

## PROGRAM & ABSTRACT BOOK

WCBEM 2025 PARTICIPANTS FLAGS



NOVEMBER 13- 15, 2025 | GRAND PARK LARA HOTEL CONVENTION  
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ANTALYA, TURKEY

# WCBEM - 2025

13TH WORLD CONFERENCE ON  
BUSINESS, ECONOMICS AND MANAGEMENT

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**13th World Conference on Business, Economics and Management  
(WCBEM-2025)**

<https://www.globalcenter.info/wc-bem/>

**Grand Park Lara Hotel Convention Center**

**Antalya – Turkey**

**13 – 15 November 2025**

<https://meet.google.com/pat-vqbb-vtp>

**PROGRAM BOOK**

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# KEYNOTES



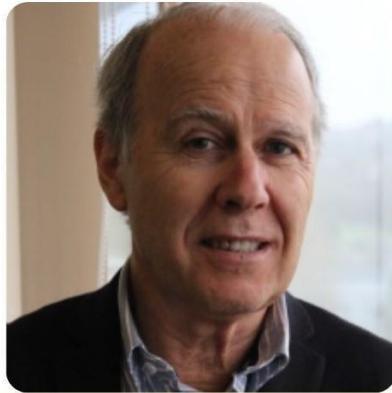
**PROF. DR. ANA CAMPINA**  
UNIVERSITY FERNANDO PESSOA,  
PORTUGAL

## TITLE

The Human Rights Generations and Artificial Intelligence

## BIOGRAPHY

Prof. Dr. Ana Campina has a PhD in Law; PhD in Human Rights; Political Scientist / Expert in International Relations ; FCHS – UFP University Fernando Pessoa Professor; Coordination Postdoctoral Fellowship “Human Rights in the Digital Age” UFP; Coordinator 1st SC Political Science and International Relations UFP; MODULE JEAN MONNET UFP “European Union's political statement on Human Rights in the age of Artificial Intelligence” Co-Coordinator; CEPESE – Centro de Estudos da População, Economia e Sociedade Researcher; FP-I3ID – Instituto de Investigação, Inovação e Desenvolvimento da UFP Researcher; CIGG – Centro de Investigación para la Gobernanza Global Researcher ; OCEAN – Open Council of Europe Academic Networks – Council of Europe Member : COST ACTION Expert; SVTFaculdade Visiting Professor SVTFaculdade (Brazil); Lecturer of Gonçalves Dias Chair (BR); Editor-in-Chief International Journal of New Trends in Social Sciences (IJSS); Editor Board Journal European Journal of Transformation Studies; Editorial Advisory Board of Law ADJURIS – International Academic Publisher; Co-Topic Editor “Human Rights and Artificial Intelligence”.



**PROF. DR. CARLOS RODRIGUES**  
**UNIVERSITY FERNANDO PESSOA,**  
**PORTUGAL**

#### **TITLE**

The Human Rights Generations and Artificial Intelligence

#### **BIOGRAPHY**

Prof. Dr. Carlos Rodrigues has a PhD European Tax Law; Associate Invited Professor in Universidade Fernando Pessoa; University Professor in Law; Coordination Postdoctoral Fellowship "Human Rights in the Digital Age"; MODULE Jean Monnet UFP Coordination; Researcher CEPSE – Centro de Estudos da População, Economia e Sociedade, Researcher FP-I3ID – Instituto de Investigação, Inovação e Desenvolvimento da Universidade Fernando Pessoa; Researcher CIGG – Centro de Investigación para la Gobernanza Global de USAL; SVTFaculdade Visiting Professor SVTFaculdade (Brazil); Lecturer of Gonçalves Dias Chair (BR); Ex-Principal Advisor Tax and Customs Authority; Legal Consultant; Frontiers in Political Science, Co-Topic Editor "Human Rights and Artificial Intelligence"; Editor-in-Chief Global Journal of Sociology: Current Issues (GJSOC); Member do OCEAN-CoE – Open Council of Europe Academic Networks; Member of High Commission of IKSAD Institute; COST – European Cooperation of Science & Technology - External Expert.



**PROF. DR. BEKIM FETAJI, MOTHER  
TERESA UNIVERSITY  
SKOPJE, NORTH MACEDONIA**

## **TITLE**

Devising Algorithmic Framework for Cybersecurity Scientific Analytics

## **BIOGRAPHY**

Bekim Fetaji is Full Professor of Informatics (Computer Sciences) at University Mother Teresa, Skopje, North Macedonia. I received his PhD in Computer Sciences at the Faculty of Computer Sciences at Graz University of Technology in 2008. He received his master's degree from Oxford Brookes University, Oxford, England UK. He was Visiting Professor at Staffordshire University UK, Tokyo University of Agriculture and Engineering, Japan, OREBRO University, Computer Science, Sweden, Canadian Institute of Technology, Tirana, Albania, Rochester Institute of Technology RIT, campus Prishtina, Kosovo, University of Novi Pazar, Serbia and other Universities. More than 25 years of teaching experience and working in higher education in different Universities in the region and abroad. Lectured in 4 languages in different Universities: English, Albanian, Macedonian, Serbian language.

Participated in several projects within different programs such as Tempus, Erasmus and other national and international research projects. Published more than 150 scientific papers in international conferences most of them in IEEE and ACM and more than 30 international journals, some of them with ISI Web of Science impact factor. Published 9 (nine) academic textbooks and 2 (two) books in English that can be found online at Amazon. Keynote speaker in many conferences among others also in IEEE Conferences (Reference: <https://iccece23.theiaer.org/keynote.html>).

Main research interest and published work is in enhanced technology enhanced education, virtual learning environments, software engineering, programming and lately Data science with AI and machine learning, Data processing with Data Analytics and closely related fields.



**PROF. DR. ÖZCAN ASILKAN**  
BUSINESS ANALYTICS DEPARTMENT  
HIGHER COLLEGES OF TECHNOLOGY  
ABU DHABI, UNITED ARAB EMIRATES

## **TITLE**

AI-Powered Personalized Learning Pathways

## **BIOGRAPHY**

Prof. Dr. Özcan Asilkan is an accomplished Computer Science Engineer and Academic with a robust background spanning higher education and multiple industries, including software development, data analysis, manufacturing, tourism, and healthcare. His research interests cover a broad range of interdisciplinary topics such as Management Information Systems (MIS), Business Analytics, Computer Science, Database Systems, Data Mining, Customer Relationship Management (CRM), and Hospitality Management.

With nearly 30 years of combined academic and industry experience, Prof. Asilkan has held numerous teaching and professional engagements across almost 10 countries and 15 universities worldwide.

In academia, he has served in various leadership and instructional capacities; including Dean, Chair, and Lecturer, and has taught a wide array of courses while publishing nearly 70 academic papers. He has also participated as a Chair and Keynote Speaker at more than 10 international conferences.

As a Computer Science Engineer, Prof. Asilkan has undertaken diverse professional roles such as Systems Analyst, Database Administrator, Application Developer, and Consultant, contributing to several major projects, including the implementation of CRM and ERP systems.

Since July 2024, he has been serving at the Higher Colleges of Technology (HCT) in Abu Dhabi, United Arab Emirates.

**PROGRAM**  
**14/11/2025, Friday**  
**ONLINE PRESENTATIONS**

14.11.2025 9:00 – 9:20	Opening Ceremony	Hall 1
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TIME	TITLE	SPEAKER	HALL NAME
14.11.2025 9:20 – 10:00 <b>Keynote 1</b>	“AI-Powered Personalized Learning Pathways”	<b>Prof. Dr. Ozcan Asilkan</b> , Senior Lecturer Business Analytics Department Higher Colleges of Technology Abu Dhabi, United Arab Emirates	1

TIME	TITLE	SPEAKER	HALL NAME
14.11.2025 10:00 – 11:00 <b>Keynote 2</b>	“Devising Algorithmic Framework for Cybersecurity Scientific Analytics”	<b>Prof. Dr. Bekim Fetaji</b> , Faculty of Informatics, Mother Teresa University, Skopje, North Macedonia	1

TIME	TITLE	SPEAKER	HALL NAME
14.11.2025 11:00 – 12:00 <b>Keynote 3</b>	“The Human Rights Generations and the Artificial Intelligence”	<b>Prof. Dr. Ana Campina</b> , University Fernando Pessoa, Portugal <b>Prof. Dr. Carlos Rodrigues</b> , University Fernando Pessoa, Portugal	1

12:00 – 13:00	Lunch
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**Session 1**  
**13:00 – 15:30**

ORDER	TITLE	AUTHOR, AFFILIATION and COUNTRY
1	A Bibliometric Analysis of Quality in Higher Education	Merve Nur Atalar, Ondokuz Mayis University, Turkey Aysel Cetindere Filiz, Ondokuz Mayis University, Turkey
2	The Impact of Creative Leadership on Enhancing Municipal Service Efficiency: A Mixed Methods Study	Seror N. Aldouri, University of Samarra, Iraq
3	Demystifying Sustainable Performance in Fmcg Companies: The Roles of Open Innovation, Dynamic, and Knowledge Management Capabilities	Banji Rildwan Olaleye, North West University, Potchefstroom, South Africa
4	Exploring the Role of Blockchain Technology in Sustainable Waste Management within Pharmaceutical Supply Chains: An Illustrative Case of the US FDA Project	khaldil litim, Batna1 University, Batna, Algeria Houssam Messaoudi, Echahid Cheikh Larbi Tebessi University, Tebessa, Algeria Samir Bensahnoune, Tipaza University, Algeria Nabil Chenene, Echahid Cheikh Larbi Tebessi University, Tebessa, Algeria
5	Understanding management strategies for smart infrastructure in Tomorrow's Turkish cities	Hamdi Tekin, Alanya University, Turkey
6	Sensory Metaphors in Digital Tourism Marketing: Bridging the Physical – Digital Gap	Mihail Cristian Ditoiu, The Faculty of Business and Administration (University of Bucharest), Romania

8	The Application of Convolutional Neural Network for Classifying Non-Defect from Defect Software Systems	Aamo Iorliam, Benue State University, Makurdi, Nigeria. Özcan Asilkan, Business Analytics Department, Higher Colleges of Technology, United Arab Emirates. Suleiman Adamu, ICT Unit of Sule Lamido University in Kafin Hausa, Jigawa State, Nigeria. Moses Iorsoo Tyavnande Benue State Polytechnic, Ugbokolo, Nigeria.
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**15/11/2025, Saturday**  
**ONLINE PRESENTATIONS**  
**09:00 – 10: 30**  
**Session 3**

ORDER	TITLE	AUTHOR, AFFILIATION and COUNTRY
1	Measuring Employer Brand Image and Scale Development for the IT Service Industry	Anca Clipa, Claudia Stoian, <i>Alexandru Ioan Cuza University</i> , Romania
2	Influence of Technology Transfer Offices on Commercialisation of Science and Technology in Latvia	Justīne Viķe, <i>Rīga Stradiņš University</i> , Latvia
3	The Measurement of Antecedents of Purchase Intentions and WoM Marketing in Fashion Industry	Mirza Ashfaq Ahmed, <i>University of Gujrat</i> , Pakistan
4	The Impact of Tourism Activity Development on the Romanian Economy	Tiberiu Iancu, Tabita Cornelia Adamov, Sorin Stanciu, Dorin Camen, Mihaela Moatar, Ioan Brad, Romania
5	Trend of Income Inequality In Asia and Effects of Education	Kang Hoon Park, <i>Southeast Missouri State University</i> , United States

10:30 – 11:00	Coffee Break
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**Session 4**  
**11:00 – 12:30**

ORDER	TITLE	AUTHOR, AFFILIATION and COUNTRY
1	Bio-districts as living labs for the promotion of sustainable development and the resilience of territories	Nadia Cipullo, <i>Link Campus University</i> , Italy
2	The impact of European integration on trade flows in Romania	Anca Maria Paraschiv, Laurentiu Dinu, Coralia Ioana Zavera, <i>Bucharest University of Economic Studies</i> , Romania
3	Tourism contribution to Gross Domestic Product and Gross Value Added	Ioana Anda MILIN, Iuliana Ioana Merce, Tiberiu Iancu, Ioan Petroman, Elena Pet, Eugenia Tigan, <i>University of Agricultural Sciences and Veterinary Medicine</i> , Romania
4	The challenges of computational simulation with industry 4.0	Tiago dos Santos Almeida, Lie Yamanaka, Thales Botelho Souza, <i>Federal University of Goiás</i> , Brasil
5	Research on the tourist traffic in protected areas in Romania	Ioana Anda MILIN, Iuliana Ioana Merce, Cornelia Petroman, Elena Tonea, <i>University of Agricultural Sciences and Veterinary Medicine</i> , Romania
6	Transformational leadership style in the relationship between innovation and efficiency of healthcare units	Wojciech Głów, <i>University of Economics</i> , Poland

12:30 – 13:00	Closing Ceremony
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**16/11/2025, Sunday**

09:00 – 18:00	Antalya Historical Places Tour
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# ABSTRACTS

## **A Bibliometric Analysis of Quality in Higher Education**

**Merve Nur Atalar**, Ondokuz Mayis University, Turkey  
**Aysel Cetindere Filiz**, Ondokuz Mayis University, Turkey

### **Abstract**

The concept of quality in higher education has gained increasing global importance in recent years due to reasons such as institutional accountability, accreditation standards, and international competition. While the number of studies addressing various dimensions such as quality assurance, academic standards, and performance indicators is increasing, there is a need for a comprehensive mapping of the existing literature through systematic analyses that reveal the structure and development of this field. The aim of this study is to explore the development and current state of academic publications on quality in higher education. In this context, relevant publications indexed in the Web of Science database will be analyzed, and influential authors, institutions, journals, and research clusters will be identified using bibliometric techniques such as co-authorship, co-citation, and keyword frequency using VOSviewer software. The study is expected to identify dominant themes, collaboration networks, and emerging trends in the field. This analysis will contribute to a better understanding of the structure of the academic literature on quality in higher education and guide future research.

**Keywords:** Quality in higher education, Quality of higher education, Web of Science, VOSviewer

# **The Impact of Creative Leadership on Enhancing Municipal Service Efficiency: A Mixed Methods Study**

**Seror N. Aldouri**, University of Samarra, Iraq

## **Abstract**

The rising demands for transparency, accountability, and effectiveness call for a rethinking of old managerial styles by municipal institutions. Therefore, this study assesses the effect of creative leadership on the enhanced efficiency of municipal services through a mixed-method design that integrates quantitative surveys and qualitative interviews. The survey yielded 78 valid responses (34.7% of the 225 questionnaires distributed) from employees, officials, and citizens in municipalities within Iraq's Salah al-Din governorate; results indicated an extremely positive correlation  $r=0.83$  between creative leadership and service efficiency. In my view, regression analysis confirms that creative leadership explains about 70% of the variation in efficiency  $R^2=0.70$ . Flexibility and innovation were the two most effective leadership characteristics. However, due to its scope limited to one region only it should be generalized with caution. The qualitative findings put forward major impediments to creative leadership namely bureaucratic rigidity and the inadequately skilled human resources while also highlighting enablers such as decision-making participation and motivational support. The study discovered that promoting creative leadership under institutional reform and employee development will greatly improve the performance of municipal services. These findings add to the existing literature on public sector leadership while giving real-life lessons on how to make local governments efficient through innovation.

# **Demystifying Sustainable Performance in Fmcg Companies: The Roles of Open Innovation, Dynamic, and Knowledge Management Capabilities**

**Banji Rildwan Olaleye**, Northwest University, South Africa

## **Abstract**

Sustainable performance has become a vital competitive requirement for Fast-Moving Consumer Goods (FMCG) companies; yet, many struggle to translate their sustainability goals into tangible performance gains, especially in emerging markets like Nigeria. This study examines the impact of knowledge capability, dynamic capabilities, and open innovation on sustainable performance in Nigerian FMCG firms. Data from a cross-sectional survey of 273 senior and middle managers in Nigerian FMCG companies located in major industrial hubs were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate the measurement model and test the direct and indirect relationships. Findings show that knowledge capability has a substantial positive direct impact on sustainable performance. Dynamic capabilities serve as a mediator between knowledge capability and sustainable performance, while open innovation moderates the link between dynamic capabilities and sustainable performance. Based on resource-based and knowledge-based theories, this study recommends that Nigerian FMCG firms should develop internal knowledge systems and build dynamic capabilities to turn knowledge into sustainability outcomes. Additionally, open innovation boosts the effectiveness of dynamic capabilities in achieving sustainable performance. Practically, managers should foster external partnerships with universities, suppliers, and startups, invest in agility and resource reallocation, and cultivate a learning culture. Policymakers play a crucial role in supporting industry-academia collaborations, offering incentives for sustainable innovation, and strengthening the national innovation ecosystem, thereby enabling significant contributions to sustainability efforts within FMCG companies.

# **Sensory Metaphors in Digital Tourism Marketing: Bridging the Physical – Digital Gap**

**Mihail Cristian Ditoiu**, University of Bucharest, Romania

## **Abstract**

Tourism brands often “sell” with images and words, but travel is remembered through smells, tastes, and touch, like a holistic “sensescape”. The problem is that this visual–sensory gap weakens online persuasion and makes destination promises to feel abstract.

The present paper proposes a practical framework for encoding olfactory, gustatory, and haptic cues into visual communication so that websites, posters, and UI elements can more credibly evoke on-site sensations and emotions. We conduct a critical synthesis of multisensory branding literature and classic industry cases, then develop a taxonomy of indirect sensory encodings. Drawing on established principles of sensory marketing and haptics, we translate cross-modal correspondences into “if–then” design rules. The output is a mapping table from tourism stimuli to visual proxies.

Findings and results are including the following aspects: a metaphor–sense matrix that links destination attributes to specific visual encoders; five reusable “translation” rules—for example, how grain, specular highlights, and chroma temperature modulate perceived freshness vs. warmth; and UI-level tactics that reliably cue tactile qualities without hardware haptics. Worked examples show how the matrix improves perceived vividness and intent-to-visit in concept tests.

Sensory metaphors can systematically narrow the physical–digital gap when applied as design rules rather than ad-hoc art direction. We recommend teams adopt the mapping table as a checklist during creative reviews, A/B-test one encoder per sense to avoid overload and localize metaphors to cultural scent/taste norms.

# **The Application of Convolutional Neural Network for Classifying Non-Defect from Defect Software Systems**

**Aamo Iorliam**, Department of Mathematics/Computer Science, Benue State University, Makurdi, Nigeria.

**Özcan Asilkan**, Business Analytics Department, Higher Colleges of Technology, United Arab Emirates

**Suleiman Adamu**, ICT Unit of Sule Lamido University in Kafin Hausa, Jigawa State, Nigeria.

**Moses Iorsoo Tyavnande**, Department of Computer Science, Benue State Polytechnic, Ugbokolo, Nigeria.

## **Abstract**

This study proposes a Convolutional Neural Network (CNN) based framework for distinguishing non-defective software systems from defective ones, with the objective of enhancing software maintenance and reliability. Traditional defect detection approaches predominantly rely on manual inspection and handcrafted metrics, which are not only labor-intensive but also insufficient for capturing the intricate and nonlinear relationships inherent in software systems. To address these limitations, this paper employs CNN to automatically learn and extract hierarchical feature representations from software metrics. The proposed model was trained and evaluated on a publicly available dataset using Python, TensorFlow, and Keras within a GPU-accelerated computational environment. Experimental results revealed exceptional performance, achieving 100% classification accuracy and near-zero loss, thereby demonstrating the model's strong generalization capability. The findings indicate that the proposed approach enables early and accurate identification of defect-prone software modules, facilitating predictive maintenance and reducing operational costs. This work contributes to the advancement of intelligent, automated software quality assurance and establishes a robust foundation for future investigations in deep learning-based software defect prediction.

**Keywords:** Convolutional Neural Networks (CNN); Software Defect Classification; Predictive Maintenance; Deep Learning; Software Quality Assurance.

# **Understanding management strategies for smart infrastructure in Tomorrow's Turkish cities**

Hamdi Tekin, Alanya University, Turkey

## **Abstract**

Advancements in technology and innovation hold significant potential for the rapid transformation of cities. Currently, infrastructure challenges negatively impact daily life, particularly in areas experiencing high migration and rapid urbanization. Smart infrastructure, with its numerous benefits, will play a vital role in shaping the cities of the future. However, investment in infrastructure requires substantial financing and planning expertise. Therefore, it is essential to carefully consider the management of smart infrastructure. This study aims to explore strategies for managing smart infrastructure, which will be crucial for future urban environments. In addition to a comprehensive literature review, Türkiye's smart infrastructure and smart city strategy documents, portals, and training guides were examined in detail. The strategies were analyzed through content analysis methods. The study revealed that Türkiye's smart infrastructure management strategies are designed to function as systems that collect and process data from sensors, integrate smart transportation systems within cities, and create public value by responding to environmental changes. In this context, the concepts of technology, innovation, and sustainability are prioritized, with goals including waste minimization, environmental sensitivity, and maximizing the efficient use of energy and essential resources. Additionally, priorities for smart infrastructure strategies include cost reduction, enhanced user experience, increased security and mobility, and the development of the internet network.

Key words: Smart Infrastructure, Technology, Sustainability, Cities

# The Human Rights Generations and Artificial Intelligence

Prof. Dr. Ana Cláudia Carvalho Campina, University Fernando Pessoa, Portugal

Prof. Dr. Carlos Rodrigues, University Fernando Pessoa, Portugal

## Abstract

There is a (re)new world designed with the Artificial Intelligence introduction to the whole life – from the abstract and distant idea to the Humanity life in all dimensions. Artificial Intelligence created a serious challenge by the profit of its all potentialities as by the inherent serious threat that it (would) represents. Dare aiming to answer Artificial Intelligence dangers, the States, the Governments and International Organizations developed political and legal in the Human Rights issues. It's undoubtable Artificial Intelligence is not just a "simple" evolution but a deep change on the paradigm of the cyberspace, in a getting involved in "real" life, over the state borders, as an unknown "world/life" challenging the Human being living. The (re)action—legal and political – have been increasing impacting the Human Rights International, Regional and National Laws. The United Nations General Assembly in 2024 "overwhelmingly passed the first global resolution on AI" as the member States are "urged to protect Human Rights and personal data and to monitor AI for potential harms the technology can benefit all." However, in 2021, European Union developed a comprehensive framework that guides all actions related to digital called "Digital Decade" aiming to ensure all aspects of technology and innovation work for people. Following, Portugal published on 17 May 2021 the "Portuguese Charter on Human Rights in Digital Age". Within the international policy and legal regulation European Union published on 13-03-2024 the "AI Act", the first widespread law covering this technology. The Council of Europe started in 2019 working with the internal committee to achieve in 2024 to the "first-ever international legally binding treaty": the "Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law" aims to fill any legal gaps that may result from rapid technological advances. Opened to signature in September 2024, this legal document was already signed by 10 (ten) states, including United States of America, and by European Union, what demonstrates its high relevance and positive legal position within Human Rights protection in Artificial Intelligence Era. The International, Regional and National Law on the intersection of AI with Human Rights are positive and reveals this is a vital question by the risks and opportunities generating a wide and crucial discussion by different stakeholders. In parallel, the Human Rights governance aligned with International Law has been progressed by the regularity efforts, including the permanent exchange of knowledge between technical experts, governments as political management of the Human Right's special needs (protection and acknowledgement) within AI implementation. Our focus research element is analyzing this context based on the Karel Vasak theory on Human Rights Generations classified by the historical context when have emerged. The 1st generation (1780) is associated to the USA Independence, the USA Constitution (1787), the French Revolution and the Declaration of the Rights of Man and the Citizen (1789). This 1st Human Rights Generation recognized the civil rights: life; physical integrity and freedom (personal; religious; expression; manifestation and circulation; property and economics). The 2nd Human Rights Generation (1919) emerged after World War reinforcing Social Wellbeing as an opportunity to guarantee equal rights to all citizens, i.e., political rights and gender equality. The 3rd Human Rights Generation (1960) emerged based on the ideal of fraternity and solidarity, recognizing the collective rights, the vulnerable social groups' protection and environment preservation. Internationally, this Human Rights Generation is the acknowledgement and protection of the development, peace, communication, people self-determination, avoiding racial purification threat, genocide, racial discrimination, and protection of the Human Rights in war contexts or any other armed conflict. Following the II World War the Human Rights were legally collected in International Law documents: Charter of United Nations (1945); Universal Declaration on Human Rights (the most important legal Human Rights document, 1948) and, within the United Nations legal framework, in 1966 the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights. In the Council of Europe framework: European Convention on Human Rights (1950) and European Social Charter (1965) were an effective international. Finally, within the European Union law, the Charter of Fundamental Rights, Treaty of Lisbon (2009). So, from 1945 till nowadays, although all legal documents, all governance (international, regional and national) recognize and protect the Human and Fundamental Rights, we are still in the 3rd Human Rights Generations. Applying qualitative methodology, in a wide but well defined research, we have our object of study well designed: based on the deep changes in all dimensions in the nowadays and near future digital era by the Artificial Intelligence, all the challenges to protect and defend the Human Rights, our research and analysis aims to debate attempting to understand if we are living a new Human Rights generation in this undoubtable new reality to the Human Beings, to the States and Governments, to the International Organizations by the legal, political, economic and social perspectives. As Henry Kissinger (Genesis, 2024) stated "as some would saw this moment as the final act of the humanity, we see, by the reverse, as a new start".

Keywords: Human Rights 1, Fundamental Rights 2, Human Rights Generations 3, Artificial Intelligence 4, Artificial Intelligence Systems 5, Computer Technologies

# **Exploring the Role of Blockchain Technology in Sustainable Waste Management within Pharmaceutical Supply Chains: An Illustrative Case of the US FDA Project**

**Hamdi Tekin**, Alanya University, Turkey

**Messaoudi Houssam**, Echahid Cheikh Larbi Tebessi University, Tebessa (Algeria)

**Bensahnoune Samir**, Tipaza University, alger (Algeria)

**Chenene Nabil**, Echahid Cheikh Larbi Tebessi University, Tebessa (Algeria)

## **Abstract**

**Background:** Pharmaceutical supply chains (PSCs) are characterized by vastness and complexity, leading to performance gaps that undermine sustainability. Pharmaceutical firms often disregard environmental and social concerns, neglecting product collection and recycling. They also face product recall challenges, affecting both economic sustainability and end-user health. Consequently, adopting sustainability strategies and sound waste management practices within PSCs is essential.

**Objective:** This study aims to determine the effectiveness of Blockchain technology in managing sustainable orientation within PSCs, specifically addressing pharmaceutical overconsumption and product recycling issues.

**Methodology:** The research employs an archival literature review to discuss the role of blockchain in ensuring sustainable PSC practices. The archival method was used to build a reliable knowledge base. The review drew on scientific articles and reference books from established databases, including ScienceDirect, Taylor and Francis, SpringerLink, Emerald, and Wiley Online Library.

**Main Argument:** Blockchain technology holds the potential to address sustainability challenges in PSCs. It enables the tracking of product authenticity from initial production to final consumption, securely logging transactions between parties to enhance trust and transparency.

**Conclusion:** Given the complexity of PSC operations, blockchain can be an innovative tool for managing the economic, social, and environmental issues associated with drug delivery. It facilitates the creation of smart contracts and improves traceability within an ecosystem that guarantees a single source of authentic pharmaceutical products.