ISAHP **2024**
WEB CONFERENCE

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 18th International Symposium of the Analytic Hierarchy Process (ISAHP 2024)!

The Analytic Hierarchy Process (AHP), and its broader generalization, the Analytic Network Process (ANP), has become one of the most widely used decision-making methods available—and for good reason. So, why AHP? While there are plenty of reasons to choose it, the biggest one is likely that it achieves exactly what its creator, Thomas Saaty, intended to do. As Tom used to say: "I wanted to create a method so simple my grandmother could understand and use it, but also so rigorous my doctoral advisor in Mathematics would accept it as valid." And AHP has absolutely delivered on that vision!

At its heart, AHP taps into something we've all been doing since we were babies: making comparisons. It's as simple as answering the question, "Between item A and item B, which one do you prefer and to what extent?" You don't need a math degree to do that! This simplicity makes it perfect for involving the people who matter most—actual stakeholders—instead of leaving all the heavy lifting to data scientists. And, thanks to its solid mathematical foundation, AHP stands proudly alongside other Multicriteria Decision-Making (MCDM) methods, carving out a unique niche by empowering stakeholders to take real ownership of decisions.

In today's world, where society faces complex challenges across political, social, and technical spheres, the way decisions are made matters more than ever. When we use a "bottom-up" approach (like with AHP) —engaging the very people who will be affected by

decisions—we are far more likely to create solutions that are both comprehensive and widely accepted. On the flip side, imposing "top-down" decisions risks partial, resisted outcomes driven by an elite group of experts whose reasoning often feels out of reach to the people impacted.

The theme of this year's symposium, *Enhancing Decision-Making with AI*, spotlights an exciting frontier: the integration of mature Artificial Intelligence (AI) systems into the decision-making process. Tools like large language models (LLMs)—think ChatGPT—offer new possibilities for improving the effective use of MCDM methods like AHP/ANP. But with these possibilities come important questions: What kind of AI should we use? How do we use it effectively? And what about the ethical challenges that might arise? These are critical discussions, and I can't wait to hear the insights from this symposium's presentations.

I would like to take this opportunity to express my heartfelt gratitude to the ISAHP 2024 organizing team. Special thanks go to co-chairs Mónica García-Melón and Hannia Gonzalez-Urango, the head of the scientific committee, Antonella Petrillo, and the organizers, Elena Rokou and Lirong Wei, for their dedication and hard work in ensuring the success of this symposium. I would also like to extend my appreciation to Rozann Saaty, whose leadership of the Creative Decision Foundation has been instrumental in making this event possible for so many years.

I hope you all have a productive and inspiring experience filled with meaningful exchanges with fellow AHP/ANP enthusiasts, friends, and the wider community. Let's make ISAHP 2024 a great one!

Enrique Mu
Honorary Conference Chair
ISAHP 2024

MESSAGE FROM THE PRESIDENT OF CREATIVE DECISIONS FOUNDATION

Welcome to the virtual ISAHP 2024 (International Symposium of AHP) virtual conference from December 13-15. This will be the 18th ISAHP conference and the third virtual conference. It is a great pleasure to see friends from the AHP community again. The theme of the conference this year is Enhancing Decision-Making with AI. The presentations will be interesting and novel because AI in combination with the Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP) will undoubtedly add an entirely new approach to decision making. This year, Enrique Mu of Carlow University and the University of Pittsburgh is the Honorary Conference Chair. Mónica García Melón from the Universitat Politecnica de Valencia in Spain is the Conference Chair and Hannia Gonzalez-Urango, also from the Universitat Politecnica de Valencia is the Conference Co-chair. Conference Organizer Elena Rokou and Conference Manager Lirong Wei of Creative DecisionsFoundation handled the extensive under-the-radar operations required to organize a conference. Antonella Petrillo, a professor at the Parthenope University of Naples is Scientific Committee Head. I sincerely appreciate their contributions and that of so many others: the plenary chairs, those who presented workshops, the track chairs, and the reviewers of the papers.

The world has undergone an epic technological change since our last virtual conference in 2022. This year's presentations and papers about making better decisions with AI will be truly innovative, the beginning of a new discipline. The presentations in this conference will lead to the first published AI/AHP papers.

How many of us were consciously using AI for our specific purposes in 2022? AI was already deeply ingrained in our lives but often went unnoticed. Netflix, Spotify, and YouTube used AI to recommend content based on viewing/listening habits. Amazon, eBay, and other online retailers used AI to suggest products tailored to individual preferences. Many other examples exist. Individuals, however, were not using it directly. There was no way to get hold of it and direct it to our purposes.

We only began using AI for personal purposes after OpenAI released a free version of conversational ChatGPT in late 2022. It reached a million users in 5 days; today, there are more than 300 million weekly active users. Most of you probably now rely on AI tools in your daily work and life. One of my favorite ways to use it is to open the refrigerator, tell ChatGPT what foods are there, and ask for a recipe. It may not be Michelin quality, but it makes my decision about what to cook for supper easy. For this conference, we used AI to tell us the best daily 6-hour time period out of 24 hours for our global attendees to meet. AI suggested that starting at 8 am US Eastern time would be the best. We did that, realizing that even AI can't pack worldwide participants into a universally convenient schedule. Please let us know if you have suggestions for improving the scheduled times.

The travelto an in-person conference is expensive and tiresome because our AHP community members live in countries worldwide. Many more people can attend a virtual conference, particularly younger scholars who find it difficult to get university support. The plenary talks and session presentations are being recorded, so you no longer have to choose which parallel talk to attend, as you can view them later at your convenience. A virtual conference allows young people to practice their presentation skills, get feedback from more experienced AHP community members, and, if they wish, receive mentoring to help them publish a paper. Seven highly regarded journals offer publication opportunities for this conference. Visit https://www.isahp.org to see them.

To honor the legacy of my husband, Distinguished University Professor of the University of Pittsburgh, Thomas L. Saaty (1926-

2017), best known as the creator of the decision-making methods Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP) for resolving complex problems. During the last 2 years, the Creative Decisions Foundation has sponsored several unique "T.L. Saaty Decision Making Hackathons." Events, https://creativedecisions.net/org_events/. What is a hackathon? The term hackathon was applied originally to programming competitions in which teams worked intensively for 24-48 hours to write the best code to solve a problem they were given. Holding a Decision Making Hackathon in the style of programming hackathons was Elena Rokou's vision of creating intensive two or 3-day decision-making competitions where student teams apply AHP and ANP to solve real-world challenges. Participants may tackle pre-assigned topics or learn what critical issues a business partner faces. Teams then compete to devise the most effective solutions using robust AHP and ANP decision-making methodologies. Since 2022, several T.L. Saaty decision hackathons have been held, typically hosted by universities. Last month, the Creative Decisions Foundation held the first Global Decision-Making Hackathon, with students worldwide participating. The topic was "Ethical Dilemmas and Responsibility in Autonomous Vehicles." Given the nature of AI in this topic, the winners will present their solutions at this conference.

Thank you once again for joining this virtual conference!

Rozann Saaty
President of the Board
Creative Decisions Foundation
Pittsburgh, Pennsylvania, USA

MESSAGE FROM THE PROGRAM COMMITTEE

Welcome to ISAHP 2024!

It is a great honor to welcome all members of our AHP/ANP community to this third virtual edition of our conference. The virtual format is an excellent way to bring together researchers and practitioners from around the world. Enabling us to share the latest developments, insights, and applications of AHP/ANP in a manner that is impactful, accessible, and cost-effective.

Dr. Thomas Saaty, widely regarded as the father of the AHP/ANP methodology, envisioned a world where structured decision-making could address complex problems and empower individuals and organizations to make better choices. His pioneering contributions have not only shaped the foundations of our discipline but also inspired the global community of scholars and practitioners that gathers here today. This symposium continues his legacy, bringing his vision into contemporary practice and exploring new challenges and horizons in decision-making.

The theme of this year's conference, "**Enhancing Decision-Making with AI**," reflects the growing relevance of artificial intelligence in supporting and advancing decision-making processes. As AI continues to reshape industries and societies, its integration with methodologies like AHP/ANP presents an exciting opportunity to address today's most pressing challenges. This year's discussions and presentations aim to explore these intersections, showcasing innovative applications and inspiring future research in this dynamic field.

We extend our gratitude to Rozann Saaty, founder of the Creative Decisions Foundation (CDF), for her invaluable support of this symposium and the grants that enable scholars and students to participate.

Finally, we would like to extend our sincere thanks to the dedicated members of the organizing committee: Rozann Saaty, president of CDF; Enrique Mu, honorary chair; Elena Rokou, conference organizer; Lirong Wei, conference manager; Antonella Petrillo, head of scientific committee and all the track chairs. Their hard work and commitment have made this event possible.

Thank you for joining us, and we hope you enjoy a productive and inspiring symposium!

Monica Garcia- Melon

Hannia Gonzalez-Urango

Chairs, ISAHP 2024

PROGRAM COMMITTEE

Enrique Mu
Carlow University - University of Pittsburgh
Honorary Conference Chair

Mónica García Melón
Universitat Politecnica de Valencia
Conference Chair

Hannia Gonzalez-Urango
Universitat Politecnica de Valencia
Conference Co-Chair

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Parthenope University of Naples
Head of Scientific Committee

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Conference Organizer

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Creative Decisions Foundation
President
Conference sponsor

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Creative Decisions Foundation
Conference Manager

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AGH University of Science and Technology
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AGH University of Science and Technology
Anna Ujwary-Gil
Institute of Economics, Polish Academy of Sciences

Spain

Pablo Aragonés Beltrán
Universitat Politècnica de València
Mónica García Melón
Universitat Politècnica de València
Rocío Poveda-Bautista
INGENIO (CSIC-UPV), Universitat Politècnica de València
Jose Maria Moreno Jimenez
University of Zaragoza

Hannia Gonzalez-Urango
Universitat Politècnica de València

Turkey

Cengiz Kahraman
Istanbul Technical University
Ilker Topçu
Istanbul Technical University
Sule Onsel Ekici
İstanbul University-Cerrahpaşa
Mujgan Sagir Özdemir
Eskisehir Osmangazi University
Cigdem Kadaifci
Istanbul Technical University
Seda Yanik
Istanbul Technical University
Basar Oztaysi
Istanbul Technical University
Sezi Cevik Onar
Istanbul Technical University

United Kingdom

Ludmil Mikhailov
University of Manchester
Xiaojun Wang
University of Bristol

North America

United States

Ozden Bayazit
Central Washington University
Orrin Cooper
University of Memphis
Birsen Karpak
Youngstown State University
Stan Lipovetsky
GFK Custom Research North America
Marcel Minutolo
Robert Morris University
Milagros Pereyra-Rojas
Latin American Studies Association

Enrique Mu
Carlow University - University of Pittsburgh
Elena Rokou
Creative Decisions Foundation
Gabriela Sava
Clemson University
Jennifer Shang
University of Pittsburgh
Luis Vargas
University of Pittsburgh

Mexico

Luis A. Bojorquez-Tapia
T.C. National Laboratory for Sustainability Sciences
Elvira Tatiana Merino Benitez
National Autonomous University of Mexico

South America
Brazil

Valerio Salomon
UNESP-Universidade Estadual Paulista
Chile
Claudio Garuti
Fulcrum Ingeniería, Santiago
Isabel Spencer
Fulcrum Ingeniería, Santiago
Colombia
Mario Castillo
Universidad de los Andes
Peru
Anna Florek-Paszkowska
CENTRUM Católica Graduate Business School, PUCP, Lima
Alvaro Talavera
Universidad del Pacífico

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

Enrique Mu
Carlow University - University of Pittsburgh, USA
emu@carlow.edu
Igor Balaban
University of Zagreb, Faculty of Organization and Informatics, Croatia
igor.balaban@foi.hr

TRACK #3 - INDUSTRIAL AND MANUFACTURING ENGINEERING

Ilker Topcu
Istanbul Technical University, Turkey
ilker.topcu@itu.edu.tr
Sule Onsel Ekici
Istanbul Technical University, Turkey
sule.ekici@iuc.edu.tr
Cigdem Kadaifci
Istanbul Technical University, Turkey
kadaifci@itu.edu.tr

TRACK #4 – INNOVATION, MANAGEMENT AND ENTREPRENEURSHIP

Anna Florek-Paszkowska
CENTRUM PUCP Business School, Lima, Peru
aflorekpaszkowska@pucp.edu.pe
Anna Ujwary-Gil
Institute of Economics, Polish Academy of Sciences, Poland
ujwary@inepan.waw.pl

TRACK #5 – HEALTHCARE

Claudio Garuti
FULCRUM, Chile
claudiogaruti@fulcrum.cl
Mario Sandoval
FULCRUM, Chile
marsam1061@gmail.com

TRACK #6 – ETHICS, SOCIAL RESPONSIBILITY AND SUSTAINABILITY

Bolajoko Dixon-Ogbechi
University of Lagos, Nigeria
bdixon-ogbechi@unilag.edu.ng
Adeyinka Adeyemi
Intermarc Consulting, Nigeria
adeyinka@intermarc-ng.com

TRACK #7 – RISK ANALYSIS AND DISASTER MANAGEMENT

Luis A. Bojorquez-Tapia
T.C. National Laboratory for Sustainability Sciences, Mexico
bojorquez@ecologia.unam.mx
Elvira Tatiana Merino Benitez
National Autonomous University of Mexico, Mexico
tatianam@iecologia.unam.mx

TRACK #8 – SUPPLY CHAIN MANAGEMENT

Birsen Karpak
Youngstown State University, USA
bkarpak@ysu.edu
Valerio Salomon
Sao Paulo University, Brazil
valerio.salomon@unesp.br
Seda Yanik
Istanbul Technical University, Turkey
sedayanik@itu.edu.tr
Miguel Angel Ortiz
Universidad de la Costa CUC, Colombia
mangelo2008@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
Sezi Cevik Onar
Retech Center, Ecole des Ponts, France
Istanbul Technical University, Turkey
cevikse@itu.edu.tr

TRACK #10 – MACHINE LEARNING, ARTIFICIAL INTELLIGENCE AND DIGITALIZATION

Marcel Minutolo
Robert Morris University, USA
minutolo@rmu.edu

TRACK #11 – BUSINESS APPLICATIONS

Antonella Petrillo
Parthenope University of Naples, Italy
antonella.petrillo@uniparthenope.it

Fabio Di Felice
Parthenope University of Naples, Italy
Fabio.defelice@uniparthenope.it

TRACK #12 - FOSTERING THE USE OF AHP AND ANP IN LATIN AMERICAN COUNTRIES

Milagros Pereyra-Rojas
Latin American Studies Association, USA
milagros@pitt.edu
Alvaro Talavera
Universidad del Pacífico, Peru
ag.talaveral@up.edu.pe

TRACK #13 – T.L. SAATY DECISION MAKING HACKATHON

Elena Rokou
Creative Decisions Foundation, USA
erokou@creativedecisions.net
Lirong Wei
Creative Decisions Foundation, USA
leerongw@gmail.com

ISAHP2024 SUMMARY SCHEDULE

THURSDAY DECEMBER 12			
Time	**Room**	**Title**	**Presenter**
8:00 am	Zoom Workshop 1	W1 - Mastering AHP Models in Python: Setup, Calculation, and Sensitivity Analysis with AhpAnpLib	Dr. Lirong Wei (United States) - Creative Decisions Foundation
9:00 am	Zoom Workshop 2	W2 - Introduction to ANP	Dr. Ilker Topcu (Turkey) - Istanbul Technical University
10:00 am	Zoom Workshop 3	W3 - Advancing with ANP: The Use of Ratings and BOCR Models	Dr. Monica Garcia Melon (Spain) - Universitat Politècnica de València
11:00 am	Zoom Workshop 4	W4 - Data Analytics in ANP with Python: Unveiling Insights through the Supermatrix	Dr. Elena Rokou (United States) - Creative Decisions Foundation
12:00 pm	Zoom Workshop 5	W5 - The Absolute Measurement in AHP/ANP: The Rating Mode and Its Need for Thresholds	Dr. Claudio Garuti (Chile) - Fulcrum Ingeniería, Santiago

FRIDAY DECEMBER 14			
Time	**Room**	**Title**	**Presenter**
7:30 AM	Zoom	**Welcome/Opening Ceremony**	Rozann Saaty (USA) - Creative Decisions Foundation Enrique Mu (USA) - Carlow University Monica Garcia Melon (Spain) - Universitat Politècnica de València Hannia Gonzalez-Urango (Spain) - Universitat Politècnica de València
8:00 AM	Zoom AI PANEL Room	**PANEL: STATE OF THE ART OF AHP AND ANP IN THE LIGHT OF AI**	Alessio Ishizaka (France) - NEOMA Business School Ashraf Labib (United Kingdom) - Portsmouth Business School, University of Portsmouth Elena Rokou (USA) - Creative Decisions Foundation Marcel Minutolo (USA) - Robert Morris University
9:45 AM	Zoom Room A&B	Break Out Sessions: FR_RMA_TR1 FR_RMB_TR11	
10:45 AM	Zoom Room A&B	Break Out Sessions: FR_RMA_TR8 FR_RMB_TR 11	
12:15 PM	Zoom Room A&B	Break Out Sessions: FR_RMA_TR5 FR_RMB_TR2	

**FRIDAY DECEMBER 14**
Time	**Room**	**Title**	**Presenter**
1:30 PM	Zoom Plenary Speech Room	**P2 - Shaping sustainable urban mobility: the role of AHP and decision-support methods in participatory transport planning**	Michela Le Pira (Italy) - University of Catania
2:15 PM	Zoom Room A&B	Break Out Sessions: FR_RMA_TR6	

SATURDAY DECEMBER 14			
Time	**Room**	**Title**	**Presenter**
8:00 AM	Zoom Plenary Speech Room	**P3 - Integrating ethics in AI decision making systems: challenges and opportunities**	José Felix Lozano Aguilar (Spain) - Polytechnic University of Valencia
9:15 AM	Zoom Room A&B	Break Out Sessions: SA_RMA_TR1 SA_RMB_TR11	
10:15 AM	Zoom Room A&B	Break Out Sessions: SA_RMA_TR8 SA_RMB_TR2	
11:30 AM	Zoom Room A&B	Break Out Sessions: SA_RMA_TR13 SA_RMB_TR11	
1:00 PM	Zoom Plenary Speech Room	**P4 - Enhancing Sustainable Supply Chain Decisions through Integrated AHP/ANP Frameworks**	Gulcin Buyukozkan (Turkey) - Galatasaray University
2:15 PM	Zoom Room A&B	Break Out Sessions: SA_RMA_MISC SA_RMB_TR10	

SUNDAY DECEMBER 15			
Time	Room	Title	Presenter
8:00 AM	Zoom Plenary Speech Room	**P5 - Best-Worst Method: An MCDM approach beyond merely formulas**	Jafar Rezaei (Netherlands) - TU Delft
9:45 AM	Zoom Room A&B	Break Out Sessions: SUN_RMA_TR8 SUN_RMB_TR11	
10:45 AM	Zoom Room A&B	Break Out Sessions: SUN_RMA_TR4 SUN_RMB_TR12	
12:00 PM	Zoom Room A&B	Break Out Sessions: SUN_RMA_TR12 SUN_RMB_MISC	
1:00 PM	Zoom	**Best Paper Awards/Closing Ceremony**	Rozann Saaty (USA) - Creative Decisions Foundation Monica Garcia Melon (Spain) - Universitat Politècnica de València

BREAK OUT SESSIONS SUMMARY SCHEDULE

FRIDAY DECEMBER 13 - BREAK OUT SESSIONS	
FRIDAY 9:45 am	
Zoom Room A	**FR_RMA_TR1** **Prof. Luis Vargas (University of Pittsburgh)**
FULL RANK VOTING: THE CLOSEST TO VOTING WITH INTENSITY OF PREFERENCES	*Luis Vargas 1, Marcel Minutolo 2 (1. University of Pittsburgh, 2. Robert Morris University, USA)*
STABILITY OF RANKING-DEPENDENT PAIR-WISE COMPARISON PATTERNS IN THE ANALYTIC HIERARCHY PROCESS	*Sergii Kadenko 1, Oleh Andriichuk 1, Vitalii Tsyganok 1 (1. Institute for Information Recording)*
EXTENSION OF THE SIMPLE MULTI-ATTRIBUTE RATING TECHNIQUE (SMART) TO GROUP DECISION PROBLEM SOLVING	*Hamado BAMOGO 1, Zoïnabo SAVADOGO 1 (1. Université Joseph Ki-ZERBO, UFR-SEA, LANIBIO)*
Zoom Room B	**FR_RMB_TR11** **Antonella Petrillo (Università degli Studi di Napoli Parthenope)** **Mizna Rehman**
FROM THEORY TO APPLICATION: A PYTHON-DRIVEN IMPLEMENTATION OF THE SEESIM MULTI-CRITERIA DECISION MODEL FOR SUSTAINABLE PUBLIC INVESTMENTS	*Gianfranco Iovine 1, Antonella Petrillo 2, Fabio De Felice 2, Ilaria Baffo 1 (1. UNITUS, 2. Universitv† degli Studi di Napoli Parthenope)*

A HYBRID DECISION SUPPORT FRAMEWORK FOR SUSTAINABLE BUSINESS OPTIMIZATION	*Mizna Rehman 1, Antonella Petrillo 1, Fabio De Felice 1 (1. Universit√† degli Studi di Napoli Parthenope)*
AN INTEGRATED BEST-WORST METHOD AND ENTROPY APPROACH FOR SUSTAINABLE SUPPLIER SELECTION	*Beyzanur C.Ervural 1 (1. Necmettin Erbakan University)*
PRIORITIZATION OF KEY CRITERIA FOR EVALUATING SOCIAL MEDIA ADVERTISING IN ONLINE RETAIL UTILIZING AHP	*Saba Mostafaei 1, Ilker Topcu 2 (1. Istanbul technical univ, 2. Istanbul technical university)*
FRIDAY 10:45am	
Zoom Room A	**FR_RMA_TR8** **Prof. Birsen Karpak (Youngstown State University)**
INTEGRATING CNN AND AHP FOR SUPPLIER SELECTION OF AGRICULTURAL PRODUCT	*Ririn Diar Astanti 1, Birsen Karpak 2, The Jin Ai 1 (1. Universitas Atma Jaya Yogyakarta, 2. Youngstown State University)*
MULTICRITERIA ASSESSMENT OF STRATEGIC SUPPLY CHAIN DECISIONS: BENEFITS, OPPORTUNITIES, COSTS, AND RISKS	*Claudemir Tramarico 1, Valerio Salomon 2 (1. S√£o Paulo State University (UNESP ‚Äì Universidade Estadual Paulista), 2. , S√£o Paulo State University (UNESP ‚Äì Universidade Estadual Paulista))*

ASSESSING THE MATURITY OF GOVERNANCE AND COMPLIANCE SYSTEMS: METHODOLOGY AND INSIGHTS	*Kenneth Tombs 1 (1. International Trade Council - Supply Chain Business Council)*
Zoom Room B	**FR_RMB_TR 11** **Fabio De Felice (Università degli Studi di Napoli Parthenope)** **Mizna Rehman**
IDENTIFYING THE MOST IMPORTANT FACTOR MOTIVATING NEPALESE CUSTOMERS TO USE CHATBOTS: AN ANALYTIC HIERARCHY PROCESS APPROACH	*Prabal Sapkota 1, Abhishek Byanjankar 1 (1. Kathmandu University)*
ENHANCING BANK CUSTOMER SEGMENTATION IN ELECTRONIC SERVICE ADOPTION: AN INTEGRATED ANALYTIC HIERARCHY PROCESS - AGGLOMERATIVE HIERARCHICAL CLUSTERING APPROACH WITHIN THE RECENCY, FREQUENCY, AND MONETARY VALUE FRAMEWORK	*Seyedarash Moheimani 1, Seyed Mohammad Hassan Hosseini 2, Alessio Ishizaka 1 (1. NEOMA Business School, France, 2. Shahrood University of Technology)*
INVESTIGATION OF BEST AVAILABLE TECHNIQUE FOR ENERGY AND ENVIRONMENTAL PERFORMANCE IN TEXTILE INDUSTRY: A COMBINED SWOT AND ARAS-G APPROACH	*Anaiz Gul Fareed 1, Antonella Petrillo 1, Fabio De Felice 1 (1. Universitv† degli Studi di Napoli Parthenope)*

FRIDAY 12:10 pm	
Zoom Room A	**FR_RMA_TR5** **Mr. Claudio Garuti (Fulcrum Ltda.)**
A USER-CUSTOMIZABLE HYBRID PERSONALIZATION FOR PREVENTIVE SCREENING	*M. Gabriela Sava 1, Luis Vargas 2, Jerrold May 2, Linda Limeri 3, James Dolan 4 (1. Allen W. and Carol M. Schmidthorst College of Business, Bowling Green State University, 2. University of Pittsburgh, 3. Wilbur O. and Ann Powers College of Business, Clemson University, Clemson, SC, 29634, 4. Busara Analytics LLC, Webster, NY, 14580)*
COMPARING G WITH CLASSICS PATTERN RECOGNITION FORMULAE IN AI	*Claudio Garuti 1, Fabiola Garuti 2 (1. Fulcrum Ltda., 2. Pontifical Catholic University of Chile)*
TOWARDS SUSTAINABLE HEALTHCARE: SURGICAL SET SELECTION USING SPHERICAL FUZZY AHP	*Ahmet Anf±l Kaya 1, Melis Almula Karadayf± 1 (1. Istanbul Medipol University)*
Zoom Room B	**FR_RMB_TR2** **Enrique Mu**
CHALLENGES OF USING AI-AHP FOR STRUCTURING DECISION-MAKING: A CASE STUDY IN THE BANKING SECTOR	*Emanuel Vukovac 1, Barbara ≈†libar 1 (1. University of Zagreb Faculty of Organization and Informatics)*
AN EXPERIENTIAL REFLECTION ON DECISION-MAKING USING AI-AHP: THE CASE OF A COMPANY IN THE TEXTILE AND FUR CLEANING INDUSTRY	*Eva Petrovifá 1, Barbara ≈†libar 1 (1. University of Zagreb Faculty of Organization and Informatics)*

ADVANTAGES OF DECISION-MAKING USING AI-AHP: A CASE IN THE BANKING SECTOR	*Mislav Vusifá 1, Barbara ≈†libar 1 (1. University of Zagreb Faculty of Organization and Informatics)*

SATURDAY DECEMBER 14 - BREAK OUT SESSIONS	
SATURDAY 9:15am	

Zoom Room A	**SA_RMA_TR1** **Prof. Luis Vargas (University of Pittsburgh)**
DETERMINING A SUPPORT SITE FOR INTERNALLY DISPLACED PUPILS BY EXTENDING THE EVAMIX METHOD TO COLLECTIVE DECISION-MAKING BASED ON THE CHOQUET AND SUGENO INTEGRAL IN BURKINA FASO	*Hadarou YIOGO 1, ZovØnabo SAVADOGO 1 (1. UniversitV© Joseph Ki-ZERBO, UFR-SEA, LANIBIO)*
A HIERARCHICAL MODEL TO PRIORITIZATION OF FACTORS TO INCREASE ADOPTION OF EWALLET TRANSACTIONS AMONG CUSTOMERS AND SMES IN KLANG VALLEY, MALAYSIA.	*Rajan Amaloo 1, Rafikul Islam 2 (1. Graduate School of Management, International Islamic University Malaysia (IIUM), Kuala Lumpur, Malaysia, 2. KULLIYYAH OF ECONOMICS AND MANAGEMENT SCIENCES)*
A LITERATURE REVIEW ON THE INTEGRATION OF AI WITH AHP/ANP	*Lirong Wei 1, Elena Rokou 2 (1. Creative Decisions Foundation, 2. Creative Decisions Foundation, USA)*

Zoom Room B	**SA_RMB_TR11** **Antonella Petrillo (Università degli Studi di Napoli Parthenope)** **Anaiz Gul Fareed**
SELECTION OF THE BEST DATA ANALYTICS TOOL FOR DATA ANALYSTS IN NEPAL USING THE ANALYTIC HIERARCHY PROCESS	*Prabal Sapkota 1, Prince Manandhar 1 (1. Kathmandu University)*

MULTI-CRITERIA DECISION MODELLING OF ENVIRONMENTAL, SOCIAL, AND (CORPORATE) GOVERNANCE FACTORS FOR OPTIMAL PORTFOLIO CONSTRUCTION	*Mihir Dash 1, Rita S 2 (1. Alliance University, 2. Head of Department of Statistics, Periyar University)*
PROMPTS, WORKFLOW AND METHOD STATEMENTS ,Äì MAKING AI WORK FOR USING AHP FOR GOVERNANCE RISK CONTROLS ASSESSMENT PURPOSES.	*Kenneth Tombs 1 (1. International Trade Council - Supply Chain Business Council)*

SATURDAY 10:15am

Zoom Room A	**SA_RMA_TR8** **Prof. Valerio Salomon (Sao Paulo State University)**
INDUSTRY 4.0 TECHNOLOGIES FOR REVERSE LOGISTICS: INTEGRATED BAYESIAN-BWM AND COBRA METHOD	*Ajaygopal KV 1, Rakesh Verma 2, Saroj Koul 3 (1. Operations and Supply Chain Management, Indian Institute of Management Mumbai, Mumbai, 2. Analytics & Data Sciences, Indian Institute of Management Mumbai, Mumbai, 3. Saroj Koul, Professor, Jindal Global Business School, OP Jindal Global University, Haryana)*
BIBLIOMETRIC STUDY ON AHP AND INVESTMENT DECISIONS IN INDUSTRY 4.0	*Pedro Palma 1, Raphael Bianco 1, Valerio Salomon 1 (1. S√£o Paulo State University (UNESP), School of Engineering and Sciences, Guaratinguet√°)*
AN EVALUATION FRAMEWORK FOR BLOCKCHAIN SELECTION IN SUPPLY CHAIN	*Birsen Karpak 1, Deepa Iyer 2, Ilker Topcu 3, Mustafa Sahin AYDIN 4, Emre T√ºrkmen 5 (1. Youngstown State University, 2. Cleveland State University, 3. Istanbul technical university, 4. insanteknoloji.com, 5. KocDigital)*

Zoom Room B	SA_RMB_TR2 **Enrique Mu**
RANKING DEPLOYMENT STRATEGIES OF EV CHARGING INFRASTRUCTURE: A MODIFIED AHP WITH STAKEHOLDER PERSPECTIVE	*Osman Ogunclu 1, Seda Yanik 1 (1. Istanbul Technical University)*
PRACTICAL GROUP DECISION-MAKING METHOD USING INCOMPLETE PAIRWISE COMPARISON MATRICES FOR DIFFERENTIATED EVALUATION RESULTS	*Yoichi Iida 1 (1. Suwa University of Science)*
ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION- FACTORS MOTIVATING USE OF AI- BASED TOOLS AMONG NEPALESE STUDENTS	*Prabal Sapkota 1, Kritik Dahal 1 (1. Kathmandu University)*
THE EXTENT AND IMPACT OF ARTIFICIAL INTELLIGENCE ADOPTION ON CORPORATE SOCIAL RESPONSIBILITY AMONG NIGERIAN SMES	*Moruf Adebakin [1], Elizabeth Ojo [2] (1. Department of Business Administration, Yaba College of Technology, 2. Department of Office Technology & Management, Yaba College of Technology, Yaba)*
SATURDAY 11:30am	
Zoom Room A	SA_RMA_TR13 **Elena Rokou (Creative Decisions Foundation)**

PITT HACKATHON 2024- OPTIMIZING UTILITY POLE INSPECTIONS USING THE BOCR METHODOLOGY		*Kumar Chinmay 1, Abhishek Tripathi 1, Elena Rokou 2 (1. University of Pittsburgh, Business School, 2. Creative Decisions Foundation, USA)*
LEVERAGING LARGE LANGUAGE MODELS (LLMS) TO OPTIMIZE THE ANALYTIC HIERARCHY PROCESS (AHP) FOR SAAS PROCUREMENT		*Cha Hee Park 1, Keith Saniga 1 (1. University of Pittsburgh)*
DYNAMIC DECISION-MAKING IN AUTONOMOUS VEHICLES USING AHP AND BOCR MODELS		*Andreas Stylianou 1, Elena Rokou 2 (1. National Technical University of Athens, 2. Creative Decisions Foundation, USA)*
AN AHP-BASED DECISION SUPPORT SYSTEM FOR THE SAFETY PRIORITIZATION PROBLEM OF AUTONOMOUS VEHICLES DURING UNAVOIDABLE COLLISIONS		*Hannah Faye Culaste [1], John Lennon Calorio [2] (1. University of the Philippines-Mindanao, 2. Davao Medical School Foundation, Inc.)*
Zoom Room B	**SA_RMB_TR11_12** **Fabio De Felice (Università degli Studi di Napoli Parthenope)** **Anaiz Gul Fareed**	
COMPARISON OF THE LOGISTICS PERFORMANCE WITH ENTROPY BASED WEIGHTED PRODUCT METHOD		*Beyzanur C.Ervural 1 (1. Necmettin Erbakan University)*
WHY ARE AHP RESULTS NOT BINDING FOR APPRAISING REAL ESTATE?		*Miguel Camacaro [1] (1. Appraisers Reading Club)*

MODELING ECONOMIC DISRUPTIONS AND RESILIENCE STRATEGIES FOR PAKISTAN'S TRANSPORTATION SECTOR DURING POLITICAL PROTESTS	*Yousaf Ali 1, Amin Ullah 2 (1. Fahad Bin Sultan university, Tabuk, 2. University of Macerata)*
SATURDAY 2:15pm	
Zoom Room A	**SA_RMA_TR_MISC** **Luis A. Bojorquez-Tapia (Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City)**
LEVERAGING CLIMATE CHANGE VULNERABILITY ASSESSMENT WITH MCDA	*Elvira Tatiana Merino Benitez 1, Claudio Garuti 2, Luis A. Bojorquez-Tapia 3 (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecolog√≠a, Universidad Nacional Aut√≥noma de M√©xico, Mexico City, Mexico, 2. Fulcrum Ltda., 3. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecolog√≠a, Universidad Nacional Aut√≥noma de M√©xico, Mexico City)*
MEASUREMENT SCALES IN AHP MULTICRITERIA METHODOLOGY FOR CALCULATING AND MANAGING RISKS OF NATURAL DISASTER	*Fabiola Garuti 1, Claudio Garuti 2 (1. Pontifical Catholic University of Chile, 2. Fulcrum Ltda.)*
A MACHINE LEARNING APPROACH TO REPLICATE INTERVIEW ASSESSMENTS FOR SELECTING AIR TRAFFIC CONTROLLER CANDIDATES	*Mustafa V√±zdemir 1, Mvºjgan Safüf±r V√±zdemir 2 (1. Civil Aviation School, Erzincan Binali Yildirim University, 2. Department of Industrial Engineering, Eskisehir Osmangazi University)*
Zoom Room B	**SA_RMB_TR10** **Marcel Minutolo (Robert Morris University, USA)**

STRATEGIC INTEGRATION OF AI IN PROJECT PLANNING: A BOCR-AHP FRAMEWORK	*Kumar Chinmay 1, Elena Rokou 2 (1. University of Pittsburgh, Business School, 2. Creative Decisions Foundation, USA)*
EVALUATING PREDICTIVE MODELS WITH ENSEMBLE LEARNING METHODS FOR CONSTRUCTION PROGRESS AND DEFECT ANALYSIS	*Ching-Lung Fan 1 (1. Republic of China Military Academy)*
CLIMATE FINANCE AND ESG INVESTMENTS: OPPORTUNITIES FOR AHP APPLICATION WITH AI	*Juan Antonio Lillo Paredes 1, Valerio Salomon 2, Claudemir Tramarico 3 (1. Universidad San Ignacio de Loyola, 2. , S∀£o Paulo State University (UNESP ‚Äì Universidade Estadual Paulista), 3. S∀£o Paulo State University (UNESP ‚Äì Universidade Estadual Paulista))*

SUNDAY DECEMBER 15 - BREAK OUT SESSIONS	
SUNDAY 9:45 am	
Zoom Room A	**SUN_RMA_TR8** **Birsen Karpak (Youngstown State University)**
IMPACT OF ARTIFICIAL INTELLIGENCE ON SUPPLY CHAIN RESILIENCE	*Gurkan Akalin 1, Birsen Karpak 2, Ilker Topcu 3, Emel Aktas 4 (1. University of Virginia's College at Wise, 2. Youngstown State University, 3. Istanbul technical university, 4. Cranfield University)*
EXPLORING THE INTERACTION OF PRESSURE SOURCES AND TYPES ON SSCM PRACTICES: AN ANP MODEL APPROACH	*Alina Marculetiu 1, Cigdem Ataseven 2, Birsen Karpak 1, Ilker Topcu 3 (1. Youngstown State University, 2. Cleveland State University, 3. Istanbul technical university)*
INTEGRATION OF SPHERICAL FUZZY-AHP AND OPARA METHOD FOR ROBUST MULTI-CRITERIA DECISION-MAKING	*Mr. Ajaygopal KV1, Dr. Saroj Koul2, Prof. Rakesh Verma3 (1. Operations and Supply Chain Management, Indian Institute of Management Mumbai, Mumbai, 2. Saroj Koul, Professor, Jindal Global Business School, OP Jindal Global University, Haryana, India, skoul@jgu.edu.in (ORCID: 0000-0002-3051-5625)., 3. Analytics & Data Sciences, Indian Institute of Management Mumbai, Mumbai)*
Zoom Room B	**SUN_RMB_TR11** **Antonella Petrillo (Università degli Studi di Napoli Parthenope)** **Mizna Rehman**
RELATIVE IMPORTANCE OF FACTORS IMPACTING ELECTRIC VEHICLE CHARGING STATION USER EXPERIENCE: AN AHP APPLICATION	*Ayse Elvan Bayraktaroglu 1, Ahmet Bozkurt 1, Umur Seckin 1 (1. Istanbul Technical University)*

WHAT AHP/ANP CAN DO FOR SIX SIGMA? A SHORT LITERATURE SURVEY	*Marcin Nakielski 1, Grzegorz Ginda 2, Vigneshkumar Chellappa 3 (1. Doctoral School of AGH University of Krakow, 2. AGH University of Krakow, 3. The Hong Kong Polytechnic University)*
CLIMATE CHANGE ON A BUDGET: DEFINING OPTIMAL NET ZERO STRATEGIES FOR INFRASTRUCTURE PROJECTS	*Elvira Tatiana Merino Benitez 1, Ofelia Garc√≠a 1, Luis A. Bojorquez-Tapia 1 (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecolog√≠a, Universidad Nacional Aut√≥noma de M√©xico, Mexico City)*

SUNDAY 10:15 am	
Zoom Room A	**SUN_RMA_TR4** **Anna Florek-Paszkowska**
AI INTEGRATION DEMONSTRATION AT THE AHP BASED MOBILE APP DECISION MENTOR	*Sovit Poudel 1, Shashi Bhattarai 2 (1. Truenary Solutions Pvt. Ltd., 2. Development Dynamics Pvt. Ltd.)*
ARTIFICIAL INTELLIGENCE AND ENTREPRENEURIAL DECISION-MAKING	*Olawale Olatidoye 1, Moruf Adebakin 2 (1. Department of Food Science and Technology,Yaba College of Technology, 2. Department of Business Administration, Yaba College of Technology)*
STRATEGIC DECISION MAKING: APPLYING AHP BASED APP DECISION MENTOR	*Shashi Bhattarai 1, Sovit Poudel 2 (1. Development Dynamics Pvt. Ltd., 2. Truenary Solutions Pvt. Ltd.)*
Zoom Room B	**SUN_RMB_TR12** **Milagros Pereyra-Rojas**
A MULTIDIMENSIONAL APPROACH BASED ON THE ANALYTIC NETWORK PROCESS FOR EARTHQUAKE	*Iv√°n Infanz√≥n 1, Alvaro Talavera 2 (1. Pontifical Catholic University of Peru, 2. Universidad del Pac√≠fico)*

VULNERABILITY ASSESSMENT AND POLICY DEVELOPMENT: A CASE STUDY OF AYACUCHO, PERU	
STRATEGIC MODEL FOR UNIVERSITY PERFORMANCE EVALUATION USING AHP AND FUZZY LOGIC	*Risley Rengifo 1, Alvaro Talavera 2 (1. Universidad Privada del Norte, 2. Universidad del Pac√≠fico)*
VULNERABILITY ANALYSIS OF ANAEMIA IN PERUVIAN DEPARTMENTS: A TEMPORAL COMPARISON	*Benjamin Arriaga 1 (1. Universidad del Pac√≠fico)*
VULNERABILITY ASSESSMENT OF MINING CONFLICTS IN PERU USING AHP	*Fiorella Aguirre 1, Alvaro Talavera 1, Soledad Espez√ʃa 1, Luciano Stucchi 1 (1. Universidad del Pac√≠fico)*

SUNDAY 12:00pm	
Zoom Room A	**SUN_RMA_TR6** **Bolajoko Dixon-Ogbechi (University of Lagos)**
PRIORITIZATION OF SUSTAINABLE DEVELOPMENT GOALS: A CASE STUDY APPLICATION FOR AGILE PROJECTS	*Ayv√ßa Maden 1, Erdal Ulukan 1 (1. Beykent University)*
PERCEPTION OF DRIVERS AND BARRIERS TO THE ADOPTION OF DECENTRALIZED RENEWABLE TECHNOLOGIES. AN ANP-BASED APPROACH IN COLOMBIA	*Hannia Gonzalez-Urango 1, Monica Garcia Melon 1, Isabel Aparisi-Cerda 1, David Ribv≥-Pv©rez 1, Ivan Ligardo-Herrera 2 (1. Universitat Politv®cnica de Valv®ncia, 2. Delft University of Technology)*

DETERMINING THE RELATIVE IMPORTANCE OF CORPORATE GOVERNANCE FRAMEWORK ELEMENTS FOR TECHNOLOGY FIRMS IN NIGERIA USING THE ANALYTIC HIERARCHY PROCESS MODEL		*Adeyinka Adeyemi 1, Bolajoko Dixon-Ogbechi 1 (1. University of Lagos)*
Zoom Room B	**SUN_RMA_TR_MISC** **Claudio Garuti**	
CRITICAL REVISION OF THE MENTAL HEALTH QUESTIONNAIRE /SUSESO CEAL-SM		*Claudio Garuti 1, Mario Sandoval 2 (1. Fulcrum Ltda., 2. Medical Sapiens)*
SELECTING AN ENHANCEMENT PROCESS FOR LARGE-FORMAT ADDITIVE MANUFACTURING USING THE ANALYTICAL NETWORK PROCESS (ANP)		*Javier Bas [1], Pablo Castelló [1], Cesar García [1] (1. Universidad Politécnica de Valencia; Instituto de Diseño y Fabricación)*

PROGRAM SCHEDULE WITH ABSTRACTS

WORKSHOP 1: MASTERING AHP MODELS IN PYTHON: SETUP, CALCULATION, AND SENSITIVITY ANALYSIS WITH AHPANPLIB

8:00 am

Room: Zoom Workshop Room 1

This workshop will guide participants through setting up the Python AhpAnpLib library in Google Colab. Participants will learn how to structure AHP models using Excel and repurpose SuperDecisions models by importing them into Python. The session emphasizes environment setup and the creation of AHP models using the Python library.

Requirements:

- **Software:** No software installation required; Google Colab will be used.
- **Previous Knowledge:** A basic understanding of AHP models is required. No prior Python knowledge is needed for this workshop.

Presenter: Dr. Lirong Wei (Creative Decisions Foundation, USA)

WORKSHOP 2: INTRODUCTION TO ANP

9:15 am

Room: Zoom Workshop Room 2

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. Developed by Thomas L. Saaty, ANP is widely used for structuring, modeling, and analyzing complex decisions based on mathematics and psychology.

BREAK OUT SCH. – THURSDAY

Participants 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." The workshop will also cover paired comparison matrices, eigenvector calculations, supermatrix formation, and Saaty's Compatibility Index.

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

WORKSHOP 3: ADVANCING WITH ANP: THE USE OF RATINGS AND BOCR MODELS

10:45 am
Room: Zoom Workshop Room 3

This workshop covers advanced techniques in Analytic Network Process (ANP), focusing on Benefits, Opportunities, Costs, and Risks (BOCR) models, and the ratings method to assess alternatives.
Requirements:
Participants should have a basic understanding of ANP or have attended the previous introductory ANP workshop.

Presenter: Dr. Monica Garcia Melon (Universitat Politècnica de València, Spain)

WORKSHOP 4: DATA ANALYTICS IN ANP WITH PYTHON: UNVEILING INSIGHTS THROUGH THE SUPERMATRIX

12:00 pm
Room: Zoom Workshop Room 4

In this hands-on workshop, participants will explore data analytics within the ANP framework using the AhpAnpLib Python library. Focusing on the supermatrix as a core tool, participants will learn to calculate, interpret, and conduct sensitivity analysis to test decision robustness.
Requirements:
- **Software:** Google Colab (no installation required).
- **Prior Knowledge:** Familiarity with ANP models. No Python

experience is required.

Presenter: Dr. Elena Rokou (Creative Decisions Foundation, USA)

WORKSHOP 5: THE ABSOLUTE MEASUREMENT IN AHP/ANP: THE RATING MODE AND ITS NEED FOR THRESHOLDS

1:30 pm
Room: Zoom Workshop Room 5

This workshop focuses on understanding and applying the absolute measurement mode of AHP (the rating mode), emphasizing the need for thresholds and their calculation.

Requirements:
There are no special requirements, but familiarity with scales, thresholds, and compatibility concepts is beneficial.

Presenter: Dr. Claudio Garuti (Fulcrum Ingeniería, Chile)

FRIDAY DECEMBER 13

WELCOME/OPENING CEREMONY

7:30 am

Monica Garcia Melon, Chair of ISAHP 2024, Dr. Hannia Gonzalez-Urango, Co-Chair of ISAHP 2024, Enrique Mu, Honorary Chair of the ISAHP 2024Rozann Saaty, President of the Creative Decisions Foundation, USA

Speakers:
Rozann Saaty (Creative Decisions Foundation, USA)
Enrique Mu (ISAHP 2024 Chair)
Monica Garcia Melon (Universitat Politècnica de València, Spain)
Hannia Gonzalez-Urango (Universitat Politècnica de València, Spain)

PANEL: STATE OF THE ART OF AHP AND ANP IN THE LIGHT OF AI

8:00 am

Speakers:
Alessio Ishizaka (NEOMA Business School, France), Ashraf Labib (Portsmouth Business School, University of Portsmouth, United Kingdom), Elena Rokou (Creative Decisions Foundation, USA), and Marcel Minutolo (Robert Morris University, USA)

FRIDAY - SESSION 1A - TRACK 1

9:45am

Short Code: FR_RMA_TR1

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

FULL RANK VOTING: THE CLOSEST TO VOTING WITH INTENSITY OF PREFERENCES

Luis Vargas[1], Marcel Minutolo[2] (1. University of Pittsburgh, 2. Robert Morris University, USA)

Abstract

Voting is a fundamental aspect of democracy, but traditional voting schemes often fail to capture the intensity of preferences individuals possess. This loss of intensity can lead to an oversimplification of complex issues and a lack of accurate representation of diverse opinions. To address this limitation, we propose a voting method called "Full Rank Voting" that incorporates the intensity of preferences into the voting process. By using pairwise comparisons and Saaty's fundamental scale, we transform individual preferences into numerical values and construct a matrix that represents the intensity of preferences for different candidates or options. In the case of two candidates, each voter expresses their preference intensity by assigning a numerical value from the fundamental scale. These values are then used to calculate the priorities or percentages of votes for each candidate. By incorporating intensity of preferences, the voting process becomes more nuanced, and ordinal preferences become a specific case of cardinal preferences. When multiple candidates are involved, we encounter the challenge of combining intensity of preferences with rank voting. We conduct simulation experiments to demonstrate that rank voting and voting with intensity of preferences yield similar results, even for relatively small sample sizes. We then apply the process to an actual voting dataset to further demonstrate the results. Overall, Full Rank Voting offers a solution for capturing the intensity of preferences in voting, leading to a more accurate representation of individual choices, increased democratic legitimacy, and the ability to identify common ground and prioritize preferences based on their strength.

STABILITY OF RANKING-DEPENDENT PAIR-WISE COMPARISON PATTERNS IN THE ANALYTIC HIERARCHY PROCESS

Sergii Kadenko[1], Oleh Andriichuk[1], Vitalii Tsyganok[1] (1. Institute for Information Recording)

Abstract

The paper is dedicated to ranking-dependent pair-wise comparison patterns which can be used in the Analytic Hierarchy Process. Ordinal information on compared objects can be used to improve the quality of expert data during estimation and, potentially, reduce the number of comparisons that the experts need to perform. In our research we focus on several ranking-dependent approaches – Best Worst method, Best-Second Best (Top 2) method, and the original "queues" method. The first two comparison patterns (and respective methods) are incomplete, while the third is a complete one. We determine conditions under which these three methods can be compared in terms of stability to expert errors. We also develop an algorithm, according to which a simulation-type experiment should be organized. Subsequent experimental study will allow us to compare the three listed approaches according to their stability.)

EXTENSION OF THE SIMPLE MULTI-ATTRIBUTE RATING TECHNIQUE (SMART) TO GROUP DECISION PROBLEM SOLVING)

Hamado BAMOGO[1], Zoïnabo SAVADOGO[1] (1. Université Joseph Ki-ZERBO, UFR-SEA, LANIBIO)

Abstract

This study proposes an extension of the SMART (Simple Multi-Attribute Rating Technique) method to adapt it to group decisions, a context where classical methods often show their limits. To better manage the diversity of preferences and complex interactions

between group members, it integrates the WOWA (Weighted Ordered Weighted Average) aggregation operators and the exponential weighted logarithmic mean. The use of WOWA allows performances to be weighted according to their relative importance and order, while the exponential logarithmic mean helps to effectively manage extreme values. This adaptation of SMART aims to foster harmonious collective decision-making, and offers organizations a flexible tool for collaborative governance processes, particularly useful in environments marked by complex dynamics and diverse viewpoints.)

FRIDAY - SESSION 1B - TRACK 11

9:45am

Short Code: FR_RMB_TR11

Session Chair: Prof. Antonella Petrillo (Università degli Studi di Napoli Parthenope)

FROM THEORY TO APPLICATION: A PYTHON-DRIVEN IMPLEMENTATION OF THE SEESIM MULTI-CRITERIA DECISION MODEL FOR SUSTAINABLE PUBLIC INVESTMENTS

Gianfranco Iovine[1], Antonella Petrillo[2], Fabio De Felice[2], Ilaria Baffo[1] (1. UNITUS, 2. Università degli Studi di Napoli Parthenope)

Abstract

The efficient allocation of public investments is a cornerstone of sustainable economic and social development. In the face of contemporary challenges, such as climate change, resource management, and social equity, decision-makers require innovative tools to ensure investments yield long-term value. This study presents an enhanced approach to the Sustainable Economic, Environmental, and Social Investment Model (SEESIM), a

multi-criteria framework for evaluating public projects. SEESIM leverages the Analytic Hierarchy Process (AHP) to integrate environmental, economic, and social dimensions, balancing efficiency with sustainability across diverse regional contexts.

As part of this research, the SEESIM framework has been transformed into a software application developed in Python, utilizing the Python AhpAnpLib Library. This tool automates the evaluation process, from criteria weighting to project ranking, ensuring transparency, replicability, and ease of use. The resulting software enables policymakers and practitioners to simulate scenarios, monitor project impacts, and optimize resource allocation with precision.

A case study demonstrates the application of the software, showcasing its ability to enhance decision-making and adapt to varying regional priorities. By embedding analytical rigor and technological innovation, this advancement empowers stakeholders to drive sustainable investments that align with long-term strategic objectives. The integration ofSEESIM into a practical software solution marks a significant step forward in the pursuitof sustainable development, offering a robust platform for the analysis and optimization of public resources.

A HYBRID DECISION SUPPORT FRAMEWORK FOR SUSTAINABLE BUSINESS OPTIMIZATION

Mizna Rehman[1], Antonella Petrillo[1], Fabio De Felice[1] (1. Università degli Studi di Napoli Parthenope)

Abstract

The study introduces a decision-making framework that integrates the Analytic Hierarchy Process (AHP) with regression analysis, implemented within a KNIME workflow, to

evaluate and prioritize sustainability actions. The framework utilizes AHP to analyze criteria such as resource efficiency, waste reduction, and operational transparency, and regression analysis to quantify the impact of prioritized actions on business outcomes. Applied to a manufacturing case study, the model demonstrated the ability to optimize decision-making, improve resource allocation, and accurately predict the outcomes of sustainability initiatives. The results highlight the advantages of a combined digital approach that bridges qualitative prioritization and quantitative analysis, supporting sustainability and circular economy goals.

AN INTEGRATED BEST-WORST METHOD AND ENTROPY APPROACH FOR SUSTAINABLE SUPPLIER SELECTION

Beyzanur C.Ervural[1] (1. Necmettin Erbakan University)

Abstract

The intensely competitive environment, economic conditions, and constantly changing balances require businesses to take steps to strengthen themselves. Managing supply chain processes with proactive and multidimensional decision-making mechanisms is one of the keys to a successful position in the sector. This study examines a supplier evaluation process in a manufacturing company that assesses current key competitive conditions, such as environmental awareness and digital transformation efforts, as well as key factors that remain relevant, such as price, quality and delivery performance. First, the criteria weights were evaluated using the best-worst method (BWM) based on expert opinion. Then, the suppliers were ranked by adapting the weights of these criteria to the simple additive weighting (SAW) method. In this way, criterion weights were evaluated using the BWM method, which is a subjective approach based on expert opinion, and the SAW method, which is an objective approach based entirely on calculations. Secondly, the criteria weights were evaluated using the entropy method and then the suppliers were ranked with SAW method. In

this regard, the supplier selection problem, which will always maintain its importance in the literature is evaluated from a multidimensional perspective with a two-stage analytical approach. The obtained results are expected to provide guidance for the improvement and investment decisions that company managers should prioritize.

PRIORITIZATION OF KEY CRITERIA FOR EVALUATING SOCIAL MEDIA ADVERTISING IN ONLINE RETAIL UTILIZING AHP

Saba Mostafaei[1], Ilker Topcu[2] (1. Istanbul technical univ, 2. Istanbul technical university)

Abstract

This paper aims to establish a structured approach for evaluating social media advertising strategies in online retail by identifying critical evaluation criteria and then prioritizing them. Through a comprehensive literature review of over 25 papers, and categorized by AI tools this study suggests key factors that drive effective advertising outcomes, including audience engagement, conversion rates, and cost efficiency. The findings reveal that these criteria are essential in guiding marketers to make informed decisions that maximize ad effectiveness and customer reach. In examining multi-criteria decision-making (MCDM) methods, the Analytic Hierarchy Process (AHP) is identified as the most widely adopted technique in digital marketing contexts. In this study, we also utilized the AHP method to prioritize the social media advertising strategies.

FRIDAY - SESSION 2A - TRACK 8

10:45am

Short Code: FR_RMA_TR8

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

INTEGRATING CNN AND AHP FOR SUPPLIER SELECTION OF AGRICULTURAL PRODUCT

Ririn Diar Astanti[1], Birsen Karpak[2], The Jin Ai[1] (1. Universitas Atma Jaya Yogyakarta, 2. Youngstown State University)

Abstract

Decision-making in a company spans strategic, tactical, and operational levels. Supplier selection, a critical strategic decision, requires evaluating whether product samples from prospective suppliers meet the company's established standards, such as color and texture. This evaluation process is time-consuming and labor-intensive when conducted manually, especially given the inherent variability of agricultural products. Moreover, the high variability can lead to decision fatigue among evaluators.

To address these challenges, this study proposes using Convolutional Neural Network (CNN) techniques to automate the evaluation process. A CNN model, trained on approximately 3,000 labeled images of a specific agricultural product, classifies samples as either meeting standards (acceptable) or not meeting standards (not acceptable). By applying this model, the company can efficiently assess whether a product sample from a prospective supplier aligns with its quality standards and generate automated decision recommendations.

However, product quality is only one of several criteria involved in supplier selection. Other critical factors, such as price, vendor reputation, and supplier capacity, must also be considered. The Analytic Hierarchy Process (AHP) is employed alongside the CNN model to incorporate these multiple criteria. In the proposed framework, CNN results filter out suppliers whose products do not meet quality standards and provide pairwise comparison values for the "quality" criterion in AHP. Combined with other criteria, these

pairwise comparisons enable a comprehensive AHP-based decision model for supplier selection.

This integrated CNN-AHP framework streamlines the supplier selection process by automating quality assessments and systematically addressing multiple decision criteria. It offers a robust solution for strategic decision-making in agricultural supply chains.

MULTICRITERIA ASSESSMENT OF STRATEGIC SUPPLY CHAIN DECISIONS: BENEFITS, OPPORTUNITIES, COSTS, AND RISKS

Claudemir Tramarico[1], Valerio Salomon[2] (1. São Paulo State University (UNESP – Universidade Estadual Paulista), 2., São Paulo State University (UNESP – Universidade Estadual Paulista)

Abstract

An adequate supply chain strategy must exhibit agility to respond to evolving circumstances while demonstrating resilience to ensure operational stability during disruptions. This paper systematically evaluates supply chain strategies, emphasizing the Benefits, Opportunities, Costs, and Risks (BOCR) framework through a multicriteria perspective. A significant contribution of this research lies in developing a methodology that leverages Multi-Criteria Decision Analysis (MCDA) for assessing these strategies. An exploratory analysis was performed using the Analytic Hierarchy Process (AHP). This evaluation incorporates BOCR as the criteria alongside various functional performance categories as alternatives. By providing a practical framework, this paper supports supply chain managers in identifying and addressing critical elements such as speed, dependability, volume/mix flexibility, and quality, enhancing overall performance. Additionally, this study contributes valuable theoretical insights into the application of MCDA

methodologies in supply chain strategy, highlighting the benefits of adopting a structured decision-making approach.)

ASSESSING THE MATURITY OF GOVERNANCE AND COMPLIANCE SYSTEMS: METHODOLOGY AND INSIGHTS

Kenneth Tombs[1] (1. International Trade Council - Supply Chain Business Council)

Abstract

Effective Governance, Risk, and Compliance (GRC) systems are vital for managing risks and regulatory or standards requirements, particularly for micro/smaller or niche businesses. Assessing these systems for quality and effectiveness is challenging, especially in complex environments that demand data completeness, timeliness, and integration. This paper presents a methodology for evaluating GRC systems combining AI-driven data analytics and judgement making, focusing on key criteria such as completeness, improvement over time, cross-linking, granularity, and effectiveness in relation to ISO and other standards.

FRIDAY - SESSION 2B - TRACK 11

10:45am

Short Code: FR_RMB_TR 11

Session Chair: Prof. Fabio De Felice (Università degli Studi di Napoli Parthenope)

IDENTIFYING THE MOST IMPORTANT FACTOR MOTIVATING NEPALESE CUSTOMERS TO USE CHATBOTS: AN ANALYTIC HIERARCHY PROCESS APPROACH

Prabal Sapkota[1], Abhishek Byanjankar[1] (1. Kathmandu University)

Abstract

Digital transformation has fundamentally changed the way we do business. Many companies have adopted new technologies to streamline operations, increase profitability, maintain a competitive advantage, and enhance customer experience. In line with this, interest in chatbots is growing, as these machine agents function as natural language user interfaces for service providers. Chatbots are believed to enhance customer satisfaction and operational efficiency. However, there is no definitive factor that motivates customers to use chatbots. This uncertainty also applies to the Nepalese context, where businesses offering chatbot services are unaware of the main reasons customers use them. Companies are unsure about upgrading their chatbot services, as several factors and subfactors influence their use. This research aims to identify and rank the factors and subfactors that motivate Nepalese customers to use chatbots. These findings can help chatbot service providers address areas where their chatbots need improvement. This is a true case of multi-criteria decision-making (MCDM), and the Analytic Hierarchy Process (AHP) has been adopted in this study.)

ENHANCING BANK CUSTOMER SEGMENTATION IN ELECTRONIC SERVICE ADOPTION: AN INTEGRATED ANALYTIC HIERARCHY PROCESS - AGGLOMERATIVE HIERARCHICAL CLUSTERING APPROACH WITHIN THE RECENCY, FREQUENCY, AND MONETARY VALUE FRAMEWORK

Seyedarash Moheimani[1], Seyed Mohammad Hassan Hosseini[2], Alessio Ishizaka[1] (1. NEOMA Business School, France, 2. Shahrood University of Technology)

Abstract

Clustering techniques, invaluable for classifying data based on feature similarities, often face challenges with hierarchical structures and varying submetrics. This study integrates the Analytic Hierarchy Process (AHP) and Agglomerative Hierarchical Clustering (AHC) to address these limitations, prioritizing criteria and enhancing customer segmentation in electronic banking service adoption through internet and mobile bank portals. We introduce a unique framework based on the Recency, Frequency, Monetary (RFM) model to assess customer engagement with concrete data. Data were collected from an Iranian bank in the first half of 2022 to test our proposed method. The research findings, validated by the Silhouette Coefficient (SC), reveal a four-cluster solution representing varying levels of customer engagement with e-services, distributed as 32.5%, 5. 5.2%, 1. 2.1%, and 0.2%, from the least to the most engaged clusters. A subsequent AHP analysis prioritized these clusters, informing targeted marketing strategies. Finally, our study offers practical, demographic-based recommendations for bank directors, aimed at enhancing engagement with electronic banking services and improving operational efficiency.)

INVESTIGATION OF BEST AVAILABLE TECHNIQUE FOR ENERGY AND ENVIRONMENTAL PERFORMANCE IN TEXTILE INDUSTRY: A COMBINED SWOT AND ARAS-G APPROACH

Anaiz Gul Fareed[1], Antonella Petrillo[1], Fabio De Felice[1] (1. Università degli Studi di Napoli Parthenope)

Abstract

This study includes connecting the Best Available Technique (BAT) for energy evaluations and environmental performance criteria in the textile industry, mainly employing fiber preparation, cotton fabric dying, printing and, other textile finishing operations. After careful investigation, 9 different techniques are identified in this

study from three distinct categories of overall environmental performance, water consumption and wastewater generation, and energy efficiency. The SWOT analysis using the fuzzy analytical hierarchical process of this study revealed "Weakness" as the most influential factor, followed by "Opportunities", "Strengths" and then "Threats". Subsequently, a multi-criteria decision-making approach, employing the grey additive ratio assessment (ARAS-G) was used to rank the BAT in this study.

FRIDAY - SESSION 3A - TRACK 5

12:15pm

Short Code: FR_RMA_TR5

Session Chair: Mr. Claudio Garuti (Fulcrum Ltda.)

A USER-CUSTOMIZABLE HYBRID PERSONALIZATION FOR PREVENTIVE SCREENING

M. Gabriela Sava[1], Luis Vargas[2], Jerrold May[2], Linda Limeri[3], James Dolan[4] (1. Allen W. and Carol M. Schmidthorst College of Business, Bowling Green State University, 2. University of Pittsburgh, 3. Wilbur O. and Ann Powers College of Business, Clemson University, Clemson, SC, 2. 9634, 4. Busara Analytics LLC, Webster, NY, 1. 4580)

Abstract

Targeted medical decision-making is a current strategy for addressing the heterogeneity in the patient population, especially when patients' preferences are included in the decision-making process. In this paper, we propose a user-customizable hybrid framework that can be adjusted at the patient group level to target a medical decision process. Our framework provides a flexible design, capable of balancing the gain from the reduction of provider time against the cost of prediction inaccuracy resulting from group

customization. The framework combines a descriptive process, used to group the patients based on preference-based subjective features, with a predictive process, which uses objective features to match a new patient with a group. We illustrate our approach by applying it to a colorectal cancer screening problem. The provider chooses what level of trade-off is appropriate, as a function of the acceptable error level. The group customization process allows decision makers to better allocate scarce resources, by potentially shortening the time-consuming process of modelling patients' preferences using individualized stability analysis.

COMPARING G WITH CLASSICS PATTERN RECOGNITION FORMULAE IN AI

Claudio Garuti[1], Fabiola Garuti[2] (1. Fulcrum Ltda., 2. Pontifical Catholic University of Chile)

Abstract
This study assesses the G index as a similarity measure for pattern recognition, particularly in weighted environments like medical diagnosis. Compared to traditional methods such as Weighted Absolute Differences (WAD) and Dot Product (DP), the G index provides greater sensitivity and accuracy using the definition of cosine function, normalizing each coordinate and sum over all the profile's coordinates. Through analysis and examples, the paper demonstrates that G better captures variations in profile similarity, especially with differing indicator weights. The study also introduces the Maximum Difference Formula for pinpointing maximum deviation, enhancing database optimization for disease profiles. This research highlights the importance of choosing appropriate similarity measures to improve diagnostic accuracy in sensitive fields through better pattern recognition.)

TOWARDS SUSTAINABLE HEALTHCARE: SURGICAL SET SELECTION USING SPHERICAL FUZZY AHP

Ahmet Anıl Kaya[1], Melis Almula Karadayı[1] (1. Istanbul Medipol University)

Abstract

Selecting materials for the operating room is a critical decision-making process that significantly impacts patient safety, operational success, and cost efficiency. Ensuring that surgical sets are made from high-quality, durable, and reusable materials is essential, as this not only reduces the risk of complications but also enhances overall patient outcomes. However, the selection process is complex, involving numerous criteria that must be carefully evaluated to meet stringent quality standards while considering cost constraints and reusability.

To address these challenges, this study proposes a multi-criteria decision-making (MCDM) framework utilizing the Spherical Fuzzy Analytic Hierarchy Process (AHP), which is particularly suited for handling the uncertainty and vagueness often present in expert evaluations. Spherical Fuzzy AHP allows for a detailed assessment of the various factors influencing material selection—such as durability, quality, cost, and reusability—by incorporating fuzzy logic to account for the subjective and imprecise nature of human judgment. This approach provides a structured methodology for weighting and ranking each criterion, facilitating a comprehensive analysis that supports decision-makers in selecting the optimal materials for operating room use. The proposed framework not only ensures that the selected materials align with clinical and operational needs but also promotes cost-effective choices that contribute to long-term sustainability. A case study with a private hospital in Istanbul was conducted to demonstrate the effectiveness of the proposed approach.)

FRIDAY - SESSION 3B - TRACK 2

12:15pm

Short Code: FR_RMB_TR2

Session Chair: Enrique Mu

CHALLENGES OF USING AI-AHP FOR STRUCTURING DECISION-MAKING: A CASE STUDY IN THE BANKING SECTOR

Emanuel Vukovac[1], Barbara Šlibar[1] (1. University of Zagreb Faculty of Organization and Informatics)

Abstract

In today's business environment, decision-making has become more complex and reliant on data. This research examines decision-making structuring using the Analytic Hierarchy Process (AHP), employing traditional research techniques like expert interviews and literature reviews, along with support from artificial intelligence (AI), specifically the ChatGPT tool. This study explores the challenges of using AI-AHP, drawing on students'

experiences in tackling a tactical issue related to Internet Security Vulnerabilities in the current version of a new application within a financial organization.

AN EXPERIENTIAL REFLECTION ON DECISION-MAKING USING AI-AHP: THE CASE OF A COMPANY IN THE TEXTILE AND FUR CLEANING INDUSTRY

Eva Petrović[1], Barbara Šlibar[1] (1. University of Zagreb Faculty of Organization and Informatics)

Abstract

BREAK OUT SCH. – FRIDAY

Working on structuring a strategic decision-making problem in the textile industry provided an opportunity to experience two approaches to structure the decision model: the traditional one (interviews, surveys, and literature review) using the Analytic Hierarchy Process (AHP) and a hybrid approach, using artificial intelligence (AI), more specifically ChatGPT, to validate/modify the original model.

ADVANTAGES OF DECISION-MAKING USING AI-AHP: A CASE IN THE BANKING SECTOR

Mislav Vusić[1], Barbara Šlibar[1] (1. University of Zagreb Faculty of Organization and Informatics)

Abstract

In the contemporary business landscape, decision-making processes have become increasingly sophisticated and data-driven. This research explores the structuring of decision-making problems through the Analytic Hierarchy Process (AHP), using traditional research methods, such as expert interviews and literature review, followed by artificial intelligence (AI) support, specifically the ChatGPT tool. The paper discusses the AI advantages with AHP based on students' experience when addressing a tactical problem concerning Internet Security Vulnerabilities in the Current Version of a New Application within a financial organization.

PLENARY SPEAKER - SHAPING SUSTAINABLE URBAN MOBILITY: THE ROLE OF AHP AND DECISION-SUPPORT METHODS IN PARTICIPATORY TRANSPORT PLANNING

1:30 pm

The keynote speech will present some applications of AHP in combination with other decision-support methods and tools (e.g. agent-based modelling, the Delphi method, GIS) to support participatory decision-making processes in transport planning.

BREAK OUT SCH. – FRIDAY

Transport planning has been traditionally seen as a technocratic process, aimed at analysing the transport system, defining and choosing solutions based on the results of technical analyses. Nowadays, thanks to the sustainable mobility paradigm, the approach has changed towards participatory decision-making processes. However, it is not easy to understand how to engage stakeholders and citizens to find solutions that are technically-sound, while satisfying multiple preferences and expectations. Since transport decisions typically involve multiple criteria of judgments, the rationale behind the speech is to understand how multi-criteria decision-making methods and, in particular, AHP, could be used to support participatory transport planning.

Presenter: MICHELA LE PIRA (University of Catania, Italy)

BREAK OUT SCH. – FRIDAY

SATURDAY DECEMBER 14

PLENARY SPEAKER: INTEGRATING ETHICS IN AI DECISION MAKING SYSTEMS: CHALLENGES AND OPPORTUNITIES

8:00 am

One of the principal risks, urgently identified by the European AI-ACT, is the potential for AI systems to substitute human decisions in vital spheres of human life (education, health, economy, legal, etc.).

My speech aims to reflect on the diverse options for integrating the ethical principles in AI systems in a way that, using Florid words: "promotes human self-realization, enhances human capabilities, increases social capacities, and cultivates social cohesion". (Floridi et al., 2018a).

I will start by presenting the main concerns regarding ethics in AI. My second point will define ethics and highlight its potential to guide the development of a human-oriented AI. I will finalize my contribution by proposing ways for the effective and legitimate integration of ethical principles in AI systems.

Presenter: JOSÉ-FÉLIX LOZANO-AGUILAR (Polytechnic University of Valencia, Spain)

SATURDAY - SESSION 1A - TRACK 1

9:15am
Short Code: SA_RMA_TR1
Session Chair: Luis Vargas

DETERMINING A SUPPORT SITE FOR INTERNALLY DISPLACED PUPILS BY EXTENDING THE EVAMIX METHOD

BREAK OUT SCH. – FRIDAY

TO COLLECTIVE DECISION-MAKING BASED ON THE CHOQUET AND SUGENO INTEGRAL IN BURKINA FASO

Hadarou YIOGO[1], Zoïnabo SAVADOGO[1] (1. Université Joseph Ki-ZERBO, UFR-SEA, LANIBIO)

Abstract

La situation sécuritaire au Burkina Faso s'est dégradée ces dernières années. Cela a eu un impact négatif sur le système éducatif du pays à travers la fermeture de plusieurs écoles. Compte tenu de l'importance accordée à l'éducation, il est nécessaire de mettre en place des sites d'accueil pour les élèves déplacés afin d'assurer la continuité de leurs études. Il existe un certain nombre de méthodes d'aide à la décision, mais certaines d'entre elles ne sont pas sans défaut. Dans ce travail, nous abordons le problème en étendant la méthode EVAMIX à la prise de décision groupée en utilisant l'intégrale de Choquet et Sugeno, en tenant compte de l'ordre d'importance des décideurs, et en l'appliquant au problème d'identification du meilleur site. Grâce à une simulation, nous avons appliqué notre méthode à quatre sites et obtenu de bons résultats.

A HIERARCHICAL MODEL TO PRIORITIZATION OF FACTORS TO INCREASE ADOPTION OF EWALLET TRANSACTIONS AMONG CUSTOMERS AND SMES IN KLANG VALLEY, MALAYSIA.

Rajan Amaloo[1], Rafikul Islam[2] (1. Graduate School of Management, International Islamic University Malaysia (IIUM), Kuala Lumpur, Malaysia, 2. KULLIYYAH OF ECONOMICS AND MANAGEMENT SCIENCES)

Abstract

The purpose of this study intends to develop a hierarchical model through prioritization factors that could increase the adoption of eWallet transactions among customers and SMEs in Klang Valley,

BREAK OUT SCH. – FRIDAY

Malaysia. Mixed method approach used in the present research. Initially, interviews were conducted to solicit information about the prioritization factors that could increase the adoption of eWallet. The interview findings used for questionnaire development to rank factors with respect of the increase adoption of eWallet. The survey result was analyzed using the analytic hierarchy process (AHP), a mathematical model and is synthesized using Super Decisions Software. The study developed a hierarchical model and can be set as a benchmark for prioritizing factor to increase adoption of eWallet among customers and SMEs in Klang Valley, Malaysia. As a result, Security came up as the most crucial prioritization factors for both the customers and SMEs.

A LITERATURE REVIEW ON THE INTEGRATION OF AI WITH AHP/ANP

Lirong Wei[1], Elena Rokou[2] (1. Creative Decisions Foundation, 2. Creative Decisions Foundation, USA)

Abstract

The release of ChatGPT to the public has significantly accelerated interest in artificial intelligence (AI), establishing it as a transformative technology across diverse disciplines. The integration of AI with the Analytic Hierarchy Process (AHP) dates back to the late 20th century, with early explorations involving expert systems and neural networks to enhance decision-making. This paper presents a comprehensive literature review of AI integration with AHP and its network-based extension, the Analytic Network Process (ANP). It focuses on applications in key fields such as healthcare, supply chain, and energy policy. We analyze the methodologies and advancements in combining AI with AHP/ANP, highlighting how these approaches address complex decision-making challenges. Additionally, we discuss emerging trends, identify potential challenges, and propose directions for future research. By providing insights into the current state and evolution of AI-AHP/ANP integration,

this study aims to contribute to the ongoing development of Multi-Criteria Decision-Making (MCDM) methods and their applications in modern decision analytics.

SATURDAY - SESSION 1B - TRACK 11

9:15am
Short Code: SA_RMB_TR11
Session Chair: Prof. Antonella Petrillo (Università degli Studi di Napoli Parthenope)

SELECTION OF THE BEST DATA ANALYTICS TOOL FOR DATA ANALYSTS IN NEPAL USING THE ANALYTIC HIERARCHY PROCESS

Prabal Sapkota[1], Prince Manandhar[1] (1. Kathmandu University)

Abstract

Data is one of the most important assets an organization possesses. When properly analyzed, data can optimize business processes and provide a competitive advantage. With the growth in adoption of computerized technology in business, there was a massive rise in data generation and storage. This gave birth to data analytics. Data analytics uses tools/software that can streamline business processes and enhance decision-making to drive growth and efficiency. However, this only holds true with the application of appropriate tools. Selecting an appropriate tool is not an easy task as multiple data analytic software/tools have emerged in the last two decades. In order to select an appropriate tool, one has to consider several factors/subfactors associated with it. This research aims to identify the most important factors/subfactors and the alternatives associated with the selection of data analytic tools/software in the Nepalese context. This is a case of Multi Criteria Decision Making (MCDM) and Analytic Hierarchy Process (AHP) has been adopted in this work.)

BREAK OUT SCH. – FRIDAY

MULTI-CRITERIA DECISION MODELLING OF ENVIRONMENTAL, SOCIAL, AND (CORPORATE) GOVERNANCE FACTORS FOR OPTIMAL PORTFOLIO CONSTRUCTION)

Mihir Dash[1], Rita S[2] (1. Alliance University, 2. Head of Department of Statistics, Periyar University)

Abstract

Environmental, Social, and Governance (ESG) issues are playing an increasing role in investors' investment decisions around mergers, acquisitions, and divestitures. ESG investing has grown rapidly over the past decade. Investors' interest in ESG factors reflects the view that environmental, social, and corporate governance issues will affect the long-term performance of companies and should be given adequate consideration in investment decisions.

The study proposes multi-criteria decision modelling of ESG factors which, when combined with the mean-variance framework, yields sustainable optimal portfolios. The study compares the results of different modelling approaches including TOPSIS and AHP using a sample of large-cap stocks listed on the National Stock Exchange (NSE) of India. The data for the ESG factors were obtained from the sustainability reports of the corresponding companies from the NSE website.

Keywords: Environmental, Social, Governance, multi-criteria decision modelling, TOPSIS, AHP, sustainability reports.)

PROMPTS, WORKFLOW AND METHOD STATEMENTS – MAKING AI WORK FOR USING AHP FOR GOVERNANCE RISK CONTROLS ASSESSMENT PURPOSES.

Kenneth Tombs[1] (1. International Trade Council - Supply Chain Business Council)

Abstract

The evaluation of management systems presents challenges in ensuring consistency, granularity, and actionable insights across diverse organisational contexts. This paper explores the use of structured prompts and detailed method statements as tools for improving the quality of Governance, Risk, Controls and Compliance (GRC) systems. Drawing on experiences in applying these techniques within the Analytical Hierarchy Process (AHP) framework, we illustrate how structured guidance facilitates data collection, evaluation, and decision-making. Joining AHP/ANP with AI will engender a whole new generation of handling operational performance improvement over time. Clearly, AI moves us from a programmatic-driven mind-set to an insight-driven mind-set. Key findings highlight the role of prompts in driving precision, reducing cognitive biases, and standardising assessments; while method statements ensure alignment with organisational objectives and maturity models. This paper provides practical insights for practitioners and contributes to the growing discourse on enhancing decision-support methodologies through structured AI tools. We are entering an environment more in keeping with philosophy and reasoning than technology AI as simply a 'black box'.

SATURDAY - SESSION 2A - TRACK 8

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

INDUSTRY 4.0 TECHNOLOGIES FOR REVERSE LOGISTICS: INTEGRATED BAYESIAN-BWM AND COBRA METHOD

Ajaygopal KV[1], Rakesh Verma[2], Saroj Koul[3] (1. Operations and Supply Chain Management, Indian Institute of Management Mumbai, Mumbai, 2. Analytics & Data Sciences, Indian Institute of Management Mumbai, Mumbai, 3. Saroj Koul, Professor, Jindal Global Business School, OP Jindal Global University, Haryana)

Abstract

BREAK OUT SCH. – FRIDAY

The logistics sector is vital in the supply chain, ensuring freight transport is fast, flexible, safe, cost-effective, efficient, and environmentally sustainable. The circular economy (CE) emphasizes maintaining the highest utility and value of goods, components, and materials, highlighting the role of effective reverse logistics (RL) processes. Traditional RL methods often fall short in modern supply chains, necessitating Industry 4.0 technologies to enhance efficiency. This study assesses the applicability of various Industry 4.0 technologies in the RL sector, identifying the most suitable options. A novel "multicriteria decision-making (MCDM)" model was developed, combining the Bayesian Best-Worst Method (BWM) for criteria weights with the "Comprehensive Distance-Based Ranking (COBRA)" method for ranking technologies. The ranking of the proposed method is compared with other prominent MCDM methods to validate this innovative approach. Findings revealed that the most applicable technologies are the "Internet of Things (IoT)", cloud computing, and electronic-mobile marketplaces. These advancements are expected to significantly influence RL processes and CE systems, contributing to positive environmental and economic outcomes.

BIBLIOMETRIC STUDY ON AHP AND INVESTMENT DECISIONS IN INDUSTRY 4.0

Pedro Palma[1], Raphael Bianco[1], Valerio Salomon[1] (1. São Paulo State University (UNESP), School of Engineering and Sciences, Guaratinguetá)

Abstract
This work presents a bibliometric study on the Analytic Hierarchy Process and investment decisions in Industry 4.0 technologies. We identified essential elements, such as keywords in documents indexed in the Scopus database, and we mapped the recent trending

BREAK OUT SCH. – FRIDAY

topics using VOSviewer. Industry 4.0 was selected due to its relevance to economic development. The survey was carried out in September 2024, resulting in 74 documents published since 1992. One significant finding is the absence of scientific production relating the Analytic Hierarchy Process to decisions regarding Industry 4.0 technologies.

AN EVALUATION FRAMEWORK FOR BLOCKCHAIN SELECTION IN SUPPLY CHAIN

Birsen Karpak[1], Deepa Iyer[2], Ilker Topcu[3], Mustafa Sahin AYDIN4, Emre Türkmen5 (1. Youngstown State University, 2. Cleveland State University, 3. Istanbul technical university, 4. insanteknoloji.com, 5. KocDigital)

Abstract

The Comprehensive ANP Framework is designed to assist in blockchain selection specifically for supply chain management, emphasizing the importance of accounting for interdependencies among blockchain enablers. It highlights the impact of alternative blockchain platforms on critical enablers and critiques frameworks that overlook these platform impacts, underscoring their limited practical applicability.

SATURDAY - SESSION 2B - TRACK 2

10:15am
Short Code: SA_RMB_TR2
Session Chair: Enrique Mu

RANKING DEPLOYMENT STRATEGIES OF EV CHARGING INFRASTRUCTURE: A MODIFIED AHP WITH STAKEHOLDER PERSPECTIVE

BREAK OUT SCH. – FRIDAY

Osman Ogunclu[1], Seda Yanik[1] (1. Istanbul Technical University)

Abstract

Electric vehicle (EV) adoption is a critical step in combating climate change, with the success of EVs heavily reliant on the establishment and operation of an effective charging infrastructure. Achieving the objectives of this infrastructure involves the contributions of multiple stakeholders, each playing distinct roles. However, limited research exists on understanding the relationships and priorities of charging infrastructure goals from the stakeholders' perspectives. This study introduces a comprehensive framework for selecting charging infrastructure deployment strategies by identifying and prioritizing these goals from a unified stakeholder perspective. Goals and alternative deployment strategies were identified through extensive literature review and expert interviews, while stakeholder roles were clarified using insights from literature and the Stakeholder Theory. Unlike existing studies, which lack explicit integration of stakeholder viewpoints, this research highlights key goals such as integration, safety, digitalization, and cost-effectiveness. Based on these priorities, the top deployment strategies include (i) supporting the improvement of electric distribution and smart grid systems and (ii) focusing on the development of smart charging systems.

PRACTICAL GROUP DECISION-MAKING METHOD USING INCOMPLETE PAIRWISE COMPARISON MATRICES FOR DIFFERENTIATED EVALUATION RESULTS

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

Abstract

The objective of this paper is to propose a practical Analytic Hierarchy Process (AHP) as a method for administrative evaluation based on citizen voting. When aggregating individual judgments or evaluations to make a collective decision, it is expected that the resulting outcomes will exhibit some degree of differentiation. To express such differentiation, the scales used in AHP can be utilized.

BREAK OUT SCH. – FRIDAY

However, when applying AHP in group decision-making, the challenge lies in constructing a pairwise comparison matrix that represents the group as a whole. The aim of this paper is to propose a method that simplifies the use of AHP for group decision-making by enabling the calculation of relative importance with a minimal number of comparisons, through preliminary ranking. The Harker method is employed to estimate priorities from incomplete pairwise comparison matrices. The resulting pairwise comparison matrices are characterized by their complete consistency, allowing all individual matrices, without adjustment, to be incorporated into a consistent group matrix. This method was devised as an evaluation approach for the administrative planning of a certain city in Japan and is introduced in this paper as an application example.)

ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION-FACTORS MOTIVATING USE OF AI- BASED TOOLS AMONG NEPALESE STUDENTS

Prabal Sapkota[1], Kritik Dahal[1] (1. Kathmandu University)

Abstract
Artificial Intelligence (AI) is significantly impacting various fields, including science and technology, business, industry, education, and our everyday lives. This growing interest over the past few decades is primarily driven by advancements in AI methods and their availability to the public, often at no cost. In education, AI is revolutionizing traditional teaching and learning methods by personalizing learning experiences, providing timely feedback, and streamlining grading processes. However, the use of AI in education does present certain risks. Students may bypass the learning process by relying on AI to complete assignments, leading to increased dependence on technology. Before generalizing the pros and cons of AI-based tools in education, it is crucial to understand how and for

what purposes students are using these tools. There can be several motivating factors and sub- factors, which vary from individual to individual. This research aims to identify and rank the factors and sub- factors that motivate students to use AI-based tools in their studies. The findings can assist universities authorities and educational policymakers in developing new mechanisms for implementing AI-based tools within the higher education system. This study exemplifies Multi-Criteria Decision Making (MCDM), with the Analytical Hierarchy Process (AHP) employed as the analytical method.)

THE EXTENT AND IMPACT OF ARTIFICIAL INTELLIGENCE ADOPTION ON CORPORATE SOCIAL RESPONSIBILITY AMONG NIGERIAN SMES

Moruf Adebakin [1], Elizabeth Ojo [2] (1. Department of Business Administration, Yaba College of Technology, 2. Department of Office Technology & Management, Yaba College of Technology, Yaba)

Abstract

This study examines the degree of Artificial Intelligence (AI) application and its influence on corporate social responsibility (CSR) in Small and Medium-Sized Enterprises (SMEs) in Lagos State, Nigeria. Data was collected from 64 employees and managers in SMEs across several industries using a descriptive survey study design. The Artificial Intelligence and SME Social Impact Questionnaire (AISSIQ) was designed to assess AI utilization, perceived advantages, and corporate social responsibility impact. The analysis of the data, employing descriptive statistics, correlation, and regression, indicated that the degree of AI utilization does not substantially correlate with CSR participation, implying that Nigerian SMEs may not yet harness AI for socially responsible operations. Moreover, the perceived advantages of AI usage did not significantly forecast AI adoption rates, suggesting that alternative factors may exert a greater influence on AI deployment within these organizations. The study's results underscore the necessity for greater investigation into supplementary factors influencing AI adoption, especially in

BREAK OUT SCH. – FRIDAY

resource-limited settings. Policymakers and SME management are urged to contemplate infrastructural assistance and resource distribution to facilitate extensive and significant AI implementation. These findings elucidate the problems encountered by Nigerian SMEs in AI integration and enhance comprehension of AI's role in fostering socially responsible business practices.

SATURDAY - SESSION 3A

11:30 am
Short Code: SA_RMA_TR13
Session Chair: Dr. Elena Rokou (Creative Decisions Foundation)

PITT HACKATHON 2024- OPTIMIZING UTILITY POLE INSPECTIONS USING THE BOCR METHODOLOGY

Kumar Chinmay[1], Abhishek Tripathi[1], Elena Rokou[2] (1. University of Pittsburgh, Business School, 2. Creative Decisions Foundation, USA)

Abstract
Duquesne Light Company (DLC) serves over 600,000 customers in Western Pennsylvania and must adhere to a 12-year regulatory utility pole inspection cycle. Using the Benefits-Opportunities-Costs-Risks (BOCR) methodology, we evaluated three scheduling alternatives: minimizing drive time, balancing workloads, and grid-based scheduling. Our analysis identifies workload balancing as the optimal strategy, providing a balance between operational efficiency, resource utilization, and compliance. This paper outlines the methodology, strategic criteria, and recommendations to enhance utility operations and regulatory adherence.

LEVERAGING LARGE LANGUAGE MODELS (LLMS) TO OPTIMIZE THE ANALYTIC HIERARCHY PROCESS (AHP) FOR SAAS PROCUREMENT)

Cha Hee Park[1], Keith Saniga[1] (1. University of Pittsburgh)
Abstract

BREAK OUT SCH. – FRIDAY

This study explores the use of Large Language Models (LLMs) to enhance an Analytic Hierarchy Process (AHP) for evaluating SaaS supplier proposals. Traditional assessments are often slow and biased, but LLMs offer a faster, objective alternative. The evaluation framework includes five criteria: Total Cost of Ownership, Implementation Time, Deployment Type, Integration with Existing Systems, and Supplier Reliability and Support, with weights refined by a procurement specialist. Consistency was tested through repeated trials to calculate a reliable "true mean" of LLM assessments. Results from testing on [10]AI-generated proposals indicate that LLMs can provide efficient, consistent, and unbiased proposal evaluations, supporting their potential in automating decision-making processes.)

DYNAMIC DECISION-MAKING IN AUTONOMOUS VEHICLES USING AHP AND BOCR MODELS

Andreas Stylianou[1], Elena Rokou[2] (1. National Technical University of Athens, 2. Creative Decisions Foundation, USA)
Abstract
Self-driving cars are transforming the automotive industry by utilizing advanced technologies to achieve fully autonomous operations. However, ensuring real-time decision-making that matches or surpasses human judgment poses significant challenges. This paper presents a comprehensive decision-making framework that combines the Analytic Hierarchy Process (AHP) for driver preference customization with a Benefits-Opportunities-Costs-Risks (BOCR) model for dynamic adaptation to real-world conditions. By addressing critical factors such as traffic, safety, and passenger comfort, the proposed approach enhances the practical and ethical aspects of autonomous driving. This study underscores the potential of self-driving technology to improve public mobility and transportation systems.

AN AHP-BASED DECISION SUPPORT SYSTEM FOR THE SAFETY PRIORITIZATION PROBLEM OF AUTONOMOUS VEHICLES DURING UNAVOIDABLE COLLISIONS

Hannah Faye Culaste[1], John Lennon Calorio[2] (1. University of the Philippines-Mindanao, 2. Davao Medical School Foundation, Inc.)

Abstract

The rise of self-driving cars brings attention to ethical challenges in artificial decision- making during unavoidable collisions. This study addresses the safety prioritization problem of autonomous vehicles during unavoidable collisions by modeling it as a multi-criteria decision-making challenge using the Analytical Hierarchy Process (AHP). The proposed system incorporates diverse factors such as legal, societal, and ethical considerations, allowing vehicle owners to preset their safety preferences. Results demonstrate the potential of this AHP-based decision support system to enhance the transparency and ethical programming of autonomous vehicles, contributing to safer and more systematic emergency decision-making.

SATURDAY - SESSION 3B – TRACK 11

11:30 am
Short Code: SA_RMB_TR11_4
Session Chair: Prof. Fabio De Felice (Università degli Studi di Napoli Parthenope)

COMPARISON OF THE LOGISTICS PERFORMANCE WITH ENTROPY BASED WEIGHTED PRODUCT METHOD

Beyzanur C.Ervural[1] (1. Necmettin Erbakan University)
Abstract

The most important determinant in the domestic and international commercial activities of countries is the success in logistics activities, and the correct evaluation and use of this indicator. In this study, we aimed to compare the logistics performance of the countries through the Entropy-Weighted Product Method (WPM) by using the Logistics Performance Index (LPI) data of 2023 published by the World Bank. In this context, the Entropy method was used to determine the importance levels of the criteria to be used when comparing countries. Then, countries were ranked according to their logistics performance using the WPM and the determined criteria weights. The proposed approach is compared with the Entropy-based SAW method and LPI published by the World Bank. According to the obtained results, the rankings of the countries are generally close and the results of the analysis are consistent.

WHY ARE AHP RESULTS NOT BINDING FOR APPRAISING REAL ESTATE?

Miguel Camacaro[1] (1. Appraisers Reading Club)
Abstract
Using the method of reduction to absurdity, an initial hypothesis was considered: the results of the general weighting vector of AHP are not linked to real estate market prices, as opposed to the alternative hypothesis that they are linked. To demonstrate this, a "real fable" was used to explain the valuation of a medieval castle. The first example was based on three criteria: quality of the environment, quality of the castle, and state of conservation; and six alternatives, five comparables plus the property being appraised (3. C+6A), completing three more cases. Using AHP, the elements of the global vector of the alternatives were determined. With the offer prices and the use of RV, the value of the property and the values of the comparables were estimated for comparative analysis. The Non-Ratio Reciprocity Test (NRRT) was used, obtaining significant percentage differences between the values and prices of the comparables, not guaranteeing reciprocity to

validate the initial estimates of the appraised property value. In the second example, three different criteria were used: strength, security, and access; the same six alternatives were used (3C+6A). It was possible to demonstrate the inconsistency of the results due to the disparity of the values obtained in all cases of the two examples for the appraised property, which does not allow for guaranteeing reliable market values. For the third example, the database simulation was performed based on the information from the original sample, with [8]explanatory variables, to obtain [69]data points. Econometric modeling was carried out, demonstrating that there is no correlation between the explained variable (unit price) and the explanatory variables as a whole, much less individually, therefore, the results are not reliable. Despite the non-fulfillment of the basic assumptions of MRLM, point and interval estimation was done. These values were similar to those obtained in the second example, using AHP+RV. With this evidence, the analyzed proposal does not guarantee market values; therefore, the initial hypothesis is correct.)

MODELING ECONOMIC DISRUPTIONS AND RESILIENCE STRATEGIES FOR PAKISTAN'S TRANSPORTATION SECTOR DURING POLITICAL PROTESTS

Yousaf Ali[1], Amin Ullah[2] (1. Fahad Bin Sultan university, Tabuk, 2. University of Macerata)

Abstract

Transportation is a critical factor in any country's economy, serving as the backbone of an effective supply chain by facilitating the movement of goods from origin to destination within required timelines. It supports various sectors, including Cold Supply Chains, Agribusinesses, and health supply chains, and is one of the three major components of supply chain management alongside purchasing and manufacturing. For any economy or supply chain to function effectively, a sustainable and fully operational transport sector is essential. However, in South Asia, frequent political disruptions, including protests, riots, and lockdowns, significantly

impact transportation networks. Using Pakistan as a case study, this research explores the effects of recurring protests, led by major political parties, which disrupt daily life, economy, education, and transportation. These disruptions result in road closures, logistical delays, increased costs, and broader social and economic challenges. To address these issues, the study employs the Inoperability Extended Multisectoral Model (IEMM) to assess transportation disruptions and their ripple effects on Pakistan's economy using the Social Accounting Matrix (SAM). Additionally, it utilizes the Analytic Hierarchy Process (AHP) to rank and evaluate resilience strategies aimed at mitigating the impacts of such protests. The findings will provide policymakers with actionable recommendations to enhance the sustainability and resilience of the transport supply chain during disruptions.

PLEANRY SPEAKER- NHANCING SUSTAINABLE SUPPLY CHAIN DECISIONS THROUGH INTEGRATED AHP/ANP FRAMEWORKS

1:00 pm

The talk will focus on the integrated application of AHP/ANP methods with other techniques and approaches in different design, evaluation and selection problems for the effective realization of "Sustainable supply chain management" activities.

It highlights how the combined application of AHP / ANP can support strategic decision-making for real world sustainable supply chain problems, providing a structured and quantitative approach to complex evaluations..

Presenter: GULCIN BUYUKOZKAN (Galatasaray University)

SATURDAY - SESSION 4A – TRACK 7&10

2:15pm
Short Code: SA_RMA_TR_MISC

BREAK OUT SCH. – FRIDAY

Session Chair: *Dr. Luis A. Bojorquez-Tapia (Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City)*

LEVERAGING CLIMATE CHANGE VULNERABILITY ASSESSMENT WITH MCDA

Elvira Tatiana Merino Benitez[1], Claudio Garuti[2], Luis A. Bojorquez-Tapia[3] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City, Mexico, 2. Fulcrum Ltda., 3. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City)

Abstract

Sustainability faces interconnected global challenges, including climate change, biodiversity loss, and resource depletion, posing significant threats to current and future generations. Addressing climate change vulnerability is an urgent priority for policymakers aiming to achieve SDG 13, which emphasizes resilience-building and adaptive capacity through scientific knowledge. While Climate Change Vulnerability Assessments (CCVA) are commonly used in this context, they often fail to pinpoint critical thresholds—those that separate adaptive (desirable) states from vulnerable (undesirable) states. This paper presents a Multi-Criteria Decision Analysis (MCDA) approach designed to reinforce the scientific and technical foundations of CCVA. We illustrate this approach with a case study on small-scale fishing communities, demonstrating its broader applicability. By enhancing methodological support, this approach aims to identify effective policies and interventions that contribute to global sustainability efforts.

MEASUREMENT SCALES IN AHP MULTICRITERIA METHODOLOGY FOR CALCULATING AND MANAGING RISKS OF NATURAL DISASTER

Fabiola Garuti[1], Claudio Garuti[2] (1. Pontifical Catholic University of Chile, 2. Fulcrum Ltda.)
Abstract

This paper presents a refined approach to disaster risk management using the Analytic Hierarchy Process (AHP), emphasizing the use of rating mode with cardinal scales for more accurate and mathematically valid risk calculations. By integrating hazard, vulnerability, and resilience into a comprehensive disaster risk index, the model offers decision-makers a robust tool for evaluating and managing risks in public investment projects. The methodology corrects common issues with ordinal scales in risk assessments and introduces a new formula created by Claudio Garuti for calculating risk levels within normalized ranges. This approach ensures better prioritization of investments in disaster-prone areas, improving infrastructure resilience and decision-making efficiency.)

A MACHINE LEARNING APPROACH TO REPLICATE INTERVIEW ASSESSMENTS FOR SELECTING AIR TRAFFIC CONTROLLER CANDIDATES

Mustafa Özdemir[1], Müjgan Sağır Özdemir[2] (1. Civil Aviation School, Erzincan Binali Yildirim University, 2. Department of Industrial Engineering, Eskisehir Osmangazi University)
Abstract

Selecting suitable air traffic control (ATCO) candidates is critical due to the demanding responsibilities of the role, which requires rapid decision-making and strong stress management. Traditional methods, such as multistage interviews, are commonly used in this selection process but face challenges, including subjectivity and lack of standardization. To address these issues, we explore machine learning (ML) as an alternative to streamline and improve the reliability of candidate evaluations. This study develops three ML models including Logistic Regression (LR), Support Vector Machine SVM, and Decision Tree (DT) to replicate the outcomes of the interview phase. The candidate selection process was framed

as a binary classification problem based on features such as previous exam results, high school background, and high school Grade Point Average. The results from the best-performing ML model are compared with previous studies that used AHP/ANP-based approaches. Our findings indicate that ML models can closely replicate interview exams, achieving accuracy rates of 95% for LR, 9. 3% for DT, and 95% for SVM, highlighting their potential for practical application in ATCO candidate selection.)

SATURDAY - SESSION 4B – TRACK 11

2:15pm
Short Code: SA_RMB_TR10
Session Chair: Dr. Marcel Minutolo (Robert Morris University, USA)

STRATEGIC INTEGRATION OF AI IN PROJECT PLANNING: A BOCR-AHP FRAMEWORK

Kumar Chinmay[1], Elena Rokou[2] (1. University of Pittsburgh, Business School, 2. Creative Decisions Foundation, USA)
Abstract

Artificial Intelligence (AI) is transforming project planning through predictive analytics, automation, and scenario simulation. This paper presents a Benefits-Opportunities-Costs-Risks (BOCR)-Analytic Hierarchy Process (AHP) framework for evaluating and selecting AI tools and determining optimal deployment stages. By systematically considering organizational priorities, the framework ensures alignment of AI adoption with strategic goals, mitigates risks, and improves overall project planning efficiency. Empirical findings and expert insights validate the practical applicability of this approach.

EVALUATING PREDICTIVE MODELS WITH ENSEMBLE LEARNING METHODS FOR CONSTRUCTION PROGRESS AND DEFECT ANALYSIS

Ching-Lung Fan[1] (1. Republic of China Military Academy)
Abstract
The construction industry has historically faced challenges in predicting project progress and managing defects effectively. Traditional methods, such as statistical models, often produce biased results due to their reliance on predefined assumptions. In contrast, machine learning (ML) models offer significant advantages in handling complex datasets with multiple attributes. ML models can identify critical features that influence construction performance without being constrained by distribution or collinearity effects. This study leverages the extensive Public Construction Intelligence Cloud (PCIC) dataset, enabling ML models to uncover hidden patterns related to deficiencies and construction progress, thereby supporting decision-making in construction management. Supervised learning classifiers, including Decision Tree (DT), Random Forest (RF), AdaBoost, and Gradient Boosting, are employed to analyze data collected from construction sites. The findings indicate that ML models can identify correlations and trends within large datasets that traditional methods might overlook, thereby enhancing predictive capabilities and providing actionable insights for construction management.)

CLIMATE FINANCE AND ESG INVESTMENTS: OPPORTUNITIES FOR AHP APPLICATION WITH AI

Juan Antonio Lillo Paredes[1], Valerio Salomon[2], Claudemir Tramarico[3] (1. Universidad San Ignacio de Loyola, 2. , São Paulo State University (UNESP – Universidade Estadual Paulista), 3. São Paulo State University (UNESP – Universidade Estadual Paulista)
Abstract
This study explores the optimization of climate finance and ESG (Environmental, Social, and Governance) investments using the Analytic Hierarchy Process (AHP). By leveraging advanced technologies such as Python, machine learning, and Bloomberg

Query Language (BQL), we aim to enhance decision-making processes in this critical area. Our research identifies key criteria for evaluating investment opportunities and assesses climate risks through predictive models. Our findings highlight the importance of integrating data science with financial analysis to address the challenges faced in climate finance. This paper contributes to the existing literature by providing a structured approach to decision-making in sustainable investments.)

BREAK OUT SCH. – FRIDAY

SUNDAY DECEMBER 15

PLENARY SPEAKER - BEST-WORST METHOD: AN MCDM APPROACH BEYOND MERELY FORMULAS

8:00 am

In this workshop, I will begin with an overview of the Best-Worst Method, explaining how it effectively mitigates behavioral biases commonly found in multi-criteria decision-making (MCDM) problems. I then present some experimental analyses comparing BWM to some other MCDM methods including AHP.

Presenters :
JAFAR REZAEI (TU Delft, Netherlands)

SUNDAY - SESSION 1A – TRACK 8

9:45am
Short Code: SUN_RMA_TR8
Session Chair: Dr. Birsen Karpak (Youngstown State University)

IMPACT OF ARTIFICIAL INTELLIGENCE ON SUPPLY CHAIN RESILIENCE

Gurkan Akalin[1], Birsen Karpak[2], Ilker Topcu[3], Emel Aktas4 (1. University of Virginia's College at Wise, 2. Youngstown State University, 3. Istanbul technical university, 4. Cranfield University)

Abstract
The analytic network process (ANP) captures the interplay between AI and components of supply chain resilience, enabling a structured evaluation of their interactions. By prioritizing strategies through this approach, organizations can enhance continuity and adaptability, effectively navigating disruptions in supply chains.

BREAK OUT SCH. – SUNDAY

EXPLORING THE INTERACTION OF PRESSURE SOURCES AND TYPES ON SSCM PRACTICES: AN ANP MODEL APPROACH

Alina Marculetiu[1], Cigdem Ataseven[2], Birsen Karpak1, Ilker Topcu[3] (1. Youngstown State University, 2. Cleveland State University, 3. Istanbul technical university)

Abstract

The growing focus on sustainability has intensified pressures on firms to adapt their supply chain management practices. Various stakeholders, including individuals, firms, governments, and organizations, apply coercive, normative, and relational pressures to drive sustainable supply chain management (SSCM) improvements (Marculetiu et al., 2023). Synthesizing 93 research articles published between 1997 and 2022, the authors examine how these pressure types, exerted by sources such as governments, suppliers, customers, and employees, influence firm-level practices across internal, upstream, and downstream operations. Despite extensive research on the role of coercive (regulatory compliance), normative (social expectations), and mimetic (industry benchmarking) pressures in SSCM, their relative importance and interdependencies across varying contexts remain unclear (Marculetiu et al., 2023; Oyedijo et al., 2024). This study addresses this gap by proposing an Analytic Network Process (ANP) model to systematically evaluate and prioritize these interactions, offering a robust framework to guide SSCM strategies.

INTEGRATION OF SPHERICAL FUZZY-AHP AND OPARA METHOD FOR ROBUST MULTI-CRITERIA DECISION-MAKING

Ajaygopal KV[1], Saroj Koul[2], Rakesh Verma[3] (1. Operations and Supply Chain Management, Indian Institute of Management Mumbai, Mumbai, 2. Saroj Koul, Professor, Jindal Global Business School, OP Jindal Global University, Haryana, India, skoul@jgu.edu.in (ORCID: 0000-0002-3051-5625)., 3. Analytics & Data Sciences, Indian Institute of Management Mumbai, Mumbai)

Abstract

This study introduces "Spherical Fuzzy-Objective Pairwise Ratio Analysis (SF-OPARA)", a novel decision-making method that integrates OPARA with Spherical Fuzzy Sets (SFS) to address complex and uncertain scenarios. SF-OPARA overcomes the limitations of traditional methods that struggle with ambiguous data by combining OPARA's objective

structure with the flexibility of SFS. This integration capture membership, non-membership, and hesitancy within a single framework, enhancing effectiveness in uncertain conditions. A case study demonstrates SF-OPARA's superior reliability to traditional and fuzzy Multi-criteria Decision-Making (MCDM) methods, providing detailed and practical rankings under uncertainty. SF-OPARA aligns decision-making with real-world needs by converting expert judgments into precise, actionable insights. Its unique handling of subjective data makes it a valuable tool across various fields, including public policy, resource management, and strategic planning. This approach enhances decision-making flexibility and precision, aiding organizations in making well-informed choices that reflect real-world complexities. SF-OPARA's broad applicability significantly adds to decision support tools, especially in uncertain environments. This study is the first to apply Spherical Fuzzy Sets within the OPARA framework, filling a notable gap in MCDM research and advancing the development of tools for complex decision challenges.

SUNDAY - SESSION 1B – TRACK 11

9:45am
Short Code: SUN_RMB_TR11
Session Chair: Prof. Antonella Petrillo (Università degli Studi di Napoli Parthenope)

RELATIVE IMPORTANCE OF FACTORS IMPACTING ELECTRIC VEHICLE CHARGING STATION USER EXPERIENCE: AN AHP APPLICATION

Ayse Elvan Bayraktaroglu[1], Ahmet Bozkurt[1], Umur Seckin[1] (1. Istanbul Technical University)
Abstract
The widespread adoption of electric vehicles can only be achieved by increasing individual mobility based on electricity, that is, by designing charging stations that meet the needs of electric vehicle owners. According to models that address usage intention/behavior (e.g., Technology Acceptance Model or Theory of Planned Behavior), the usability of the technology, as well as the benefits it provides, positively influences customer satisfaction. This, in turn, contributes to greater acceptance of the technology by users. This study aims to identify the key user experience factors and their relative importance levels for charging station usage from the perspective of Turkish electric vehicle owners. A literature review is conducted to identify these factors, and the importance of each factor is then determined using the Analytic Hierarchy Process (AHP), a multi-criteria decision-making method. The importance of these factors is assessed across different groups based on the duration of electric vehicle ownership. Results show that, as the duration of ownership increases, ease of use becomes more important, while pricing slightly loses its significance, though it remains one of the top three factors for all user groups.

WHAT AHP/ANP CAN DO FOR SIX SIGMA?   A SHORT LITERATURE SURVEY

Marcin Nakielski[1], Grzegorz Ginda[2], Vigneshkumar Chellappa[3] (1. Doctoral School of AGH University of Krakow, 2. AGH University of Krakow, 3. The Hong Kong Polytechnic University)
Abstract
Six Sigma provides a robust and universal methodology for solving practical decision—making problems in diverse industries. AHP/ANP methodology, on the other hand, provides universal decision making services for any application. The methodologies fit perfectly into one another, therefore. It is unclear, however, if this perfect fit is fully utilized in the practice of Six Sigma and

derivative methodologies. This is why a literature survey is applied in the paper to reveal actual state of Six Sigma users' interest in AHP/ANP application. Survey results are finally utilized to draw conclusions about present trends and   gaps in the utilization of actual AHP/ANP potential in Six Sigma.

CLIMATE CHANGE ON A BUDGET: DEFINING OPTIMAL NET ZERO STRATEGIES FOR INFRASTRUCTURE PROJECTS

Elvira Tatiana Merino Benitez[1],   Ofelia García[1], Luis A. Bojorquez-Tapia[1] (1. Laboratorio Nacional de Ciencias de la Sostenibilidad, Instituto de Ecología, Universidad Nacional Autónoma de México, Mexico City)

Abstract

In response to the growing impacts of climate change, Net Zero initiatives have emerged as a global effort to mitigate its effects. However, despite extensive research, a critical gap persists in developing strategies that address the complex interdependencies between corporate standards and economic constraints in a rapidly changing world. To address this gap, we propose a Net Zero framework designed to prioritize actions, establish decision thresholds, and formulate effective courses of action. Our framework integrates the Analytical Network Process (ANP), Multi-objective Optimization (MO), and Decision Making under Deep Uncertainty (DMDU). We demonstrate the application of this framework using the case of a privately-operated highway in Mexico City, though its adaptability makes it suitable for any infrastructure project. The results identify optimal solution sets that ensure Net Zero targets are met by [2030]and 2040, accounting for the uncertainties of future technological advancements and economic constraints. This approach provides a systematic method for stakeholders to navigate the complexities of achieving Net Zero goals.)

SUNDAY – SESSION 2A – TRACK 4

10:45am
Short Code: SUN_RMA_TR8
Session Chair: Anna Florek-Paszkowska

ARTIFICIAL INTELLIGENCE AND ENTREPRENEURIAL DECISION-MAKING

Olawale Olatidoye[1], Moruf Adebakin[2] (1. Department of Food Science and Technology, Yaba College of Technology, 2. Department of Business Administration, Yaba College of Technology)

Abstract

Traditional, human-centric approaches to innovation management often fall short due to their limitations in fully addressing information needs and coping with complexity. This study explores how artificial intelligence (AI) systems can support innovation management by enhancing entrepreneurial decision-making and also examines the impact of Artificial Intelligence (AI) on entrepreneurial decision-making, investigating the mediating effects of data-driven insights, and organizational learning Through a Mediational analysis, we investigate the impact of AI on entrepreneurs' decision-making, considering the mediating roles of customer preferences and industry benchmarks. AI-powered systems enable businesses to process and analyze vast amounts of data efficiently, leading to quicker and more informed decision making. Hence, the integration of AI in business decision making has the potential to drive organizational success and shape the future of business practices. Furthermore, this empirical study provides practical recommendations to organizations on enhancing various aspects related to proactiveness, innovativeness, and risk-taking. The study provides insights for researchers, entrepreneurs, and aspiring entrepreneurs on leveraging AI in entrepreneurial contexts and sets an agenda for future research in this emerging field.)

BREAK OUT SCH. – SUNDAY

AI INTEGRATION DEMONSTRATION AT THE AHP BASED MOBILE APP DECISION MENTOR

Sovit Poudel[1], Shashi Bhattarai[2] (1. Truenary Solutions Pvt. Ltd., 2. Development Dynamics Pvt. Ltd.)

Abstract

Proposal is for a demonstration session on Integration of Artificial Intelligence (AI) at the
Analytic Hierarchy Process (AHP) based mobile app Decision Mentor. The live app
demonstration covering technical as well as practical side. In the practical side, how the
value is added AHP implementation will be demonstrated. In the technical side, which AI
model is used, how connected with the AI resources to add value on AHP implementation
etc. AI integrated on AHP based application Decision Mentor adds productivity on
strategic decision analysis approaches with simplifying criteria and choices identifying
processes with added support to interact with AI (use of feature AI Mentor) in the process
of decision analysis are the value addition or take away to the participations on the session.
AHP implementation at Decision Mentor is presented in the Box below.

ARTIFICIAL INTELLIGENCE AND ENTREPRENEURIAL DECISION-MAKING: A MEDIATIONAL ANALYSIS

Olawale Olatidoye[1] (1. Department of Food Science and Technology, Yaba College of Technology)

Abstract

Traditional, human-centric approaches to innovation management often fall short due to their limitations in fully addressing

BREAK OUT SCH. – SUNDAY

information needs and coping with complexity. This study explores how artificial intelligence (AI) systems can support innovation management by enhancing entrepreneurial decision-making and also examines the impact of Artificial Intelligence (AI) on entrepreneurial decision-making, investigating the mediating effects of data-driven insights, and organizational learning Through a Mediational analysis, we investigate the impact of AI on entrepreneurs' decision-making, considering the mediating roles of customer preferences and industry benchmarks. AI-powered systems enable businesses to process and analyze vast amounts of data efficiently, leading to quicker and more informed decision making. Hence, the integration of AI in business decision making has the potential to drive organizational success and shape the future of business practices. Furthermore, this empirical study provides practical recommendations to organizations on enhancing various aspects related to proactiveness, innovativeness, and risk-taking. The study provides insights for researchers, entrepreneurs, and aspiring entrepreneurs on leveraging AI in entrepreneurial contexts and sets an agenda for future research in this emerging field.)

SUNDAY – SESSION 2B – TRACK 12

10:45am
Short Code: SUN_RMB_TR12
Session Chair: Milagros Pereyra-Rojas

A MULTIDIMENSIONAL APPROACH BASED ON THE ANALYTIC NETWORK PROCESS FOR EARTHQUAKE VULNERABILITY ASSESSMENT AND POLICY DEVELOPMENT: A CASE STUDY OF AYACUCHO, PERU

Iván Infanzón[1], Alvaro Talavera[2] (1. Pontifical Catholic University of Peru, 2. Universidad del Pacífico)
Abstract

Purpose: This study introduces a decision-making framework based on the Analytic Network Process (ANP) to assess seismic vulnerability and enable the design of specific mitigation strategies for the city of Ayacucho in Peru, an Andean region prone to seismic hazards. The model evaluates vulnerability through a multidimensional approach, incorporating environmental, social, and economic criteria to generate a comprehensive vulnerability index and prioritize strategic interventions.

Methodology: The methodology involves an extensive literature review and consultations with local experts in disaster risk management (DRM) to identify specific vulnerability factors of the city of Ayacucho across three key dimensions: environmental, social, and economic. The identified vulnerable elements are integrated into the ANP framework, which models the interrelations among these elements and the dimensions they belong to. The resulting model provides a detailed vulnerability index and a ranked list of critical risk factors. Based on these findings, strategic policies and mitigation actions are developed in conjunction with stakeholders, emphasizing local needs and feasible implementation pathways.

Findings: The analysis highlights the environmental dimension as the most significant contributor to Ayacucho's seismic vulnerability, particularly due to the prevalence of predominant building material, housing location in unsafe areas, age of building construction, main occupation of the population (employment), building elevation configuration, and terrain topography. Social factors, including age group (population age), illiteracy, and gender predominance as household head, further exacerbate the city's susceptibility. Proposed mitigation strategies include modernizing essential infrastructure, enhancing public awareness campaigns, and integrating seismic risk considerations into urban planning policies.

Originality and Value: This case study demonstrates the adaptability and utility of the ANP framework for local disaster risk management. By focusing on Ayacucho's unique vulnerabilities, the research provides practical insights for

BREAK OUT SCH. – SUNDAY

policymakers and underscores the importance of involving local expertise and community input in developing effective mitigation measures. This approach offers a replicable model for other regions with similar seismic and socioeconomic conditions.

STRATEGIC MODEL FOR UNIVERSITY PERFORMANCE EVALUATION USING AHP AND FUZZY LOGIC

Risley Rengifo[1], Alvaro Talavera[2] (1. Universidad Privada del Norte, 2. Universidad del Pacífico)

Abstract

Purpose: This article proposes an innovative and structured management model for evaluating university performance by integrating the Analytic Hierarchy Process (AHP) and fuzzy inference systems. The model aims to provide tools that guide strategic actions, enhance key performance indicators, and ensure sustainable and competitive institutional outcomes.

Methodology: The study employs AHP to identify and prioritize criteria and dimensions critical to university performance, which are then integrated into a single indicator using a fuzzy inference system. This approach facilitates a comprehensive, adaptable, and quantifiable analysis of the factors most relevant to institutional performance evaluation.

Findings: The research reveals that many universities focus on strengthening specific indicators through economic investments and management improvements, yet these efforts often fail to significantly enhance their positions in international rankings. Furthermore, the absence of a unified performance measurement system, particularly in Latin American universities, hampers institutional comparisons and the precise identification of critical areas for improvement.

Originality and Value: The proposed model offers a flexible and practical solution for evaluating multiple performance indicators and consolidating them into a single, actionable metric. This enables universities to accurately pinpoint performance-impacting

criteria, make informed decisions, and design effective strategies for continuous and sustainable improvement.

VULNERABILITY ANALYSIS OF ANAEMIA IN PERUVIAN DEPARTMENTS: A TEMPORAL COMPARISON

Benjamin Arriaga[1] (1. Universidad del Pacífico)

Abstract

Anemia is a critical public health issue among children aged 6 to 35 months, significantly affecting cognitive development, physical growth, and overall well-being. The condition shows pronounced regional disparities across Peruvian departments, necessitating systematic and targeted interventions. This study utilizes the Analytic Hierarchy Process (AHP) to assess anemia vulnerability, incorporating sociodemographic and healthcare data into a structured decision-making framework. By analyzing data from two points in time, the study identifies shifts in vulnerability indices, investigating factors driving improvements in some regions and challenges contributing to increased vulnerability in others. Effective interventions from regions with positive outcomes are examined alongside barriers in areas with worsening conditions. The AHP framework synthesizes multiple criteria to calculate updated vulnerability indices, visualized through enhanced vulnerability maps that provide a detailed regional overview. These findings aim to support evidence-based policymaking and the development of targeted strategies to reduce anemia prevalence, improve access to prenatal and child healthcare, and enhance health outcomes for vulnerable populations across Peru.

VULNERABILITY ASSESSMENT OF MINING CONFLICTS IN PERU USING AHP

Fiorella Aguirre[1], Alvaro Talavera[1], Soledad Espezúa1, Luciano Stucchi[1] (1. Universidad del Pacífico)

Abstract

Mining is essential to Peru's economy but frequently generates

BREAK OUT SCH. – SUNDAY

conflicts due to its environmental and social impacts. This study uses the Analytic Hierarchy Process (AHP) to evaluate the vulnerability of mining projects by analyzing economic, social, and environmental factors. The evaluation of three major mining projects in Peru highlights key elements that increase the likelihood of conflict and provides insights into the interconnected nature of these factors.

By applying a hierarchical analysis model, the study systematically assesses the interplay between opportunities, challenges, and pressures within mining activities. This approach not only identifies the main drivers of conflict but also offers a practical framework for anticipating vulnerabilities and fostering more sustainable relationships between mining operations and affected communities.

SUNDAY – SESSION 3A – TRACK 6

12:00pm
Short Code: SUN_RMA_TR6
Session Chair: Prof. Bolajoko Dixon-Ogbechi (University of Lagos)

PRIORITIZATION OF SUSTAINABLE DEVELOPMENT GOALS: A CASE STUDY APPLICATION FOR AGILE PROJECTS

Ayça Maden[1], Erdal Ulukan[1] (1. Beykent University)

Abstract

  In today's fast-changing industrial landscape, project management serves as a cornerstone for driving digital transformation across diverse sectors. Regardless of whether an organization is a small enterprise, a medium-sized business, or a multinational corporation, effective project management is essential for ensuring the successful and efficient delivery of objectives. Traditional approaches like the waterfall model, which rely on linear processes, often prove inadequate in environments requiring rapid iteration and shorter

delivery timelines. Conversely, agile methodologies have gained prominence due to their flexibility and capacity to adapt, providing a sustainable framework for addressing the complexities of modern projects. However, the intersection of agile practices and sustainability remains underexplored, with much of the existing research focused on developed countries. Limited attention has been given to how agile methodologies can align with the United Nations' Sustainable Development Goals (SDGs), leaving a critical gap in understanding their potential synergy. Furthermore, few studies have utilized Multi-Criteria Decision-Making (MCDM) methods to evaluate the role of SDGs in improving agile project outcomes. This study aims to address these gaps by applying the Analytic Hierarchy Process (AHP) to evaluate and prioritize SDGs relevant to a case organization. The identified goals are weighted based on the company's sustainability strategy, providing a structured framework to guide future agile project improvements. This study offers a unique perspective on how sustainability considerations can be integrated into agile project management. This research contributes to the literature by proposing a novel approach that connects sustainability objectives with agile methodologies, paving the way for organizations to enhance project outcomes while supporting long-term SDGs.

PERCEPTION OF DRIVERS AND BARRIERS TO THE ADOPTION OF DECENTRALIZED RENEWABLE TECHNOLOGIES. AN ANP-BASED APPROACH IN COLOMBIA

Hannia Gonzalez-Urango[1], Monica Garcia Melon[1], Isabel Aparisi-Cerda1, David Ribó-Pérez[1], Ivan Ligardo-Herrera[2] (1. Universitat Politècnica de València, 2. Delft University of Technology)

Abstract
The adoption of Renewable Energy Technologies (RETs) is critical for advancing Colombia's energy transition and achieving its sustainability goals. This study provides a comparative analysis of

the drivers and barriers influencing the adoption of two decentralized RETs: batteries and photovoltaic (PV) solar systems. Using the Analytic Network Process (ANP), input from experts in industry, government, and academia was analyzed to prioritize the most significant factors. Economic and institutional drivers, such as fiscal incentives, stabilization of energy prices, and market participation mechanisms, emerged as key enablers for both technologies. Social and technical drivers, while less influential, highlighted the importance of adopter motivation and addressing service failures. Economic barriers, particularly the lack of financing and high CAPEX, were identified as the most significant challenges, emphasizing the need for innovative financing mechanisms. Technical and institutional barriers, including techno-economic uncertainty and lack of standardization, also impede adoption. The study underscores the importance of aligning expert perspectives to create cohesive strategies and strengthen renewable energy policies. While the findings are specific to Colombia, they provide valuable insights into addressing economic and technical barriers in similar contexts.

DETERMINING THE RELATIVE IMPORTANCE OF CORPORATE GOVERNANCE FRAMEWORK ELEMENTS FOR TECHNOLOGY FIRMS IN NIGERIA USING THE ANALYTIC HIERARCHY PROCESS MODEL

Adeyinka Adeyemi[1], Bolajoko Dixon-Ogbechi[1] (1. University of Lagos)

Abstract

Corporate governance has become a widely discussed topic in Nigeria as it is being considered a key factor for stable growth in businesses. Although it would appear that corporate governance in Nigeria is influenced by a number of internal and external factors, there are institutions that play significant roles in the governance process. To ensure compliance and make for the achievement of these fundamental principles, there are certain elements of

Corporate Governance Framework that must necessarily be considered and put in place to effect viable Corporate Governance enforcement. Thus, this study applied the AHP model to determine the relative importance of Corporate Governance Framework elements that will help improve the performance of technology firms in Nigeria. The cross- sectional survey research design using an Analytic Hierarchy Process (AHP) model based quantitative approach was used to study a sample of 30 heads of department of technology firms selected using a multistage sampling procedure. Data was gathered through the use of a semi-structured questionnaire designed using the relative importance scale generated from the Super Decision Matrix. The data was analysed using descriptive statistics on the SPSS (Statistical Package for Social Sciences) version 26.0, Excel and the Super Decision Matrix ANP version 6.0. It was found that the CGF elements that will help improve the performance of technology firms in Nigeria, using the AHP model is: Board Structure (Size of Board); Ethics and Compliance (Code of Ethics); Regulatory Framework and Compliance (Applicable Laws) and Transparency and Accountability (Financial Reporting). It is recommended amongst others that Technology firms in Nigeria should Take advantage of the regulatory provisions for size of board and CEO Duality by the regulatory authorities since both are the highest ranked Board Structure criteria.

SUNDAY – SESSION 3B – TRACK 3,5 &6

12:00pm
Short Code: SUN_RMB_TR_MISC
Session Chair: Claudio Garuti

CRITICAL REVISION OF THE MENTAL HEALTH QUESTIONNAIRE /SUSESO CEAL-SM

 Claudio Garuti[1], Mario Sandoval[2] (1. Fulcrum Ltda., 2. Medical Sapiens)

Abstract

The Work Environment Assessment Questionnaire – Mental Health / SUSESO, CEAL-SM/SUSESO, is established as an instrument for identifying and measuring psychosocial risk factors at work and, according to its website, claims to be a measurement instrument. This questionnaire consists of 88 questions that are grouped into two sections: a general one, with 34 questions; and a psychosocial risk one, with 54 questions. The risk exposure score or "risk status" is only calculated for one specific section and, by definition, is the raw sum of the scores obtained in each of the sections of this specific section. Those scores are based in ordinal scales; thus the results are lack of rationality. Because of this, the user obtains unsure outputs that may not reflect the measured environment.

SELECTING AN ENHANCEMENT PROCESS FOR LARGE-FORMAT ADDITIVE MANUFACTURING USING THE ANALYTICAL NETWORK PROCESS (ANP)

Javier Bas [1], Pablo Castelló [1], Cesar García [1] (1. Universidad Politécnica de Valencia; Instituto de Diseño y Fabricación)

Additive manufacturing, also known as 3D printing, has revolutionized industry by enabling the creation of parts with complex geometries and significantly reducing waste compared to traditional methods. In particular, large-format additive manufacturing (LFAM) has established itself as a key tool in demand- ing sectors such as aerospace and wind energy. However, this technology still faces significant chal- lenges related to part quality, process efficiency, and economic and environmental sustainability.

This study addresses these issues by applying the Analytical Network Process (ANP), a multi-criteria tool for evaluating and prioritizing technology alterna- tives for improvement. This analysis evaluated four alternatives for improving large-format additive manufacturing. The first is the use of lasers integrated into the extruder to improve adhesion between lay- ers and structural strength. Another suggestion is the implementation of software that

allows printing of non-flat layers, which increases strength in all direc- tions and reduces manufacturing time. The use of new materials such as ABS-CF20%, which offers better mechanical and thermal properties compared to con- ventional polymers, has also been studied. Finally, the recycling of molds and materials was evaluated, a solution that not only contributes to sustainability, but also improves adhesion between layers and signifi- cantly reduces costs.

CLOSING/ AWARDS CEREMONY

1:00pm

Speakers:

Rozann Saaty (Creative Decisions Foundation, USA), Dr. Monica Garcia Melon (Universitat Politècnica de València)

BREAK OUT SCH. – SUNDAY

CONFERENCE PARTICIPANTS – CONTACT INFORMATION

ADEJUMOLA, BUSAYO, adejumolapeter@gmail.com
AYDIN, Mustafa Sahin, msahin35@gmail.com
AYDIN GÖK, Filiz, sfilizgok@yahoo.com
Adebakin, Moruf, moruf.adebakin@yabatech.edu.ng
Adeyemi, Adeyinka, adeyinka@intermarc-ng.com
Agarwal, Dr. Mohit Kumar, agrwalmohitk@gmail.com
Aguirre, Fiorella, fa.aguirrez@alum.up.edu.pe
Ai, The Jin, the.jinai@uajy.ac.id
Akalin, Gurkan, ygd9my@uvawise.edu
Akman, Gülşen, akmang@kocaeli.edu.tr
Aktas, Emel, emel.aktas@cranfield.ac.uk
Alcantar-López, Georgina, georgina.alcantarlopez@un.org
Ali, Kashif, 2011kashifali23@gmail.com
Ali, Yousaf, yali@fbsu.edu.pk
Alvear, Raul, alvear.raul@gmail.com
Amaloo, Rajan, rajan.amaloo@gmail.com
Andriichuk, Oleh, andreychuck@ukr.net
Aparisi-Cerda, Isabel, isapcer@upv.es
Aragones, Pablo, aragones@upv.es
Aragonés-Beltrán, Pablo, aragones@dpi.upv.es
Arriaga, Benjamin, bm.arriagaa@up.edu.pe
Astanti, Ririn Diar, ririn.astanti@uajy.ac.id
Ataseven, Cigdem, c.ataseven@csuohio.edu

BADMUS, ADEOLA, jekpudu@unilag.edu.ng
BADMUS, ADEOLA, khalimatat@yahoo.com
BAMOGO, Hamado, hamadobamogo@gmail.com
BUYUKOZKAN, GULCIN, gulcin.buyukozkan@gmail.com
Baffo, Ilaria, ilaria.baffo@unitus.it
Balaban, Igor, igor.balaban@foi.hr
Banwet, Devinder Kumar, dbanwet@gmail.com
Bas, Javier, jababo@etsii.upv.es
Bautista, Rocio Poveda, ropobau@upvnet.upv.es
Bayraktaroglu, Ayse Elvan, bayraktaroglu@itu.edu.tr

Benitez, Elvira Tatiana Merino, tatianam@iecologia.unam.mx
Bhattarai, Shashi, shashibhattarai@yahoo.com
Bhattarai, Shashi, shashibhattarai@gmail.com
Bianco, Raphael, raphael.bianco@unesp.br
Bojorquez-Tapia, Luis A., bojorquez@ecologia.unam.mx
Bojórquez-Tapia, Luis Antonio, luis@multicriteria.org
Bozkurt, Ahmet, bozkurtah18@itu.edu.tr
Byanjankar, Abhishek, 2011009_abhishek@kusom.edu.np

C

C.Ervural, Beyzanur, bc.ervural@erbakan.edu.tr
CHRIT, Salma, s.chrit@emsi.ma
Calorio, John Lennon, jllcalorio@gmail.com
Camacaro, Miguel, mundovalor@gmail.com
Castelló, Pablo, pabcaspe@idf.upv.es
Chellappa, Vigneshkumar, vkumar.chellappa@polyu.edu.hk
Chinmay, Kumar, chc462@pitt.edu
Corriça, José, corrica.pina@ime.eb.br
Culaste, Hannah Faye, hcculaste@up.edu.ph

D

Dash, Mihir, mihirda@rediffmail.com
De Felice, Fabio, fabio.defelice@uniparthenope.it
De Felice, Fabio, defelice@unicas.it
Delinov, Emil, delinov@abv.bg
Dixon-Ogbechi, Bolajoko, bdixon-ogbechi@unilag.edu.ng
Dolan, James, jdolan787@gmail.com

E

Egedi, Jerry, jerorotins@gmail.com
Erol, Özgür, oeyesilsirt@medipol.edu.tr
Espezúa, Soledad, s.espezual@up.edu.pe
Espinal, Delka, espinal@geohaz.org
Fan, Ching-Lung, p93228001@ntu.edu.tw

F

Felix Lozano Aguilar, José, jlozan@dpi.upv.es
Florek-Paszkowska, Anna, aflorekpaszkowska@pucp.edu.pe
Florek-Paszkowska, Anna, greda.anna@gmail.com

G

GBENGa, DABIRI, dabiri.gs@lasustech.edu.ng
Galkin, Andrii, andrii.galkin@uantwerpen.be
García, Cesar, cegarga3@etsid.upv.es
García, Ofelia, ofelia.garcia@iecologia.unam.mx
Garuti, Claudio, claudiogaruti@fulcrum.cl
Garuti, Fabiola, f.garuti@uc.cl
Ginda, Grzegorz, gginda@agh.edu.pl
Ginda, Grzegorz, grzegorzginda@wp.pl
Gonzalez-Urango, Hannia, hkgonzal@upvnet.upv.es
Gonzalez-Urango, Hannia, gonzalezurango@gmail.com
Gul Fareed, Anaiz, anaizgulfareed.silawat001@studenti.uniparthenope.it

H

Habib, Qasim, qasimhabib659@gmail.com
Halim, Siana, halim@petra.ac.id
Herdhiansyah, Dhian, dhian.herdiansyah@uho.ac.id
Hosseini, Seyed Mohammad Hassan, sh.hosseini51@gmail.com

I

ISAAC, MARY, misaac@unilag.edu.ng
Iida, Yoichi, youichi.iida@gmail.com
Infanzón, Iván, ivan.infanzon@pucp.pe
Iovine, Gianfranco, gianfranco.iovine@unitus.it
Ishizaka, Alessio, alessio.ishizaka@neoma-bs.fr
Islam, Rafikul, rislam@iium.edu.my
Iyer, Deepa, d.iyer@csuohio.edu

J

Jablonsky, Josef, jablon@vse.cz
Jackson, William, bill.jackson@successtaging.com

K

KV, Ajaygopal, ajaygopal.2020@iimmumbai.ac.in
Kabak, Ozgur, kabak@itu.edu.tr
Kadaifci, Cigdem, kadaifci@itu.edu.tr
Kadaifci, Cigdem, cigdem.kadaifci@gmail.com
Kadenko, Sergii, seriga2009@gmail.com
Kahraman, Cengiz, kahramanc@itu.edu.tr
Kara, Gokhan, karagokhan@gmail.com
Karadayı, Melis Almula, makaradayi@medipol.edu.tr
Karpak, Birsen, bkarpak@ysu.edu
Kaya, Ahmet Anıl, ahmet.kaya2@std.medipol.edu.tr

Kisman, Zainul, zainulkisman@trilogi.ac.id
Koul, Saroj, skoul@jgu.edu.in

L

Labib, Ashraf, ashraf.labib@port.ac.uk
Le Pira, Michela, michela.lepira@unict.it
Ligardo-Herrera, Ivan, i.e.ligardoherrera@tudelft.nl
Lillo Paredes, Juan Antonio, jlillo@usil.edu.pe
Limeri, Linda, lindalimeri@gmail.com
Lindo, Juan Carlos, jc.lindom@gmail.com
Lobitaña, Jhudiel, jhudiel.lobitana@nmsc.edu.ph

M

Maden, Ayça, aycamaden@beykent.edu.tr
Mahajan, Venugopal, venugopalmahajan@gmail.com
Manandhar, Prince, 2011019_prince@kusom.edu.np
Marculetiu, Alina, amarculetiu@ysu.edu
May, Jerrold, jerrymay@katz.pitt.edu
Medina Momparler, Víctor, vicmemom@upv.edu.es
Melon, Monica Garcia, mgarciam@dpi.upv.es
Minutolo, Marcel, minutolo@rmu.edu
Mock, Ernesto, proavaluos@yahoo.com
Mohammed, Olurotimi, oomusa@unilag.edu.ng
Moheimani, Seyedarash, arash.moheimani@neoma-bs.fr
Moreno, Jose Maria, moreno@unizar.es
Moreno-Reynosa, María Antonieta, moreno.mantonieta@gmail.com
Mostafaei, Saba, sabamostafaei46@gmail.com
Mostafaei, Saba, mostafaei23@itu.edu.tr
Mu, Enrique, emu@carlow.edu

N

Nakielski, Marcin, nakielsk@agh.edu.pl
Namoco, Rhoda, rhoda.namoco@gmial.com
Neuhaus, Kyle, kneuhaus@coaxinc.com
Nwankwo, Chukwuka, chukason.nwankwo@gmail.com

O

ODIGIE, MARTINS, eromosem@yahoo.com
OGUNKEYE, BOLADALE, bogunkeye@gmail.com
Ogra, Aurobindo, aogra@uj.ac.za
Ogunclu, Osman, ogunclu20@itu.edu.tr
Ojo, Elizabeth, elizabeth.ojo@yabatech.edu.ng

Olatidoye, Olawale, waleolatidoye@gmail.com
Olonade, Seun, olonadeseun@yahoo.com
Onar, Sezi Cevik, cevikse@itu.edu.tr
Onsel, Sule, sule.ekici@iuc.edu.tr
Ortiz, Miguel Angel, mangelo2008@gmail.com
Ozdemir, Mustafa, mozdemir0307@gmail.com
Oztaysi, Basar, oztaysib@itu.edu.tr

P

PEACE, LADY, peace.expensive3@gmail.com
Palma, Pedro, pedro.palma@unesp.br
Park, Cha Hee, chahee.p@outlook.com
Percin, Selcuk, spercin@ktu.edu.tr
Pereyra-Rojas, Milagros, milagros@pitt.edu
Perry, Cole, chperry57@hmail.com
Petrillo, Antonella, antonella.petrillo@uniparthenope.it
Petrović, Eva, epetrovic23@student.foi.hr
Piantanakulchai, Mongkut, mongkut@siit.tu.ac.th
Poudel, Sovit, psovit@truenary.com
Poudel, Sovit, sovit.poudel@gmail.com

R

Rashidfar, Maryam, mrashidfar@gmail.com
Regmi, Suraj, regmisuraj72@gmail.com
Rehman, Mizna, mizna.rehman001@studenti.uniparthenope.it
Rengifo, Risley, risley.rengifo@upn.edu.pe
Rezaei, Jafar, j.rezaei@tudelft.nl
Ribó-Pérez, David, david.ribo@iie.upv.es
Rokou, Elena, erokou@creativedecisions.net

S

S, Rita, ritasamikannu@gmail.com
SAVADOGO, Zoïnabo, serezenab@yahoo.fr
Saaty, Rozann, rozann@creativedecisions.net
Salako, Temilolu, lolu2020@yahoo.com
Saliari, Marita, marita.saliaris@gmail.com
Salomon, Valerio, valerio.salomon@unesp.br
Samur, Mustaga, samur19@itu.edu.tr
Sandoval, Mario, marsam1061@gmail.com
Sandoval, Mario, mario@medicalsapiens.com
Saniga, Keith, sanigak@outlook.com
Saniga, Keith, keith.saniga@aspirant.com

Sapkota, Prabal, prabal@ku.edu.np
Sava, Gabriela, msava@bgseu.edu
Sava, M. Gabriela, msava@bgsu.edu
Saylam, Serhat, saylamserhat@gmail.com
Sağır Özdemir, Müjgan, mujgan.sagir@gmail.com
Seckin, Umur, seckin19@itu.edu.tr
Sezer, Mevlude, sezer19@itu.edu.tr
Stucchi, Luciano, stucchi_l@up.edu.pe
Stylianou, Andreas, styl_andreas@outlook.com
Syaban, Kharis, ksyaban@usn.ac.id

T

Talavera, Alvaro, ag.talaveral@up.edu.pe
Tekile, Hailemariam, hailebb@gmail.com
Tombs, Kenneth, kenneth.tombs@business-compass.com
Topcu, Ilker, topcuil@itu.edu.tr
Topcu, Ilker, ilker.topcu@itu.edu.tr
Tramarico, Claudemir, claudemir.tramarico@unesp.br
Tramarico, Claudemir, claudemir.leif@terra.com.br
Tripathi, Abhishek, abt84@pitt.edu
Tsogtsaikhan, Uyanga, uyanga@plantprotection.mn
Tsyganok, Vitalii, vitaliy.tsyganok@gmail.com
Turel, Taci, tacibaht@gmail.com
Türkmen, Emre, emre.turkmen@kocdigital.com

U

Ujwary-Gil, Anna, ujwary@inepan.waw.pl
Ullah, Amin, amin.llh@gmail.com
Ulukan, Erdal, ulukan.erdal@gmail.com

V

Vargas, Luis, lgvargas@pitt.edu
Verma, Rakesh, rakeshverma@iimmumbai.ac.in
Verma, Rakesh, rakeshverma@nitie.ac.in
Vieira Neto, Leopoldino, leovine@fu-usa.com
Vukovac, Emanuel, evukovac23@foi.hr
Vukovac, Emanuel, evukovac23@student.foi.hr
Vusić, Mislav, mvusic23@student.foi.hr

W

Wei, Lirong, weileerong@foxmail.com
Wei, Lirong, leerongw@gmail.com

Y

Z