified management system on CE is discussed and the challenges and opportunities from its adoption in the hotel are also highlighted. It appears that very significant benefits can be gained from the implementation of CSR and CE strategies. Furthermore, the certified management system provides a structured and an effective approach to implement CSR and CE strategies.

Keywords: Corporate Social Responsibility, Circular Economy, Certified Management System, Hotel industry

JEL Codes: Q52; Q53, Q56



A Methodological Framework and Typology to classify the regulatory- or proactive-driven corporate environmental and social behavior

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Abstract

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Different economic and social actors ask firms to protect natural environment and minimize their negative impacts on societies. In turn, firms have responded to these pressures, incorporating environmental and social management practices. So far, the literature has examined proactive and regulatory-driven motives behind firms' decisions to adopt environmental management practices with various typologies being suggested that intuitively classify firms into categories such as reactive, proactive, and first mover. Although the intuitive nature of such classifications has a great merit, these typologies have also drawbacks which can impact on decision making of interested parties. To enhance the effectiveness of these typologies, this paper develops a Typology Matrix to classify firms into four behavior types namely, reactive, proactive, innovative and progressive, in relation to various sustainbility criteria. It is based on scoring measurement systems to draw information from corporate social responsibility reports in order to identify the proactive or regulatory-driven strategy of firms. The proposed methodology was applied in a sample of top 25 chemical firms according to their sales. The results showed that 16% of the sampled firms were progressive firms since they achieved high score in the progressive financial, social and environmental topics, whereas the vast majority of the firms were classified as reactive (60%).

Keywords: Corporate Sustainability, Corporate Environmental Management, Corporate Environmental Innovation, Corporate Environmental Accounting, firm behavior

JEL Codes: D22, D25, F64, G18, G28, G38, J16, Q58









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122		& Lisbon University
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		& ATHENA RC
156	Zourka Stefania	Cluster of Bioeconomy and Environment of Western Macedonia








List of Institutions

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3	Dept. of Forestry & Natural Environment Management	Agricultural University of Athens
4	Dept. of Physics	Alioune Diop University of Bambey
5	Dept. of Civil Engineering, School of Engineering	Aristotle University of Thessaloniki
6	School of Primary Education, Faculty of Education	Aristotle University of Thessaloniki
7	Dept. of Spatial Planning and Development Engineering /	Aristotle University of Thessaloniki
	Polytechnic School	
8	Faculty of Engineering, School of Civil Engineering	Aristotle University of Thessaloniki
9	Lab. of Forest Economics, School of Forestry and Natural Environment	Aristotle University of Thessaloniki
10	Lab. of Forest Informatics Faculty of Forestry and Natural Environment, School of Agriculture, Forestry & Natural Environment	Aristotle University of Thessaloniki
11	Lab. of Environmental Engineering and Planning, Division	Aristotle University of Thessaloniki
	of Hydraulics and Environmental Engineering, Dept. of Civil Engineering, School of Engineering	
12	Lab. of Forest Engineering and Topography, School of Forestry and Natural Environment	Aristotle University of Thessaloniki
13	School of Agriculture, Forestry & Natural Environment	Aristotle University of Thessaloniki
14	School of Civil Engineering	Aristotle University of Thessaloniki
15	School of Physical Education and Sports Science	Aristotle University of Thessaloniki
16	Sustainable Development Unit	ATHENA RC
17	Research Lab. on Socio-Economic and Environmental Sustainability (ReSEES)	Athens University of Economics and Business
18	School of Business	Athens University of Economics and Business
19	School of Economics and ReSEES Research Lab.	Athens University of Economics and Business
20		Avaris Transport Engineers LLC
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22	Dept. of Digital Transition and Climate Policies	Cluster of Bioeconomy and Environment of Western Macedonia
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24	Dept. of Civil Engineering	Democritus University of Thrace
25	Section of Transportation, Dept. of Civil Engineering	Democritus University of Thrace
26	Department of Environmetnal Engineering	Democritus University of Thrace
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28	Directorate of Primary Education of Zakynthos	Greek Ministry of Education and Religious Affairs
29	Dept. of Economics and Sustainable Development	Harokopio University of Athens
30	Dept. of Economics and Sustainable Development, School of Environment, Geography and Applied Economics	Harokopio University of Athens
31	Agriculture Economics Research Institute (AGRERI)	Hellenic Agricultural Organization – DEMETER
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34	College of Economics and Management	Huazhong Agricultural University
35		Institute for Studies on the Mediterranean (ISMed)
36		Institute for Systems Engineering and Computers at Coimbra
37		Instituto Superior de Engenharia de Coimbra
38	Dept. of Civil Engineering	International Hellenic University
39	Dept. of Organisation Management, Marketing and Tourism	International Hellenic University

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No	Department	Institution
40	Dept. of Surveying and Geoinformatics Engineering	International Hellenic University
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42		Koubaras Ltd
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44	CEMAT, Center for Computational and Stochastic	Lisbon University
	Mathematics, Instituto Superior Técnico	
45	Dept. of Economics	National and Kapodistrian University of Athens
46	Faculty of Social Theology and Religious Studies, Theology School	National and Kapodistrian University of Athens
47	Dept. of Geography and Environmental Sciences	Northumbria University
48	NOVA Information Management School (NOVA IMS)	Nova University Lisbon
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59	Deparment of Economy	Universidade da Coruña
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62	UDESC	Universidade do Estado de Santa Catarina
63	Faculdade de Medicina Dentária	Universidade do Porto
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66	Dept. of Economics	University of Patras
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77	Dept. of Informatics and Computer Engineering	University of West Attica
78	Dept. of Public and Community Health	University of West Attica

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