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Editorial

We are delighted to extend a warm welcome to all participants attending the International Conference 2024 on 4th – 5th December 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 October 2024, the Organizing Committee has received more than 55 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 4th – 5th December 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.

Sukumar Sen
Program Manager
Research Plus

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Abstract

Green Transformation of Biomass-Derived Indian Gooseberry into Fluorescent Intrinsic Nitrogen-Functionalized Carbon Quantum Dots for Real-Time Detection of Vitamin B2 in Nanomolar Range

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Abstract:

Riboflavin (RF) detection is essential for controlling nutritional health due to its increasing significance in the food products, biological, and pharmaceutical industries. Regular daily intake of RF (vitamin B2) is important because it is not synthesized and stored in human body in appreciable amounts. 1.1 mg for men and 1.3 mg for women is suggested on daily basis. So efficient and biocompatible nanosensor with good selectivity and sensitivity is required for RF detection. CQDs derived from biomass have recently attracted interest in environmental science due to their simple, cost-effective methods of synthesis, as well as their sustainability advantages and practical implications. Herein, we demonstrate the utility of ratiometric fluorescence-based carbon quantum dots (CQDs) nanosensor from biomass precursor (Indian Gooseberry) using microwave-assisted pyrolysis method for detection of RF in its isolated, pure form in aqueous and HEPES medium as well as in pharmaceutical tablets in the nanomolar range, governed predominantly by FRET. The synthesis protocol was very fast, simple, green, and biocompatible with no externally-added reagent. This present work opens a new vision for development of innovative and sensitive approach of green fluorescent nanosensor for detection of RF which may find potential applications in the biological and food industries.

Keywords:

Biomass, Indian Gooseberry, N-CQDs, Green nanosensor, Riboflavin (vitamin B2 detection), FRET, Real sample analysis.

Pierson Syndrome: Case Report

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Abstract:

Background: Pierson syndrome comprises of congenital nephrotic syndrome (CNS) and peculiar ocular changes. LAMB2 gene mutation has been reported to be causative reason for this rare autosomal recessive disorder.

Methods: An observational case series reports comprising of two children presenting with symptoms like heavy proteinuria, haematuria are being discussed. Physical examination along with ophthalmological assessment, hearing assessment, varied blood investigations, urinalysis, renal biopsy and gene testing were carried out to diagnose the condition.

Results: Pearson syndrome was detected with mutations of LAMB2 gene detected by Whole Exom Sequencing test in one of the case study. The Ocular abnormality in both patients comprised of squint hypertropia, a new variant ocular finding related to Pearson syndrome.

Conclusions: The clinical finding of squint hypertropia is a novel finding associated with Pearson syndrome, reported here for the first time.

Keywords:

Autosomal recessive; Pearson syndrome; Congenital Nephrotic Syndrome, Children.

Can Machine-Learning Methods Detect Inappropriate Internet Behavior?

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Abstract:

Due to the Internet's popularity, various services are reachable at work. In most workplaces, employees may use the Internet to do personal shopping, web surfing, chatting, gaming, social media, streaming, investment, illegal downloads, pornography, gambling, etc. Such activities cause production and Internet bandwidth loss and increase cyber security risks for the companies. Popular ways adopted by companies to address the issues include the enhancement of Internet use policy, training, and monitoring. Commercial Internet filtering software is one of the most popular and acceptable resolutions among these solutions. The disadvantage of such products is that they rely on blacklists, whitelists, and keyword matching, which require a lot of effort to maintain. This study proposed a machine-learning approach to detect inappropriate web pages loaded in the workplace.

Advanced Blast Identification in All Using Pivot-Growing Segmentation and U-Net PLR

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Abstract:

In this work, we propose a singular approach for blast identification and classification in Acute Lymphoblastic Leukemia (ALL), an ordinary kind of formative child cancer dataset. The proposed method combines the Pivot-Growing Segmentation (PGS) algorithm with the U-Net structure better with Parametric Leaky ReLU (PLR) activations. The Pivot-Growing Segmentation has set of rules to clustering method that utilizes K-medoid and squared Euclidean distance as a similarity degree. In this context, it's far used to delineate blast areas from microscopic images by imparting unique localization. This technique is hired to improve the accuracy of blast identification, that's vital for accurate diagnosis and treatment of cancer. The U-Net PLR version is then used for blast classification that is a fully linked Convolutional Neural Network (CNN) with Parametric Leaky ReLU activations. This version is designed to extract difficult capabilities from segmented areas, improving the type overall performance. The U-Net PLR version includes an encoder and decoder structure, with bypass connections among the corresponding layers. The encoder is accountable for extracting capabilities from the input image, while the decoder reconstructs the image and outputs the segmentation mask. The proposed method is achieving overall performance in blast identification and classification of the given dataset. The proposed technique offers a promising path for boosting diagnostic accuracy and assisting in personalized treatment techniques for pediatric sufferers with ALL.

Keywords:

Pivot-Growing Segmentation, K-medoid, Squared Euclidean Distance, U-Net PLR, Parametric Leaky ReLU.

The Role of Machine Learning in Enhancing Realism in Unreal Engine Games

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Abstract:

It is the work of incorporating ML into Unreal Engine 5 to bring more realism to virtual game environments, simulating specifically a wind turbine. This solution used ML algorithms to improve visual and mechanical aspects by offering real-time interactions. Simulation of the turbine that dynamically adapts to environmental conditions through the hybrid application of Blueprint scripting and C++. The results have shown that ML significantly enhances realistic gameplay features and will play a major role in future development regarding AI-driven game design.

Keywords:

Machine learning, Unreal Engine, Game development, Realism, Artificial Intelligence, Immersive experiences.

Bone Carving Art of Kazakhstan: The Path of Research and Discovery

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Abstract:

Livestock breeding plays an important role in the history of Kazakhstan, as the country's climate and natural resources contributed to the development of pastoral cultures. Bone carving is one of the most ancient crafts of the Kazakh people. There was plenty of material for making and decorating objects: scapulas, shins, antlers, ribs and jaws of horses, camels, cattle and sheep. The first sources of data on the study of bone objects and tools include the works of Chinese, Arabic and Persian authors who traveled through Central Asia in the 9th-14th centuries, as well as Russian researchers who traveled to eastern countries for various purposes. These sources present information in their works about the life and culture of the Turk tribes who lived in the Kazakh steppe at that time. Archaeological study of the monuments of Central Kazakhstan began in 1945-1946. Materials on bone tools of Central Kazakhstan can be found in the works of A. Kh. Margulan, K. Kadyrbaev, J. Zh. Kurmankulov, O. A. Krivtsova-Grakova, A. Orazbaev, A. Z. Beisenov, A. S. Ermolaeva and others. Ethnographic studies of bone objects are reflected in the works of H. Argynbaev, E. A. Masanov, O. Zhanibekov, S. E. Azhigali, A. T. Toleubaev, Sh. Toktabaev, H. Babakumar and other researchers.

Globalization and Insurance Business Risk Analytics: Evidence from Africa

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Abstract:

This paper investigated how the cost efficiency (performance) of insurance companies are affected by their risk taking and risk governance posture using data from the Ghanaian insurance industry.

The risk governance was measured by the amount of reinsurance ceded and the risk taking measured by the 95% Value-at-Risk of claims while Tone's DEA was used to evaluate the cost efficiency.

The panel regression model that was used was estimated using the Feasible Least Squares approach and it was found that whereas risk governance negatively impacted on cost efficiency of insurers, risk-taking on the other hand positively impacted the cost efficiency of insurers.

The results show that there may exist an optimal mix of risk-taking and risk governance to give the insurer consistent cost efficiency if that is the objective of the insurer.

Keywords:

Cost Efficiency, FGLS, Risk Governance, Non-Life Insurance, VaR

Culture War: Exploring the Dialectics of Pro-Life and Pro-Family Social Movements' Engagement with the Radical Right-Wing Party Chega

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Abstract:

Inglehart proposed the concept of a “silent cultural revolution,” while Ignazi posited that the rise of the Populist radical right wing constitutes a “counter- revolution.” This dynamic frames the ongoing “Culture War” as a profound clash of divergent cultural values. Progressivist actors aim to dismantle long-standing norms, while conservative actors staunchly defend national and religious cultural traditions. This research explores the potential alignment between conservative social movements and the radical right-wing in Portugal, in their cultural struggle against progressive social justice movements, particularly concerning sexual and gender rights. The expected contributions include an analysis of whether Christian movements have shifted their support from the moderate center-right to the radical right, exemplified by the Chega party, a trend that has been observed in other Western countries. It also examines how this relationship works and the mechanisms employed. Also, the study seeks to understand what gaps in the theoretical and comparative scholarship on radical right movements can be addressed by examining the Portuguese case? Or does it present a new angle or reinforce existing theories?

Developing a Comprehensive AI-Driven Decision Support System for Colorectal Cancer: Integration of Mutation Data and Web Application Implementation

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Abstract:

Colorectal cancer (CRC) is a prevalent malignancy, and early diagnosis is crucial for improving patient outcomes. With advancements in sequencing technologies, exome datasets now allow for the comprehensive analysis of genetic mutations associated with CRC. In this study, we utilize 25 colorectal cancer exome datasets containing somatic and germline mutations, categorized as either benign or malignant. To develop a decision support system (DSS) for CRC, we explore the use of various Artificial Intelligence (AI) and Machine Learning (ML) algorithms to analyze these mutations and predict the likelihood of malignancy.

Our approach begins with data preprocessing to clean and standardize the mutation data, followed by feature selection to identify key mutations/genes associated with CRC. We then implement supervised machine learning techniques such as decision trees, random forests, and support vector machines (SVM), which are known for their interpretability and effectiveness in classification problems. Additionally, we explore deep learning methods like artificial neural networks (ANNs) for more complex data patterns. These models are trained using labeled benign and malignant mutation data and validated through cross-validation techniques to assess their performance.

Once the optimal model is selected, we develop a web-based application to make the DSS accessible to clinicians. The web app integrates the trained model and allows users to input new mutation data to receive predictions on the likelihood of malignancy. This DSS has the potential to assist healthcare providers in diagnosing CRC by leveraging AI/ML models for quick and accurate mutation interpretation. The user-friendly interface ensures ease of use and integration into existing clinical workflows, contributing to personalized and timely treatment decisions for CRC patients.

Keywords:

Colorectal cancer exomes, Somatic and Germline Mutations, Supervised Learning Algorithms, Cross-Validation Techniques, Artificial Neural Networks (ANNs).

On the Mathematical Modeling of Carcinogenesis

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Abstract:

Carcinogenesis is a complex pathophysiological process of tumor origin and development. It is a multi-stage process and its transition from one stage to another depends on many external and internal factors that can support or oppose this process. According to Armitage and Doll [1], the cancer is the final result of n mutations (or the final result of n stages). The explanation of the observed decreasing the incidence rate in older age is given in several papers [2-6] .

The first epidemiological model considering the impact of cellular mortality on carcinogenesis was proposed in [2]. This model predicts that for a given cancer

$$I(t) = atn-1\ (1-\beta t).$$

In this beta model, $atn-1$ represents the incidence function of the n −stage multistage model, and βt is the probability that a cell and its linear descendants have become extinct from cellular senescence by time t.

The modified beta model of carcinogenesis to fit data from pancreatic and kidney cancer was proposed in [5]:

$$I(t) = atn-1(1-\beta t)\ m$$

Both these models predict that an increase of cancer incidence at a younger age would lead to overall higher rate in the population and turn around at the same age. This has been verified by at least one cohort study.

At present we have preliminary results of the modeling of carcinogenesis of all cancer sites combined SEER Incidence rates by age at diagnosis, 2017-2021.

Potential application for Odor Control using Ferrate Modified Biochar

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Abstract:

Biochar made by pyrolyzing agricultural and forestry by-products and other organic wastes has potential not only as an eco-friendly fertilizer but also as pollutant adsorbent because of its porous structure. In this study, the commercially available biochar are evaluated for potential usage as odor adsorbents. Adsorption characteristics of two types of biochar (Low temperature pyrolysis biochar (LTPB) and high temperature pyrolysis biochar (HTPB)) and activated carbon are analyzed using ammonia and hydrogen sulfide which are major odor substances in livestock farms. Biochar and activated carbon (AC) used in the study was modified with ferrate solution, sulfuric acid and phosphoric acid. The adsorption of hydrogen sulfide and ammonia was more effective in activated carbon than in biochars. Low adsorption rate of biochar is considered because of larger pore size and 10 to 100x lower pore volume. Especially LTPB which is pyrolyzed at 250~350oC has 0.22~0.57 m2/L of specific surface area compare that HTPB showed 12~206 m2/L. However adsorption rate of ferrate modified AC was severely decreased in ammonia removal rather showed increase in both LTPB and HTPB supporting that metal salts modification dissolves the organic components of the biochar and enhances its adsorption capability. Acid modification increased ammonia adsorption in AC but not in biochars. This is because the acid modification increases acidic functional groups and improves the pore structure. For hydrogen sulfide, ferrate modification of LTPB showed 90% removal compare to non modified and acid modified with 10% removal. The higher concentration ferrate modified LTPB showed the better hydrogen sulfide removal implicating concentration dependent removal efficiency.

Keywords:

Biochar, odor adsorption, ammonia, hydrogen sulfide.

AI-Powered Entrepreneurial Education: Using AI to Train Future Entrepreneurs at Vienna University of Technology

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Abstract:

The rapid advancement and integration of artificial intelligence technologies in business and society demand a complete reimagining of how we train future entrepreneurs. Currently, the educational support offered to the business sector focuses more on recognizing and exploring key technologies, including predictive and generative AI, alongside their implications and ethical concerns. Therefore, the separation between the two domains hinders the strategic implementation of AI technologies in this field and delays decision-making. A new approach to entrepreneurial education could facilitate skills-building to bridge this gap. This article focuses on identifying the state of the art for using artificial intelligence tools in entrepreneurial education by studying use cases, specifically the entrepreneurial education offered at Vienna University of Technology and the use of AI tools in this process.

Keywords:

entrepreneurial education, artificial intelligence

Enhancing Manufacturing Resilience: An Integrative Framework for Human Contribution in Industry 4.0

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Abstract:

This study addresses the need to deepen our understanding of the human contribution to manufacturing resilience in the era of Industry 4.0. While current research often focuses on technological advancements, the human role remains insufficiently considered. To bridge this gap, we focus on developing an integrative framework that incorporates Human System Integration and Risk Management principles to examine the biomechanical aspects of human operator arm movements in a manufacturing environment. By addressing situation awareness and physical ergonomics that affect system performance, contributes to the understanding of the human role in manufacturing resilience within the Industry 4.0 context.

Utilizing a simulation model, this study explores scenarios by assessing the impact of factors related to operator physical strain through biomechanical analysis and comparison of postures, anthropometrics, tool mass, and moments and forces. These scenarios provide insights into how the human role can be considered in optimizing and improving adaptability and robustness in resilient manufacturing processes. We expect the outcomes to provide valuable insights into system development through the integrative framework. By employing a proactive approach to system design, it enables a holistic approach to comprehend the complexities of human-technology interactions when designing resilient manufacturing processes.

Determinants of Filtered Water Usage Attitudes Among Malaysian Consumers

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Abstract:

Water pollution has garnered global attention due to its severe health risks, such as typhoid fever, cholera, and kidney problems. Concerned about water quality, many people choose for filtered water, boiling water, or buying bottled water for daily use. This study aims to explore the factors influencing attitude toward water filter usage and to assess the impact of health consciousness, consumer knowledge, environmental concern, perceived monetary value, and social influence on attitude. Additionally, the study examines whether consumers' attitudes mediate the relationship between social influence and water filter usage behaviour. Using a convenience sampling method, self-administered data were collected via an online survey from Malaysian consumers aged 18 and above. Analysing the responses from 238 questionnaires with SPSS version 26.0 revealed that attitudes significantly influence water filter usage behaviour among Malaysian consumers. Among the determinant factors of attitude, only environmental concern and social influence were found to positively impact consumers' attitude toward water filter usage, each exerting an equal influence. Furthermore, the findings demonstrated that attitude mediate the relationship between social influence and water filter usage behaviour. The results offer valuable insights for the sustainable product industry to develop effective promotions and marketing strategies targeting the right consumers. Additionally, the study provides useful information for government initiatives in creating health campaigns and activities that promote healthy consumption among Malaysians. This research paves the way for further studies on consumer behaviour patterns related to specific healthy product categories, contributing to the overall well-being of Malaysians.

Keywords:

Consumer behaviour, Environmental concern, Filtered water usage, Health consciousness, Social influence.

Adoption of Agritech Innovations in Digital Agriculture: A TAM-Based Study of Farmers for Sustainable Agriculture 4.0

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Abstract:

This study delves into the digitalization of agriculture, with a particular emphasis on the Technology Acceptance Model (TAM) from the perspective of farmers. It investigates how agritech innovations are transforming farming practices and paving the way for a more sustainable future in agriculture. By focusing on the TAM, the study aims to understand farmers' willingness to adopt new technologies, analyzing the factors that influence their acceptance and the resulting impact on their operations.

The research is structured around three key stakeholder groups, all unified by the common goal of transitioning to more sustainable farming practices. First, it examines the organizational shifts among stakeholders influenced by the rapid technological advancements in the sector. Second, it explores farmers' direct experiences with connected agriculture, focusing on their acceptance of new technologies and their practical integration into daily farming activities. Finally, the study assesses consumer behaviors and their receptiveness to products derived from technologically advanced, sustainable agricultural methods.

Through qualitative research, this study uncovers the interconnectedness of these stakeholders within a network driven by technological implementation. This network seeks to maximize the collective value of its members' actions, ultimately contributing to the democratization of Agriculture 4.0. The findings highlight that while factors such as the age of farmers play a role in technology adoption, other critical determinants also emerge. The study concludes that government facilitation is crucial in harmonizing this network and supporting the broader adoption of sustainable agritech practices.

Keywords:

Agritech Adoption, Technology Acceptance Model (TAM), Sustainable Agriculture, Digital Agriculture, Agriculture 4.0

Exploring the Potential of TikTok for E-Learning: Engagement, Challenges, and Pedagogical Opportunities

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Abstract:

The integration of digital platforms in education has transformed traditional learning models, with e-learning becoming a vital part of contemporary pedagogy (Garrison & Anderson, 2003; Bates, 2019). TikTok, a social media platform initially designed for entertainment, is now being explored as a tool for e-learning due to its engaging format and capacity to deliver microlearning experiences. This study draws upon theoretical frameworks of connectivism (Siemens, 2005) and microlearning (Hug, 2005), along with research on e-learning (Garrison & Anderson, 2003) and educational technologies (Bates, 2019), to analyze how TikTok can support education. E-learning theories emphasize the importance of learner autonomy, interaction, and the use of technology to enhance learning outcomes. TikTok's algorithm-driven content distribution and interactive features align with these principles, creating opportunities for creative, engaging, and easily consumable educational content. This paper reviews case studies and literature to explore TikTok's potential as a tool for education, addressing both its advantages, such as student engagement and digital fluency, and its challenges, including digital literacy and content control. The findings highlight TikTok's significant role in fostering informal learning, enabling users to access educational content in a more flexible, self-directed, and context-driven manner outside traditional educational environments.

Keywords:

E-learning, TikTok, Microlearning, Connectivism, Educational Technologies.

Comparative Analysis of Pueraria Montana Var. Lobata Behavior and Management Strategies in South Africa and Other Developing Countries

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Abstract:

Kudzu (Pueraria montana var. lobata), an invasive vine originally from East Asia, has spread across various regions, including developing countries where it poses significant ecological and economic threats. This paper compares the behavior of Pueraria montana var. lobata in South Africa with its behavior in other developing countries and evaluates the management strategies employed. The study finds that while kudzu exhibits similar invasive traits globally, regional differences in climate, soil, and land use influence its behavior and management outcomes.

Keywords:

ecological, economic, management strategies, soil, climate.

A System Dynamics Model to Optimize Purified Water Supply from the Dam for Residences Use in Rural Communities

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Abstract:

The effective management of water supply is important to ensure sustainable health and well-being of residents in communities. This paper presents a system dynamics model to optimize the delivery of clean water from dams to communities more especially in rural areas. The developed model includes elements such as water inflow, purification processes, storage capacities, distribution channels as well as consumption patterns.

The dynamics of water supply is influenced by various factors such as seasonal fluctuations or variations, maintenance schedules, as well as population growth. The developed model employs feedback loops to simulate the interactions between these components and identify potential inefficiencies in the system.

This study aims to suggest and develop strategies to enhance the reliability and efficiency of water supply to the targeted areas. Different scenarios are analyzed to evaluate the impact of management and administrative practices, such as adjusting purification capacity, optimizing storage levels, as well as improving distribution methods. The objective of the study is to provide insights for policy makers and stakeholders to ensure sustainable and equitable water supply for rural communities.

The results of the study demonstrate that system dynamics modelling can effectively identify key areas of improvement in the water supply chain and better service delivery. This approach presents a comprehensive framework for addressing the complex challenges associated with rural water supply systems and support informed decision making in water resource management.

Keywords:

System dynamics, Water Supply, Sustainability.

An Alternative to Conventional Dental Implants: Basal Implants

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Abstract:

The conventional crestal implants are indicated in situations when an adequate vertical bone supply is given. These crestal implants function well in patients who provide adequate bone when treatment starts, but prognosis is not good as soon as augmentations become part of the treatment plan. Augmentation procedures tend to increase the risks and costs of dental implant treatment as well as the number of necessary operations. Patients who have severely atrophied jaw bones paradoxically receive little or no treatment, as long as crestal implants are considered the device of first choice.

Basal implants are used to support single and multiple unit restorations in the upper and lower jaws. They can be placed in the extraction sockets and also in healed bone. Their structural characteristics allow placement in bone that is deficient in height and width. Basal implants are the devices of first choice, whenever (unpredictable) augmentations are part of an alternative treatment plan. The technique of basal Implantology solves all problems connected with conventional (crestal) Implantology. It is a customer oriented therapy, which meets the demands of the patients ideally.In this presentation the indications of using basal implants and the differences that exist between basal implants and crestal implants are discussed along with a case repot.

How to Prevent Default by Winners in Procurement Auctions? Theory, Simulations and Experiments

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Abstract:

We study and compare the impact of the possibility of default in procurement auctions and to gain insight in the effectivity of different measures. This is a very topical issue, as especially governments buy for billions services from private suppliers and default happens rather frequently in some branches.

We use theory to analyse the analytical structure of payoffs for the auctioneer and the private suppliers. We then use numerical simulations to illustrate the core relationships.

We find that when the suppliers' cost components are uncertain, default becomes more likely. Especially important is the ratio of the post-auction variance in the winners cost to the variance of supplier' pre-auction costs. The higher this ratio, the higher the probability of default. Interestingly, for the probability of default, it does not matter if costs are expected to increase or decrease. The reason is that the auction format competes away most of the trade surplus.

We see three measures having a positive effect. Ordered from high to lower welfare increase for the government: financial bonds, an entry fee and physical pre-investment (See the figure below for the physcal pre-investment PPQ and the financial bonds FB). The mechanisms with which these measures work are rather different, which allows us to test the theory with an experiment. Not only the welfare, price and default outcomes are predicted to be different for the different measures, but also the bidding behavior should be different. In particular, in a second-price auction, suppliers are predicted to bid above their cost with financial bonds, but below their costs with an entry fee and physical pre-investment. The reason is that the expense of the entry fee and physical pre-investment are sunk costs, and are thus not relevant for the bidding behavior.

We are planning an experimental study, and we have a first draft of the experimental design and the experimental computer software.