
ISAHP 2022
WEB CONFERENCE

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Library of Congress Publication Data

Proceedings of the International Symposium on the Analytic Hierarchy Process: the 17th ISAHP conference. Publication date: December 2022

Online Proceedings: ISSN 1556-8296

CONTACTS

Rozann Whitaker Saaty

Creative Decisions Foundation
4922 Ellsworth Avenue
Pittsburgh, PA 15213
Phone: 412-621-6546

E-mail: rozann@creativedecisions.net

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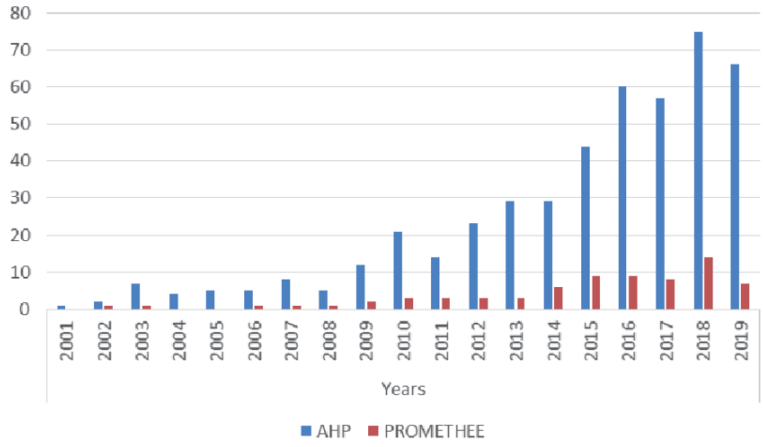
Thomas Saaty (1926 -2017)

Thomas Saaty in 1959 - Age 33 in London while working at the US Embassy for the Office of Naval Research

MESSAGE FORM THE HONORARY CONFERENCE CHAIR

Welcome to the 17th International Symposium of the AHP/ANP. The first symposium took place in Tianjin, PRC in 1988. Since then, we have usually met every two or three years. We have come a long way from the early meetings in which the main expenditure was printing the proceedings. Today almost everything we have is electronic. In 1996 when we met in Simon Fraser University, Burnaby, B.C. Canada the publisher Kluwer-Nijhoff offered to create a journal on the AHP. In that conference it was decided that at that time there was not enough volume of papers to warrant a printed publication. I proposed to create an electronic journal, but the publisher turned it down. At that time only the Association for Computing Machinery (ACM - https://www.acm.org/) published a journal exclusively online. That is certainly not true today. The proliferation of papers using the AHP/ANP is tremendous, and most journals have an online publication without a printed one. For example, our own journal the International Journal of the Analytic Hierarchy Process (IJAHP). Many other journals have dedicated areas for submission of AHP/ANP papers, e.g., the Journal of Multi-Criteria Decision Analysis (JMCDA). Papers come from all over the World. Most statistics show the predominance of the use of AHP versus other methods, e.g., PROMETHEE. See the chart below (Marovic, I., K.T. Strok, M. Sopic, D. Car-Pusic, "Group decision-making in civil engineering based on AHP and PROMETHEE methods," December 2020, *Scientific Review Engineering and Environmental Sciences* 29(4):474-484. License: CC BY-NC 4.0)



The theme of this symposium is Decision-Making in Business Practice. This theme puts forth the idea of interdisciplinary applications of the AHP which is what we have been observing for the last few years. I hope you enjoy the talks and interactions with the participants.

Luis Vargas
Honorary Conference Chair
ISAHP 2022

MESSAGE FROM THE PRESIDENT OF CREATIVE DECISIONS FOUNDATION

Two years have gone by since our first virtual conference in December 2028. Welcome to the second virtual conference of the International Symposium of AHP (ISAHP), December 15-18, 2022. Though we remember with pleasure our in-person meetings, usually with wonderful food, the virtual conferences have advantages. Because our AHP community members are in countries around the world, the travel is expensive and tiresome. With a virtual conference many more people can attend, particularly younger scholars who find it difficult to get university support. The plenary talks and session presentations are being recorded, so no longer do you have to choose which parallel talk to attend as you can see them at your convenience.

I am proud to say that every conference has been international. For ISAHP 2022 there are participants from 28 countries, and it will be the 17th such gathering. The first ISAHP in 1988 was held in Tianjin, China, organized by Professor Xu Shubo of Tianjin University. Though Shubo passed away many years ago we should remember the debt owed to him for initiating these meetings.

My husband Thomas Saaty passed away in 2017 at the age of 91. He never retired and was teaching his classes even that year. Tom often said he felt he was only the messenger, that his job was to bring AHP and ANP to the world in the hope it would help everyone make better decisions, as the most important thing any of us do is make good decisions. The strength of these processes he invented is that people now have a way to include their judgments and

values along with data, which itself often needs to be interpreted. Each of you is working to spread awareness as you apply AHP and ANP in various disciplines, teach it in universities, and help companies and government agencies better allocate their resources.
Thank you for joining us once more in this virtual conference.

Rozann Saaty
President
Creative Decisions Foundation
Pittsburgh, Pennsylvania USA

MESSAGE FROM THE PROGRAM COMMITTEE

Welcome to ISAHP 2022!

It is a pleasure to welcome all members of our AHP/ANP community to our second virtual meeting. While we had decided to move the ISAHP in 2020 to a virtual meeting, at the time it was not apparent how successful it would be to host a meeting virtually! What we found is that it enabled researchers and practitioners from around the world to rapidly converge and share the latest accomplishments, concepts, and research in the application of AHP/ANP in an impactful, convenient, and low-cost manner. When my father, Dr. Thomas Saaty, passed away in 2017 the last thing he told our family was "always look forward, never look back." As a pioneer in planning he would have been a strong supporter of a virtual conference format, one in which we all get to leave behind the vestiges of the pandemic and "move forward" in our respective pursuits. I hope that you can appreciate the import of his statement and overall idea of "looking forward."

I would also like to thank Rozann Saaty, my mother and the founder of the Creative Decisions Foundation (CDF). CDF provides funds to organize this symposium and also grants for scholars and students to attend this event. We also heartily thank our sponsors, Arama Consulting, Decision Lens, and The International Society of Multiple Criteria Decision Making, without which many of the scholarships would not have been available.

This meeting, whose theme is "Decision-Making in Business Practice" is not only dedicated to Tom's memory and to his legacy but also to our desire to see this ground-breaking theory applied in actual practice, relevant to the most important decisions that organizations make in the world today. We also seek to recruit a new generation of AHP/ANP researchers and practitioners interested in promoting better decision making in an ever more

complex world. Finally, I would like to express my recognition to all the members of the organizing committee: CDF president Rozann Saaty, program co-chairs Biesen Karpak, Marcel Minutolo and Elena Rokou, the head of the scientific committee Enrique Mu and Antonella Petrillo and our hard-working conference manager Lirong Wei. Without them this even would not have been possible. Enjoy the symposium!

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United States
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Poland
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İstanbul University-Cerrahpaşa
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Eskisehir Osmangazi University
Turkey
Elio Padoano
University of Trieste
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University of Warwick
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University of Naples
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Universitat Politècnica de València
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Creative Decisions Foundation
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UNESP-Universidade Estadual Paulista,
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Japan
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University of Pittsburgh
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Patrizia Simeoni
Università degli Studi di Udine
Italy
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Fulcrum Ingeniería, Santiago
Chile
Ilker Topçu
Istanbul Technical University
Turkey
Luis Vargas
University of Pittsburgh
United States
Xiaojun Wang
University of Briston
United Kingdom
Min-Suk Yoon
Chonnam National University
Korea
Keyu Zhu (Andy)
China

TRACK CHAIRS

TRACK #1 - MCDA THEORY

Luis Vargas
University of Pittsburgh, USA
lgvargas@pitt.edu
Jose Maria Moreno Jimenez
University of Zaragoza, Spain
Moreno@unizar.es

TRACK #2 - EDUCATION, GOVERNMENT AND PUBLIC POLICY

Nina Begicevic Redjep
University of Zagreb, Croatia
nina.begicevic@foi.hr
Anna Ujwary-Gil
Institute of Economics, Polish Academy of Sciences (INE PAN), Poland
ujwary@inepan.waw.pl

TRACK #3 - INDUSTRIAL AND MANUFACTURING ENGINEERING

Ilker Topcu
Istanbul Technical University, Turkey
topcuil@itu.edu.tr
Sule Onsel Ekici
Istanbul University-Cerrahpasa, Turkey
sule.ekici@iuc.edu.tr
Cigdem Kadaifci
Istanbul Technical University, Turkey
cigdem.kadaifci@gmail.com

TRACK #4 - INNOVATION AND ENTREPRENEURSHIP

Fabio De Felice
Parthenope University of Naples, Italy
defelice@unicas.it
Shashi Bhattarai
Knowledge Holding Intl, Nepal
shashibhattarai@yahoo.com
Antonella Petrillo
Parthenope University of Naples, Italy
antonella.petrillo@uniparthenope.it

TRACK #5 - HEALTHCARE

Claudio Garuti
FULCRUM, Chile
claudiogaruti@fulcrum.cl
Mario Sandoval
BIOMER, Chile
mario@medicalsapiens.cl

TRACK #6 - ETHICS, SOCIAL RESPONSIBILITY AND SUSTAINABILITY

Monica Garcia Melon
Politecnico de Valencia, Spain
mgarciam@dpi.upv.es
Hannia Gonzalez
Politecnico de Valencia, Spain
gonzalezurango@gmail.com

TRACK #7 - RISK ANALYSIS AND DISASTER MANAGEMENT

Mujgan Sagir
Eskisehir Osmangazi University, Turkey
mujgan.sagir@gmail.com
Xi Chen
Xidian University, China
xchen@xidian.edu.cn

TRACK #8 - SUPPLY CHAIN MANAGEMENT

Birsen Karpak
Youngstown State University, USA
bkarpak@ysu.edu
Valerio Salomon
Sao Paulo University, Brazil
valerio.salomon@unesp.br
Lirong Wei
Creative Decision Foundation, USA
leerongw@gmail.com

TRACK #9 - EXTENSIONS OF FUZZY SETS AND FUZZY DECISION MAKING

Cengiz Kahraman
Istanbul Technical University, Turkey
kahramanc@itu.edu.tr
Basar Oztaysi
Istanbul Technical University, Turkey
oztaysib@itu.edu.tr
Selcuk Cebi
Yildiz technical University, Turkey
scebi@yildiz.edu.tr

TRACK #10 - MACHINE LEARNING, ARTIFICIAL INTELLIGENCE AND DIGITALIZATION

Marcel Minutolo
Robert Morris University, USA
minutolo@rmu.edu
Elena Rokou
Creative Decision Foundation, USA
erokou@gmail.com
Werner Kristjanpoller
Universidad Técnica Federico Santa María, Chile
werner.kristjanpoller@usm.cl

Nigel Clark
NOVA Chemicals Inc.
moon.clarks@gmail.com
Anna Florek
CENTRUM - Lima, Peru
aflorekpaszkowska@pucp.edu.pe
David Brauer
Priority Bridge, USA
dave@prioritybridge.com

ISAHP2022 SUMMARY SCHEDULE

THURSDAY DECEMBER 15			
Time	**Room**	**Title**	**Presenter**
8:00 am	Zoom Workshop 1	W1 - How to use AHP for conflict resolution	Dr. Marcel Minutolo) *(United States) - Robert Morris University*
9:00 am	Zoom Workshop 2	W2 - ANP Row Sensitivity	Dr. William Adams *(United States) – Decision Lens*
10:00 am	Zoom Workshop 3	W3 - AHP using the new AHP ANP Lib for Python	Dr. Elena Rokou *(United States) - Creative Decisions Foundation*
11:00 am	Zoom Workshop 4	W4 - Introduction to ANP	Dr. Ilker Topcu *(United States) - Decision Lens*
11:00 am	Zoom Workshop 5	W5 - Introduction to ANP in Spanish	Dr. Raúl Alvear Pérez (Chile)- *Universidad de Chile*
12:00 pm	Zoom Workshop 6	W6 - Why one should use Fuzzy AHP and when it is appropriate?	Dr. Cengiz Kahraman (Turkey) - *Istanbul Technical University*

FRIDAY DECEMBER 16			
Time	**Room**	**Title**	**Presenter**
7:30am	Zoom	**Welcome/Opening Ceremony**	Prof.Luis Vargas *(United States) – University of Pittsburgh* Mr.John Saaty *(United States) – Decision Lens*
8:00am	Zoom Plenary Speech Room	**P1 – Conflict Resolution**	Dr. Amos Guiora *(United States) - University of Utah*
9:15am	Zoom Room A&B	Break Out Sessions: FR_RMA_TR1 FR_RMB_TR6	
10:15am	Zoom Room A&B	Break Out Sessions: FR_RMA_TR8 FR_RMB_TR 7&11	
11:30am	Zoom Room A&B	Break Out Sessions: FR_RMA_TR3 FR_RMB_TR2	
1:00pm	Zoom Plenary Speech Room	**P2 - Prioritizing Organ Transplant Allocation using AHP**	Dr. James Alcorn *(United States) - United Network for Organ Sharing*
2:15pm	Zoom Room A&B	Break Out Sessions: FR_RMA_TR11 FR_RMB_RMA_STUDENTS	

SATURDAY DECEMBER 17			
Time	**Room**	**Title**	**Presenter**
8:00am	Zoom Plenary Speech Room	**P3 - Decisions in Disaster Risk: A Novel Model for Disaster Risk Assessment Using the AHP**	Dr. Madhury Ray *(United States) - NYC Department of Health and Mental Hygiene*
9:15am	Zoom Room A&B	Break Out Sessions: SA_RMA_TR1 SA_RMB_TR9	
10:15am	Zoom Room A&B	Break Out Sessions: SA_RMA_TR8 SA_RMB_TR6	
11:30am	Zoom Room A&B	Break Out Sessions: SA_RMA_MISC SA_RMB_TR2	
1:00pm	Zoom Plenary Speech Room	**P4 - Strategic planning and decision making challenges in Education**	Dr. Nina Begicevic Redjep *(Croatia) - University of Zagreb*
2:15pm	Zoom Room A&B	Break Out Sessions: SA_RMA_TR 5&9 SA_RMB_TR11	

SUNDAY DECEMBER 18			
Time	**Room**	**Title**	**Presenter**
8:00am	Zoom Plenary Speech Room	**P5 - AHP in Practice to promote Collective Decision Making**	Dr. Oğuz Babüroğlu*(Turkey) - Sabancı University* Dr. Ilker Topcu *(Turkey) - Istanbul Technical University* Dr. Ozay Ozaydin *(Turkey) – Dogus University*
9:15am	Zoom Room A&B	Break Out Sessions: SU_RMA_TR1 SU_RMB_TR9	
10:15am	Zoom Room A&B	Break Out Sessions: SU_RMA_TR8 SU_RMB_TR4	
11:30am	Zoom Room A&B	Break Out Sessions: SU_RMA_TR3 SU_RMB_TR6	
12:30pm	Zoom Room A&B	Break Out Sessions: SU_RMA_MISC SU_RMB_TR2	
1:30pm	Zoom	**Closing Ceremony**	Prof.Luis Vargas *(United States) – University of Pittsburgh* Rozann Saaty *(United States) – Ceative Decisions Foundations*

BREAK OUT SESSIONS SUMMARY SCHEDULE

FRIDAY DECEMBER 15 - BREAK OUT SESSIONS		
FRIDAY 9:15 am		
Zoom Room A	**FR_RMA_TR1** **Prof. Luis Vargas (University of Pittsburgh)**	
SIGNIFICANCE OF THE ORDER OF PAIRWISE COMPARISONS IN AHP: AN UPDATE		*Oleh Andriichuk [1], Sergii Kadenko [1], Vitalii Tsyganok [1] (1. Institute for Information Recording of the National Academy of Sciences of Ukraine)*
PROPOSALS FOR THE SEQUENCES OF PAIRWISE COMPARISONS		*Zsombor Szádoczki [1], Sándor Bozóki [1] (1. Institute for Computer Science and Control (SZTAKI), Eötvös Loránd Research Network (ELKH), Hungary)*
CRISP JUDGEMENT SCALE-BASED SENSITIVITY ANALYSIS FOR PROVIDING RELIABLE QUALITATIVE AHP/ANP USE OUTCOMES		*Grzegorz Ginda [1], Chellappa Vigneshkumar [2] (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)*
Zoom Room B	**FR_RMB_TR6** **Dr. Monica Garcia Melon (Universitat Politecnica de Valencia)**	
CLASSIFICATION OF OIL AND GAS COMPANIES AS TO THEIR ESG PARAMETERS FROM THE AHP-TOPSIS-2N METHOD		*Pedro Pontes Gomes Lopes Martins [1], Vitor Pinheiro de Araújo COSTA [2], Ian José Agra Gomes [3], Igor Pinheiro de Araújo Costa [4], Miguel Ângelo Lellis Moreira [1], Adilson Terra [1], Carlos Francisco Simões Gomes*

	[1], Marcos Santos [8] (1. Federal Fluminense University, 2. Brazilian Air Force, 3. Brazilian Navy, 4. Naval Systems Analysis Centre, 5. Military Institute of Engineering)
DETERMINATION OF SELECTION CRITERIA FOR WAVE ENERGY CONVERTERS	*Sertap Varol [1], Hasan Suat Arslan [1], Irem Ucal Sari [1] (1. Istanbul Technical University)*
CLIMATE-NEUTRAL CITIES WITH A GENDER PERSPECTIVE: ASSESSING THE INTERACTION BETWEEN GENDER AND CLIMATE OBJECTIVES IN URBAN POLICIES	*Monica Garcia Melon [1], Isabel Aparisi-Cerda [1], David Ribó-Pérez [3], Julia Pineda-Soler [1], Julia Gomar-Pascual [1], Rocío Poveda-Bautista [1] (1. Universitat Politecnica de Valencia, 2. Delft University)*
FRIDAY 10:15am	
Zoom Room A	**FR_RMA_TR8** **Prof. Birsen Karpak (Youngstown State University)**
PREFERENCES ANALYSIS OF RESTAURANTS, INDUSTRY AND RETAILERS FOR SELECTING FRUITS AND VEGETABLES SUPPLIERS IN SPAIN, FRANCE AND MOROCCO	*Adrià Menéndez I Molist [1], Zein Kallas [1], Maite Puig de Morales [3], Hassan Ouabouch [4], Kaoutar Elfazazi [5], YOUNES NOUTFIA [5], Olfa Boughamoura [3], Karima El Baamran [4] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. International Centre for Advanced Med. Agronomic Studies-CIHEAM-IAMM, 3. Université Hassan 2 de Casablanca, 4. National Institute of Agricultural Research-INRA)*

CONSUMERS' PREFERENCES FOR SUSTAINABILITY ATTRIBUTES WHEN SELECTING A PLACE TO PURCHASE FRUITS AND VEGETABLES IN SPAIN, FRANCE & MOROCCO	*Lorena Ruiz de Larrinaga [1], Zein Kallas [2], Adrià Menéndez I Molist [1], Maite Puig de Morales [4], Nadia Houmy [5], Hassan Ouabouch [6], YOUNES NOUTFIA [5], Olfa Boughamoura [4], Karima El Baamran [6] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. Centre for Agro-food Economy & Development, 3. International Centre for Advanced Med. Agronomic Studies-CIHEAM-IAMM, 4. National Institute of Agricultural Research- INRA, 5. Université Hassan 2 de Casablanca)*
ASSESSING FARMERS' OBJECTIVES TO PARTICIPATE IN SHORT FOOD SUPPLY CHAINS	*Adrià Menéndez I Molist [1], Zein Kallas [2], Maite Puig de Morales [3], YOUNES NOUTFIA [4], Hassan Ouabouch [5], Olfa Boughamoura [3], Aouatif Benali [4], Karima El Baamran [5] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. Centre for Agro-food Economy & Development, 3. International Centre for Advanced Med. Agronomic Studies-CIHEAM-IAMM, 4. National Institute of Agricultural Research-INRA, 5. Université Hassan 2 de Casablanca)*
Zoom Room B	**FR_RMB_TR 7&11** **Müjgan Sağır**

MITIGATION OF HYDROGEOLOGICAL RISK: RANKING OF AREAS PRONE TO WATER-RELATED HAZARDS BY PRIORITY OF INTERVENTION	*Chiara D'Alpaos [1] (1. Department ICEA - University of Padova)*
AHP/ANP-BASED RISK ASSESSMENT CUSTOMISATION	*Grzegorz Ginda [1], Chellappa Vigneshkumar [2] (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)*
FINDING OPTIMAL INFRASTRUCTURE INVESTMENT LOCATIONS WITH GIS-MCDA	*Tatiana Merino-Benítez [1], Víctor Hernández [1], Ileana Grave [1], Luis Bojórquez-Tapia [1] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, UNAM)*
FRIDAY 11:30 am	
Zoom Room A	**FR_RMA_TR3** **Ilker Topcu**
EXAMINING FACTORS AFFECTING THE EMIGRATION DECISION OF MEDICAL DOCTORS IN TURKEY USING AHP	*Cigdem Kadaifci [1], Ilker Topcu [1], Ahmet ÖZDEMİR (1. Istanbul Technical University, 2. Ministry of Health)*
CLASSIFICATION OF VOLUNTEERS FOR SEARCH AND RESCUE ACTIVITIES TO ASSIGNMENT IN HUMANITARIAN ORGANIZATIONS USING INTEGRATED AHP- TOPSIS-SORT METHOD	*Ümit Özdemir [1], Süleyman Mete [2], Muhammet Gul [3] (1. Munzur University, 2. Gaziantep University, 3. Istanbul University)*

ASSESSMENT OF FOREST FIRE RISK SCORE: AN MCDM APPLICATION	*Sena Cakmak [1], Secil Yurdakul Erol [2], Ilker Topcu [1] (1. Istanbul Technical University, 2. Istanbul University – Cerrahpasa)*
Zoom Room B	**FR_RMB_TR2** **Prof. Claudio Garuti (Chile) - Fulcrum Engeneering**
APPLICATION OF AHP AND TOPSIS METHODS FOR THE SELECTION OF INSTRUCTORS IN THE BRAZILIAN AIR FORCE	*Carlos Eduardo José da Silva [1], Luiz Leduino de Salles-Neto [2], Marcos Santos [3] (1. Aeronautics Institute of Technology, 2. Federal University of São Paulo, 3. Brazilian Navy)*
EVALUATION OF EDUCATION TYPES UTILIZING MCDM METHODS	*Mehmet Soydan [1], Ilker Topcu [1] (1. Istanbul Technical University)*
A DECISION ANALYSIS PROPOSAL TO STRENGTH INDUSTRIAL COMPLIANCE OF MARITIME EDUCATION AND TRAINING PROGRAMS	*Muhittin Orhan [1], Metin Celik [1] (1. Istanbul Technical University)*
FRIDAY 2:15 pm	
Zoom Room A	**FR_RMA_TR11** **Anna Florek**
APPLICATION OF THE AHP MODEL TO INVESTIGATE CRITICAL FACTORS FOR MILLENNIALS ONLINE RETAILING REPURCHASE AND SWITCHING BEHAVIOUR IN LAGOS METROPOLIS	*Bolajoko Dixon-Ogbechi [1], Adebola Adekoya [1] (1. University of Lagos)*

PRIORITIZATION OF POTENTIAL MOTIVATIONS AFFECTING THE ADOPTION DECISION OF A SUSTAINABLE INNOVATION INVOLVED IN CIRCULAR ECONOMY AT THE FARM LEVEL: CATALONIA CASE STUDY	*Selene Ivette Ornelas Herrera [1], Zein Kallas [2] (1. UPC-Centre for Agro-food Economy & Development-CREDA-UPC, 2. Centre for Agro-food Economy & Development)*
FEASIBILITY OF THERMAL ANALYSIS OF CONSTRUCTIVE SYSTEMS USING THE AHP-GAUSSIAN METHOD	*Bruna Apolinário [1], Luiz Fernando Kowalski [2], Marcos dos Santos [3] (1. Centro Universitario Adventista de São Paulo, 2. UFSCAR - Federal University of São Carlos, 3. IME - Instituto Militar de Engenharia)*
Zoom Room B	**FR_RMB_STUDENTS** **Dr. Marcel Minutolo (Robert Morris University**
LIMITING FOOD WASTE IN SCHOOLS USING AHP	*Katherine Crossen [1], Mitchell Wong [1], Ryan Doyle [1], Trevor Broman [1] (1. Robert Morris University)*
APPLICATION OF THE ANALYTIC HIERARCHY PROCESS (AHP) IN THE SELECTION ECOLOGICAL ACTIVITIES AND PROJECTS IN WIELICZKA	*Jimena Arianna Jurado Bustamante [1], Leslie Picon [1], Emilio Tafur [1] (1. Universidad del Pacifico)*

SATURDAY DECEMBER 16 - BREAK OUT SESSIONS		
SATURDAY 9:15am		
Zoom Room A	**SA_RMA_TR1** **Prof. Luis Vargas (University of Pittsburgh)**	
ANALYSIS OF THE GAUSSIAN AHP METHOD IN THE LIGHT OF THE PARETO FRONTIER OBTAINED THROUGH THE MULTI-ATTRIBUTE TRADESPACE EXPLORATION (MATE) METHOD – A CASE STUDY		*Sergio Oliveira [1], Marcos Santos [2], Igor Pinheiro de Araújo Costa [3] (1. Universidade Federal do Ceara, 2. Brazilian Navy, 3. Naval Systems Analysis Centre)*
THE AHP PHENOMENON OF RANK REVERSAL DEMYSTIFIED		*Pawel Tadeusz Kazibudzki [1] (1. Opole University of Technology)*
Zoom Room B	**SA_RMB_TR9** **Prof. Cengiz Kahraman (Istanbul Technical University)**	
EXTENSIONS OF AHP/ANP AT INTERNATIONAL CONFERENCES: EXAMPLES FROM ISAHP AND INFUS CONFERENCES		*Basar Oztaysi [1], Selcuk Cebi [1], Sezi Cevik [1], Cengiz Kahraman [1] (1. Istanbul Technical University)*
INTEGRATION OF ANALYTIC HIERARCHY PROCESS WITH OTHER MCDM METHODS: A LITERATURE REVIEW		*Selcuk Cebi [1], Sezi Cevik Onar [1], Basar Oztaysi [1], Cengiz Kahraman [1] (1. Istanbul Technical University)*

FUZZY EXTENSIONS OF AHP AND ANP: A STATE OF THE ART LITERATURE REVIEW	*Sezi Cevik [1], Basar Oztaysi [1], Selcuk Cebi [1], Cengiz Kahraman [1] (1. Istanbul Technical University)*
SATURDAY 10:15am	
Zoom Room A	**SA_RMA_TR8** **Prof. Valerio Salomon (Sao Paulo State University)**
THIRD-PARTY LOGISTICS SERVICE PROVIDERS IN CIRCULAR ECONOMY	*Birsen Karpak [1], Ozden Bayazit [2], Tacibaht Turel [1] (1. Youngstown State University, 2. Central Washington University)*
CIRCULAR 'SUPPLIER EVALUATION AND SELECTION' USING HYBRID MCDM METHODS: CASE OF THE STEEL MANUFACTURING INDUSTRY	*RAKESH VERMA [1], Ajaygopal KV [2], Saroj Koul [3] (1. ADS,National Institute of Industrial Engineering (NITIE), Mumbai-400087, 2. National Institute of Industrial Engineering (NITIE), Mumbai-400087, 3. Jindal Global Business School NCR, 131001)*
A DECISION MAKING APPROACH FOR SELECTING SUSTAINABLE SUPPLIER BASED ON SPHERICAL FUZZY AHP-TOPSIS	*Sezin GÜLERYÜZ [1] (1. Bartin University)*
Zoom Room B	**SA_RMB_TR6** **Dr. Monica Garcia Melon (Universitat Politecnica de Valencia)**
GREEN CONSTRUCTION IN NEW COMMERCIAL BUILDINGS	*Landon Lauer [1], Dominic Irwin [1], Hunter Smith [1], Kellen Nerem [1], Ryan Main [1] (1. Robert Morris University)*

AHP/ANP IMPLEMENTATION FOR ADJUDICATING ENVIRONMENTAL TORT CLAIMS	*Paola Gómez-Priego [1], Luis Bojórquez-Tapia [1] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, UNAM)*
DETERMINATION OF SELECTION CRITERIA FOR WAVE ENERGY CONVERTERS	*Sertap Varol [1], Hasan Suat Arslan [1], Irem Ucal Sari [1] (1. Istanbul Technical University)*
SATURDAY 11:30am	
Zoom Room A	**SA_RMA_MISC** **Cigdem Kadaifci**
CRISP JUDGEMENT SCALE-BASED SENSITIVITY ANALYSIS FOR PROVIDING RELIABLE QUALITATIVE AHP/ANP USE OUTCOMES	*Grzegorz Ginda [1], Chellappa Vigneshkumar [2] (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)*
COMBINING AHP, TOPSIS AND CONJOINT ANALYSIS TO RANK SHOPPING CENTERS IN THE LOCALITY OF MBANZA-NGUNGU, DR CONGO	*Ruffin-Benoît Ngoie [1], Ossok Dibakidi [1], Ruffin Mbaka [1], Jean-Aimé Sakulu [1], Don Musoni [1] (1. Institut Supérieur Pédagogique de Mbanza-Ngungu)*

PARTICLE SWARM OPTIMIZATION TO SOLVE INCOMPLETE PAIRWISE COMPARISON	*Ririn Diar Astanti [1], The Jin Ai [2], Leonardo Vincent Hendrawan [2] (1. Universitas Atma Jaya Yogyakarta, 2. UNIVERSITAS ATMA JAYA YOGYAKARTA)*
Zoom Room B	**SA_RMB_TR2** **Anna Ujwary-Gil (Institute of Economics, Polish Academy of Sciences)**
ENHANCING POLICE-COMMUNITY RELATIONS VIA A CONFLICT RESOLUTION APPROACH	*Amos Guiora [1], Marcel Minutolo [2], Luis Vargas [3], Margaret Vargas [3], H.J. Zoffer [3] (1. University of Utah, 2. Robert Morris University, 3. University of Pittsburgh)*
ANALYZING EIA IN PARANÁ, BRAZIL AND CALIFORNIA, UNITED STATES WITH FUZZY-SET QUALITATIVE COMPARATIVE ANALYSIS AND THE ANALYTICAL HIERARCHY PROCESS	*John Loomis [1], Maurício Dziedzic [2] (1. Universidade Positivo, 2. University of Northern British Columbia)*
APPLICATION OF THE AHP-TOPSIS-2N METHOD IN PRIORITIZING TECHNOLOGIES OF INTEREST TO THE BRAZILIAN ARMY	*Romullo Girardi [1], Marcos Santos [1] (1. Military Institute of Engineering)*
SATURDAY 2:15pm	
Zoom Room A	**SA_RMA_TR 5 & 9** **Claudio Garuti**

A DECISION SUPPORT SYSTEM FOR THE OPTIMAL ALLOCATION AND DISTRIBUTION OF COVID-19 VACCINES USING ANALYTIC HIERARCHY PROCESS (AHP) AND INTEGER PROGRAMMING (IP) MODELS	*Songul Cinaroglu [1] (1. Hacettepe University)*
TRADITIONAL, DEA-AHP RANKING AND POSSIBILISTIC FUZZY DEA APPROACH FOR EFFICIENCY ANALYSIS OF CITY HOSPITALS	Elena Rokou (United States)[1], William Adams (United States)[2] (1. CDF, 2. Decision Lens)
IOT BASED SMART CITIES EVALUATION BY CIRCULAR INTUITIONISTIC FUZZY ANALYTIC HIERARCHY PROCESS	*ESRA ÇAKIR [1] (1. Galatasaray University)*
Zoom Room B	**SA_RMB_TR11** **Nigel Clark, Anna Florek**
A NOVEL MODEL FOR PROCESS MATURITY MEASUREMENT BASED ON FUZZY ANALYTIC HIERARCHY PROCESS	*Elif Buyukkaya [1], Selcuk Cebi [1] (1. Yildiz Technical University)*
EVALUATING THE MARKET CHANCES OF NANO-CELLULOSE FOR SURFACE ABSORPTION OF HEAVY METALS	*majid azizi [1], mohammad azad fallah [1], hasan shoja [3] (1. university of Tehran, 2. university of tehran)*
DEVELOPING AN AHP-BASED MODEL FOR THE PROBLEM-SOLUTION FIT OF BATTERY ELECTRIC VEHICLES (BEV): A CASE OF THE MOST AFFORDABLE BEV IN INDONESIAN MARKET	*Ade Febransyah [1] (1. School of Business and Economics, Universitas Prasetiya Mulya)*

SUNDAY DECEMBER 17 - BREAK OUT SESSIONS		
SUNDAY 9:15 am		
Zoom Room A	**SU_RMA_TR1** **Prof. Luis Vargas (University of Pittsburgh)**	
REPRESENTATIONS, RATIOS, AND UNITS		*William Wedley [1], Orrin Cooper [2], Idil Yavuz [3] (1. Simon Fraser University, 2. Self Employed, 3. Dokuz Eylul University)*
AN ECONOMETRIC MODEL MRLM + ANALYTIC HIERARCHY PROCESS (AHP) TO SELECT THE BEST ALTERNATIVE FOR A REAL ESTATE INVESTMENT. CASE: APARTMENT IN PANAMA CITY (PANAMA).		*Miguel Camacaro [1], Ernesto Mock [1] (1. Appraisers Reading Club)*
Zoom Room B	**SU_RMB_TR9** **Prof. Basar Oztaysi (Istanbul Technical University)**	
ANALYTIC HIERARCHY PROCESS BASED ON THE MAGNITUDE OF Z-NUMBERS		*Nik Muhammad Farhan Hakim Nik Badrul Alam [1], Ku Muhammad Naim Ku Khalif [1], Nor Izzati Jaini [1] (1. Centre for Mathematical Sciences, Universiti Malaysia Pahang, Gambang, Malaysia)*
GROUPING REPRESENTATIVE POINTS IN AHP-FUZZYSORT WITH AGGLOMERATIVE HIERARCHICAL CLUSTERING		*Alvaro Labella [1], Diego García-Zamora [1], Wen He [1], Rosa M. Rodríguez [1], Luis Martínez [1] (1. University of Jaén)*
SUNDAY 10:15 am		
Zoom Room A	**SU_RMA_TR8** **Lirong Wei** **Prof. Birsen Karpak (Youngstown State University)**	

ENTERPRISE BLOCKCHAINS ADOPTION		*Birsen Karpak [1], Deepa Iyer [1], Ilker Topcu [3] (1. Youngstown State University, 2. Istanbul Technical University)*
MULTI-CRITERIA ASSESSMENT OF SPARE PARTS OF HYDRAULIC SYSTEMS		*Nuno Torre [1], Valerio Salomon [1] (1. Sao Paulo State University)*
EFFECT OF STAKEHOLDERS' BIASED JUDGMENTS ON THE RESULT OF THE GROUP DECISION MAKING		*Omid Hossein Zadeh [1], Marzieh Hajjarian [1], Reza Abdi [3] (1. Assistant professor, Department of Forestry, Faculty of Natural Resources, Urmia University, Urmia, Iran, 2. School of Management, Bradford University)*
Zoom Room B	**SU_RMB_TR4** **Shashi Bhattarai**	
MULTIDIMENSIONAL CLASSIFICATION OF WOMEN'S GROUPS IN BURKINA FASO WITH A VIEW TO PROVIDING FINANCIAL AND TECHNICAL ASSISTANCE: AHP METHOD APPLICATION CASES		*Zoïnabo SAVADOGO [1], Frederic NIKIEMA [2] (1. Laboratory of Applied Mathematics, Joseph KI-ZERBO University, 2. Université Joseph KI-ZERBO)*
STRATEGIC PRIORITIES OF INDONESIAN YOUNG ENTREPRENEURS' MOTIVATION		*Jozef Raco [1], James V. Krejci [2], Yulius Christian Raton [1], Ronaldo F Rottie [1], Tryadi Wilhelmus Tumewu [1], Jeanne Ellyawatis [6], Silvya L Mandey [7], Jeanette Etty Magdalena Soputan [7] (1. Universitas Katolik De La Salle Manado, 2. Lewis University, Illinois, USA-College of Business, 3. Universitas Atma Jaya Yogyakarta, 4. Universitas Sam Ratulangi Manado)*
PRIORITIZATION OF ENABLING TECHNOLOGIES THROUGHOUT DIGITAL TRANSFORMATION IN SHIP		*Muhittin Orhan [1], Metin Celik [1] (1. Istanbul Technical University)*

MANAGEMENT COMPANIES	
SUNDAY 11:30 am	
Zoom Room A	**SU_RMA_TR3** **Sule Onsel ekici**
AN INTEGRATED MCMD MODEL FOR CLIMATE-SMART AGRICULTURE	*Ida Gjergji [1], Ilker Topcu [2] (1. TU Wien, 2. Istanbul Technical University)*
EVALUATION OF COMPANIES IN THE MINING AND STEEL INDUSTRY SECTOR USING THE MULTI-CRITERIA DECISION SUPPORT METHOD AHP-TOPSIS-2N	*Felipe Fortuna Lucas [1], ANA AMÉLIA PASTOR MENDONCA DA SILVA [2], Carlos Francisco Simões Gomes [3], Marcos Santos [4] (1. Universidade Federal Fluminense (UFF), 2. Furnas Centrais Elétricas S.A, 3. Federal Fluminense University, 4. Brazilian Navy)*
AN INTEGRATED MCDM APPLICATION FOR RANKING OF SMART CITIES	*Mehmet Güneş [1], Ilker Topcu [1] (1. Istanbul Technical University)*
Zoom Room B	**SU_RMA_TR 6 & 8** **Ms. Hannia Gonzalez-Urango (Ingenio, CSIC - Universitat Politècnica de València)**
A MULTI-METHOD APPROACH TO STUDY THE DETERMINANTS OF ACADEMIC PERFORMANCE OF SECONDARY STUDENTS: THE CASE OF CARTAGENA	*Hannia Gonzalez-Urango [1], Rosaura Arrieta [2], Daniel Guerrero Agámez [2] (1. Ingenio, CSIC - Universitat Politècnica de València, 2. Universidad de Cartagena)*

DE INDIAS (COLOMBIA)	
EVALUATION OF OPTIONS FOR FOOD WASTE MANAGEMENT IN METRO MANILA USING AHP	*Jahziel Lantin [1], Michael Angelo Promentilla [1] (1. De La Salle University - Manila)*
EVALUATION OF METAVERSE RISKS FOR SUPPLY CHAIN SUSTAINABILITY USING SPHERICAL FUZZY AHP	*Ayça Maden [1] (1. Beykent University)*
SUNDAY 12:30 pm	
Zoom Room B	**SU_RMB_TR2** **Shashi Bhattarai**
CONSOLIDATION OF CITIZENS' OPINIONS WITH THE AHP FOR PDCA CYCLE IN LOCAL GOVERNMENTS	*Yoichi Iida [1] (1. Suwa University of Science)*
TOURISM DEVELOPMENT OF THE SIAU TAGULANDANG BIARO ISLANDS' REGENCY USING AHP AND BUCKLEY'S FUZZY-AHP	*Jozef Raco [1], James V. Krejci [2], Yulius Christian Raton [1], Ronaldo F Rottie [1], Tryadi Wilhelmus Tumewu [1], Denny Kondoj [6] (1. Universitas Katolik De La Salle Manado, 2. Lewis University, Illinois, USA- College of Business, 3. Secretary Office of Siau Tagulandang Biaro Island's Regency, North Sulawesi)*
FACTORS AFFECTING THE SUCCESS OF AIR-RAIL INTEGRATION IN THAILAND	*Benyapa Suwannarat [1], Chanuwat Nitikittiwat [1], Nitchamol Samittivate [1], Waralee Rattanakijsuntorn [1] (1. King Mongkut's Institute of Technology Ladkrabang)*

PROGRAM SCHEDULE WITH ABSTRACTS

WORKSHOP 1: HOW TO USE AHP FOR CONFLICT RESOLUTION

8:00 am
Room: Zoom Workshop Room 1

For more than 10 years, the International Center for Conflict Resolution has been using AHP for conflict resolution. The process has been used in South Africa for work to abolish apartheid; the Punjab conflict in India; the Palestinian – Israelis conflict; police – community relations; and, more recently to model an approach for the Russia – Ukraine conflict. In this workshop, we will show the process that they go through to use AHP for conflict resolution. We will discuss the development of the criteria, the costs, benefits, perceived costs, and perceived benefits relative weights by each part. We then present how to construct the payoff ratios for the opposing parties in the conflict. Finally, we show how to pair the concessions such that a resolution can be reached. Additionally, we discuss the benefits from using this approach to resolve conflicts.

Presenter: Dr. Marcel Minutolo (Robert Morris University)

WORKSHOP 2: ANP ROW SENSITIVITY

9:00 am
Room: Zoom Workshop Room 2

- How can you most easily change public opinion on a topic of vital importance?
- What is the most effective way to increase the market share of your company?
- How can you find the most influential components of a decision?
- If you know how to use ANP Row Sensitivity, you can answer these

questions and more.
Join us for an introduction to the theory and practical uses of ANP Row Sensitivity presented by its creator, Dr. Bill Adams

Presenter: Dr. William Adams (Decision Lens)

WORKSHOP 3: AHP USING THE NEW AHP/ANP LIB FOR PYTHON

10:00 am
Room: Zoom Workshop Room 3

What happens when you put together the most powerful decision-making tool (AHP) and an object-oriented, high-level programming language, like Python?

Learn how to set up an AHP model, do the calculations, export to excel or external survey tools, and do sensitivity analysis using our Python Libraries

Presenter: Dr. Elena Rokou (United States) – Creative Decisions Foundation

WORKSHOP 4: INTRODUCTION TO ANP

11:00 am
Room: Zoom Workshop Room 4

Analytic Network Process (ANP) is one of the most powerful methodologies for combining and evaluating judgments of the decision-makers to effectively rank alternatives, choose a compromise solution, and predict outcomes. ANP, developed by Thomas L. Saaty, is a widely used technique for structuring, modeling, and analyzing complex decisions based on mathematics and psychology.

Decision-makers are poor at assimilating large quantities of information

on their problems. They cope with cognitive overload by employing heuristics that simplify the problem. This can lead to the selection of suboptimal alternatives. The participants of the workshop will carry out an experiment on cognitive psychology and learn Miller's "the magical number seven, plus or minus two: some limits on our capacity for processing information".

In complex decisions, there may be dependence and feedback. We will discuss how network modelling improves the priorities derived from judgments and makes predictions much more accurate.

We will go through the arrangement of paired comparison judgements in a matrix, the calculation of eigenvector and inconsistency of the pairwise comparison matrix, and then, the formation of the supermatrix, weighted supermatrix, and limiting supermatrix. Last but not least, we will examine Saaty Compatibility Index

Presenter: Dr. Ilker Topcu (Turkey) - Istanbul Technical University

WORKSHOP 5: INTRODUCTION TO ANP IN SPANISH

11:00 am

Room: Zoom Workshop Room 5

Mi exposición versará sobre mi experiencia del uso y aprendizaje del AHP en la empresa como Gerente de Finanzas, Asesorías y en la Universidad como Profesor Senior. El tema para desarrollar será en principio el uso del AHP en la toma de decisiones estratégicas del directorio de una empresa.

My presentation will deal with my experience of using and learning of the AHP in the company as Manager of Finance, Consulting and in the University as Senior Professor. The topic to be developed will be, in principle, the use of the AHP in the strategic decision-making of a company's board of directors.

Presenter: Raúl Alvear Pérez

WORKSHOP 6: WHY ONE SHOULD USE FUZZY AHP AND WHEN IT IS APPROPRIATE?

12:00 pm

Room: Zoom Workshop Room 6

- Definition of Fuzzy Logic and Fuzzy Sets
- History of Fuzzy sets
- Extensions of Ordinary Fuzzy sets
- Why Fuzzy sets are used in AHP
- Fuzzy AHP and Fuzzy AHP Extensions in the Literature
- A Comparison Between Classical AHP and Buckley's Fuzzy AHP
- Fuzzy AHP Studies at INFUS Conferences

Presenters: Prof. Cengiz Kahraman*, Prof. Sezi Cevik Onar*, Prof. Basar Oztaysi*, Prof. Selcuk Cebi **
* (Turkey) - Istanbul Technical University
** (Turkey) - Yildiz Technical University

FRIDAY DECEMBER 16

WELCOME TO ISAHP 2022

7:30 am

Dr Luis Vargas, Honorary Chair of the ISAHP 2022 and Mr. John Saaty, Chair of the ISAHP 2022 welcome you to the 2nd virtual ISAHP conference

Speakers:
Dr. Luis Vargas (University of Pittsburgh)
Mr. John Saaty (Decision Lens)
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PLENARY SPEAKER: CONFLICT RESOLUTION

8:00 am

We will discuss the role of AHP in the Israel-Palestinian conflict which resulted in two work products: the Pittsburgh Principals and the book published by Springer: Overcoming the Retributive Nature of the Israeli-Palestinian Conflict
The talk will address the following issues:

- Brief over-view of the conflict;
- Brief over-view of efforts over the years to resolve the conflict;
- My involvement in Implementation of the Oslo Accords;
- Addressing the question of conflict resolution v conflict management;
- Addressing the interests of various stakeholders;
- Application of AHP to the conflict;
- Team building/identifying participants.
- Ground rules for participation;
- Issues "on the table/off the table"
- Conducting sessions (intra team and inter teams);
- Take-aways regarding relevance-application of AHP to the conflict;

- Next steps

Presenter: Prof. Amos Guiora (USA) - University of Utah

FRIDAY - SESSION 1A - TRACK 1

9:15am

Short Code: FR_RMA_TR1

Session Chair: Prof. Luis Vargas (USA) - University of Pittsburgh

SIGNIFICANCE OF THE ORDER OF PAIRWISE COMPARISONS IN AHP: AN UPDATE

Oleh Andriichuk 1, Sergii Kadenko 1, Vitalii Tsyganok 1 (1. Institute for Information Recording of the National Academy of Sciences of Ukraine)

Abstract

The paper outlines the authors' latest research on the impact of the order of pair-wise comparisons (PC) upon AHP expert session results. The authors suggest a specific PC order, based on initial rough ranking of compared objects. According to obtained empirical results, in most cases, this PC order makes priority vectors more credible in the eyes of the experts, and pair-wise comparison matrices (PCM) – more consistent. The suggested PC order provides the basis for potential reduction of the number of PC, required from the experts, without significant impact upon the credibility of the session results. The suggested approach is used to modify a well-known combinatorial (spanning tree enumeration) method of priority vector calculation.

PROPOSALS FOR THE SEQUENCES OF PAIRWISE COMPARISONS

Zsombor Szádoczki [1], Sándor Bozóki [1] (1. Institute for Computer Science and Control (SZTAKI), Eötvös Loránd Research Network (ELKH), Hungary)

Abstract

Pairwise comparison matrices form the basis of the AHP. We provide optimal sets of comparisons of incomplete pairwise comparison matrices (IPCMs) in case of given number of alternatives and given number of comparisons, i.e., the ones that provide the closest weight vectors to the vectors calculated from the complete case. We conduct extensive simulations to compare the different structures of comparisons. It turns out that the regularity and bipartiteness of the representing graphs of IPCMs are the most important properties connected to optimality. Among spanning trees, the star graph is found to be optimal. In many cases the different optimal sets are reachable from each other by adding exactly one comparison to the previous set, resulting in an optimal sequence of pairwise comparisons. Our findings can be utilized not only by the application of a given optimal set of comparisons but also using an optimal sequence in cases when the number of comparisons given by the decision maker is not guaranteed (e.g., in online questionnaires).

CRISP JUDGEMENT SCALE-BASED SENSITIVITY ANALYSIS FOR PROVIDING RELIABLE QUALITATIVE AHP/ANP USE OUTCOMES

Grzegorz Ginda 1, Chellappa Vigneshkumar 2 (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)

Abstract

AHP/ANP comprises qualitative technique that is capable of dealing with intangible issues. The application of standard crisp linear judgement 0-9 scale provides user with results that are of a rather quantitative nature, however. This is why, among other things, other measures (fuzzy numbers, gray numbers, rough sets etc.) are applied to express influence of intangible issues in AHP/ANP technique to obtain qualitative analysis

results, instead. The application of non-crisp notions for the expression of intangibility seems rather doubtful in light of opinion of the creator of the technique. This is why an effort is made in the paper to provide necessary means to facilitate obtaining qualitative AHP/ANP application outcomes while using crisp input data. Concurrent application of different alternative crisp judgement scales is proposed with this regard. The results of their sample application are also discussed in the paper.

FRIDAY - SESSION 1B - TRACK 6

9:15am

Short Code: FR_RMB_TR6

Session Chair: Dr. Monica Garcia Melon (Universitat Politecnica de Valencia)

CLASSIFICATION OF OIL AND GAS COMPANIES AS TO THEIR ESG PARAMETERS FROM THE AHP-TOPSIS-2N METHOD

Pedro Pontes Gomes Lopes Martins 1, Vitor Pinheiro de Araújo COSTA 2, Ian José Agra Gomes 3, Igor Pinheiro de Araújo Costa 4, Miguel Ângelo Lellis Moreira 1, Adilson Terra 1, Carlos Francisco Simões Gomes 1, Marcos Santos 8 (1. Federal Fluminense University, 2. Brazilian Air Force, 3. Brazilian Navy, 4. Naval Systems Analysis Centre, 5. Military Institute of Engineering)

Abstract

More and more has been heard about ESG, an acronym that in English means Environmental, Social, and Governance. This concept represents a company's practices considering environmental, social, and governance aspects. These points today do not represent only the companies' ideas, they directly reflect the market value and the brand's establishment. The

ESG index is constantly being measured and analyzed by companies and independent market players. This article proposed a methodology for comparing these companies, in the oil and gas industry case, by applying a multicriteria decision-making method (AHP-TOPSIS-2N) that stipulated a ranking of the prominent companies of this follow-up regarding their ESG requirements.

DETERMINATION OF SELECTION CRITERIA FOR WAVE ENERGY CONVERTERS

Sertap Varol 1, Hasan Suat Arslan 1, Irem Ucal Sari 1 (1. Istanbul Technical University)

Abstract

Considering the fact that Turkey's energy consumption has increased significantly over the past three decades as a result of economic and social development, the purpose of this paper is to evaluate wave energy conversion technology selecting criteria to be located in the Aegean Sea as a keyway to address Turkey's energy-related challenges by generating potential from wave energy. In this paper, weights of the criteria are determined to compare wave energy conversion technology alternatives in order to achieve Turkey’s energy sustainability goal. Three main criteria are determined with 8 sub-criteria. The study shows that the environmental aspect is the most important criterion in the selection process and the impact on the ecosystem has the highest importance among all sub-criteria.

CLIMATE-NEUTRAL CITIES WITH A GENDER PERSPECTIVE: ASSESSING THE INTERACTION BETWEEN GENDER AND CLIMATE OBJECTIVES IN URBAN POLICIES

Monica Garcia Melon 1, Isabel Aparisi-Cerda 1, David Ribó-Pérez 3, Julia Pineda-Soler 1, Julia Gomar-Pascual 1, Rocío Poveda-Bautista 1 (1. Universitat Politecnica de Valencia, 2. Delft University)

Abstract

Gender studies have highlighted how policies and actions that are not drafted and planned with a gender perspective tend to produce a gender bias. Climate policies are not an exception. Measures to mitigate and adapt cities to climate change might lead to undesired outcomes regarding gender equality or, in contrast, may help to improve equality. Ideally, cities should prioritise actions that aim to reduce their carbon footprint but also help promote gender equality. We propose a Multicriteria Decision-Making Method to assess urban policies and relate them to climate and gender criteria. We describe policies for urban decarbonisation that have a non-negative outcome from a gender perspective and compare their impact according to climate and gender criteria. To do so, we use a DEMATEL-ANP technique to determine how policies contribute to climate action and gender equality. Experts in the different areas and city planning respond to the DANP model by comparing and relating criteria and actions. Our results show which policies have a significant potential to reduce cities' carbon footprint and increase gender equality. Furthermore, comparisons are carried out to analyse on the one hand how the results differ when only gender or climate criteria models are considered, and on the other, how they differ depending on the expertise field. Regarding the former, we were able to conclude that the inclusion of gender criteria contributes to a more socially equitable decarbonisation.

FRIDAY - SESSION 2A - TRACK 8

10:15am

Short Code: FR_RMA_TR8

Session Chair: Prof. Birsen Karpak (Youngstown State University)

PREFERENCES ANALYSIS OF RESTAURANTS, INDUSTRY AND RETAILERS FOR SELECTING FRUITS AND VEGETABLES SUPPLIERS IN SPAIN, FRANCE AND MOROCCO

Adrià Menéndez I Molist [1], Zein Kallas [1], Maite Puig de Morales [3], Hassan Ouabouch [4], Kaoutar Elfazazi [5], YOUNES NOUTFIA [5], Olfa Boughamoura [3], Karima El Baamran [4] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. International Centre for Advanced Med. Agronomic Studies-CIHEAM-IAMM, 3. Université Hassan 2 de Casablanca, 4. National Institute of Agricultural Research- INRA)

Abstract

This study focuses on evaluating the criteria used by stakeholders (restaurants, industry, and small-scale retailers) to select fruits and vegetable suppliers in Spain, France, and Morocco targeting three selected countries' specific products and supply chains (fresh tomatoes in Spain, Chestnuts in France, Carob in Morocco). The research consisted firstly of conducting deep interviews (DI) with the main stakeholders in the added-value chain of fruits and vegetables in order to understand factors affecting their decision when selecting suppliers. A special interest was drawn on the criteria "produced by local farmers" in order to determine its relative importance within the stakeholder's decision-making. Secondly, semi-structured questionnaires were carried out by using the analytic hierarchy process (AHP) to estimate the relative importance of each criterion and to evaluate the weight of the sustainable factors. Data were collected from stakeholders in the food-added value chain with a total sample, equally distributed across countries, of 180 restaurants, 30 industries, and 180 small-scale retailers. The survey was applied during the months of May to October 2022. Research results revealed the most important supplier selection attributes vary according to each country and product category. The role of sustainable criteria in selecting suppliers played an important role in particular in France. Local small farmers were important for local industry

as sustainable suppliers but less relevant for restaurants and retailers respectively. Improving the sustainability of the supply chain should focus more on retailers and restaurant marketing strategies when purchasing fruits and vegetables in order to set quotas for locally produced products. This outcome highlights the need for a new and optimized business model in which small local farmers can directly supply local restaurants and retailers and contribute to improving sustainability and ensuring reasonable profit for farmers

CONSUMERS' PREFERENCES FOR SUSTAINABILITY ATTRIBUTES WHEN SELECTING A PLACE TO PURCHASE FRUITS AND VEGETABLES IN SPAIN, FRANCE & MOROCCO

Lorena Ruiz de Larrinaga [1], Zein Kallas [2], Adrià Menéndez I Molist [1], Maite Puig de Morales [4], Nadia Houmy [5], Hassan Ouabouch [6], YOUNES NOUTFIA [5], Olfa Boughamoura [4], Karima El Baamran [6] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. Centre for Agro-food Economy & Development, 3. International Centre forAdvanced Med. Agronomic Studies-CIHEAM-IAMM, 4. National Institute of Agricultural Research- INRA, 5. Université Hassan 2 de Casablanca)

Abstract

The purpose of this study is to analyze consumers' relative importance of economic, social, and environmental factors when selecting a place to purchase fruit and vegetables in order to establish new strategies according to consumers' preferences and optimize Short Food Supply Chain models. For that purpose, we analyzed consumers' acceptance and preferences using AHP methodology as a multi-criteria decision analysis. Data were obtained from a semi-structured questionnaire completed by 180 consumers from Spain, Morocco, and France. Results showed some heterogeneity across countries. In general terms, in Spain consumers demand a nearby shopping place, with a wide variety of fruits and vegetables that are sold in bulk without packaging. In France, consumers give the highest relative importance to a place with seasonal and locally produced fruits and vegetables, with a diversity of products offered at a lower price. This behavior was also similar to consumers in Morocco. In

addition, results showed the existence of an "attitude-behavior gap"; which implies that consumers' stated environmental and social concerns do not always translate into actual purchase behavior. In this sense, carrying out awareness campaigns, new marketing strategies and the implementation of farmers' markets in urban areas emerges as a strategy for the implementation of the SFSC model in cities in order to promote the consumption of local products, to ensure fair trade and generate employment in the region. The AHP approach seems to be a reliable tool for analyzing consumer preferences. However, due to the diversity of cultures and traditions in each country analyzed, it is necessary to explore the behavior of consumers according to segments and localities and complement these studies with consumers' willingness to pay techniques and thus delve into the "attitude-behavior gap".

ASSESSING FARMERS' OBJECTIVES TO PARTICIPATE IN SHORT FOOD SUPPLY CHAINS

Adrià Menéndez I Molist [1], Zein Kallas [2], Maite Puig de Morales [3], YOUNES NOUTFIA [4], Hassan Ouabouch [5], Olfa Boughamoura [3], Aouatif Benali [4], Karima El Baamran [5] (1. Centre for Agro-food Economy & Development-CREDA-UPC-IRTA, 2. Centre for Agro-food Economy & Development, 3. International Centre for Advanced Med. Agronomic Studies-CIHEAM-IAMM, 4. National Institute of Agricultural Research- INRA, 5. Université Hassan 2 de Casablanca)

Abstract

The promotion of Short Food Supply Chains (SFSC) is an issue that is becoming more relevant to both the public and research agenda, aiming to build more sustainable agri-food supply chains and empower smallholder farmers. This research aims to determine the willingness of small farmers to adopt SFSCs as an alternative to conventional distribution. The Analytical Hierarchy Process (AHP) methodology was used to assess farmers' objectives of their agricultural activity in Spain, France, and Morocco. For the selection of objectives, deep interviews (DI) and a literature review were carried out. Data were collected from a total of 130 farmers carried out between May and October 2022. Results showed that regardless of the stated interest of farmers' in promoting

SFSCs, the production-related objectives, especially "Increase productivity" and "Invest in knowledge and machinery", received the highest priority to distribution-related objectives. Moreover, objectives concerning social responsibility received the lowest relative importance where the environmental concerns outweigh social objectives (especially in the French case). The economic performance of the farm plays a decisive role in the farmers' decision-making as expected in the three countries analyzed. This is important when exploring mechanisms to incentivize farmers to adopt SFSCs where economic sustainability and efficiency are needed. More research is needed to determine the relationship between the choice of supply chain alternatives and the objectives of the farming activity. This knowledge may help in providing marketing alternatives that are more sustainable and adapted to farmers' preferences.

FRIDAY - SESSION 2B - TRACK 7&11

10:15am

Short Code: FR_RMB_TR 7 &11

Session Chair: Müjgan Sağır

MITIGATION OF HYDROGEOLOGICAL RISK: RANKING OF AREAS PRONE TO WATER-RELATED HAZARDS BY PRIORITY OF INTERVENTION

Chiara D'Alpaos [1] (1. Department ICEA - University of Padova)

Abstract

The mitigation of hydrogeological risk has assured to be one of the most striving challenges that governments and societies are facing today. In this context, the enormous complexity of public decision processes aimed at mitigating hydrogeological risk makes it emerge the need for policymakers and planners of robust and transparent decision models to support and inform the design of risk mitigation strategies and rank top priority areas of intervention. In this paper, we propose an operational

framework to address hydrogeological risk and uncertainty through an integrated approach based on the AHP, which can be applied to different areas exposed to water-related hazards.

AHP/ANP-BASED RISK ASSESSMENT CUSTOMISATION

Grzegorz Ginda [1], Chellappa Vigneshkumar [2] (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)

Abstract

Complex conditions of surrounding environment and a lack of reliable information about it make contemporary decisions prone to risk very much. This is why a reliable risk assessment becomes even more important today. Imperfect nature of available information means that risks can be often expressed in qualitative measures, only. Inherent merits make AHP/ANP technique appropriate for risk assessment in such the case, therefore. Note, however, that adequate risk assessment depends on the the ability to address risk attitude. The attitude may deal with both risk neutrality, risk apprehension, and tendency towards risk taking. The common application of the technique for risk assessment is nevertheless based on the use of Saaty's linear judgement scale that is rather adequate of coping with a casual – neutral – attitude to risk, only. The development of the technique provided nevertheless alternative non-linear judgement scales. This is why their applicability for a reliable risk assessment while taking into account alternative – non-neutral – risk attitudes is discussed in the paper. Two scales which provide necessary means with this regard are finally recommended in ther paper.

FINDING OPTIMAL INFRASTRUCTURE INVESTMENT LOCATIONS WITH GIS-MCDA

Tatiana Merino-Benítez [1], Víctor Hernández [1], Ileana Grave [1], Luis Bojórquez-Tapia [1] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, UNAM)

Abstract

Infrastructure investments are increasingly challenged by environmental

conflicts in both public and private sectors. Here, we present a land suitability approach based on geographic information system multicriteria decision analysis (GIS-MCDA) to support collaborative planning processes. Our approach involves the Analytic Hierarchy Process (AHP) and the Ordered Weighted Average (OWA) to develop multiple land suitability scenarios regarding opposing views of multiple stakeholders. We illustrate our approach with the consensus building process for the location of a major investment swine plant in the environmental sensitive region of Yucatán, México.

FRIDAY - SESSION 3A - TRACK 3

11:30am

Short Code: FR_RMA_TR3

Session Chair: Sule Onsel ekici

EXAMINING FACTORS AFFECTING THE EMIGRATION DECISION OF MEDICAL DOCTORS IN TURKEY USING AHP

Cigdem Kadaifci [1], Ilker Topcu [1], Ahmet ÖZDEMİR (1. Istanbul Technical University, 2. Ministry of Health)

Abstract

In this study, a multi-criteria decision model is proposed to examine the factors affecting the emigration decision of medical doctors in Turkey. Due to the hierarchical structure of the decision model, the Analytic Hierarchy Process (AHP) is selected to model the decision problem and to obtain priorities. This problem has been studied in the literature, but the lack of a comprehensive multi-criteria decision-making model is identified. Based on the assessments of seventy-three participants through a pairwise comparison questionnaire, low remuneration, future anxiety due to the political situation, perceptions regarding the loss of professional reputation, and personal security concerns due to the violence and harassment against doctors are founded as the most

important factors pushing people to emigrate.

CLASSIFICATION OF VOLUNTEERS FOR SEARCH AND RESCUE ACTIVITIES TO ASSIGNMENT IN HUMANITARIAN ORGANIZATIONS USING INTEGRATED AHP- TOPSIS- SORT METHOD

Ümit Özdemir [1], Süleyman Mete [2], Muhammet Gul [3] (1. Munzur University, 2. Gaziantep University, 3. Istanbul University)

Abstract

Volunteers constitute an important part of public and private organizations operating in many fields. Organizations plan to select the most suitable volunteers for their institutions within the framework of the criteria they have determined according to their needs. If the appropriate volunteer selection is not made, the volunteer may not continue and the work of the institution can be disrupted.

In this study, a student group consisting of volunteers for search and rescue activities in humanitarian organizations is classified according to certain criteria before assigning a task. For this, criteria are determined based on previous studies. Later, the criteria weights are obtained by applying the AHP method, and then our volunteers are classified using the TOPSIS SORT method. The findings obtained as a result of our study are evaluated and suggestions are made for future research.

ASSESSMENT OF FOREST FIRE RISK SCORE: AN MCDM APPLICATION

Sena Cakmak [1], Secil Yurdakul Erol [2], Ilker Topcu [1] (1. Istanbul Technical University, 2. Istanbul University – Cerrahpasa)

Abstract

Forest fires are one of the disasters that nature adapts to. However, due to increased industry and urbanization, the number of fires is rising. Forest fires not only have a severe impact on the environment, but they also threaten the lives of humans and animals. The danger of forest fires and their spread hazards are analyzed in various studies, and the fire risks of the regions are identified. Furthermore, several studies appeared to

aim to optimize fire protection strategies based on risk output. In this study, to assess the fire risk, an MCDM approach based on AHP is utilized. The evaluation criteria are determined in accordance with previous research and experts' recommendations. The decision hierarchy has 6 main criteria and 18 criteria. A pairwise comparison questionnaire survey is conducted. Tree species and composition is found as the highest forest fire risk factor.

FRIDAY - SESSION 3B - TRACK 2

11:30am

Short Code: FR_RMB_TR2

Session Chair: Müjgan Sağır

APPLICATION OF AHP AND TOPSIS METHODS FOR THE SELECTION OF INSTRUCTORS IN THE BRAZILIAN AIR FORCE

Carlos Eduardo José da Silva [1], Luiz Leduino de Salles-Neto [2], Marcos Santos [3] (1. Aeronautics Institute of Technology, 2. Federal University of São Paulo, 3. Brazilian Navy)

Abstract

Technology management includes planning, directing, controlling, and coordinating the development of technological capabilities so that organizations can conceive and achieve their strategic objectives. In the defense area, given the growing dependence between military capabilities and technology, technology management models have been sought to identify and prioritize critical technologies that will guide the strategic planning of an Armed Force. In this context, this article aims at prioritizing critical technologies based on the use of Multi-Criteria Decision-Making (MCDM) combined with the quantitative analysis of patent databases. The MCDM method used was the AHP-TOPSIS-2N, a hybrid approach that brings together the strengths of two established methods, the Analytic Hierarchy Process (AHP) and the Technique for

Order Preferences by Similarity to Ideal Solution (TOPSIS), along with two different normalization procedures. As a result, it was possible to prioritize critical technologies of interest to the Brazilian Army for application in medium-term technological development projects (2024-2031).

EVALUATION OF EDUCATION TYPES UTILIZING MCDM METHODS

Mehmet Soydan [1], Ilker Topcu [1] (1. Istanbul Technical University)

Abstract

Different education types have been introduced to eliminate the problems in traditional face-to-face education, such as insufficient quota, commute costs, operation costs, and adverse environmental effects. Although distance education has eliminated these problems, they have brought technological costs, a lack of communication, and a lack of motivation. This study discusses the effects of traditional face-to-face education, synchronous distance education, and blended education types in terms of students, academicians, and university management, which are the most important stakeholders of university education. In line with these, it is aimed to choose the best type of education for different stakeholders.

A DECISION ANALYSIS PROPOSAL TO STRENGTH INDUSTRIAL COMPLIANCE OF MARITIME EDUCATION AND TRAINING PROGRAMS

Muhittin Orhan [1], Metin Celik [1] (1. Istanbul Technical University)

Abstract

Maritime educational program development responding to the industrial tendencies has recently become a challenging issue. In fact, International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) sets competencies for maritime professionals in different ranks. However, it is so important to reconsider the relevant qualification standards and field expectations together. This paper illustrates a basic decision analysis particularly on STCW Code Table A-

III/2 in order to identify the priorities of competencies in program development. In this case, Analytic Network Process (ANP) is adapted as a suitable technique to ensure dependencies and feedbacks between the competency items under different functions such as marine engineering at the management level, electrical, electronic and control engineering at the management level, maintenance and repair at the management level, etc. The initial results are useful to balance the methods for demonstrating competence (i.e. simulator training, laboratory equipment training, training ship experience in-service experience, etc.). As a further study, the proposed approach might be extended as a quality assurance tool strength the industrial compliance of program outcomes.

PLENARY SPEAKER - PRIORITIZING ORGAN TRANSPLANT ALLOCATION USING AHP

1:00 pm

Organ transplantation is a complex field with multiple goals governed by federal laws, clinical science, and normative ethics. In the United States, the organ transplant system is administered by the Organ Procurement and Transplantation Network (OPTN). Federal law charges the OPTN with developing and implementing the allocation rules by which donor organs are matched with candidates needing an organ transplant. The order in which organs are offered and received is literally a life-and-death decision.

Over the last few decades, several authors have published different approaches to develop these allocation policies using different multi-criteria decision making (MCDM) methodologies, including AHP. Recently, the OPTN began a generational change in the development of the transplant allocation policies to be more equitable, nimble, and transparent with the community. After discussion, the OPTN chose to use an AHP exercise to collect information from the transplant community about balancing these

competing goals. The OPTN has conducted three AHP exercises (regarding lung, kidney, and pancreas transplantation) and is planning for two more AHP exercises (regarding liver and heart transplantation). Hundreds of transplant community members participated in the previous AHP exercise giving the OPTN new insights into the transplant community's priorities. With each AHP exercise, the OPTN has learned more about utilizing this information and made adjustments to the exercise, its analysis, and its role in developing transplantation policies. Initial modeling showed that the new policies will lower waiting mortality by over one-third while also having a more organ placement efficient system.

Our plenary will showcase the complexities of organ transplantation and the real-world experience of conducting AHP exercises with a large, diverse participation pool governed by multiple goals.

Presenter: James Alcorn

FRIDAY - SESSION 4A - TRACK 11

2:15pm

Short Code: FR_RMA_TR11

Session Chair: Anna Florek

APPLICATION OF THE AHP MODEL TO INVESTIGATE CRITICAL FACTORS FOR MILLENNIALS ONLINE RETAILING REPURCHASE AND SWITCHING BEHAVIOUR IN LAGOS METROPOLIS

Bolajoko Dixon-Ogbechi [1], Adebola Adekoya [1] (1. University of Lagos)

Abstract

The emergence of online retailing in Lagos metropolis, Nigeria, has brought about new challenges in the retailing business operation and the consumer shopping behaviour. Understanding and predicting post-purchase factors used by online retailing consumers in the evaluation of the online retailing industry in Lagosì metropolis, Nigeria, has become a pressing issue for online retailing service providers. This study explores the application of Analytic Hierarchy Process to investigate factors that are critical for online consumers repurchase and switching behaviour. A sample of 380 millennial online retailing consumers among MBA part-time students were drawn from tertiary institutions in Lagos metropolis, Nigeria, using a multistage sampling process. The data obtained was analysed using descriptive statistics and the Super Decision Lens 3.2.0 software. The AHP model revealed that the most critical factor in the evaluation of the Nigerian online retailing service providers is information quality, followed by service quality, vendor dimension, system quality while the least factor is the consumer dimension. This shows that among the five criteria identified in determining Nigerian consumers' online retailing post-purchase evaluation, information quality was rated highest, indicating that online retailing consumers are more concerned with the amount, accuracy and the form of information about the goods and services offered on online retailing service providers websites. The implication of this is that e-loyalty among online consumers is not guaranteed and the model applied in this study will assist online retailing service providers to formulate appropriate competitive strategies. Hence, there is a need for Nigerian online retailing service providers to re-evaluate policies in line with the identified factors in this study for sustainable competitive advantage

PRIORITIZATION OF POTENTIAL MOTIVATIONS AFFECTING THE ADOPTION DECISION OF A SUSTAINABLE INNOVATION INVOLVED IN CIRCULAR ECONOMY AT THE FARM LEVEL: CATALONIA CASE STUDY.

Selene Ivette Ornelas Herrera [1], Zein Kallas [2] (1. UPC-Centre for Agro-food Economy & Development-CREDA-UPC, 2. Centre for Agro-food Economy & Development)

Abstract

Agricultural and livestock production has among its environmental challenges the reduction of greenhouse gases (GHG) and nutrient recovery. To achieve this, it must adopt new technologies and innovative solutions at the farm level that allow it to improve efficiency in the use of resources, as well as the recovery of nutrients within its food production systems, allowing it to reach sustainability. The adoption of innovations, in which circular economy actions are implemented such as the transformation of slurry into biofertilizers LL20 Low-temperature ammonium-stripping using vacuum–pigslurry treatment), allows for reducing GHG emissions and recovery of nutrients by improving efficiency in the use of resources and reducing the negative effect on the environment. Identifying the reasons, that drive farmers to decide to adopt a certain technological solution in which the principles of circularity are applied, contributes to the generation of action strategies that favor environmental conservation. That is why this study aims to identify and prioritize the main motivations that affect the adoption of circular agronomy solutions at the farm level by stakeholders of the productive part of the agri-food value chain including farmers, fertilizers' industries, agricultural-associated industries, and institutions involved in regulating the production aspects, using a semi-structured questionnaire in which the method of the AHP hierarchical analysis process is applied to a stakeholders focus groups. Obtained results showed that economic motivations receive the greatest importance for the adoption of innovation (43.2%), followed by environmental (32.4%) and social (24.4%). Being the reduction of costs one of the most important factors in the adoption of innovations (10%). Respect for environmental motivations that that innovation reduces the amount of slurry and manure is the main motivator of adoption (6.57%). The results of preferences on different reasons for adoption can help policymakers design specific measures and tools to help livestock producers address environmental challenges and increase their business opportunities.

FEASIBILITY OF THERMAL ANALYSIS OF CONSTRUCTIVE SYSTEMS USING THE AHP-GAUSSIAN METHOD

Bruna Apolinário [1], Luiz Fernando Kowalski [2], Marcos dos Santos [3] (1. Centro Universitario Adventista de São Paulo, 2. UFSCAR - Federal University of São Carlos, 3. IME - Instituto Militar de Engenharia)

Abstract

The low energy efficiency of buildings highlights the need for materials that bring advances in this area. Therefore, this work aims to analyze the thermal viability of walls in EPS core panels in Brazilian bioclimatic zones. For this, the software EnergyPlus 9.4 was used to analyze and compare this material with that of ceramic blocks, and the AHP-Gaussian method for decision-making on the most viable systems. Several scenarios were simulated, and the results indicated that in hot zones, even for low solar absorptance, the masonry presented better performance, with the EPS presenting 39.95% more thermal load consumption. On the other hand, in cold areas, EPS core panels were among the best solutions, depending on their characteristics. Finally, the study identifies the feasibility and impacts of the analyzed systems on energy efficiency, performance, and thermal comfort of affordable housing and the benefits of the AHP-Gaussian method in decision-making in studies in this area.

FRIDAY - SESSION 4B - STUDENT

2:15pm

Short Code: FR_RMB_STUDENT

Session Chair: Dr. Marcel Minutolo (Robert Morris University)

LIMITING FOOD WASTE IN SCHOOLS USING AHP

Katherine Crossen [1], Mitchell Wong [1], Ryan Doyle [1], Trevor Broman [1] (1. Robert Morris University)

Abstract

In this AHP model, we found possible solutions to help reduce food waste

in American high schools. We used the AHP modeling system to find our goal to eliminate or reduce the amount of food waste we see in United States high schools. After this, we connected our goal to our criteria which we then aligned with some subcriteria. We then went on to input some alternatives to achieve our goal into the AHP model. Some of these alternatives included a biodigester, composting, dehydrating, and a food rescue. With our goal and criteria in place and connected, we then went on to give input as to which criteria was more important from our point of view. By doing this, we were able to figure which options would be best to help achieve our goal while finding low amounts of inconsistency in the output we received.

APPLICATION OF THE ANALYTIC HIERARCHY PROCESS (AHP) IN THE SELECTION ECOLOGICAL ACTIVITIES AND PROJECTS IN WIELICZKA

Jimena Arianna Jurado Bustamante [1], Leslie Picon [1], Emilio Tafur [1] (1. Universidad del Pacifico)

Abstract

Over the past decades, the environmental problem has only gotten worse, which affects the whole world. This leads to various other troubles such as water shortage, resource scarcity and others. The locality of Wieliczka is not free of the contamination problem, which has led to seeking solutions. This paper aims to respond to this
search with a proposal to help solve the question. This will be done using an AHP model with the software Super Decisions considering many important factors that have effect on the proposal selected.

SATURDAY DECEMBER 16

PLENARY SPEAKER: DECISIONS IN DISASTER RISK: A NOVEL MODEL FOR DISASTER RISK ASSESSMENT USING THE AHP

8:00 am

We are living in age of disaster, marked by an increasing number and severity of devastating events worldwide. Allocating preparedness resources for these high probability, low frequency events is more critical than ever before, but what threats are the most important to prepare for? What are the most critical functions for government to protect? And how can governments make these decisions?

A disaster risk assessment answers these questions, providing the foundation for an ongoing cycle of disaster preparedness. These disaster risk assessments can take many forms; they can be as simple as a ten minute conversation by leadership prioritizing which hazards to attach resources to, or complex, involving murky calculations using large datasets. In 2018, the New York City Department of Health invented a new model for disaster risk assessment using the AHP. This talk will describe the methods and rationale of this model, as well as several unique features that may transform the way that risk assessments shape emergency preparedness work.

Presenter: Madhury Ray

SATURDAY - SESSION 1A - TRACK 1

9:15am

Short Code: SA_RMA_TR1

Session Chair: Luis Vargas

ANALYSIS OF THE GAUSSIAN AHP METHOD IN THE LIGHT OF THE PARETO FRONTIER OBTAINED THROUGH THE MULTI-ATTRIBUTE TRADESPACE EXPLORATION (MATE) METHOD – A CASE STUDY

Sergio Oliveira [1], Marcos Santos [2], Igor Pinheiro de Araújo Costa [3] (1. Universidade Federal do Ceara, 2. Brazilian Navy, 3. Naval Systems Analysis Centre)

Abstract

The Multi-Attribute Tradespace Exploration (MATE) was proposed by Adam Ross and Nathan Diller while working at NASA. It is based on the Multi Attribute Utility Theory – MAUT –, developed by Ralph Keeney and Howard Raiffa in 1976 and used for eliciting requirements and defining utility functions for a great number of design alternatives, as well as for positioning those alternatives relative to a bidimensional Pareto front. On the other hand, the Gaussian Analytic Hierarchy Process – Gaussian AHP – is an evolution proposed by Dos Santos et al. for the classic AHP Method, which eliminates the need of pair comparison of attributes for each design alternative and introduces the relationship between standard deviations and mean scores in order to increase the reliability of the generated ranking. In this article the authors use a case study proposed by Adam Ross to confront the Pareto front generated by the MATE method with the ranking generated by the Gaussian AHP method.

THE AHP PHENOMENON OF RANK REVERSAL DEMYSTIFIED

Pawel Tadeusz Kazibudzki [1] (1. Opole University of Technology)

Abstract

Probably the most heated debate about the validity of AHP and ultimately its unclarified phenomenon is its ability to reverse ranks of the alternatives. The objective of this study is to question the evidence of AHP rank reversal phenomenon presented by Belton and Gear as well to extend this study conclusions on other rank reversal examples. The evidence of the research indicates that priority vectors derived from both consistent and inconsistent Pairwise Comparison Matrices are fuzzy and should not be considered as set but only as estimated with certain level of probability. Hence, any evidence showing rank reversal in the AHP models which is based on assumptions about their determined value should be considered as erroneous.

SATURDAY - SESSION 1B - TRACK 9

9:15am

Short Code: SA_RMB_TR9

Session Chair: Prof. Cengiz Kahraman (Istanbul Technical University)

EXTENSIONS OF AHP/ANP AT INTERNATIONAL CONFERENCES: EXAMPLES FROM ISAHP AND INFUS CONFERENCES

Basar Oztaysi [1], Selcuk Cebi [1], Sezi Cevik [1], Cengiz Kahraman [1] (1. Istanbul Technical University)

Abstract

Fuzzy sets have been used to extend both Analytical hierarchy process and analytical network processes in the literature. In this study we focus on the potential usage of fuzzy extensions of AHP / ANP and analyze the conferences publishing AHP papers and provide insight about the trends as a result of an extended literature review.

INTEGRATION OF ANALYTIC HIERARCHY PROCESS WITH OTHER MCDM METHODS: A LITERATURE REVIEW

Selcuk Cebi [1], Sezi Cevik Onar [1], Basar Oztaysi [1], Cengiz Kahraman [1] (1. Istanbul Technical University)

Abstract

The main objective of this study is to examine the integration of AHP method with other MCDM methods in the literature and to understand their role in the integration. For this purpose, the peer-reviewed AHP articles published in Scopus database have been analyzed and the studies were categorized according to the utilized MCDM methods. In terms of results and findings, this study shows that: (i) the number of studies including the integration of crisp AHP with other MCDM methods is considerably higher than the number of fuzzy AHP studies; (ii) from the first, TOPSIS, VIKOR, PROMETHEE, Entropy, and DEMATEL methods are the most integrated MCDM methods with AHP; (iii) among the

integration applications of AHP, the popularity of the newly proposed methods such as WASPAS and COPRAS has been increasing recently.

FUZZY EXTENSIONS OF AHP AND ANP: A STATE OF THE ART LITERATURE REVIEW

Sezi Cevik [1], Basar Oztaysi [1], Selcuk Cebi [1], Cengiz Kahraman [1] (1. Istanbul Technical University)

Abstract
Analytical hierarchy process and analytical network processes have been widely used in the literature. Both AHP and ANP have been modified by using fuzzy sets. Especially, extensions of fuzzy sets have been recently used for modifying classical AHP & ANP. In this study, we provide a brief literature review on the usage of AHP & ANP, fuzzy AHP & ANP. We utilize Scopus database for the research.

SATURDAY - SESSION 2A - TRACK 8

10:15am
Short Code: SA_RMA_TR8
Session Chair: Prof. Valerio Salomon (Sao Paulo State University)

THIRD-PARTY LOGISTICS SERVICE PROVIDERS IN CIRCULAR ECONOMY

Birsen Karpak [1], Ozden Bayazit [2], Tacibaht Turel [1] (1. Youngstown State University, 2. Central Washington University)

Abstract
The logistics outsourcing industry has been growing rapidly due to its potential to increase efficiencies in the global supply chain. As a result, logistics service providers have assumed a more comprehensive role in response to the increased complexity of global supply chains, which explains why approximately 60% of Fortune 500 companies in the United States turned to Third Party Logistics (3PL) service providers for help. In the retail industry, as the e-commerce market has grown exponentially,

so too has the 3PL market, which is forecasted to grow 8% during the period 2021-2026.

Services provided by 3PL providers have evolved over the years from basic services such as transportation (inbound and outbound), warehousing, freight forwarding, and customs clearance to a broad range of more advanced services, including IT services, customer services, and sustainability services. The logistics solutions 3PLs offer also include customized services, namely cross-docking, reverse logistics, product labeling and packaging, and supply chain consultancy services. According to Forrester Research, 54% of Fortune 500 companies outsource their distribution services, 78% outsource transportation services, and 46% outsource manufacturing activities.

In this study, we report the findings from our longitudinal study with an aerospace company in Western Washington in the U.S. Previously, we prioritized three different 3PL service providers and identified prominence of the clusters, namely technical competence, cost, and timeliness using the Analytic Hierarchy Process (AHP.) The decision criteria were identified through a literature search and modified with the interaction by a senior procurement manager for 3PL contracts who delivers logistics services to the company's production systems. Though there was dependency among certain criteria, the manager preferred simplicity over precision at the outset, which is why we employed the AHP for the first study. There were quite a few criteria considered, both qualitative and quantitative. To achieve a manageable list of 3PLs, the candidates were narrowed down based on the criteria such as capacity and capability (range of services) that line up with the company's requirements, demonstrating successful performance to the similar statement of works (SOW) as measured by key performance indicators including turnaround time, inventory accuracy, financial strength and so on. The final list of 3PL providers included a startup minority-owned company, a nation-wide company with state-of-the-art technology, and an agile medium enterprise, with an excellent customer relationship management track record. Each provider had a different strength based on the criteria considered. Throughout the process, in-depth interviews have been carried out with the manager. In eliciting judgments, we used verbal mode instead of numerical one since we knew from our own previous research that verbal mode dominates numerical one when

perceived ease of use and accuracy are considered. We did an extensive sensitivity analysis including the two-dimensional one. Our first contender remained at the top though there were rank reversals in the second and third contenders. Our decision-maker selected the Minority-owned 3PL service provider confidently as a result of AHP analysis.

Now, we propose a new framework for Sustainable third-party reverse logistics provider selection to promote circular economy.

There are more and more articles asserting that the pandemic has slowed down global sourcing. The mindsets of the employees changed remarkably, with quite a few of them opting for remote working as many of them embraced remote work as the new normal. Another important new mind resetting event has been the war in Ukraine, which is a very different kind of conflict than we are used to. This war got countries thinking about the significance of being self-sufficient as some countries cannot produce certain materials and commodities domestically to be able to meet their own demand.

Since the pandemic has made the employees' well-being top-of-mind for employers, the employee well-being of the 3PL provider was included as one of the factors in this new model. Previously, in the technical competence cluster, we included the 3PL provider's ability to meet the company's advanced IT expectations as one factor. In this new model, we also added cyber security as a separate criterion since cybersecurity attacks have become a genuine threat around the world as the Ukrainian war rages on. Moreover, the agility of the 3PL provider is another criterion added to our new framework as agility is key to long-term business survival. With the newly added dimensions and criteria, this model became far more complex, even though we are well aware of the practitioner fatigue problem. For that, we tried to restrict the number of criteria to a manageable level. Clustering also helped reduce the number of pairwise comparisons. We contented with 2n+3 (n being the number of criteria) pairwise comparisons for each cluster.

Even though frameworks for Sustainable Third-Party Logistics Service Providers have been reported in the literature, models considering interaction among decision criteria, especially models considering the influences of the alternative 3PL providers on the criteria, are very few. To the best knowledge of the authors, there are no frameworks considering the long-term impact of the pandemic as well as the expected

impact of the Ukraine war on global sourcing.

CIRCULAR 'SUPPLIER EVALUATION AND SELECTION' USING HYBRID MCDM METHODS: CASE OF THE STEEL MANUFACTURING INDUSTRY

RAKESH VERMA [1], Ajaygopal KV [2], Saroj Koul [3] (1. ADS,National Institute of Industrial Engineering (NITIE), Mumbai-400087, 2. National Institute of Industrial Engineering (NITIE), Mumbai-400087, 3. Jindal Global Business School NCR, 131001)

Abstract

Supplier evaluation is a prominent multi-criteria problem encountered in supply chain management (SCM). The steel industry has prioritized quality, cost and delivery in most of its decision-making for choosing suppliers. However, corporations are adopting circular economy (CE) principles more frequently due to the current focus on attaining sustainability and minimizing environmental damage. An integrated multiple-criteria decision-making (MCDM) method is proposed in this study to evaluate circular suppliers (CS) in the steel manufacturing sector from a developing country's standpoint, which includes Best-Worst Method (BWM) and Comprehensive Distance-Based Ranking (COBRA). In this proposed method, optimum weights of all criteria were determined by BWM, and then suppliers were ranked using COBRA. Results revealed that the top three factors for choosing a supplier are on-time supply, meeting specifications, and rejection rate. The resultant ranking from the proposed methodology was compared with another MCDM method and presented its result.

A DECISION MAKING APPROACH FOR SELECTING SUSTAINABLE SUPPLIER BASED ON SPHERICAL FUZZY AHP-TOPSIS

Sezin GÜLERYÜZ [1] (1. Bartin University)

Abstract

In this study, problem of sustainable supplier selection (SSS) is discussed.

Since SSS considered a decision process that includes high uncertainty, multiple interests and perspectives, this study proposes a framework to evaluate SSS by using an integrated Analytical Hierarchy Process (AHP) and TOPSIS techniques with spherical fuzzy sets (SFS). SFS are based on the fact that the hesitancy of a DM can be defined independently from membership and nonmembership degrees. SFS enable DMs to reflect independently their hesitancies in the decision process with a larger domain by using a linguistic evaluation scale. The advantage of the proposed method is that SFS brings together scientifically accepted aspects of Pythagorean fuzzy sets and Neutrosophic sets. In application, weights of the evaluation criteria are calculated with SF-AHP, and sustainable suppliers of selected company are ranked using SF-TOPSIS method. The originality of the study stems from the fact that this integrated technique, which is new in the literature, is applied with a real case study for the SSS problem.

SATURDAY - SESSION 2B - TRACK 6

10:15am
Short Code: SA_RMB_TR6
Session Chair: Dr. Monica Garcia Melon (Universitat Politecnica de Valencia)

GREEN CONSTRUCTION IN NEW COMMERCIAL BUILDINGS

Landon Lauer [1], Dominic Irwin [1], Hunter Smith [1], Kellen Nerem [1], Ryan Main [1] (1. Robert Morris University)

Abstract
Studies have shown that the buildings and the construction sector accounted for 36% of final energy use and 39% of energy and process-related carbon dioxide (CO2) emissions in 2018. This model addresses possible solutions on how construction companies can be greener while constructing new skyscrapers, using AHP to determine which alternative is best out of HVAC systems, Grey Water, Smart Equipment, and Green building materials. These were each selected because these are all hot

topics in the construction world for green buildings. Each of these alternatives is also tied to a list of criteria, including how cost-efficient they are if people and construction companies are willing to adopt these products, how easy it is to integrate into a building, and how much they cost compared to regular material, how large of an impact these changes will make, and efficiency is there a large difference in energy savings between the two products. Through the AHP model, it determined that Green HVAC systems were the best choice out of the alternatives. Showing that switching to eco-friendly HVAC systems makes the biggest ecological impact as well as fitting all the criteria the best.

AHP/ANP IMPLEMENTATION FOR ADJUDICATING ENVIRONMENTAL TORT CLAIMS

Paola Gómez-Priego [1], Luis Bojórquez-Tapia [1] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, UNAM)

Abstract

We present here an AHP/ANP implementation to address the challenges of measuring the quality expert judgment regarding uncertain evidence of environmental tortious conduct. Through the AHP/ANP, the approach combines two decision theory techniques, Weight of Evidence (WoE) and Clairvoyance Analysis (CA), to enable abductive reasoning and determine the best explanation of the observed environmental damage.

DETERMINATION OF SELECTION CRITERIA FOR WAVE ENERGY CONVERTERS

Sertap Varol [1], Hasan Suat Arslan [1], Irem Ucal Sari [1] (1. Istanbul Technical University)

Abstract

Considering the fact that Turkey's energy consumption has increased significantly over the past three decades as a result of economic and social development, the purpose of this paper is to evaluate wave energy conversion technology selecting criteria to be located in the Aegean Sea

as a key way to address Turkey's energy-related challenges by generating potential from wave energy. In this paper, weights of the criteria are determined to compare wave energy conversion technology alternatives in order to achieve Turkey's energy sustainability goal. Three main criteria are determined with 8 sub-criteria. The study shows that the environmental aspect is the most important criterion in the selection process and the impact on the ecosystem has the highest importance among all sub-criteria.

SATURDAY - SESSION 3A

11:30 am
Short Code: SA_RMA_MISC
Session Chair: Cigdem Kadaifci

CRISP JUDGEMENT SCALE-BASED SENSITIVITY ANALYSIS FOR PROVIDING RELIABLE QUALITATIVE AHP/ANP USE OUTCOMES

Grzegorz Ginda [1], Chellappa Vigneshkumar [2] (1. AGH Univeristy of Science and Technology, 2. Indian Institute of Technology Guwahati)

Abstract

AHP/ANP comprises qualitative technique that iscapable of dealing with intangible issues. The application of standard crisp linear judgement 0-9 scale provides user with results that are of a rather quantitative nature, however. This is why, among other things, other measures (fuzzy numbers, gray numbers, rough sets etc.) are applied to express influence of intangible issues in AHP/ANP technique to obtain qualitative analysis results, instead. The application of non-crisp notions for the expression of intangibility seems rather doubtful in light of opinion of the creator of the technique. This is why an effort is made in the paper to provide necessary means to facilitate obtaining qualitative AHP/ANP application outcomes while using crisp input data. Concurrent application of different alternative crisp judgement scales is proposed with this regard. The results of their sample application are also discussed in the paper.

COMBINING AHP, TOPSIS AND CONJOINT ANALYSIS TO RANK SHOPPING CENTERS IN THE LOCALITY OF MBANZA-NGUNGU, DR CONGO

Ruffin-Benoît Ngoie [1], Ossok Dibakidi [1], Ruffin Mbaka [1], Jean-Aimé Sakulu [1], Don Musoni [1] (1. Institut Supérieur Pédagogique de Mbanza-Ngungu)

Abstract

This paper deals with ranking stores in the locality of Mbanza-Ngungu (DR Congo) while considering consumers' preferences. The Conjoint Analysis method is used to determine weights for criteria to evaluate the considered alternatives. Next, we ran AHP and TOPSIS methods to rank these alternatives from the best to the worst. Both used methods agree with the same ranking for the six considered shopping centers. Additional computations had been performed to study the consistency of AHP matrices. The inconsistency rates of all AHP pairwise comparison matrices are lower than 0.1 showing that the AHP is verified.

PARTICLE SWARM OPTIMIZATION TO SOLVE INCOMPLETE PAIRWISE COMPARISON

Ririn Diar Astanti [1], The Jin Ai [2], Leonardo Vincent Hendrawan [2] (1. Universitas Atma Jaya Yogyakarta, 2. UNIVERSITAS ATMA JAYA YOGYAKARTA)

Abstract

According to Saaty (2008) everything we do both consciously and unconsciously is the result of decision making. Analytical Hierarchy Process (AHP) is a method that can assist in making decisions on complex problems by structuring information in a hierarchy. However, the requirement for the AHP method to be completed is a complete pairwise comparison. In fact, you can find incomplete pairwise comparison matrices in AHP. The purpose of this study is to fill in the incomplete pairwise comparison matrix on AHP so that the synthesis process on the AHP method can be completed. To estimate the missing value from

pairwise comparison matrices, the research proposed in this article uses the metaheuristic Particle Swarm Optimization Technique (PSO). The results of this study is the proposed algorithm for solving incomplete pairwise comparison using PSO.

SATURDAY - SESSION 3B – TRACK 2

11:30 am
Short Code: SA_RMB_TR2
Session Chair: Anna Ujwary-Gil (Institute of Economics, Polish Academy of Sciences) , Anna Florek

ENHANCING POLICE-COMMUNITY RELATIONS VIA A CONFLICT RESOLUTION APPROACH

Amos Guiora [1], Marcel Minutolo [2], Luis Vargas [3], Margaret Vargas [3], H.J. Zoffer [3] (1. University of Utah, 2. Robert Morris University, 3. University of Pittsburgh)

Abstract

Despite calls for calls for community-oriented policing and the recognition that it results in improved relationship between the police and community as well as improved public security outcomes, police-community relations are arguably at an all-time low. Part of the challenge in achieving police-community relations is a disparate understanding of what each part wants and what each party can provide as well as the prioritization thereof. We present a project that worked to improve police-community relations through a conflict resolution process using the Analytic Hierarchy Process. The project was conducted between a group of police officers serving an urban, predominately African American community and representatives of the community over a period of several workshops. The workshops identified the goals, criteria, and objectives of each party as well as the perception of the other party's goals, criteria, and objectives. The results of the meetings, the priorities generated, and similarities / divergences between them are presented.

ANALYZING EIA IN PARANÁ, BRAZIL AND CALIFORNIA, UNITED STATES WITH FUZZY-SET QUALITATIVE COMPARATIVE ANALYSIS AND THE ANALYTICAL HIERARCHY PROCESS

John Loomis [1], Maurício Dziedzic [2] (1. Universidade Positivo, 2. University of Northern British Columbia)

Abstract

Since its introduction in the US, environmental impact assessment (EIA) has become one of the most widespread environmental policy instruments, which has evolved from solely conservation aims to serve as a tool for sustainable development. Despite its history and dissemination, EIA is routinely criticized for being ineffective at impacting decision-making or promoting more sustainable development. This study performed a comparative case study using the effectiveness dimensions from the EIA evaluative literature and two methodologies. Two states in federalist systems were chosen, Paraná, Brazil and California, United States. This comparative case study formats the cases into contextual conditions using the fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology in order to identify the necessary and sufficient conditions that foster effective outcomes. These effectiveness outcomes and criteria are then ranked by EIA stakeholders via the analytical hierarchy process (AHP) in order to identify stakeholder priorities and to improve stakeholder management. The results show that in Paraná stakeholders identified normative effectiveness as the most important dimension for an ideal effective EIA outcome, and stakeholders in California identified this dimension as the second-most important following substantive effectiveness. For normative effectiveness outcome early project definition and public participation were found to be necessary conditions and stakeholder coordination was found to be a sufficient condition. Following normative effectiveness, Paraná stakeholders identified procedural effectiveness as the second most important. While transactive effectiveness was ranked lowest overall in both case studies, improving procedural effectiveness has been shown to be connected to the transactive effectiveness. Finally, transformative effectiveness ranked third and fourth in California and Paraná respectively, which also had the lowest set membership in fsQCA. This study advances EIA

evaluatory literature by assessing various effectiveness dimensions through two complementary methodologies.

APPLICATION OF THE AHP-TOPSIS-2N METHOD IN PRIORITIZING TECHNOLOGIES OF INTEREST TO THE BRAZILIAN ARMY

Romullo Girardi [1], Marcos Santos [1] (1. Military Institute of Engineering)

Abstract

This work aims to apply the AHP and TOPSIS methods for selection instructors in a graduate school of the Brazilian Air Force. The instructors who make up your faculty are selected from your classes. Sixty-seven candidates for the nomination of an instructor were compared among the students who graduated from the first Course for the Improvement of Aeronautical Officers 2021. Those selected would be able to perform the role of an instructor in the School of Improvement of Aeronautical Officers. The students were evaluated in six criteria - the final mean of the evaluations; the oral presentation of the course conclusion work; the subjective evaluation of the Instructor Guiding the Group's Work; the subjective evaluation of the Course Completion Work Advisor; the Horizontal Concept; and the evaluation of the Psychopedagogy Advisory. The AHP method was applied for calculating the weights of the criteria, and TOPSIS, in ordering the candidates. This implementation was compared with the actual choice of candidates by the decision-maker. It was found that the candidates closest to the positive ideal solution (PIS) received a higher number of nominations, and those closest to the negative ideal solution (NIS) received more rejections. The combined application of AHP and TOPSIS methods was effective in ordering the alternatives, allowing the decision-maker to carry out a more comprehensive and fair assessment of the candidates.

PLEANRY SPEAKER- STRATEGIC PLANNING AND DECISION MAKING CHALLENGES IN EDUCATION

1:00 pm

In order to stay competitive in the existing markets and to enter new markets, the educational institutions must foster the quality of their teaching, its research and the role in the development of economy and society. The results are more complex and demanding missions, visions and strategic goals, so the need for strategic planning and rational decision-making has been considerably expanded.

Educational institutions have become a part of a global shift to a new way of teaching and learning by using digital technologies. Digital technologies are among the main change accelerators that can drastically change educational systems, transforming teaching, learning and assessment practices for teachers and students. These changes demand action and decisions in educational institutions. For being successful in digital transformation, strategic planning of transforming teaching and learning plays a crucial role.

Nowadays, educational institutions must be innovative and strategically managed to be able to fulfil their mission, vision and strategic goals in the ever-changing landscape of digital transformation. Management of educational institutions must play a diverse range of roles such as: chief communicator to school communities, provider of technology, launcher of an online learning platform, logistics manager, tracer of the virus and emotional support for anxious faculty, students and staff.

The framework for managers of educational institutions for crisis leadership identifies five processes for responding to a crisis: 1.) gathering information about the crisis, 2.) creating and implementing a well defined plan, 3.) decisive decision making, 4.) showing concern for the wellbeing of others and 5.) demonstrating open and honest communication. There is a strong need for implementing decisive decision making to make quick, clear and well thought-out decisions under constraints. To support decisive decision making, the methodology for strategic planning and decision making focusing on the AHP/ANP was developed. In the scope of the lecture the challenges of strategic decision-making within educational education will be presented as well as methodology for strategic planning and decision making in educational institutions by using the AHP/ANP.

Presenter: Nina Begicevic Redjep

SATURDAY - SESSION 4A – TRACK 5&9

2:15pm
Short Code: SA_RMA_TR 5 & 9
Session Chair: *Claudio Garuti*

A DECISION SUPPORT SYSTEM FOR THE OPTIMAL ALLOCATION AND DISTRIBUTION OF COVID-19 VACCINES USING ANALYTIC HIERARCHY PROCESS (AHP) AND INTEGER PROGRAMMING (IP) MODELS

Hannah Faye Culaste [1], Noe Jay Torres [2], Zython Paul Lachica [2], Honey Glenn Lorono [2], Ross Fievanni Inguillo [2], May Anne Mata [6], Rhoda Namoco [7] (1. University of Science and Technology of Southern Philippines; Center for Applied Modelling, Data Analytics and Bioinformatics for Decision Support Systems in Health, 2. Center for Applied Modelling, Data Analytics, and Bioinformatics for Decision Support Systems in Health, 3. University of the Philippines - Mindanao; Center for Applied Modelling, Data Analytics, and Bioinformatics for Decision Support Systems in Health, 4. University of Science and Technology of Southern Philippines; Center for Applied Modelling, Data Analytics, and Bioinformatics for Decision Support Systems in Health)

Abstract

As the Philippines continues to vaccinate its population to manage the spread of COVID-19, prioritizing individuals to receive vaccines with respect to the COVID-19 situation in their respective areas requires careful planning. Our study developed a location-allocation model that optimally schedules the COVID-19 vaccine rollout of a community. We applied the analytic hierarchy process (AHP) to prioritize communities in the vaccine rollout. Consequently, an integer programming (IP) model was formulated to assign individuals to their respective vaccine stations in accordance with the rollout prioritization of their community, as well

as the minimum number of vaccine stations to open. The AHP-based IP model proposed in this study is implemented into a decision support system (DSS) which not only assigns individuals to vaccination stations, but is also flexible to consider different local government prioritization driven by their COVID-19 situation. Furthermore, the vaccine rollout framework in this work is applicable to other vaccine-preventable diseases (e.g., rabies, measles, etc.) should LGUs embark on adapting this approach.

TRADITIONAL, DEA-AHP RANKING AND POSSIBILISTIC FUZZY DEA APPROACH FOR EFFICIENCY ANALYSIS OF CITY HOSPITALS

Songul Cinaroglu [1] (1. Hacettepe University)

Abstract

In this study, we seek to explore six city hospitals efficiency by using public hospitals statistical records for the year 2017. Conventional DEA, DEA-AHP ranking and possibilistic fuzzy DEA models are generated and compared. Study findings provides many lights to compare conventional and fuzzy DEA efficiency results and findings pose that conventional DEA estimates overscores efficiency estimates. Traditional and possibilistic fuzzy DEA estimates with different α-cut levels are consistent and a decreasing possibilistic efficiency trend is observed while increasing α-cut parameter from 0 to 1 in possibilistic fuzzy DEA model.

IOT BASED SMART CITIES EVALUATION BY CIRCULAR INTUITIONISTIC FUZZY ANALYTIC HIERARCHY PROCESS

ESRA ÇAKIR [1] (1. Galatasaray University)

Abstract

By the involvement of IoT in urban planning, smart cities increase the quality of life and contribute to the sustainable environment in issues such as waste management, air quality, transportation integration and healthy living. Thus, it is also important for people to evaluate smart cities that will increase their living standards. This study evaluates smart cities

by integrating circular intuitionistic fuzzy sets (C-IFS), which is newly introduced to the literature, into the Analytic Hierarchy Process (AHP) approach. Alternative cities to smart waste management, air pollution control, transportation integration and smart energy consumption systems are ranked within the scope of smart cities.

SATURDAY - SESSION 4B – TRACK 11

2:15pm
Short Code: SA_RMB_TR11
Session Chair: Nigel Clark, Anna Florek

A NOVEL MODEL FOR PROCESS MATURITY MEASUREMENT BASED ON FUZZY ANALYTIC HIERARCHY PROCESS

Elif Buyukkaya [1], Selcuk Cebi [1] (1. Yildiz Technical University)

Abstract

By identifying the bottlenecks in the business process, improvements are made on the relevant process. For this, first of all, the maturity of the business process should be determined. In the literature, the process maturity model is used to measure the maturity level of processes. The model is questionnaire-based. It includes an evaluation in 0-1 logic. However, the current structure is not sensitive enough to reflect the decisions of group decision-makers. Therefore, a fuzzy set and Analytic Hierarchy Process (AHP) based approach has been proposed to measure the maturity level of processes. The effectiveness of the method is demonstrated by applying the proposed approach to the vehicle tracking process (VTP) of an organization.

EVALUATING THE MARKET CHANCES OF NANO-CELLULOSE FOR SURFACE ABSORPTION OF HEAVY METALS

majid azizi [1], mohammad azad fallah [1], hasan shoja [3] (1. university of Tehran, 2. university of tehran)

Abstract

Today, various pollutants enter the environment due to the increase in human population and industrialization of society. One of these pollutants that have become a global form is heavy metals. Heavy metals that are produced due to the development of urbanization and industry and the increase in the amount of sewage and effluent enter the environment mainly through improper and unsanitary disposal of municipal wastewater and industrial effluent. Current research has evaluated water pollution with copper and lead metals by nano cellulose and nanocellulose modified with acrylic acid to absorb heavy metals. Heavy metal adsorption was identified when four main groups of benefits, costs, opportunities, and risks were classified. The importance of these main criteria was determined using the Analytic Hierarchy process. Results show nano cellulose modified with acrylic acid is the first priority, and nano cellulose not modified with acrylic acid is the second priority.

DEVELOPING AN AHP-BASED MODEL FOR THE PROBLEM-SOLUTION FIT OF BATTERY ELECTRIC VEHICLES (BEV): A CASE OF THE MOST AFFORDABLE BEV IN INDONESIAN MARKET

Ade Febransyah [1] (1. School of Business and Economics, Universitas Prasetiya Mulya)

Abstract

The use of electric vehicles shows an increasing trend. However, the adoption rate of battery electric vehicle (BEV) is still relatively very low compared to the gasoline-powered cars. In the Indonesian market, BEVs are still not affordable for most people. Previous studies on EV have explored many factors that influence the level of adoption and people's purchase intention of electric vehicles. The purpose of this study is to analyze the problem-solution fit of a battery electric vehicle in the Indonesian market. The AHP decision model is adopted in the value proposition design (VPD) framework to see whether electric vehicles have the ability to answer people's pains and gains in performing customers' job to be done of commuting. The most affordable BEV currently introduced in the Indonesian market is chosen in this study. This

study is expected to be able to explain the problem-solution fit of any BEV product offered to a certain target customer. In addition, this study can also explain the priorities of the customer pains and gains that gasoline powered car drivers want to resolve.

SUNDAY DECEMBER 17

PLENARY SPEAKER - AHP IN PRACTICE TO PROMOTE COLLECTIVE DECISION MAKING

8:00 am

There are a fair number of participatory methodologies that are used in a variety of decision making situations in Turkey ranging from Search Conferences to Commitment Conferences. The introduction of AHP in what we have started to call Decision Conferences was a good opportunity to bundle different participatory methodologies together to support a transformation process for different types of institutions and organizations.

The first application of AHP in Turkey was on nationwide industrial strategy formation where we had the pleasure of hosting the son of Tom SAATY. Followed by a long term collaboration with Prof.Ilker TOPCU and subsequently with Ozay OZAYDIN.

We have to date well over 100 decision conferences applied to different social systems. For instance, we aimed to create a road map for Galatasaray as a soccer club to reach a state of continuity with success at the European level, to understand the root causes why Istanbul could not produce sufficient number of organ transplantation donors and to redesign the incentives and processes to overcome the shortcomings, to explore unique cases like Topkapi Palace - the Ottoman Empire's major palace.

In this plenary, we are going to present the Topkapi Palace engagement in more detail. The project started when we were called by the Topkapi Palace Museum Administration to support the transformation of the museum to one of the prime destinations to be visited and enjoyed in the global arena. The result pointed to maintenance and preservation as a top criterion that was prioritized by 40 stakeholders, because to date there was no system of time slot reservation in use at the museum. Our

plenary will showcase how the decision conference of the application and the technique was implemented.

Presenters :
Dr. Oğuz Babüroğlu (Sabancı University)
Prof. Ilker Topcu (Istanbul Technical University)
Ozay Ozaydin (Dogus University)

SUNDAY - SESSION 1A – TRACK 11

9:15am
Short Code: SU_RMA_TR1
Session Chair: Prof. Luis Vargas (University of Pittsburgh)

REPRESENTATIONS, RATIOS, AND UNITS

William Wedley [1], Orrin Cooper [2], Idil Yavuz [3] (1. Simon Fraser University, 2. Self Employed, 3. Dokuz Eylul University)

Abstract

Between the numerator and denominator, there is a fine line. Only a fraction appreciates the distinction of what is above or below that line. The denominator is an important part of the unit in a pairwise comparison and in priority vectors. Pairwise comparisons provide the unit conversions between the elements being compared. These relationships are key to the problem definition and representation. As we understand what is above and below the fine line we come to recognize, appreciate, and respect the unit. In AHP/ANP it is important to recognize the nature of the problem and how units are used to represent it.

AN ECONOMETRIC MODEL MRLM + ANALYTIC HIERARCHY PROCESS (AHP) TO SELECT THE BEST ALTERNATIVE FOR A REAL ESTATE INVESTMENT. CASE: APARTMENT IN PANAMA CITY (PANAMA).

Miguel Camacaro [1], Ernesto Mock [1] (1. Appraisers Reading Club)

Abstract

A person interested in making a real estate investment, starts a search process through real estate websites, finding several alternatives: real estate products differentiated in a range of prices that fit his purchasing power. In order to assist the future buyer in the decision making process, the real estate consultant must evaluate the most important characteristics of each alternative in order to offer a balanced quality-price ratio, in the best case, using a selection procedure with empirical basis. This article presents a case study for the selection of an apartment located in a sector of Panama City (Panama), for which offers with a price range between [165,000 and 215,000]USD were analyzed, using one of the multiple attribute decision making (MADM) methods, the Analytic Hierarchy Process (AHP). The criteria or variables considered in the multi-criteria method were: area, parking space, age, quality, building floor and distance to the value pole, which, according to the econometric model of a sample of 97 offers, were statistically significant in explaining the total real estate prices. The entire procedure established for applying the AHP was followed, but the Saaty Table was not used to structure the pairwise comparison matrix of the criteria. For the determination of the eigenvector of the criteria, the importance of the intensity in the fundamental scale was replaced by the ratio between the standardized coefficients (t*) of each independent variable of the econometric model. The ranking of the overall weighting vector suggested that the best option was PH Coral Tower, which coincided with the solution provided using the Saaty table, but with more robust results, thus mitigating the subjectivity of the heuristic solution provided by the original AHP procedure.

SUNDAY - SESSION 1B – TRACK 9

9:15am

Short Code: SU_RMB_TR9

Session Chair: Prof. Basar Oztaysi (Istanbul Technical University)

ANALYTIC HIERARCHY PROCESS BASED ON THE MAGNITUDE OF Z-NUMBERS

Nik Muhammad Farhan Hakim Nik Badrul Alam [1], Ku Muhammad Naim Ku Khalif [1], Nor Izzati Jaini [1] (1. Centre for Mathematical Sciences, Universiti Malaysia Pahang, Gambang, Malaysia)

Abstract

The analytic hierarchy process (AHP) is a powerful multi-criteria and multi-alternative decision-making model which helps decision makers in giving preferences using pairwise comparison matrices. The development of AHP using fuzzy numbers got attention from many researchers due to the capability of fuzzy numbers in handling vagueness and uncertainty. The integration of AHP with fuzzy Z-numbers has improved the model since the reliability of decision makers is considered, in which the judgement is followed by the degree of certainty or sureness. Most of the existing decision-making models based on Z-numbers transform the Z-numbers into regular fuzzy numbers by integrating the reliability parts into the restriction parts which has caused a great loss of information. Hence, this research develops the AHP based on the magnitude of Z-numbers, in which the magnitude is used to represent the criteria weights. A numerical example of criteria ranking for the prioritization of public services for digitalization is implemented to illustrate the proposed AHP model. The proposed AHP model is only used for criteria ranking, hence it can be integrated with other decision-making methods such as TOPSIS or VIKOR to rank the alternatives.

GROUPING REPRESENTATIVE POINTS IN AHP-FUZZYSORT WITH AGGLOMERATIVE HIERARCHICAL CLUSTERING

Alvaro Labella [1], Diego García-Zamora [1], Wen He [1], Rosa M. Rodríguez [1], Luis Martínez [1] (1. University of Jaén)

Abstract

The AHP-FuzzySort model extends the AHP-Sort II to improve the assignment of alternatives to different classes by using the fuzzy set theory. Both algorithms demand pairwise comparisons among

representative points (RP) and profiles, to reduce the number of comparisons. This contribution formalizes in the AHP-FuzzySort model the use of the agglomerative hierarchical clustering (AHC) to group profiles and RP.

SUNDAY – SESSION 2A – TRACK 8

10:15am

Short Code: SU_RMA_TR8

Session Chair: Prof. Birsen Karpak (Youngstown State University) , Lirong Wei

ENTERPRISE BLOCKCHAINS ADOPTION

Birsen Karpak [1], Deepa Iyer [1], Ilker Topcu [3] (1. Youngstown State University, 2. Istanbul Technical University)

Abstract

It is a great challenge for enterprises to adopt the blockchain platform of the right fit. Part of the reason of this challenge is the limited availability of reliable evaluation frameworks. One needs technical knowledge to select a suitable platform for each application. In this study, we are proposing an integrated diffusion of Innovation (DOI) and Technological, Organizational and environmental (TOE) model. To our knowledge there is only one framework in literature somewhat similar to ours yet only uses TOE and don't consider any alternative blockchain platforms. We know from our earlier research that importance of factors influencing the decisions are impacted by the alternatives. Our research fulfills this research gab in literature. We, therefore, assert that frameworks not incorporating alternatives have limited applicability.

MULTI-CRITERIA ASSESSMENT OF SPARE PARTS OF HYDRAULIC SYSTEMS

Nuno Torre [1], Valerio Salomon [1] (1. Sao Paulo State University)

Abstract

Spare parts of production line assets must be readily available at the lowest possible cost. Hydraulic systems can be found in a wide variety of industrial applications that demand control of large loads and high-power density. The assessment of spare parts of hydraulic systems involves multiple criteria. Multi-criteria decision-making (MCDM) methods were developed to solve problems with several criteria. The AHP (Analytic Hierarchy Process) is a leading MCDM method. This paper presents an AHP application in a steel mill plant located in the Brazilian State of Rio de Janeiro. With the application of AHP, it was possible to identify the highest priority factor for the inventory management of spare parts.

EFFECT OF STAKEHOLDERS' BIASED JUDGMENTS ON THE RESULT OF THE GROUP DECISION MAKING

Omid Hossein Zadeh [1], Marzieh Hajjarian [1], Reza Abdi [3] (1. Assistant professor, Department of Forestry, Faculty of Natural Resources, Urmia University, Urmia, Iran, 2. School of Management, Bradford University)

Abstract

The main focus of this study was to highlight the influence of biased judgments (BJs) on the results of decision-making (DM). Priorities for the development of local value chains were structured using an analytic network process. Also, the possibility of using the Delphi technique (DT) as a solution to moderately biased judgments was examined. In each value chain, the preference of its stakeholders compared with the preference of the rest of the panel. The results clearly showed that stakeholders in each value chain have some kind of biased judgments concerning their value chain. The results also clarified that the BJs were influential in changing the DM results, and the DT was also influential in modifying biased judgments. The findings of this study showed that the selection of DM panel members is a vital stage of group DM, and also proved that there are available approaches like the DT to mitigate BJs.

SUNDAY – SESSION 2B – TRACK 4

10:15am
Short Code: SU_RMB_TR4
Session Chair: Shashi Bhattarai

MULTIDIMENSIONAL CLASSIFICATION OF WOMEN'S GROUPS IN BURKINA FASO WITH A VIEW TO PROVIDING FINANCIAL AND TECHNICAL ASSISTANCE: AHP METHOD APPLICATION CASES

Zoïnabo SAVADOGO [1], Frederic NIKIEMA [2] (1. Laboratory of Applied Mathematics, Joseph KI-ZERBO University, 2. Université Joseph KI-ZERBO)

Abstract

Strengthening the role of women in the development process is based on several principles. The principle, the specific actions undertaken for women is of paramount importance for each country.
Some development officials as well as some NGO usually deal with several women's groups but often have to decide to choose one of them. The selection of the latter thus becomes a strategic decision that has a crucial impact on the sustainable development of countries. When making this choice, it is often necessary to take into account several criteria simultaneously.
Several applications of Multi-Criteria decision support models exist in the literature. In this article, the AHP method presented by Thomas L. Saaty has been used to apply it to a multidimensional choice of women's groups. This Multi-Criterion classification approach has been applied to prioritize women's groups in order to support them financially and technically according to their specific needs

STRATEGIC PRIORITIES OF INDONESIAN YOUNG ENTREPRENEURS' MOTIVATION

Jozef Raco [1], James V. Krejci [2], Yulius Christian Raton [1], Ronaldo F Rottie [1], Tryadi Wilhelmus Tumewu [1], Jeanne Ellyawatis [6], Silvya L Mandey [7], Jeanette Etty Magdalena Soputan [7] (1. Universitas Katolik De La Salle Manado, 2. Lewis University, Illinois, USA- College of Business, 3.

Universitas Atma Jaya Yogyakarta, 4. Universitas Sam Ratulangi Manado)

Abstract

There are many factors that drive people to become entrepreneurs, but the study of determining the main motivation is still lacking in research. This study aims to determine the main motivation of entrepreneurs. The Analytical Hierarchy Process (AHP) method is used to calculate the percentage of each criterion and sub-criteria and determine the main criteria and sub-criteria. The Fuzzy-AHP method is used to clarify the gray area and uncertainty of the respondents' perceptions. The results show that economic motivation is the main criterion. The global weight calculation determines that understanding a business opportunity and taking action on it is the highest motivation. This research is useful in determining the strategy for developing entrepreneurship.

PRIORITIZATION OF ENABLING TECHNOLOGIES THROUGHOUT DIGITAL TRANSFORMATION IN SHIP MANAGEMENT COMPANIES

Muhittin Orhan [1], Metin Celik [1] (1. Istanbul Technical University)

Abstract

Identification of enabling technologies is a critical stage to manage digital transformation process in different industries. This paper investigates the priorities enabling technologies throughout digital transformation in ship management companies. As a suitable technique to this case, Analytic Network Process is utilized to clustering of organizational functions (i.e. technical management, operation management, etc.) and enabling technologies (i.e. big data analytics, internet of things, etc.). The results highlight big data analytics as the most important enabling technologies. Besides improving the managerial skills, ship management companies might consider the priorities to decide on the investments on digital transformation.

SUNDAY – SESSION 3A – TRACK 3

11:30am

Short Code: SU_RMA_TR3

Session Chair: Prof. Ilker Topcu (Istanbul Technical University)

AN INTEGRATED MCMD MODEL FOR CLIMATE-SMART AGRICULTURE

Ida Gjergji [1], Ilker Topcu [2] (1. TU Wien, 2. Istanbul Technical University)

Abstract

Due to climate change, sustainable agriculture is under threat. Climate Smart Agriculture practices are recommended for policymakers and farmers to improve agricultural productivity sustainability. In this study, a multi-criteria decision model was proposed to evaluate Climate Smart Agriculture practices and recommend the most appropriate ones for farmers. For this purpose, the integration of the Analytic Hierarchy Process approach and the Technique for Order of Preference by Similarity to the Ideal Solution method was utilized to prioritize the evaluation criteria and reveal the preferences of Climate Smart Agriculture practices. A case study was conducted in the region of Navarra in northern Spain.

EVALUATION OF COMPANIES IN THE MINING AND STEEL INDUSTRY SECTOR USING THE MULTI-CRITERIA DECISION SUPPORT METHOD AHP-TOPSIS-2N

Felipe Fortuna Lucas [1], ANA AMÉLIA PASTOR MENDONCA DA SILVA [2], Carlos Francisco Simões Gomes [3], Marcos Santos [4] (1. Universidade Federal Fluminense (UFF), 2. Furnas Centrais Elétricas S.A, 3. Federal Fluminense University, 4. Brazilian Navy)

Abstract

The objective of this paper is to evaluate the companies in the Mining and Steel sector present in IBOVESPA using the AHP-TOPSIS-2N multi-

criteria decision support method. For this analysis, data referring to the 2nd quarter of 2021 of the aforementioned companies were used. The data were obtained from the mining and steel sector shares traded on BOVESPA. The AHP-TOPSIS-2N method was used to sort the shares according to the following criteria: Price on Earnings, Price on Book Value, Dividend Yield, Enterprise Value/EBITDA, and Return on Equity. For the attribution of the weights of the matrix of pairwise comparisons of the evaluation criteria, specialists in the financial area were consulted. Among the sector's shares, the best evaluated were CSN (CSNA3) and CSN Mineração (CMIN3), reflecting the companies' performance in the international market.

AN INTEGRATED MCDM APPLICATION FOR RANKING OF SMART CITIES

Mehmet Güneş [1], Ilker Topcu [1] (1. Istanbul Technical University)

Abstract

Since the beginning of human history, people have felt the need to live in groups. This need for coexistence began to increase over time. Gradually growing human communities formed structures called “city”. Cities, where production and therefore job opportunities are high, have become centers of attraction for people. The population in the cities began to increase. This increasing population naturally caused some problems. At the beginning of these problems was the rapid depletion of resources. These problems pushed people to seek some solutions. As a solution, the concept of "smart city" emerged. In this study, a multi-criteria decision model has been developed to rank the success of some smart cities in Europe. As a result of this model, it has been revealed which city implements the concept of smartness better.

SUNDAY – SESSION 3B – TRACK 6&8

11:30am

Short Code: SU_RMA_TR 6 & 8

Session Chair: Ms. Hannia Gonzalez-Urango (Ingenio, CSIC -

Universitat Politècnica de València)

A MULTI-METHOD APPROACH TO STUDY THE DETERMINANTS OF ACADEMIC PERFORMANCE OF SECONDARY STUDENTS: THE CASE OF CARTAGENA DE INDIAS (COLOMBIA)

Hannia Gonzalez-Urango [1], Rosaura Arrieta [2], Daniel Guerrero Agámez [2] (1. Ingenio, CSIC - Universitat Politècnica de València, 2. Universidad de Cartagena)

Abstract

The main objective of the paper is to investigate the determinant factors affecting academic performance of students in secondary education in the city of Cartagena de Indias (Colombia). The study consists of two parts. In the first part, a probit regression analysis is applied to identify potential factors affecting the results of students in the Colombian National Quality Test. It focuses on measuring the impact of students' socioeconomic conditions and the characteristics of the school on the results obtained. In the second part, using an AHP model, local education managers evaluate the same variables in relation to academic performance. Preliminary results show that being male, studying in an urban area, having access to the internet and a computer, as well as the educational level of the fathers, increase the probability of high performance in the critical reading and mathematics components. On the other hand, studying in a public school and having a job reduce the probability of obtaining good results. The managers consulted so far consider that socioeconomic status and time devoted to reading are the two main factors that affect student performance.

EVALUATION OF OPTIONS FOR FOOD WASTE MANAGEMENT IN METRO MANILA USING AHP

Jahziel Lantin [1], Michael Angelo Promentilla [1] (1. De La Salle University - Manila)

Abstract

Food waste management has been explored to contribute to

sustainability actions. However, developing countries like the Philippines have no specific actions on food waste. Food waste is collected and disposed of along with other solid waste with no further waste treatment. This study evaluated different scenario alternatives on food waste based on the criteria financial viability, social acceptability, environmental sustainability and technical enforceability using AHP The most preferred option by the experts was the scenario on food donation.

EVALUATION OF METAVERSE RISKS FOR SUPPLY CHAIN SUSTAINABILITY USING SPHERICAL FUZZY AHP

Ayça Maden [1] (1. Beykent University)

Abstract

As a brand-new technology, metaverse attracts the attention of supply chains. Especially in virtual worlds, metaverse offers different features to supply chains with its accompanying technologies like virtual reality, blockchain, and artificial intelligence. However, to design a virtual world similar to the real world, different risks from the technological to social sides should be considered. In this study, the effect of metaverse risks on supply chain sustainability was investigated using a case study application. To do this, the spherical Fuzzy AHP method was used. Metaverse risks were determined using the literature review. After determining the weights of the metaverse risks, a selection was made between the supply chain sustainability dimensions over the determined risks.

SUNDAY – SESSION 3B – TRACK 6&8

12:30pm
Short Code: SU_RMB_TR2
Track Chair: Shashi Bhattarai

CONSOLIDATION OF CITIZENS' OPINIONS WITH THE AHP FOR PDCA CYCLE IN LOCAL GOVERNMENTS

Yoichi Iida [1] (1. Suwa University of Science)

Abstract

It is well-known that the Analytic Hierarchy Process is able to consolidate people's opinions and differentiate the evaluation of projects due to the Saaty's scale. One of the purposes of the paper is to present an actual example to show that this method is helpful and useful to do the PDCA cycle of activities with citizen participatory evaluation in local governments from the above features. This attempt was the result over three years. The other is to show that administrative officers can easily use this evaluation process because of the DX era.

TOURISM DEVELOPMENT OF THE SIAU TAGULANDANG BIARO ISLANDS' REGENCY USING AHP AND BUCKLEY'S FUZZY-AHP

Jozef Raco [1], James V. Krejci [2], Yulius Christian Raton [1], Ronaldo F Rottie [1], Tryadi Wilhelmus Tumewu [1], Denny Kondoj [6] (1. Universitas Katolik De La Salle Manado, 2. Lewis University, Illinois, USA- College of Business, 3. Secretary Office of Siau Tagulandang Biaro Island's Regency, North Sulawesi)

Abstract

The Covid 19 pandemic has had a significant impact on the tourism industry requiring areas such as the Siau Tagulandang Biaro Islands Regency to reevaluate their strategy. Identification of the key strategic initiatives is paramount to a successful tourism plan. Because these initiatives are often defined using vague and uncertain perceptions or gray areas, the Fuzzy-AHP methodology was identified and used to determine the value of each criterion and sub-criteria and establish strategic recommendations. The results of the analysis show that facilities are the highest criterion (34.4% AHP; 24.7% Fuzzy-AHP). The global weight calculation shows that hygiene and health aspects are priority elements (8.6% AHP; 8.2% Fuzzy-AHP). The sensitivity analysis shows that the results are robust, consistent, and stable. These results indicate that there is no significant difference between the AHP and Fuzzy-AHP methods. The tourism development strategy for Siau Tagulandang Biaro regency must prioritize its attention to improving the

cleanliness and health of tourist destinations.

FACTORS AFFECTING THE SUCCESS OF AIR-RAIL INTEGRATION IN THAILAND

Benyapa Suwannarat [1], Chanuwat Nitikittiwat [1], Nitchamol Samittivate [1], Waralee Rattanakijsuntorn [1] (1. King Mongkut's Institute of Technology Ladkrabang)

Abstract

The existing airport rail link project in Thailand has proven to be an unsuccessful air-rail integration, despite the fact that this type of relationship is favorable, especially for passengers in Europe and Eastern Asia. As there are plans for future airport rail link projects, investment and operational challenges were considered. However, factors associated the success of air-rail integration has not been examined. This research aims to fill such gap by using AHP to quantify the result. The model comprises of four dimensions and ten factors. The average CR value of 0.0464 validates the outputs. It was revealed that time was the leading factor, followed closely by seamless journey while career opportunity has the least significance impact to the success of air-rail integration.

CLOSING/ AWARDS CEREMONY

1:30pm

Speakers:

Luis Vargas (University of Pittsburgh)

Rozann Saaty *(United States) - Creative Decisions Foundation*

1:30 to 2:00 pm

CONFERENCE PARTICIPANTS – CONTACT INFORMATION

A

abdullah, emtenan, ealmoqbel@stu.kau.edu.sa
Abourokbah, Safinaz, saburokbah@kau.edu.sa
Adekoya, Adebola, agadekoya@unilag.edu.ng
Alabdali, Mahmoud, malabdali@hotmail.com
Alajhar, Noha, n-alajhar@hotmail.com
Alamoudi, Lujain, lalamoudi0026@stu.kau.edu.sa
Alarifi, Areej, areejalarifi@yahoo.com
alghofeli, mashael, malghofeli@hotmail.com
Ali, Muhammad Khurram, khurram.ali@uettaxila.edu.pk
Allan, Marzena, mxa379@live.co.uk
Alomari, Ahmed, amalomari@stu.kau.edu.sa
alshahrani, mohammed, malshahrani0279@stu.kau.edu.sa
Aparisi Cerdá, Isabel, isapcer@etsii.upv.es
Apolinário, Bruna, brunasapolinario@gmail.com
Aragonés-Beltrán, Pablo, aragones@dpi.upv.es
Arrieta, Rosaura, rarrietaf@unicartagena.edu.co
Astanti, Ririn Diar, ririn.astanti@uajy.ac.id
azizi, majid, mazizi@ut.ac.ir

B

Bahurmoz, Asma, bahurmoz@kau.edu.sa
Bello, Kabir, 209023030@live.unilag.edu.ng
Bhattarai, Shashi, shashibhattarai@yahoo.com
Blagojevic, Bosko, blagojevic.uns@gmail.com
Bojórquez-Tapia, Luis, bojorquez@ecologia.unam.mx
Browne, Michael, mbrowne@decisionlens.com
Buyukkaya, Elif, elif98kaya@gmail.com

C

ÇAKIR, ESRA, esrckr_@hotmail.com
Cakmak, Sena, cakmakse17@itu.edu.tr
Camacaro, Miguel, mundovalor@gmail.com
CayirErvural, Beyza, beyzacayir.er@gmail.com
Cebi, Selcuk, scebi@yildiz.edu.tr
Cevik, Sezi, sezi@outlook.com
Cinaroglu, Songul, songulcinaroglu@gmail.com
Clark, Nigel, moon.clarks@gmail.com

Clarke, Roland, drrolandclarke@gmail.com
Cooper, Orrin, 3cooppitz@gmail.com
Culaste, Hannah Faye, hcculaste@up.edu.ph

D

D'Alpaos, Chiara, chiara.dalpaos@unipd.it
deramond, cesar, cderamond@gmail.com
Dixon-Ogbechi, Bolajoko, bdogbechi@gmail.com

E

Eduardo José da Silva, Carlos, ceduardo1972@gmail.com

F

Fabson, Taiyelolu, taiyelolufabson@gmail.com
Febransyah, Ade, afebran@pmbs.ac.id
Frikha, Ahmed, ahmed.frikha@isgis.rnu.tn

G

Ginda, Grzegorz, gginda@zarz.agh.edu.pl
Girardi, Romullo, romullogirardi@ime.eb.br
Gjergji, Ida, ida.gjergji@tuwien.ac.at
Gómez, Ana, angoag@upvnetupv.es
Gonzalez-Urango, Hannia, gonzalezurango@gmail.com
Guerrero Agámez, Daniel, dguerreroa1@unicartagena.edu.co
GÜLERYÜZ, Sezin, sezinguleryuz@gmail.com
Güneş, Mehmet, gunesmehm@itu.edu.tr

H

Hariri, Sulafah, shariri@kau.edu.sa

I

Iida, Yoichi, youichi.iida@gmail.com
Iyer, Deepa, dgiyer@ysu.edu
Izebhokhae, Uwaghahu, uwapapala@gmail.com

J

Jurado, Jimena, juradojimena@gamil.com

K

Kadaifci, Cigdem, cigdem.kadaifci@gmail.com
Kadenko, Sergii, seriga2009@gmail.com
Kahraman, Cengiz, kahramanc@itu.edu.tr
Kallas, Zein, zein.kallas@upc.edu
Karpak, Birsen, bkarpak@ysu.edu
Kazibudzki, Pawel Tadeusz, emailpoczta@gmail.com
Koul, Saroj, skoul@jgu.edu.in
Kowalski, Luiz Fernando, lkowalski@estudante.ufscar.br
KV, Ajaygopal, ajaygopal.2020@nitie.ac.in

L

Labella, Alvaro, alabella@ujaen.es
Lantin, Jahziel, jahziel_p_lantin@dlsu.edu.ph
Li, Xin, xinl9615@163.com
Loomis, John, john.loomis@up.edu.br

M

Maden, Ayça, aycamaden@beykent.edu.tr
Mashat, Reem, rmashat@kau.edu.sa
McDonald, Matt, mmcdonald@decisionlens.com
Melon, Monica Garcia, mgarciam@dpi.upv.es
Menéndez I Molist, Adrià, adria.menendez@upc.edu
Merino-Benítez, Tatiana, tatianam@iecologia.unam.mx
Minutolo, Marcel, minutolo@rmu.edu
Mohanta, Kshitish Kumar, kshitishkumar147@gmail.com
Moslem, Sarbast, sarbastmoslem@hotmail.com
Mousa, Ablah, ahmousa@kau.edu.sa

N

Nik Badrul Alam, Nik Muhammad Farhan Hakim, farhanhakim@uitm.edu.my

O

Odita, Anthony, oditaao@delsu.edu.ng
Oliveira, Sergio, sergio.r.f.oliveira@ieee.org
Onsel ekici, Sule, sule.ekici@iuc.edu.tr
ONYENIKE, KENNETTH, onyeniken@yahoo.com
Orhan, Muhittin, muhittinm10@gmail.com
Ornelas Herrera, Selene Ivette, selene.ivette.ornelas@upc.edu
Ozaydin, Ozay, ozay.ozaydin@gmail.com
Özdemir, Mustafa, mozdemir26@eskisehir.edu.tr
Özdemir, Ümit, umitozdemir@munzur.edu.tr
Oztaysi, Basar, oztaysib@itu.edu.tr

P

Padoano, Elio, padoano@units.it
Pastor Mendonca Da Silva, Ana Amélia, aamelia.mendonca.rjbr@gmail.com
Prathama, Aditya, aditya.prathama@calvin.ac.id

R

Raco, Jozef, jraco@unikadelasalle.ac.id
Rattanakijsuntorn, Waralee, waralee.pe@kmitl.ac.th
Ray, Madhury, mray1@health.nyc.gov
Rokou, Elena, erokou@gmail.com

S

Saaty, Rozann, rozann@creativedecisions.net
Slibar, Barbara, bslibar@foi.unizg.hr

Soydan, Mehmet, soydanm@itu.edu.tr
Szádoczki, Zsombor, zsombcu@gmail.com

T

Tafur, Emilio, et.tafurl@alum.up.edu.pe
Terra, Adilson, adilsonvterra@gmail.com
Topcu, Ilker, ilker.topcu@itu.edu.tr
Topcu, Ilker, topcuil@itu.edu.tr
Torre, Nuno, nuno_torre@hotmail.com
Turel, Tacibaht, tturel@ysu.edu

U

Ujwary-Gil, Anna, ujwary@inepan.waw.pl

V

Vargas, Luis, lgvargas@pitt.edu
Varol, Sertap, varols18@itu.edu.tr
Vemala, Prasad, vemala@rmu.edu

W

Wedley, William, wedley@sfu.ca
Wei, Lirong, leerongw@gmail.com

Y

YOON, MinSuk, msyoon@jnu.ac.kr
Younis Masoud Mohammed, Rola, rymasoud@outlook.com

Z

Zaid, Wafa, wafazaid2022@gmail.com
Zultner, Richard, richard@zultner.org