# PROCEEDING OF

# INTERNATIONAL CONFERENCE 2024

**HYBRID EVENT**

# INTERNATIONAL CONFERENCE 2024

## 27th – 28th November 2024

**Organized By**

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# Editorial

We are delighted to extend a warm welcome to all participants attending the International Conference 2024 on 27th - 28th November 2024. This conference provides a vital platform for researchers, students, academicians, and industry professionals from all over the world to share their latest research results and development activities in multidisciplinary fields. It offers delegates an opportunity to exchange new ideas and experiences, establish business or research relationships, and explore global collaborations.

The proceedings for International Conference 2024 contain the most up-to-date, comprehensive, and globally relevant knowledge across various disciplines. All submitted papers underwent rigorous peer-reviewing by 2-4 expert referees, and the papers included in these proceedings were selected for their quality and relevance to the conference. We are confident that these proceedings will not only provide readers with a broad overview of the latest research results but also serve as a valuable summary and reference for further studies.

We are grateful for the support of many universities and research institutes, whose contributions were vital to the success of this conference. We extend our sincerest gratitude and highest respect to the professors who played an important role in the review process, providing valuable feedback and suggestions to authors to improve their work. We also appreciate the efforts of the technical program committee, reviewers, and authors for their dedication.

Since September 2024, the Organizing Committee has received more than 45 manuscript papers, covering various aspects of multidisciplinary research. After review, approximately 20 papers were selected for inclusion in the proceedings of International Conference 2024.

We thank all participants for their significant contribution to the success of the conference. Our gratitude extends to the keynote speakers, individual speakers, technical program committee, reviewers, and the organizing committee for their efforts in making this conference a reality.

# Acknowledgement

The International Conference 2024, was successfully held in 27th - 28th November 2024. We extend our heartfelt gratitude to our colleagues, staff, professors, reviewers, and members of the organizing committee for their unwavering support in making this conference a success.

We would also like to thank all the participants who traveled far and wide to attend this conference and those who attended the event virtually, making it a truly global event. This conference provided a platform for students, professionals, researchers, and scientists to share their latest research and developments in various disciplines.

The aim of the conference was to promote research and development activities and to encourage scientific information exchange between researchers, developers, professionals, students, and practitioners from all around the world. Once again, we thank everyone who contributed to making this conference a resounding success.

**Dr. Simpson Rodricks**
President
International Institute of Education, Research and Development (IIERD)

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# The Impact of Multilingual Education on the Development of Grammar Skills in School Students in Kazakhstan

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## Abstract:

In the multilingual society of Kazakhstan, learning grammar is a complex process, especially for children immersed in three languages—Kazakh, Russian, and English. Each language has unique grammatical structures, which poses challenges for students as they navigate multiple linguistic frameworks simultaneously. This study explores the impact of Kazakhstan's multilingual education on grammar skill development among primary and secondary school students, highlighting both the benefits and challenges associated with this approach. Multilingual education is intended to promote cultural understanding and cognitive flexibility, but it can also lead to difficulties in acquiring grammatical accuracy across languages. The primary aim of this article is to analyze the specific grammatical difficulties faced by students and examine how language interference and cognitive load impact language learning. The study employs a mixed-methods approach, incorporating quantitative assessments of student performance and qualitative feedback from educators. Key findings reveal recurring grammatical errors, including syntax confusion and tense mismatches, as students transfer rules from one language to another. Methodological recommendations for addressing these challenges include targeted grammar exercises and adaptive teaching strategies that support cross-linguistic transfer while minimizing interference. The study concludes that while multilingual education enriches students' cognitive abilities, tailored grammatical instruction is essential to prevent the formation of persistent errors and to enhance language competence across all three languages.

## Keywords:

Multilingual education, grammar skills, Kazakh, Russian, English.

# Improving Advanced Radiological and Clinical Equipment's Without Durable Biomedical Engineering Support; An Unsustainable Reality and Sunk Cost–The Taraba, Nigeria Experience

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## Abstract:

**Background:** Low and Medium countries like Nigeria with enormous populations and high prevalence of chronic/complex diseases are increasingly investing in modern radiological and clinical paraphernalia like advanced CT scans, MRI, 3D echo/ultrasound, interventional radiology, radiotherapy and dialysis and ICU support equipment. However, these positive developments are not in tandem with the training and availability of locally based and available biomedical engineers and technicians to service and repair/maintain these expensive and useful equipment with a high proclivity of frequent breakdown due to power instability, ineRective utilization and excessive utilization resulting in sunk cost, and unsustainable health systems and poor patients outcomes despite heavy upfront investments in bio-technology.

**Method:** An audit of the equipment supplied de novo and progressively over a 5 year period at Taraba State Specialist Hospital Nigeria, a brand new 350 bed public hospital heavily equipped to provide modern health care access to communities and dissuade the high and expensive trend of international medical tourism from Nigeria to India, Egypt, Malaysia, Turkey and the UK. All existing and newly procured advanced medical and biomedical equipment were cataloged, costs calculated and audited, mean period of break down/down times were estimated and a survey was conducted to determine the number and technical expertise of biomedical engineers and technicians locally in Taraba State and supportive engineers/techs in the industrial hub of Nigeria, Lagos State.

**Results:** Advanced Biomedical facilities identified include a helical CT scan/Siemens, 3 GE advanced ultrasound machines, 2 GE vivid I doppler echocardiograms, 5 new generation dialysis machines with automatic water filtration system, 2 digital mammography machines, urodynamics/laparoscopes, cystoscopes and general and gynecological laparoscopes, 2 new Pentax endoscopes with full diagnostic and interventional capabilities including banding and sclerotherapy and colonoscopes and Pentax bronchi scopes and advanced colposcopes and orthopedic supplies amongst others. During the 5- year period an investment of $2.3 million dollars was estimated. The utilization rates were 100%. The average down time was 30 months (50%) of the observation period. The sunk cost in these investments due to break down and loss revenues and alternative investments was determined to be $5.5 million dollars more than 200% of the initial investments. The calculated return in

investments was minus 62%. The number of locally available biomedical engineers over the 5-year period was zero, thus all engineering support was outsourced at more than 300% of local rates and patient time to utilization of these equipment was 7 days at inception but increased to a mean of 82 days over the 5 year period. Biomedical technicians specially trained were also none. Local training and national trained was provided to 6 biomedical technicians in a newly established biomedical technical support department. International tele-biomedical engineering was arranged but asses to be prohibitively expensive to sustain, ineRective, unreliable and unsustainable. The rate of equipment failure within 6 months of utilization was 45%.

**Discussion:** Low and medium countries are saddled with very expensive health systems investments in human resources and increasingly migrating towards advanced diagnostic and therapeutic equipment without a corresponding availability of biomedical engineering support resulting in an economic vicious cycle of upfront re investments, early break downs of machines, poor durable utility of the machines, poor clinical support for clinicians, poor patient satisfaction and increase poor outcomes for patients and an overall abysmal return on investments and a huge “cemetery” of expensive and abandoned machines and re-surfacing of international medical tourism draining much needed foreign currencies and denying clinicians from gaining local expertise.

**Recommendations:** The future of advanced and precision medicine is increasingly a desire for developing countries to improve local patient care. These involved huge investments but very poor eRective utilization rates and results in sunk costs, wasted investments, denied local capacity building and lack of eRective access by patients. There is a clear and urgent need for the training and availability of local and national biomedical engineers and technicians to support the systems now circumnavigating in huge investments, low utility rates, high down times, high patient satisfaction rates and poor clinical competency rates and adverse health outcomes indicators and lack if sustainable health systems. This is clearly a clinical, biomedical and public health and global health systems issues needing a concerted and inter-grated approach. Health/medical relief missions should include biomedical engineers. A digital/virtual biomedical engineering support network is acutely needed.

# Impact of Financial Constraints on Firm's Economic Value: Evidence from Pakistan Stock Exchange

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## Abstract:

The purpose of this research work is to examine the impact of financial constraints on economic value of firms in Pakistan. For this study, all listed companies in Pakistan Stock exchange have considered as population, which were 574 within the total 35 sectors. The final sample includes 100 nonfinancial firms listed in (PSX) Pakistan stock exchange from the time period of 2014-2023. Independent variable includes financial constraints index obtained from synthetic index, Labor inputs and intermediate inputs while economic value added is used as dependent variable for this study. Production function technique has been used to predict the noteworthy relationship. According to the results of this study Pakistani firm's economic value added is affected by financial constraints significantly and negatively in financial market.

## Keywords:

Financial constraints, Economic value added, financial constraint index.

# Pitt-Hopkins Syndrome – A Case Report from Pakistan

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## Abstract:

Pitt-Hopkins syndrome (PTHS) is a rare neurodevelopmental disorder caused by loss of function of one allele of the Transcription Factor 4 (*TCF4)* gene. We present the first case report from Pakistan where Chromosomal Microarray (CMA) was utilised for diagnosing PTHS. Haploinsufficiency of *TCF4* gene located at 18q21.2 region was identified by CMA. Haploinsufficiency in the *TCF4* has an important role in the development of the nervous system and the ability of the protein to bind to DNA and initiate neuronal differentiation, contributing to the neurological symptoms seen in PTHS. We present an overview of the clinical presentation and diagnostic workup, ultimately leading to the diagnosis of PTHS.

# From Argentina to the World: The Strategic Importance of Textile Engineering in Global Workforce Development

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## Abstract:

The field of textile engineering is critical to the advancement of industries worldwide, yet it remains underrepresented in higher education. In Argentina, the Universidad Tecnológica Nacional (UTN) is one of the few institutions offering a specialized degree in textile engineering, producing a limited number of graduates each year. This paper investigates how the combination of generic, specific, and transversal competencies acquired by textile engineers at UTN enables them to navigate diverse roles across the textile industry and beyond. Using survey data from industry professionals and textile engineering graduates, the paper highlights the significant shortage of specialized talent in the sector, compounded by the migration of skilled engineers abroad. Case studies, including sustainable textile innovation led by UTN graduates and an international collaboration in Ghana, illustrate the global demand for textile engineering expertise. The findings emphasize the need for expanding access to textile engineering education, aligning curricula with evolving industry demands, and positioning textile engineering as a key field for future workforce development.

## Keywords:

Cross-Disciplinary Competencies, Global Talent Shortage, Sustainable Innovation, Textile Engineering Education.

# Decision Tree Analysis of Social Exclusion Factors

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## Abstract:

This article presents a study that employs machine learning techniques to investigate the factors influencing poverty as a primary driver of social exclusion in the United States. Addressing gaps in previous research, we propose a decision tree-based approach to develop a set of predictive models aimed at identifying and quantifying the factors affecting poverty. To this end, we train models using microdata from IPUMS USA, collected from censuses and surveys, containing a wide range of socio-economic variables. By grouping the variables into three categories: predisposing, socio-demographic, and socio-economic, we build three sets of predictive models used to assess the significance of factors associated with these variables. Through variable sensitivity analysis and Variable Effect Characteristic (VEC) analysis to evaluate the values of these variables, we propose a methodology for empirically assessing various factors related to poverty. The proposed methodology would aid in making informed decisions when developing policies and setting priorities in this area.

## Keywords:

Classification, decision trees, machine learning models, poverty, supervised learning.

# Policies and Challenges of Service Delivery in South Africa

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## Abstract:

In this paper, the different problems and difficulties that come with providing public services in South Africa are investigated. The South African government plays a very important part in making sure that public service is fair and that everyone has the same equal opportunities. Government is responsible for basic services, public infrastructure development and maintenance, regulatory services, financial services, international relations, and oversight services. The paper investigated how State-Owned Enterprises (SOEs) deal with financial management, corruption, and governance. The study also into the influence of political influence on the provision of public services, found that there is a need for policy reform to enhance professionalism within the public sector. The study examined the difficulties encountered by local governments and the involvement of entities such as the Public Services Commission (PSC), Statistic SA, Auditor General South Africa (AGSA), and the South African Local Government Association (SALGA). Lastly, the study recommends how to tackle these challenges to enhance service delivery and achieve the objectives specified in the National Development Plan 2030. The study found that there is a necessity for more coordination, policy reform, accountability, and prosecution of corrupt practices within public service delivery in South Africa to attain these goals.

## Keywords:

Governance, South African government, Public Service Commission, Service delivery, Salga.

# Nonlinear Model Predictive Control for Landing Guidance of Reusable Rocket Using Thruster Inputs

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## Abstract:

This paper proposes a control system design method based on nonlinear model predictive control for automatic landing of reusable rockets with considering the thruster inputs and the manipulation of gimbal angles and aerodynamic coefficients. Model predictive control is a kind of optimal feedback control in which the control performance over a finite future is optimized and its performance index has a moving initial time and a moving terminal time. This paper provides a numerical solution method based on the C/GMRES algorithm to solve the nonlinear model predictive control problem of automatic landing of reusable rockets. The effectiveness of the proposed method is verified by numerical simulations.

## Keywords:

Nonlinear Control, Optimal Control, Space Engineering, Control Systems, Automatic Landing.

# Novel Spectrophotometric Determinations of Cu(II) and Cr(III) by Complexation with a Natural Polyphenolic Betanin and their Applications to Biological Fluid

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## Abstract:

Betanin is a natural polyphenolic compound that has gained wide popularity recently due to its characteristics. Therefore, the study of the interaction between betanin with metals is receiving more attention. In this study, betanin was extracted from natural Beetroot and it was bounded with metals Cr(III) and Cu(II) to form binary complexes. These complexes were studied by using simple, rapid and accurate UV-Vis spectroscopic methods and applied to biological urine matrix. Acid-base equilibria of betanin were investigated. The reactions of betanin with Cr(III) and Cu(II) were optimized to produce highly absorbent complexes at 525 and 499 nm within 1 min at pH= 7 and 25 ºC, respectively. Linear concentration ranges from 1500 to 200 µg $mL^{-1}$ and from 2000 to 270 µg $mL^{-1}$ were achieved for Cr-betanin and Cu-betanin complexes with correlation coefficients more than 0.997, respectively. The stoichiometry of complexes was found to be 1:1 Metal:Betanin. The LOD and LOQ values were calculated and found to be (LOD=76.7& LOQ=232.5µg$mL^{-1}$) for Cr-Betanin complex and (LOD=98.5 & LOQ= 298.5 µg $mL^{-1}$) for Cu-Betanin complex. The current methods have high precision and accuracy with RSDs<1.0 and % recovery of 100±5%. The proposed methods were successfully applied to biological urine matrix**.**

## Keywords:

Metal-polyphenolic complexes, Betanin, Cr(III), Cu(II), UV-Vis, Urine.

# Adaptive Multimedia Interfaces in Learning Systems: Enhancing Cognitive Load Management

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## Abstract:

Cognitive load management is one critical factor in optimizing learning outcomes, especially in an online digital learning environment. This paper discusses how video, audio, and interactive simulations can have their multimedia content better designed using the principles of cognitive informatics that manage cognitive load. CLT will be discussed, along with adaptive multimedia interfaces, neurofeedback mechanisms, the impact of different multimedia modalities on memory retention, understanding, and cognitive engagement, and finally the practical applications in e-learning and virtual classrooms.

# Non-Technical Loss Detection in Electric Meter Systems: A Predictive Approach with Business Intelligence in North Lima

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## Abstract:

Non-technical losses (NTL) in power distribution systems, including electricity theft, device failures, and maintenance issues, represent a significant challenge for electric utility companies, especially in emerging economies. This study presents a predictive model that uses advanced business intelligence (BI) and machine learning techniques, specifically ARIMA and XGBoost models, to detect non-technical losses in electric metering systems in northern Lima. The methodology employed includes data extraction, transformation, and loading (ETL) from various sources, such as the National Open Data Platform and electric utility registries. After a series of preprocessing steps involving anomaly detection, feature engineering, and cross-validation, the model optimizes its accuracy in predicting irregular consumption patterns, energy theft indicators, and other NTL. The results obtained demonstrate that the combination of ARIMA and XGBoost is effective in identifying atypical consumption patterns, contributing to improving both the reliability of the electric system and its economic efficiency. Furthermore, the model respects data governance policies under Legislative Decree 1412, ensuring quality and security of information. The solution is scalable and can be adapted to other similar contexts, offering a useful tool for energy distribution companies in the early detection of consumption irregularities. Thus, it presents an effective alternative to reduce non-technical losses through advanced analysis, improving energy management in areas with distribution challenges.

# The Regional Statistical Information System at the Service of Local Development: Status and Prospects. The Case of the Regional Department of the High Commission for Planning, Souss-Massa Region, Morocco

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## Abstract:

The role of the regional statistical information system (RSIS) remains little approached. Yet this system enables public and private institutions to base their policies and action programs on knowledge and analysis of the situation at the regional level. They need to have regular access to a series of indicators capable of informing them about the realities they manage and providing them with the information they need to make decisions or take action. Producing meaningful statistical data for the provinces and prefectures of the Souss-Massa region requires sample sizes that are out of all proportion to the human and budgetary resources available to the regional Department of the High Commission for Planning (HCP). It also implies remedying the slow pace of production of economic statistics and data (Agadir communal inventory survey, production structure survey, etc.). As part of this proposal, we will study the statistical information system specific to the Regional Department of the HCP (RDHCP), focusing our analysis on the human and logistical resources available to the RDHCP, the shortcomings of the information collection system, and the prospects for partnership with decentralized administrations with a view to improving the regional statistical system.

## Keywords:

Statistical information system, decentralized administrations, local level, regionalization, development.

# Synthesis of a Calcium Silicate Cement Containing a Calcinated Strontium Silicate Phase

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## Abstract:

**Objectives:** The positive effects of strontium on dental and skeletal remineralization have been confirmed in the literature. This study aimed to assess the properties of a calcium silicate cement (CSC) containing a sintered strontium silicate phase.

**Materials and Methods:** The calcium silicate and strontium silicate phases were synthesized by the sol–gel technique. Strontium silicate powder in 0 (CSC), 10 (CSC/10Sr), 20 (CSC/20Sr), and 30 (CSC/30Sr) weight percentages was mixed with calcium silicate powder. Calcium chloride was used in the liquid phase. X-ray diffraction (XRD) of specimens was conducted before and after hydration. The setting time and compressive strength were assessed at 1 and 7 days after setting. The set discs of the aforementioned groups were immersed in the simulated body fluid (SBF) for 1 and 7 days. The ion release profile was evaluated by inductively coupled plasma-optical emission spectrometry (ICP-OES). Biomineralization on the specimen surface was evaluated by scanning electron microscopy/energy dispersive X-ray spectroscopy (SEM/EDS). Data were analyzed by the Kolmogorov–Smirnov test, one-way and mixed ANOVA, Levene's test, and LSD post hoc test ($P < 0.05$).

**Results:** Except for an increasement in the peak intensity of hydrated specimens, XRD revealed no other difference in the crystalline phases of hydrated and nonhydrated specimens. The compressive strength was not significantly different at 1 and 7 days in any group ($P > 0.05$). The setting time significantly decreased by an increase in percentage of strontium ($P < 0.05$). Release of Ca and Si ions significantly decreased by an increase in percentage of strontium ($P < 0.05$). SEM/EDS showed the formation of calcium phosphate deposits at 1 and 7 days.

**Conclusion:** Incorporation of 10−30 wt% sintered strontium silicate phase as premixed in CSC can significantly decrease the setting time without compromising the compressive strength or biomineralization process of the cement.

# Context within Context: Towards a New Understanding of Headteacher Leadership Enactment in Ghana

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## Abstract:

Ghana Education Service (GES) is hierarchically managed across all levels with Headteachers being the smallest unit of the leadership framework. As the smallest unit they are responsibilized for the school's everyday operations. Understanding how these Headteachers enact leadership within this hierarchy to support their practices in the context is not well understood. Recent literature shows the absence of formal Headteacher Leadership (HTL) training and recruitment programs. Empirical research also shows a prevalence of diverse leadership practices but predominantly transformational leadership with evidence it has been shaped by international training programs like Leadership for Learning (Jull et al., 2014; Swaffield, 2017). Yet Ghana's HTL is constructed and produced through the Headteachers' Handbook (GES, 2010). As a Handbook, it informs how Headteachers are to enact leadership. Little attention has been paid to how Headteachers navigate their leadership then within this context. Therefore, this study examined how Headteachers understand their leadership practices within this hierarchy and context of a handbook that details how leadership should be practiced. This study is one study within a larger PhD project that employed three methodologies: a rapid review of the literature, a critical discourse analysis of the Headteachers Handbook, and finally an interactive ethnography designed to explore the context-specific leadership practices of Six ECE Headteachers across Ghana. This paper reports on the preliminary themes emerging from this final phase of the PhD project. Thematic and ethnographic analyses of interviews, focus group discussions, and observation fieldnotes showed emerging themes point to Headteachers' practices as negotiating and navigating between policies, context, and culture to translate and interpret policies to commensurate the cultural value of school communities. While these themes suggest a significant impact on Headteachers' agency, notions of damaging-and-damaged culture and deculturizing self also surfaced. The emerging themes portray the voices of Ghana's Headteachers, establishing the contextual leadership realities of the West African nation. These findings provide a frame of reference for present and future Headteachers in the field and also point to the essential need for developing leadership frameworks tailored to Ghana's HTL context.

## Keywords:

Context, Ethnography, GES, Headteachers, Headteacher Leadership.

# Impact of Tpack-21 Mastery on Post-Pandemic Technostress among High School Teachers in the Southern Philippines

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## Abstract:

Studies on technostress reveal that technology often induces negative emotions like skepticism, inefficiency, mental fatigue, and anxiety, thereby diminishing user satisfaction. Although research consistently identifies these adverse effects across various sectors, few studies address how technostress affects teachers specifically, or how it correlates with their Technological Pedagogical and Content Knowledge (TPACK-21) in the 21st century. This study investigates the relationship between technostress and TPACK-21 among high school teachers in the southern districts of the Department of Education-Divisions of Bukidnon and Valencia City, Bukidnon, Mindanao, Philippines. The sample comprised 169 teachers, with data collected via surveys measuring technostress and TPACK-21. Statistical methods included descriptive statistics, Pearson's correlation coefficient, and multiple linear regression. Results indicated a moderate level of technostress (average score of 2.89) and high proficiency in TPACK-21 (average score of 3.97). A significant inverse correlation was found between overall TPACK-21 and technostress ($r = -0.58$, $p<0.038$), with notable correlations in its subcomponents: Technological Knowledge ($r = -0.10$, $p<0.043$), Pedagogical Knowledge ($r = 0.82$, $p<0.025$), and Technological Pedagogical Knowledge ($r = -0.78$, $p<0.047$). The study showed that Pedagogical Content Knowledge, Technological Content Knowledge, and Technological Pedagogical and Content Knowledge together explained 69% of the variance in technostress ($r^2 = 0.069$). These findings suggest that educational administrators in Bukidnon and Valencia City should reassess teacher training and implementation strategies to improve teaching effectiveness while addressing technostress.

## Keywords:

TPACK-21, technostress, and High School Teachers.

# A Study on the Overseas Luxury Consumption Behaviour of Chinese HNWIs from a Behavioural Economics Perspective

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## Abstract:

Allied Market Research (2023) reports that the worldwide travel retail industry was valued at $52.7 billion in 2021 and is projected to attain $187.1 billion by 2031. In 2020, Chinese luxury consumers, who previously accounted for approximately two-thirds of all purchases in tourist destinations such as Paris, London, Rome, New York, and Los Angeles, contributed nearly 80% of all luxury expenditures within China due to the pandemic (Schneider and Lee, 2023; Cheng, 2023). Chinese luxury buyers will resume international travel post epidemic. The evolving purchasing behaviour of affluent Chinese consumers is influenced by social dynamics and trends. High-net-worth individuals constitute a small segment of the client base, however, they have significant importance in this market sector (Keating and Kriz, 2008). High-net-worth individuals regularly influence luxury and fashion trends, representing a substantial share of luxury expenditures. Research indicates that more than 70% of high-end purchases by Chinese consumers take place overseas (Roll, 2020). The purchasing behaviours of these individuals constantly inspire others, even countries with similar economic conditions to China. Nevertheless, there is a deficiency of scholarly study about the purchasing behaviours of Chinese high-net-worth individuals overseas. This article elucidates the luxury travel sector by examining the purchase behaviour patterns of Chinese HNWIs. Furthermore, comprehensive interviews were conducted to understand HNWIs' purchasing behaviour on luxury shopping abroad and analyse the consumption behaviour from a behavioural economics perspective, therefore examining the psychological factors that impact high-net-worth individuals. Develop innovative marketing strategies, and then use this analysis to assess the suitability of these tactics for luxury businesses.

## Keywords:

Luxury consumption, consumer behaviour, Chinese HNWIs, behavioural economics, travel retail.

# Digital Innovation Analysis in Knowledge Management within Tourism Supply Chains: Challenges and Opportunities

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## Abstract:

This paper explores the transformative potential of digital innovations—such as artificial intelligence (AI), blockchain, Big Data, and the Internet of Things (IoT)—in enhancing knowledge management within tourism supply chains. These technologies facilitate real-time data exchange and predictive analytics, improving operational efficiency and personalized services. Despite these benefits, challenges such as high implementation costs, security risks, and organizational resistance limit their adoption. This study provides a comprehensive analysis of both the opportunities and obstacles associated with these innovations, offering practical recommendations for tourism businesses to address challenges and maximize the benefits of digital transformation. The findings highlight the importance of technological infrastructure, employee training, and cultural transformation for successful implementation. This research contributes to the literature by bridging knowledge gaps and providing actionable insights for enhancing knowledge management practices in tourism supply chains.

## Keywords:

Digital Innovations, Knowledge Management, Tourism Supply Chain, AI, Blockchain.

# The Selection of Optimal Formulations for a Hydrophilic Biopolymer-Based Soft Dosage Form

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## Abstract:

This article discusses the preparation of gelatin-glycerin and cellulose-glycerin-based hydrogel systems for soft cosmetic preparations. The pH, viscosity and electrical conductivity of the obtained systems were measured with variations in different compositions of aqueous substances.

Ultrasonic treatment (UST) was used to change the morphology, structure and condition of the gel base of the system.

The selection of the most effective UST modes ensured stabilization conditions and regulation of properties of hydrogel systems. It is shown that the change in viscosity, acidity and electrical conductivity, as one of the most sensitive indicators of structural changes in the system, during ultrasound treatment is a consequence of dispersion and conversion of inhomogeneous fractions into a gel state. As a result, a colloidal homogeneous system with the necessary set of functional properties is formed.

## Keywords:

Hydrogels, ultrasonic treatment, gelatin, cellulose, colloidal systems.

# Parametric Analysis of Prestressed Concrete Beams with the Finite Element Method

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## Abstract:

This study presents a numerical analysis of a prefabricated prestressed concrete beam with a span length of 4600 mm, cross-section of 240 x 400 mm, reinforced with a single 7-wire strand with a diameter of 15.2 mm, subjected to a three-point bending test. In order to ensure the propriety and reliability of the numerical model of the studied beam, a parametric analysis of the influence of selected model components on the determined results was carried out. Using the finite element method (FEM) software Abaqus/CAE by Simulia, the following parameters were analyzed: a) the effect of mesh size and meshing method, b) the type and shape of elements, c) the method of transferring the prestressing force, d) the effect of passive reinforcement. To ensure the high precision and reliability of the model, numerical results were compared and contrasted with analytical solutions, assessing the sensitivity of these factors. The final results presented in the paper demonstrate a strong agreement between numerical simulations and analytical calculations for the prestressed concrete beam, encompassing the deflection and stresses in both the elastic and inelastic ranges.

## Keywords:

Prestressed concrete beams, finite element analysis, parametric and numerical analysis, analytical solution, meshing strategy.

# HemoToolIA: An Intelligent System to Support Clinical Decision Making in Hemodynamic Studies

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## Abstract:

In this paper we are going to present a tool that includes techniques and procedures of Artificial Intelligence "HEMOTOOLIA" for the prediction of the affected cardiac muscle mass, from the occlusion values and the location of the lesions in the coronary vessels. It is based on a tool called Hemotool, developed by the authors of this paper, together with other collaborators from School of Medicine of New Vision University (NVU - Georgia), and which has been tested in the haemodynamics section of the University Hospital Complex of A Coruña (CHUAC - Spain). The incorporation of new functionalities is proposed to improve its performance, such as the incorporation of a machine learning module that allows the analysis of images with patient metadata to increase the accuracy of the prognosis in each case in a personalized way. The user guide used by clinicians to obtain the results shown here from the Hemotool Tool can attached as an annex.

## Keywords:

Artificial Intelligence, Coronary Artery Disease, Precision and Personalized Health Care, Risk Scoring System.