Proceedings of the 1st Sustainable Solutions for Growth conference

BOOK OF ABSTRACTS

September 17 - 18, 2018, Wrocław, Poland

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KRPZ	KRPZ	legal	legal
Peter Symon Nganga	Zebedee Enterprise	business strategies	consulting
RT-VC Fund	RT-VC Fund	venture capital fund	equity investment
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Peter Stones	AKA Enterprise	business development	consulting
ZTN Consulting	ZNT Consulting	business development	consulting

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Scope

The Sustainable Solutions for Growth (SSG) conference is designed as a platform for reporting, discussing, improving, disseminating and implementing emerging innovative and sustainable solutions facilitating economic growth. SSG is designed as a highly interdisciplinary event bringing together researchers, reviewers, innovators, consultants, entrepreneurs and investors under common goal - creating, evaluating, implementing and benefiting from sustainable solutions. SSG will thus initiate and support innovative commercial projects that bring benefits to all involved stakeholders associated with SSG. Participants from universities, institutes, NGOs, associations, incubators, companies, venture capital funds, consultancies, private/public research agencies etc. are invited. It is an internationally unique conference with ambitions to share leading ideas, expertise and highlight emerging business opportunities. SSG aims to be one of the most effective channels transferring innovative sustainable solutions from innovators to the practice thereby these solutions may start to generate revenues and affect the society. Post-conference activities of SSG will involve an international virtual incubator (IVI) dedicated to the best sustainable solutions selected during SSG. The conference is a must for research groups and developers of innovative sustainable solutions who seek opportunities for their effective commercialisation. On the other hand, commercial companies and venture capital funds seeking opportunities to invest in innovations and expanding to new markets will be interested in examining sustainable solutions presented at SSG. Research done in academia related to e.g. new technologies, innovation management, business, finance, economic growth or in any other way supporting the creation and development of high-income sustainable solutions is vital to the success of SSG. In addition, delegates from enterprises may benefit from sponsoring, exhibiting and networking thus creating the environment for enhanced business development. Participants may join the SSG network by registering either as researchers, innovators, consultants, entrepreneurs or investors. The participation mode can be either in-person or virtual. Digital conference Proceedings including abstracts and contact details of all accepted contributions will be published on-line in gold open-access. Submitted full manuscripts will be internally reviewed by SSG international referees and review outcomes communicated to authors for facilitated publication in leading international journals, edited books and books. The most innovative sustainable solutions presented at SSG might be implemented in the business practice thus generating revenues and bringing benefits to investors, entrepreneurs, innovators, consultants, researchers and reviewers associated with SSG.

Themes

The special theme for the 1st SSG 2018 is:

- Sustainable Innovation Management for Sectors: Information Technology, Health, Energy, Water, Agriculture, Process Industry, Education

Other main themes for the 1st SSG 2018 are:

- Innovative Projects to be Funded Privately
- Innovative Technologies
- New Products (Goods or Services), Processes, Marketing Methods or Organisational Methods
- Venture Capital
- Entrepreneurship
- Consulting Services

Additional SSG themes include:

- Innovation management
- Sustainability
- Sustainable innovations for sectors: information technology, health, energy, water, agriculture, education
- Disruptive innovations
- Solutions for developed, developing and underdeveloped countries
- Environmental and climate impacts
- Resources
- Materials
- Human skills
- Market research, marketing
- Life cycle assessment
- Infrastructure
- Business models and strategies
- Intellectual property rights
- Finance, project finance and management
- Entrepreneurial finance, corporate finance
- Strategic management, human resource management
- Start-ups, Small and Medium Enterprises (SMEs), licensing
- Capital markets, outsourcing, consumer behaviour
- Risks and risk management
- Knowledge-based networking
- Decision science
- Other topics of essential importance for developing sustainable solutions for growth

Preface

The 1st SSG 2018 conference aims at creating the environment for presenting, evaluating, developing, implementing and benefiting from sustainable innovations. This first edition brings together participants delivering 46 abstracts published on the conference Proceedings. The rejection rate for sustainable solution abstracts was about 40%.

Six SSG 2018 presentations were highlighted as keynote lectures - research and one as keynote lecture - sustainable solution. They addressed some of the essential entrepreneurial aspects of innovation management. More specifically, D'Agostino discussed network of networks and how to cope with the advent of Smart Society. Wach lectured on compressed air energy storage (CAES). Majtánová presented new investment opportunities of insurance companies on financial markets. Nganga spoke about balancing risks and opportunities for sustainable business strategies. Štetka gave a talk on diffusion of renewable energy sources across European markets. Sushil discussed theory of sustainable enterprise: a synthesis and multiple case study approach. Nasrullah presented a sustainable solution - a plasma pyrolysis reactor for non-recyclable households wastes.

In addition, many interesting oral lectures and short communications were presented and well received by the SSG audience and attract interest internationally via Proceedings published on-line in gold open access.

The IIC, SAB, EAB and Consultants meeting analysed how to shape future SSG conferences in order to maximise benefits for participating researchers, reviewers, innovators, consultants, entrepreneurs and investors. It also informed on conference publication models such as internal reviews, journals, edited books and books.

Panel discussion was dedicated to innovation management of sustainable solutions presented at the current SSG conference. Discussions related to the roles of researchers, reviewers, innovators, consultants, entrepreneurs and investors.

Award Committee consisting of the Chair and 2 anonymous experts nominated 3 candidates in each Best conference lecture category and the winners were selected by voting of all participants present at the SSG 2018 conference. In the category Best conference lecture - research 3 lecturers obtained the same number of votes. The best SSG 2018 conference lectures are:

(1) Best conference lecture - research -

(i) Gregorio D'Agostino - SSG2018.0001 - Network of networks: how to cope with the advent of Smart Society

(ii) Augusta Marinho - SSG2018.00012 - Sustainability and Circular Economy - textile valorisation with vegetal waste and by-products for development of Vegan Leather
(iii) Grant D. Wach - SSG2018.0002 - Compressed air energy storage (CAES)
(2) Best conference lecture - sustainable solution - Muhammad Nasrullah - SSG2018.0007 - Transforming non-recycleable household residual waste into electricity through plasma pyrolysis technology - a disruptive and innovative waste-to-energy solution
(3) Best conference lecture by student - Lisa-Marie Jaunet - SSG2018.00014 - New therapeutic for autoimmune kidney disease: multimodal nanoconjugate

W. Budzianowski

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	A Sustainable Solutions for Growth (SSG) conference social model for innovation management *Wojciech Budzianowski*
14.30-15.00	Short communication session - sustainable solution 4 (Room A) Session Chair Wojciech Budzianowski RingAir: understand and monitor your city's environmental quality real time *Arina Matvejeva* Constraining a geological model for sustainable development of hydrogen gas from subsurface rocks *Tom Jerzykiewicz, Denis Briere* Oscosurvismeter for organic nanoformulations *Man Singh, Sunita Singh* Multifunctional materials derived from biowastes in leather industry *Palanisamy Thanikaivelan*
15.00-15.45	Panel discussion: The effectiveness of SSG conference social model for implementation of sustainable solutions in the business practice. Synergy of SSG with current and future associated research & business conferences. (Room A)
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BOOK OF ABSTRACTS

KEYNOTE LECTURES - RESEARCH

SSG2018.0001

Network of networks: how to cope with the advent of Smart Society

Gregorio D'Agostino[1,2,*]

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Abstract

The societal organisation of countries at advanced level development is facing a continuous transition due to the pervasive and progressive introduction of informational and cyber capabilities. From large infrastructures to domestic devices (IOT), all systems are endowed with intelligent companions enhancing their security, reliability, availability and usability. Furthermore vital infrastructures (providing energy, water, food, transports, communication and financial services etc) are becoming constantly more interdependent, thus forming an entangled "network of networks". In synthesis, one may say we are facing the advent of the "smart society".

Modelling the complexity of such a continuously evolving system allows to improve its capabilities and to drive further developments. Different approaches to modelling are presented and compared, spanning from simple multi-graphs, to semantic multiplexes, to agent based models. Examples of all approaches are provided.

Flow networks (electric systems, water systems) interdependencies are discussed by mean field approximation; while the effects of earthquakes on urban areas is simulated and represented in a GIS environment. The resilience of the system is also discussed.

As an example of a semantic social network applications, the gender divide in scientific communities is inspected.

Web crawling of the net and analysis of the resulting big data from the web-news or data in the wild (e.g. Twitter) allows to monitor the impact of infrastructures malfunctioning on the population.

All different approaches are combined in a holistic representation of the system.

Keywords

network of networks; electric system; modelling; resilience; critical infrastructures; web crawling; gender divide

SSG2018.0002

Compressed air energy storage (CAES)

Grant D. Wach[1, *], Maurice B. Dusseault[2], Ian Hill[3], Richard Jackson[4], Robert Walsh[4]

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Abstract

Governments are transitioning towards renewable energy in response to climatic issues associated with a fossil fuel energy economy. However, intermittent renewable sources such as wind and tidal are often prevented from accessing the power grid to ensure stability and grid reliability. Renewables will play a greater role in our future and large-scale energy storage systems become increasingly important for grid management and load levelling. Compressed Air Energy Storage (CAES) is one method of capturing renewable energy. In CAES, air is compressed with low cost electricity at off-peak times and then used later to generate electricity which is sent back into the grid when demand is high. CAES offers a highly reliable, market competitive solution to capture and balance large-scale renewable based energy.

Nova Scotia, Canada has massive compressed air storage opportunities within underground salt caverns. These, combined with the relatively simple grid system and renewable energy potential, make it the ideal location to undertake research on CAES technology.

This project will investigate opportunities for compressed air storage in Nova Scotia using three primary research streams.

1) Identify and Characterize Potential Storage Sites. Geological sites will be identified using subsurface data and modelled in the Basin & Reservoir Lab at Dalhousie University. The caverns will be examined with subsurface methods and analogues to test the cavern against initial models of rock mass behaviour, permeability, and predictions of movement of the salt under load.

2) Assess Methods and Effects of Creating Storage Sites. Storage caverns are created by dissolving salt to create a brine. Although the brine can be discharged into naturally saline seawater, subsurface disposal into a deeper saline aquifer may be more -effective. Successful deep well injection requires assessment of maximum injection rates through a given configuration of injection wells. This requires understanding of permeability, porosity and extent of deep brine aquifer systems. Modelling will be used to address issues of pressurization, fault re-activation (induced seismicity), and caprock integrity.

3) Improve Compressor Design and Performance. In CAES there is significant energy loss from the industrial scale air compressors used during the compression stage. A laboratory-scale two-stage reciprocating piston compressor will be retrofitted with custom-machined heads incorporating foam-metal heat exchangers. Thermodynamic metrics (temperatures, pressures, heat flows, etc.) will be measured during operation. Heat exchanger parameters, including metals, surface coatings, porosity, pore size, ordering and interconnectedness will be varied to optimize heat exchange. Optimized heat exchangers will be included in a prototype-scale near-isothermal CAES system, and improved roundtrip efficiencies demonstrated.

Nova Scotia's salt caverns present an opportunity to link CAES compression plants with emerging wind and tidal energy to achieve continual, stable base load power captured from off peak energy production. Suitable geological structures for storage and potential brine injection, coupled with the CAES technology and improved compressor performance, can optimize storage potential and maximize the benefits of locally produced renewable energy, to be a prime hub for CAES projects and will receive the long-term energy benefits.

Keywords
Compressed Air Energy Storage; renewable energy; wind; tidal; salt caverns; compressor design

SSG2018.0003

New investment opportunities of insurance companies on financial markets

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Abstract

Globalisation has become obvious worldwide – such an interconnection has been carried out in all areas – thus insurance industry cannot be excluded. Insurance comprises significant component of each country´s economy. This is due to its function as a stabilizer not only in connection with dynamic development of trade, services, industry but also in sequence with increasing quality of people´s lives that results in challenging completely new needs.

In context of globalisation as well as financial service sector, there have been identified the following key challenges:

supporting further financial integration focusing on higher economic growth,

ensuring that financial services would respond to economic and social needs in motion and their coping with global changes,

keeping competitiveness of this branch of services from the global point of view.

Since 1st January, 2016, the EU insurance industry has been regulated by a new legislative framework. The new directive proposes fundamental change in comprising regulation system based on principle. In the context of insurance company´s investment policy it means that regulator does not strictly sets restrictions for insurance company´s assets allocation but there has been recognized a certain "freedom of investment activities."

The above mentioned current issues have been dealt with in the submitted paper that has been presented as an output of the research project VEGA 1/0242/16 " Globalisation Trends and Dynamism of Changes on the EU Insurance Market" being solved at the Department of Insurance of the Faculty of National Economy of the University of Economics in Bratislava.

The aim of the paper is to confirm the necessity for cumulating sufficient technical reserves on the side of insurance companies with regard to insurance companies´ contract commitments resulting from their insurance activities. This is the basic reason why we have focused our research on current forms of cumulation and assessment of technical reserves that have been exercised in insurance companies´ basic activities.

Next goal of the research target has focused on determining the accuracy of all the data that are involved in the process of the best possible assessment calculation as well as risk margin including the calculation methods. Adequate data and estimations comprise basic inputs. These are to go through complex analysis and validation prior to being exercised in particular models. All the data are to comply with the demands following the Solvency II Directive.

The ultimate goal of the submitted paper involves analysis of the new approach to the process of investing technical reserves that have been introduced by the Solvency II Directive. It comprises the principle of the so called cautious entity. Insurance companies have no longer been committed to limits of placing in particular assets, however, it is necessary for them to create a certain investment activity framework that would cope with their entrepreneurial activities, and at the same time it would not challenge policy holders´ means inadequately - to face potential losses on financial markets.

Keywords
insurance; financial markets; globalisation; policy holders, legislative framework

SSG2018.0004

Balancing risks and opportunities for sustainable business strategies

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Abstract

Purpose: researching, developing, and implementing new technologies and design, while seeking cooperation of various countries who must also fulfill the immediate needs of their respective populations.

Nature of the problems: Currently, due to environmental changes there are various business implications impacting business environmental trends. It's evident, the threat of climate change has put the role of corporate leadership in context striving for new business models and strategies while adhering with stringent regulations. For example, for the last decade new external forces impacting how organizations make decisions has emerged. Consumer health related issues such as green gas emission, industrial pollution, product or services safety and water scarcity highlights the social responsibility of business (Nada & John, 2015). Apart from the consumer related issues business are also heavily impacted by the occurrence of natural disasters. Between 1980 and 2000s, floods disasters increased by 230% and draught disasters increased by 38%. The occurrence of these natural disasters is widely spread from 1995 to 2014, of the storm related fatalities, 89% occurred in lower- income countries. Even though these nations experienced only 26% of the storms. Nonetheless, this problem is also affecting businesses in developed nations, the total cost of the 16 separate billion-dollar weather related events in the United States of America (USA), in 2017, was $306.2 billion, breaking the previous cost record of $214.8 billion in 2005 (NOAA, 2018). Moreover, Japan also has experienced 10 of the worst natural disasters in the 21st century. Varying from tsunamis, floods, typhoons, earthquakes, cyclones and volcanic eruptions shutting down production for months (Ghimire Nikhil,2013). Inadequate power supplies and the ever-global decreasing water quantity over the last five decades is another issue affecting businesses today. The global water withdraws has tripled in domestic, agricultural and industrial demand. In addition, approximately ninety percent of global water bodies are contaminated by obstinate toxic chemical pollutants (Dave Grossman et.al, 2013). Pertaining to the water scarcity, from the year 1990 to 2015, tremendous collective progress was made in making clean drinking water accessible to approximately 2.6 billion people especially those in developing countries. Yet, approximately 844 Million people still lacks access to clean water (Kathryn Reid, 2018), or clean energy sources. Lack of policy or regulations uniformity among various trade bodies is also negatively impacting business environment today. Policies and regulations on intellectual property rights differ from one region to the other.

Design/Methodology/approach: Although the purpose of research is advancing scientific methodologies. Whenever we face new problems, we must devise new solutions instead of relying on the past failed memorized practices. We should strive designing, and developing creative imaginative solutions. We may combine various methodologies, AHP with DEA or any other. We may come up with less imaginative but reasonable solutions or something quite illogical or no solution at all. However, experiences teach us the main key of solving problems is simply recognizing them. In other cases, we might recognize the problems but doesn't know how to solve them. Either way, the best strategy in creating, evaluating, implementing and benefiting from sustainable innovations is starting within a simpler version of the problem. At Zebedee Enterprise we emphasis on practical problem solving rather than dwelling on the methodology.

Findings: The current environmental trend not only impacts the nature of the business environment but implicates all sectors of the economy and it is unsustainable for long term growth. Global collaboration, and efforts on global ecological footprint is necessary. Nevertheless, on the positive side these same implications present great new opportunities for sustainable enterprises striving for new innovations. To avoid excessive cost from natural resources degradation and the increase of resource use continuous innovations are necessary. Cooperation is also required for trust and transparency among stakeholders. Moreover, visionary leadership or stewardship of human and natural resources is necessary. Issues regarding intellectual property rights should be comprehensively addressed. While also harmonizing various trade bodies to collaborate in terms of policy uniformity especially, on new innovations.
Careful balancing of these risks and opportunities is and will be part of a sustainable business strategy.
Research Limitations/ Implications: Follow up study is necessary in sustainable solutions emphasizing on water, electricity and limited income.
Practical implication: We intend to create expedient tools and products for all markets including the developing countries.
Originality value: The research advances the body of knowledge focusing on sustainability. Helping firms to solve real world problems is our primary objective.
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Keywords
sustainability; water; energy; innovations; strategies; business models

SSG2018.0005

Diffusion of renewable energy sources across European markets

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Abstract

This research paper is primarily focused on the quantification of the coefficient of innovation (p) and the coefficient of imitation (q), as a result of the application of the Bass diffusion model to the data contained in the Eurostat database, presenting the structure of energy consumption classified by its sources, with an emphasis on renewable energy sources, across European national markets. The analysis results are subsequently applied in order to create and present the long-term prediction of the renewable sources share in the final consumption of electricity. Interpretation of this prediction puts emphasis not only on the overall development of electricity consumption generated by renewable sources, but also on the different dynamics of this indicator growth across different European regions. Identified deviations in above mentioned dynamics were a subject of subsequent analysis of dependence between these variations and the general preference of environmentally friendly solutions. This preference rate has been identified for each country using six indicators included in the World Values Survey database. The extent of dependence was determined by the initial correlation and regression analysis, complemented by hierarchical segmentation using factor analysis. This segmentation was also complemented by the application of discriminatory data to compile the complex socio-cultural profiles of identified segments. As discriminatory data were applied indexes contained in models created by Hofstede, Trompenaars and Hampden-Turner, Schwartz and also indicators included in World Values Survey and European Values Study database.

Keywords

diffusion; renewable sources; final consumption; environment; cultural dimensions

Acknowledgments

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SSG2018.0006

Theory of sustainable enterprise: a synthesis and multiple case study approach

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Abstract

The organization does accept the existence of stakeholders, however, the stakeholder mapping and synthesis continue to remain difficult. Hence, based on the existing research vacuum a novel perspective in management thinking need to be synthesized. Therefore, the theory of sustainable enterprise advances the study from a philanthropic attitude of the firm in conducting a responsible business. Gradually the concept is shaped and molded as an essential element for business strategy to sustain and prosper financially. Different definitions, various approaches, and multiple perspectives are widely discussed by researchers and scholars. However, identifying the external element and understanding the importance of sustainability less discussed. Therefore, the study follows a literature review on sustainable enterprise and review of existing theoretical perspectives. Further, the study identifies five major corporations such as, Nestlé, McDonald, Lufthansa, L'Oréal, and Dow that excel in sustainable practices to determine the performance factors and based on determined factors TISM (Total Interpretive Structural Modelling) is developed. According to Sushil (2017), The practitioners aiming to clarify unstructured mental models in groups such as strategic intent, policy structure or any other problem requiring driver-dependence relationship would find ISM/TISM methodology to be a scientific and knowledge-intensive approach. Further to validate our research findings, panel data regression analysis is conducted and to find the model fit, Breusch and Pagan LM test is carried out. Finally, the implications and future scope of the study are discussed. The study not only provides the futuristic view but also discuss the policy implications and the practical shortcomings that firms are facing in sustainable practices.

Keywords

sustainable enterprise; responsible business; external elements; organisational capabilities; knowledge

KEYNOTE LECTURES - SUSTAINABLE SOLUTION

SSG2018.0007

Transforming non-recycleable household residual waste into electricity through plasma pyrolysis technology - a disruptive and innovative waste-to-energy solution

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Abstract

This paper presents the development and working of an end-to-end small-scale waste-to-energy system transforming non-recycleable household residual waste into electricity and heat. The system is based on highly efficient and environment friendly plasma pyrolysis technology. The core of this waste-to-energy system is a pyrolyzer which is complemented with a pre-treatment setup for input waste feedstock and post-treatment setup for an efficient cleaning and exploitation of the product gas (syngas) into electricity and heat. The system is made of cost effective commercially available components. The system aims to process 50 kg of household residual waste/ day. The pyrolyzer reactor is confined with refrectory lining which in addition is wrapped with insulation material to prevent the heat losses and further covered with steel jacket for a coolant circulation inside it for required heat exchange. The heat to the pyrolyzer is provided through an electrically generated plasma arc inside the reactor developing a very high temperature (> 5000 oC) especially near the electric arc. Such heating process makes the waste thermal treatment in the reactor highly efficient and environment friendly by producing syngas with high calorific value and destroying the dioxins and furans produced in thermal treatment of waste material. The reactor operates at around 1000 oC wall temperature, atmospheric pressure and in the absence of air/oxygen. The pyrolyzer reactor converts about 85-90 wt.% of input waste material into gaseous product and the rest of it into an inert vitrified solid residue. The gaseous product is rich in syngas (CO+H2) ensuring product gas having high calorific value. The syngas can be exploited in a combined heat and power system (CHP) to produce electricity and heat used directly in situ by the community producing the waste. The inert vitrified solid residue can be used as partial substitute of aggregates in bitumen- and cement-bound construction. The system provides a comprehensive solution to the community to manage their own residual waste by getting electricity and heat and material for recycling out of it.

The idea for this small-scale waste-to-energy system was born out of the various waste crises that affected the region around Naples, Italy in the late Noughties. Those crises demonstrated the fragility of a collection and disposal system that, when not properly managed, can give rise to a serious health and safety emergency. If each household or group of dwellings had a device able to treat its own waste, and hence was not relying on a centralised service, the mountains of garbage seen in the streets of Naples would not have arisen. The on-site waste treatment system is a fundamental part of the services that community likely to host up to 80 people a day will require, together with on-site generation of electricity (via photovoltaic and biomass CHP). The system has been developed with the aim to provide a low-cost alternative for those communities (mountain villages, islands, new housing developments) that either pay high costs for collection of waste because of their location or peculiar regulatory obligations, or that would like to become independent in the way they deal with their own residual waste and recover energy off it. The specific mountain location chosen is Ambornetti, a hamlet in the Municipality of Ostana, near Cuneo, Piemonte (Italy), some 1600m above the sea level. This hamlet is being refurbished to be transformed in a minigrid community hosting tourist

accommodations, a restaurant, a farm and a dairy. The innovation is being taken forward by IRIS srl from TRL5 to TRL7.

Keywords
pyrolysis; household residual waste; plasma technology; waste-to-energy

ORAL LECTURES - RESEARCH

SSG2018.0008

Renewable energy for sustainable growth

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Abstract

This work focuses on renewable energy as an element of sustainable economic growth. We may begin our exploration of renewal and sustainability with the textbook by Tom Tietenberg (2000). This volume provides a good overview of environmental economics with a short section on sustainable solutions and economic growth. Gardner Brown (2000) analyzes renewable resources in the context of incomplete property rights. He applies his theory to fisheries. Missing property rights led to the Russians' exterminating of the hake fishery before the US could develop it. Paul Joskow (2003) examined energy policy forecasts in a historical perspective. He noted that they had turned out rather well. Wallace Tyner and Farzad Taheripour (2007) study renewable energy policy. They observe that it includes government subsidies, especially in biofuel and ethanol. Severin Borenstein (2012) suggests that subsidy is a substitute for offsetting a negative externality. However, it may not be effective. Brian Murray, Maureen Cropper, Francisco de la Chesnaye and John Reilly (2014) demonstrate that it may not be. While the effect is small, removing the subsidy can decrease the negative spillover. Finally the International Renewable Agency (2015) presents statistics for renewable energy capacity. Later volumes required purchase for access. Preliminary results show that renewable energy capacity depends on gdp, population and educational expenditure.

Keywords

renewable energy; economics; policy; growth

SSG2018.0009

C-RAN software defined radios for smart city applications

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Abstract

US IGNITE, a non-profit foundation spearheading a coordinated effort to grow technologies that will improve the quality of life and in particular spur innovation to improve economic sustainability, recently named Lincoln, Nebraska a Smart Gigabit City (SGC). In this presentation, we will discuss the association of the University of Nebraska-Lincoln's high performance computing (HPC) center (Holland Computing Center, or HCC) with a city-wide effort to integrate fiber optic networking to the home and numerous key intersections around the city. Several current research topics such as advanced wireless networks, Cognitive Radios, IoT, autonomous vehicles, and others will be pursued. A unique governance model has been developed between the city government, the University, and several corporations.

HPC centers have not traditionally been concerned with energy efficiency, but the end of Dennard scaling in recent processor technology has rapidly changed this, with centralized resources and in particular commercial clouds playing a more dominant role even in distributed systems. In the current SGC related activity, the economy of scale of a centralized advanced computing center at HCC improves the overall energy efficiency while also bringing a more scalable approach to model training for machine learning as well as data management and analysis in general. This allows the deployment of a green network while incorporating the computational capability of our local HPC center. High speed fiber networking is exploited so response times remain acceptable to consumers running next generation smart applications.

An initial research project is focused upon broadly deploying a network of Software Defined Radios in a cloud radio access network (C-RAN) architecture that will both receive from and transmit on a wide portion of the useable wireless spectrum. Raw radio samples will be transmitted to our local HPC center, where traditionally distributed operations of demodulation, decoding, etc, will be processed in clustered baseband units. Machine learning will be employed to decipher which portions of the spectrum are available for utilization, with the goal to develop and ultimately deploy advanced wireless services for the Lincoln community. The ability to rapidly analyze current spectrum utilization, once machine learning models are trained, will then be pushed to the edge of the network in energy efficient FPGAs for low-latency dynamic response rates and to more fully utilize available bandwidth. It is anticipated that the resources utilized for this research will eventually be incorporated into a platform that will be leased for commercial carrier research and development as well as other academic investigations.

Keywords

Software Defined Radio; C-RAN; HPC

SSG2018.0010

Capacity to innovate as a driver for innovation-enhanced growth: a time-series analysis

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Abstract

Ability of companies to respond rapidly to business and environmental changes is crucially important for their development and sustainability of growth. In this study, a time-series analysis is used to investigate the relationship between capacity to innovate (CTI) and the company experienced innovation-enhanced growth (IEG). The raw data was gathered independently from multiple firms using one unified assessment tool over five years. This data is then analysed using inferential statistics through one-way analysis of variance (ANOVA) to evaluate and compare the average scores associated with the CTI and IEG constructs. Furthermore, the post hoc analysis is applied to assess the extent and direction of variation in scores on selected variables and moderated by different years. The results indicate that the CTI for small to medium enterprises (SME) and the observed IEG are associated interdependent relationship. More specifically, the relationship between CTI and IEG, at least partially, seems to be influenced by the macroeconomic scales and the overall experienced sustainable growth. These relationships are discussed and analysed in the context of the local markets growth and suitability. The research will assist the SME stokeholds as well as the officials of relevant governance bodies to relate the changes in the macroeconomic scales on the to the economic throughput, in particular from the innovation, growth, and sustainability perspectives.

Keywords

capacity to innovate; innovation-enhanced growth; small to medium enterprises; sustainable growth; ANOVA

Acknowledgments

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SSG2018.0011

Sustainable data center in smart cities: the role of sustainability-related metrics

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Abstract

In the context of smart cities, 'smartness' is achieved via Information and Communication Technologies (ICTs). They offer new interdisciplinary opportunities to improve services, integrate different infrastructures while reducing resource consumption, greenhouse gases (GHG) and other polluting emissions. Meanwhile, ICT itself consumes power and has an environmental footprint and in this scenario, being energy-hungry by their nature, DCs form (energy-hungry for their nature) the integral part of global ICT infrastructure. Therefore, the role of DCs within the society is leading to increasing interest in both ICT and energy sectors. The concept of energy efficiency is becoming a complex issue in DCs, both at the design and operational stages, due to high-energy prices and policy pressures. Moreover, the influx of large data sets (Big Data) and their intensive processing demands have led to an increase in energy consumption, and undeniably, electricity usage contributes to the highest proportion of costs in DCs. A sustainable DC should entail exploitation of renewable energy, and optimisation of energy consumption without impacting the level of QoS provided to users. Hence, a sustainable DC offers an excellent opportunity to meet both environmental and business goals. The most important driver of a sustainable DC is embodied within its energy efficiency strategy. The baseline for the development of this strategy is a structured measurement/metric framework that can be used to quantify DC energy efficiency and provide insights into ways for improving it. Even though a comprehensive list of energy metrics has been presented in existing literature, limited progress has been made concerning DCs energy efficiency measurement recently. Therefore, the analysis of energy efficiency in DCs, through a set of globally accepted metrics, is an ongoing challenge. The purpose of this work is to present a comprehensive yet critical analysis of energy metric, provide a set of current DC sustainability-related and productivity metrics, followed by formalizing the role of metrics in the achievement of sustainability and its associated enhancement in the context of urban living standards. The present work discusses and analyzes the role and importance of rigorous, formal, and efficient energy management in DCs and its associated metrics to achieve this goal. This work is mainly motivated by two driving factors. Firstly, it is the prioritised focus on reducing DCs energy costs and improvement of their energy efficiency through the use of a structured measurement/metric framework and policies. The second factor relates to the following issues: availability, resource allocation (linked to SLAs), and energy consumption of smart applications that run daily in DCs. An optimised trade-off between performance and energy consumption poses a future DC sustainability-related challenge. In particular, the following novel contributions will be addressed: future development of energy efficiency metrics for DCs; application of productivity metrics to resource management in urban environment paradigms (such as edge computing); suitable emerging sustainability metrics in the context of smart cities. DCs that prioritise reduced energy consumption and carbon emissions have more control over the market growth. With more sustainable DCs, IT organisations can better manage increased computing, network, and storage demands while lowering their energy costs followed by reducing the total cost of ownership (TCO) of its IT equipment. Undoubtedly, active promotion and dialogue with industrial (and Standardization) organisations concerning these metrics frameworks and methodologies, will ensure this proposed research.

Keywords
Sustainable Data Centre; Smart Cities; Energy Management; Energy Efficiency Metrics; SLA

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SSG2018.0012

Sustainability and Circular Economy - textile valorisation with vegetal waste and by-products for development of Vegan Leather

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Abstract

In a current context of environmental awareness, companies in the Textile and Clothing Industry sector intend to bet on a research strategy that leads to the adoption of sustainable policies and reduction of environmental impact, based on the valorisation of waste and by-products of geographically close industries. In all these situations, there are challenges in the research, processing and applicability of these wastes in the production of new textile structures. It is in this context that this R&D Vegan Leather project arises, whose main goal is the development of sustainable, multifunctional and eco-design textile structures, based on the valorisation of vegetable waste and by-products from other industries, inserting itself in the new paradigm of "circular economy". The Vegan Leather project appears as a new concept that aims the development of new textile structures with better environmental credentials and high benefit by the use of waste and by-products of vegetable materials from agroforestry industries. The Vegan Leather project intends to the R&D of an innovative generation of textile solutions coated with micro particles / granules / powder of wastes and by-products from vegetal origin, such us cork, walnut shell, rice husk, net shell, almond shell, mushrooms, apples, coffee grounds, rose bushes, etc. The main goal is achieve a vegan alternative to natural and / or synthetic leather, more sustainable and with the integration of new functional properties combining the design, eco-design and fashion effects, promoting the sustainability and circular economy. The R&D it is focused on the treatment/ adaptation/ suitability of vegetable waste fractions with properties of composition, quality, stability, shape, performance and functionality intended, compatible with their incorporation by coating in textile structures with pastes, foams and other water based solutions. These new developments present a high potential of application in several areas, such as fashion, eco-design, sports and protection apparel, furniture decoration, home textiles, footwear, fashion accessories and among others.

Keywords

Vegan leather; sustainable; vegetal waste; circular economy; textile coating

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SSG2018.0013

The System of Accounts for Global Entropy Production, (SAGE-P): A nonlinear entropy accounting method to measure the critical path towards a sustainable system

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Abstract

The System of Accounts for Global Entropy Production, SAGE-P posits three independent, but integral, value systems to construct inclusive algorithms of sustainable inflows or production, sustainable outflows or consumption from any well-defined stock of the Low Entropy Fund (LEF) or capital. The LEF is described by the limit functions of the following topological domain spaces: A. The Ecosphere, where values conserved-in-itself or existential, B. The Sociosphere, where values conserved-in-use or intensity of participation, and C. The Econosphere, where values conserved-in-exchange or prices, (Friend, 2016). The Method assumes an hierarchical set in the form: A [B(C)]. We take the position that values human constructed abstract objects, like mathematics, but can be logically discerned from the analytical discourse on cultural values or from metaphysics, such as ethics, (Schopenhauer, 2010). Values can also be extracted empirically from economic, social and environmental statistics, either directly as in commodity prices or inferred choices, such as contingent valuation methods. The problematique of distinguishing individual values described by markets versus collective values described by politics and religious beliefs, is largely resolved in the holistic methods of entropy accounting. Values are conservation principles of entropic processes subject to the Second Law of thermodynamics. Economic values are conserved in transactions of the market from producer (i.e., negentropy) into consumer (i.e., entropy) goods and services. Social values are conserved in the transformation/evolution of socio-cultural structures (i.e., negentropy) into intensity of participation (i.e., entropy) of the human population. Ecological values are conserved in the transformation/evolution of global ecosystems (i.e., negentropy or inflow of solar energy) into intensity of extraction, or in situ use, of ecological goods and services. This 'pluralism of values' applies a set-theoretic Venn Diagram of three overlapping circles representing distinctive categories of economic, social and environmental values, (b) apply G-R Flow-Fund Model of the entropic process to construct, with sufficient formalism, the algorithm necessary for the three-way correspondence mapping of values on some well-defined, hierarchical-structure, database of the: Ecosphere [Sociosphere (Econosphere)], and (c) to assess policy objectives of sustainability measured in terms of the entropy-efficiency criterium, (i.e., minimum rate of entropy production per unit of consumption, and its inverse, the maximum rate of entropy efficiency per unit of production). While exchange and use value pose little, if any, unsurmountable problem for constructing the entropy efficiency value-algorithms for human produced goods and services, the corresponding existential-value algorithm for nature produced goods and services remains inextricable from the current methods of economic accounts and models The result, as in the case of the algorithm proposed for "The Economics of Ecosystems and Biodiversity (TEEB) Project, assumes an imagined equivalence between Human-produced and Nature-produced goods and services, either as value conserved-in exchange (i.e., instant in space-time), or as value conserved-in-use (i.e., over a period in space-time). Georgescu-Roegen noted the absurdity of this notion of equivalence, to wit: Economists do speak occasionally of natural resources. Yet the fact remains that, search as one may, in none of the numerous economic models in existence is there a variable standing for nature's perennial contribution. The contact some of these models have with the natural environment is confined to Ricardian land, which is expressly defined as a factor immune to any qualitative change. We could very well refer to it simply as 'space'.(Georgescu-

Roegen, 1971:2). Karl Polanyi echoed the same sentiment when he wrote: What we call land is an element of nature inextricably interwoven with man's institutions. To isolate it and form a market out of it was perhaps the weirdest of all undertaking of our ancestors. (Polanyi, 1957:178). We shall propose, and indeed demonstrate, that 'intrinsic-value' of material objects and/or functions can be expressed in two types of interactive algorithms. The first, and indeed extremely challenging, is written in the language of metaphysics where existential values are derivatives of ethical principles, such as Kant's analytic a priori versus synthetic a posteriori propositions. The second, and the one we shall expand in this paper, is written in the language of thermodynamics, where intrinsic values are redefined as conserved existential values of any well-defined entropic process. The UN Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) with its object to share, and evaluate, sciences-policy of the member States concerning the conservation of ecosystems and biodiversity, felt nonetheless compelled to value nature's contribution to people, perhaps erroneously, by applying the economist's TEEB Project. This Paper presents an alternative, perhaps more robust, application to value Nature's contribution to human wellbeing.

Reference:

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Keywords

entropy; accounting; statistics; values; algorithms; ecosystems; social systems, economic systems

SSG2018.0014

New therapeutic for autoimmune kidney disease: multimodal nanoconjugate

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Abstract

Currently, there is no direct cure for kidney failure besides transplantation. We propose a unique novel nanoconjugate that specifically targets and induces clearance of the inflammatory autoantibodies that induce kidney failure. Our preliminary tests in cells lines and mice model strongly support the efficacy of the nanoconjugate that we are using to synthesise this new nanoconjugate.

A specific anti-phospholipid antibody has been developed and tested, the first step in the development of the nanoconjugate. After this step, there was further development of a new therapeutic nanoconjugate that specifically binds autoimmune antibodies found in kidney disease. New nanoconjugates were tested in 11 cell lines and two mice models (NOD, NZD; IV administration twice over 12h period). Low toxicity was achieved and efficient lowering of autoantibody strength by using the conjugates compared with controls.

The team includes a PI (Kira Astakhova, DTU Chemistry), PostDoc (Tiago Silva, DTU Chemistry) and a research assistant (Sangita Khatri, DTU Chemistry).

By addressing an unmet medical need this project is of a large market potential.

The market potential of the product is estimated to be in billions USD, given the high demand and no competing technologies for the direct therapy of kidney failure. In the US alone, treatment of chronic kidney disease exceeds $48 billion per year, whereas in England, according to a recent report published by NHS Kidney Care, chronic kidney disease costs more than breast, lung, colon and skin cancer combined.

Keywords

nanoconjugate; autoimmune disease; kidney disease; therapeutic; autoantibodies

SSG2018.0015

Interaction with local communities as an element of social and environmental responsibility of oil and mining companies in Russia

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Abstract

Russian oil and mining industry are strategically important for the national economy and regional economic system. In 2017, the share of these industries in gross regional product (GRP) exceeded 60 percent for several Russian regions including Sakhalin Oblast, Nenets, Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs (GKS, 2017). In recent literature, these regions are often called “resource-abundant regions” or simply “resource regions” (Desai et al., 2005; Ledyaeva, 2009).

Key production capacities and business units of the largest Russian oil and mining companies are often located in small cities. Economic development, social welfare and quality of life in these cities are largely determined by the level of social and environmental responsibility of “city-forming” enterprises, as well as their parent companies (Rogers, 2012).

Our study aims to systematize key features of interaction between oil and mining companies and small cities’ communities within the framework of CSR programs. The study is based on the data collected during the preparation of two annual projects: the environmental responsibility rating of oil and gas companies (2014-present) and the environmental responsibility rating of mining companies (2017-present). The ratings are compiled using authors’ methodology (Shvarts, Pakhalov, Knizhnikov, 2016). The sample includes 22 largest oil and gas and 33 leading mining companies operating in Russia (WWF Russia, 2017). Their interaction with local communities is investigated based on the content analysis of various sources: corporate sustainability reports, corporate profiles, national and local media publications, etc.

The main findings and results of the study include:

(a) financial and organizational support for cultural and educational events in small cities (e.g. "city days" or national holidays of indigenous peoples) is the most common type of CSR projects of Russian oil and mining companies;

(b) Russian oil and mining companies avoid CSR projects that assumes involvement of small cities’ communities in corporate decision making process (e.g. environmental councils with participation of local residents involved in public evaluation of investment projects);

(c) level of transparency and responsibility in the relationship with local communities is higher for companies whose head office is located in the region of production activity (e.g. Surgutneftegaz, Tatneft, Uralkali);

(d) social and environmental conflicts with local communities are officially commented by companies only in cases when information on these situations falls into the field of view of federal media, while conflicts covered by local media are ignored by companies and not included in non-financial reporting.

Keywords

social and environmental responsibility; oil and mining companies; local communities, small cities; content analysis

Acknowledgements

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SSG2018.0016

The analysis of hybrid systems foundations in the form of foundation heating piles for a wind turbine in the Silesian Botanical Garden in Mikołów

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Abstract

The aim of the study is to analyse the behaviour of the hybrid system in the form of foundation heating piles that are the foundation of a wind turbine. The entire system should provide electrical and heat energy necessary to meet the demand of the Silesian Botanical Garden in Mikołów in Poland. This demand was determined on the basis of the available documentation. The forces having an impact on the wind turbine have been calculated. They must be transferred through the intermediate foundation because of their values and existing ground conditions. Based on authorial numerical analyses using the finite element method, the effect of the heat flow phenomenon between the soil and foundation pile on the load capacity and pile displacement has been estimated. The numerical tests conducted showed an unfavourable effect of thermal energy acquisition from the soil on the load capacity of the pile foundation; however, the resulting limitations in the form of reduced load capacity do not exclude the use of the analysed foundation pile as the lower heat source. Thus it is possible to make a hybrid system that will acquire both electrical and heat energy using renewable energy sources. Thanks to the implementation of the installation collecting heat from the soil through steel pipes located inside the tested foundation pile, it will be possible not to reinforce the main pile in the form of traditional steel rods. In a situation when the planned construction requires the intermediate foundation, the implementation of the presented hybrid system results in large material savings. In fact, in the case of the pile foundation implementation, besides its capacity function it will act as the lower heat source as well. Another advantage will be lower use of reinforcing steel by using the exchanger installation as the main reinforcement. Moreover, it will be also beneficial to reduce the detrimental impact of energy-consuming processes of steel and cement production on the environment due to the lower use of concrete and steel.

Keywords

wind turbines; heating piles, renewable energy sources, heat flow; FEM

Acknowledgments

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SSG2018.0017

Possibilities and problems of marketing performance evaluation in terms of marketing assets

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Abstract

The aim of this paper is to characterize marketing assets, to point out their importance and importance for businesses. This paper presents partial outcomes of the research conducted at the University of Economics in Bratislava, Faculty of Business Management, Department of Business Administration in Companies in the Slovak Republic 2016. We analyze marketing assets and barriers to measuring marketing performance, focusing mainly on customer satisfaction and customer loyalty and brand value. The survey was conducted in Slovak companies in September-December 2016. We used the quantitative survey methodology and focused on quantitative methods in particular. For data processing, quantitative statistical methods were used using standardized assessment procedures (Chi-Square Test and Cramer coefficient). We analyzed the data obtained in the PSPP statistical program and evaluated data using a descriptive statistical cross-section, using the statistical toolbox - correlation and regression analysis. We identify and analyzes of barriers to measuring marketing performance in terms of enterprise size, business structure and business time. Measuring the performance of our business's marketing activities reflects the return on marketing investments in the form of sales, profits, market shares or brand values. From survey results we can conclude that businesses are aware of the importance of evaluating and measuring marketing performance. The level of survey of individual indicators is very high, with 95.74% satisfaction and 72.63% loyalty. The ability to measure marketing positively influences company performance (O'Sullivan, Abela, Hutchinson, 2009). Businesses are aware of the importance of evaluating and measuring marketing performance. Through this survey, we have helped to clarify the issue of measuring marketing assets, highlighting their importance, importance and problems in the business survey. Marketing assets must be perceived as interdependent on other indicators of marketing performance measurement, given their impact on the management decision-making process, the company's financial performance, and the impact on sustainable business performance in the future.

Keywords

marketing performance; marketing assets; customer loyalty; brand value

SSG2018.0018

Biofuel production level and the development of biofuel technologies in the world

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Abstract

Ethanol and esters are the most common biocomponents (biofuels) in the world which can be used directly as fuels or mixed with gasoline or diesel to form fuel blends. In general, the cost of biofuel production is higher than the price of diesel and gasoline. Global policy supports the development of biofuel production in order to reduce the greenhouse gas (GHG) emissions and to decrease the use of oil. In most countries, governments implement rules enforcing the use of biofuels for transportation and, at the same time, they provide financial support for the production and development of biofuels. The biofuel situation varies from country to country. On a global scale, Poland is an average country in terms of its population (38.5 mln) and area (312,780 km2). For this reason it has been chosen as a reference country for comparisons with selected countries regarding biofuel production and the development of biofuel technologies.

Analysis has shown a correlation between the development of certain kinds of biofuels and the feedstock and technologies available in particular countries.

The author has developed a new biofuel production unit - POLbep, which stands for Poland's biofuel energy production in 2016 and which amounts to 56 PJ. This unit helps to compare the status of biofuel production and its use in different regions and countries in a particular year.

It can be concluded that the development of new technologies including the production of advanced biofuels from lignocellulosic material, algea and waste, and from hydrogenation of vegetable oils, fats and waste, along with stable governments supporting this policy are key factors in extending the global use of biofuels in the transportation sector.

Keywords

biofuels; national; technology; production

SSG2018.0019

Sustainable development of the cultural landscape of the Vistula river delta

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Abstract

Protecting both natural and cultural environment has become a global issue. Unconditional growth development in conjunction with environmental degradation, has stimulated a global commitment to landscape preservation. In her studies, the author uses the idea of sustainable development in the context of the cultural landscape preservation and maintaining. Nowadays, culture is recognised as the fourth pillar of sustainable development. Thus, a wide range of research methods, approaches, and tools which used to be reserved only for environmental analyses have become available for analysing cultural landscapes as there are many parallels between natural and cultural sustainable development. The Vistula River is the longest and largest river in Poland with a length of approximately 1047 kilometres. The whole catchment area of the river is 194 000 km2, of which 168 699 km2 lie within Poland. The river Vistula and its mouth constitute the most extensive hydrological system connected to the non-tidal Baltic Sea. The Vistula river delta is a truly unique region where natural and human-made elements are so tightly connected that it is even difficult to describe them separately. The element water which was the primary force shaping the landscape of the region has influenced human actions so deeply that it is present in almost every anthropogenic object visible in the landscape. What is more, the cultural landscape of the region has been created by numerous consecutive groups of people, having different backgrounds and cultures, who were migrating there and bringing their spiritual culture with them.

The author attempts to perform a mainly descriptive analysis of the cultural landscape of the Vistula river delta according to the categories of the STAMEX system proposed by J. Solon (2004). The system allows to describe the analysed region in a methodical and complex manner and to determine all elements of cultural heritage, their present condition and the initiatives aimed at their preservation and sustainable development.

In order to do so, the author analysed official materials, maps and strategic documents concerning the analysed region as well as carried out fieldwork in July and August 2017 during which several study visits and interviews with representatives of organizations and activists involved in protection of the cultural landscape of Żuławy Wiślane were made.

Keywords

cultural landscape; sustainable development; Vistula river delta

SSG2018.0020

Assessing sustainability dimensions of transportation as a critical infrastructure: Jordan as a case study

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Abstract

Infrastructure is the fundamental facilities that plays an important part in socio-economic development for modern societies, if such sector is well planned, managed by decision makers in a way that is compatible with the population growth, safety, and national security needs; it will enrich progress, prosperity, awareness, social and economic welfare for any country. Infrastructure is the most important aspect of life, because it can provide materials, products and services that will improve and facilitate living conditions and maintain sustainability at the same time, and in order to study critical infrastructure in general we must think sustainability, otherwise there will be a significant gap. The planning processes for sustainability include urban infrastructure and Public Transportation are considered the most important sectors for economic development for both developed and developing countries as they are linked to the civilizational and urban development, meanwhile, choosing the appropriate transportation mode that will provide a good level of service, and increase the satisfaction of the potential users is a difficult task.

This research paper tries to assess where Jordan is located vs. each Transportation Sustainability dimensions in aspects related to social, economic and environmental for Sustainability Transportation infrastructure. Measures of Performance indicators for each dimensional goal were traced and supported with needed data, figures and statistical findings.

The study uses analytical descriptive style and methodology based on different references and previous studies from secondary data sources to support the case. Recommendations for enhancing sustainability were concluded and future reform directions were proposed which can be applied to Jordan and generalized for other developing countries with similar circumstances.

Keywords

infrastructure transportation sustainability; economic; social; environmental

SSG2018.0021

"Sustainability of information" as a new subject in university degrees in business management and administration: reporting of non-financial information - a Spanish case

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Abstract

The implementation of curricula of degree, within the framework of the European space of higher education (EEES) has been a substantial change in University learning. The student spent acquire knowledge, competencies, being considered as "an identifiable and measurable set of knowledge, attitudes, values and skills related that allow satisfactory performance in real-life situations of" work, according to the standards used in the occupational area" (Van-der Hofstadt and Gomez, 2013, p. 30). More specifically, we talk about generic skills, which are the cognitive, social, emotional and ethical (initiative, effort with the quality, liability, etc.) of transferable character that constitute "knowledge be" in vocational training of the University (Corominas, 2001); and specific competencies in the various degrees and disciplines, allowing to specify functions and professional profiles to form.

The degree of management and business administration, general objective is to train professionals and experts in the knowledge and use of processes, procedures, and practices employed in organizations. This overall objective implies to consider the interrelationships between the different parts of the Organization and its relationship with the environment. Studies administration and business management are aimed at learning theories, models and tools applicable to the processes of decision and management organizations. According to the book white of the title of the degree in economics and business, published by the national agency of evaluation and quality, distinguish between specific objectives in the field of knowledge and specific objectives in the field of competences and skills. Focusing on the latter, and in accordance with the Subject Benchmark Statements of General Business and Management, published by the Quality Assurance Agency for Higher Education in the United Kingdom, the specific objectives in the field of skills and abilities that we focus the work would empower the student to it raise the ethical exercise of the profession, assuming social responsibility in decision-making.

In this environment, it is necessary to consider the implementation of the 2014/95/EU Directive on disclosure of non-financial information and information on diversity of certain large companies and certain groups resulted in the publication of the Royal Decree 18 / 2017, of 24 November, whereby amending the commercial code, the consolidated text of the Capital Companies Act approved by Royal Legislative Decree 1/2010 of 2 July and the law 22/2015, 20 July audit of accounts , in the field of non-financial information and diversity.

The directive extends the content of the mandatory for listed companies' corporate governance annual report. They should develop, in a complementary manner, the State of non-financial information, whose content, briefly, should include the following fields:

- Environmental aspects, with detailed information on the current and foreseeable effects of the activities of the company in environmental, health and safety, the use or not of renewable energy, greenhouse gas emissions, the consumption water and air pollution.
- Social and aspects relating to specific personnel on measures taken to ensure gender equality, the implementation of conventions of the International Labour Organization, conditions of work, social dialogue, respect for the right of the workers to be informed and consulted, the respect of trade union

rights, health and safety in the workplace, the dialogue with the local communities and the measures taken to ensure the protection and the development of those communities.

- Human rights with information on the prevention of their violation and measures to mitigate, manage, and repair any damage committed.
- Information about the fight against corruption and bribery and implemented tools for detection and denunciation.
- Information on due diligence procedures applied by the company in relation to their supply and subcontracting chains. Actions carried out to identify and assess risks, as well as verification and control.
- The preparation of this information must be based on national frameworks, frameworks of the European Union, as the system of management and environmental auditing (EMAS), adapted to the Spanish legal order by the Royal Decree 239/2013, April 5, or based on international frameworks of the United Nations Global Compact, the lines of guidelines of the Organization of economic cooperation and development for multinational enterprises, the standards ISO 26000 from the International Organization for standardization or initiative The GRI sustainability reporting presentation world.

This new disclosure requirement for companies leads us to consider the need to introduce a transversal subject in the curricula of students in economics and management and business administration studies, in order to acquire the skills necessary in the European higher education area (EHEA), to produce the new business reports.

Keywords
information; sustainability; business management

ORAL LECTURES - SUSTAINABLE SOLUTION

SSG2018.0022

Social appliances for sustainable smart homes

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Abstract

Modern homes are among the main consumers of energy and water and main producers of pollution. The residential sector accounts for around 30 % of total electricity used in developed countries, and a similar percentage stands for the water consumption. Everyday detergents are one of the main sources of chemical pollutant.

Our goal is to notably reduce this environment waste, still maintaining an agreed level of domestic comfort. The solution we propose, and partially realized, passes through a special social network of facts ruled by a machine learning module that produces recipes for household appliances. Recipes are the set of parameters to be set on the appliance to get a given task (i.e. cooking chicken, washing laundry, etc.). At the task completion the user is requested for some simple feedbacks on the task satisfaction expressed in Likert scale. The set of all <task, recipe, feedback> triplets occurring during the normal life of the social network members constitutes the knowledge base in input to the machine learning module. When they are properly clustered to denote classes of users, the recipes produced by the module will meet the preferences of these users.

The machine learning module is trained to jointly satisfy, with a proper trade-off, those preferences jointly with green goals (such as water and energy saving) that may be decided either by the users themselves, or/and by public authorities.

Inhabitants are seen as nodes of a network: each of them owns a specific set of appliances and interacts with them, signaling their satisfaction. The profile of the user is progressively enriched over time, so that the recipes provided by the system become more and more appropriate. Appliances are opportunely identified by their type (e.g.: washing machine, refrigerator, oven, etc.), brand and model.

The whole is resumed by an entire ecosystem whose infrastructure is mainly composed of the following logical blocks:

a) An extended social network database, marked as ESN, which contains the knowledge about appliances and programs, users and home setups, together with their preferences and feedbacks.

b) A distributed cognitive system, marked as NI (Networked Intelligence), which accounts for learning algorithms, online and offline evaluations, and action triggers.

c) Appliances and users, for which the interactions happen through a mobile application.

d) the Domestic Infrastructure (DI) which enables communications between users, appliances and intelligence.

A schematic drawing for this layout can be presented in Fig. 1.

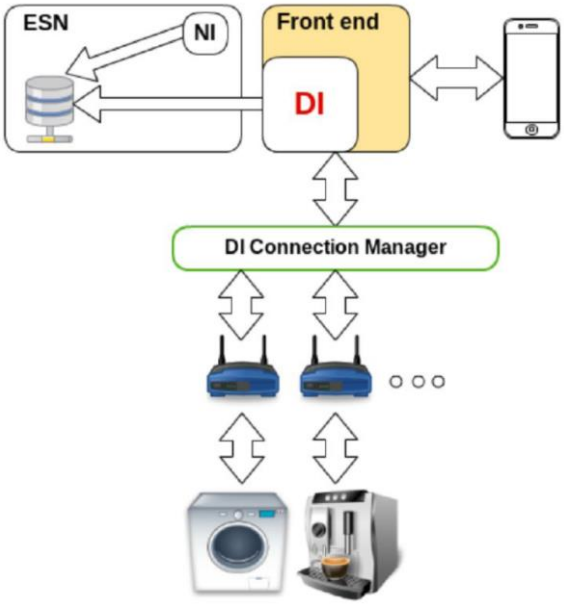

Figure 1. A schematic drawing of the proposed layout

The architecture is meant to embrace the classical cloud-connected paradigm.
The machine learning module is based on granular constructs to cope with both the fuzziness of the feedback expressed by the user and with the non-linearity of the inverse problem to be solved in order to compute the appliance optimal operational parameters.
The Networked Intelligence, database facilities and the remote component of the Domestic Infrastructure currently run on a prototypal mockup of the Social Things srl laboratory in Milano. A solution concerning the regulation of a bread machine has been published on scientific journals [1]. Large scale simulations on the social network dynamics have been carried out on ONE.lab cloud infrastructure [2]. A former issue of our ecosystem has been deeply experimented in the frame of an European project [3]. In synthesis, Technology Readiness Level is definitely high. More in general, the Social Things R&S team owns a wide experience on Data Analytics and Machine Learning. The company CRO Bruno Apolloni has a long CV on this field [4].
The current version of our ecosystem is cofounded by the Italian regional institution Regione Lombardia within a consortium between SME and research institution [5].
Our goal is to export the system at the European level, getting the sponsorship and cofounding by the European Community and the State Agencies for the Environment.
In this way, we aim at providing a back office infrastructure of European regulations for the environment protection. The innovation of our solution consists indeed of both advances on web-services and on concrete machine learning applications, as well as a new way of bargaining public and private benefits in face of the compelling constraints requested by the environment protection. The whole is based on an actor that normally is missed in the smart home scenarios proposed by the majors both in the field of web-services and of appliances production. Namely, this actor is the feedback expressed by the user as the key for adapting the services to the vast variety of the user preferences, rather than aligning the latter to a few directions dictated by the majors.
The investments to push up our solution to the European level are of a twice nature.
As for money around 600 k€ are needed to assess the general infrastructure and the machine learning module. The second kind of investment concerns the know of the appliance manufacturers. Definitely unwilling violating their IPs, we need their cooperation to feed the machine learning algorithms with wise initial rules and technologically validated routines to subsequently adapt them to the user preferences.
Actually, on their part producers know how to optimize the operational parameters to get a given task. On our part, we are able to translate the user requests into specific tasks. Obviously, we may obviate the producers' unavailability with a long hacking of their knowledge via reverse engineering, but this would prove a waste for both producers and us. Vice-versa, an explicit merge of the producer know

how (something that already exists in practice) would push the competition between producers toward higher technological levels, with a benefit for both producers and consumers.

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[2] https://onelab.eu
[3] http://www.sands-project.eu
[4] http://homes.di.unimi.it/apolloni/indice_pubblicit.html, https://dblp.uni-trier.de/pers/hd/a/Apolloni:Bruno
[5] http://www.easy40.it

Keywords
social appliances; green social network; machine learning

SHORT COMMUNICATIONS - RESEARCH

SSG2018.0023

Brand personalities of sustainable brands

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Abstract

Nowadays, even already established brands are enhanced with sustainable product attributes, e.g., Fair Trade label, to tackle the enormous trend of sustainable consumption. Company's visible inclusion of 'sustainability' implies both operative decisions, e.g., creation of an appropriate advertising campaign, and strategic decisions on branding. Hereby, the core focus lies on the brand strategy's (re-)formulation and (re-)positioning, i.e., the (re-)definition of the brand personality. The personality of a brand constitutes of human characteristics, e.g., humour, elegance, consciousness, that a consumer associates with a brand. Recent literature found, that consumers tend to prefer those brands which conform to their own personality. Hence, companies should learn about the personality traits of sustainable consumers in order to harmonise the personality of their sustainable brands. This approach supports companies to optimise their branding, which (hopefully) results in increasing profits. Since no study has tackled this important research area, the present study investigates the personality traits of sustainable consumers and draws conclusion on appropriate brand personality strategies for sustainable brands.

We explored the personality of consumers with the popular Five Factor Theory (FFT), which describes a consumer's personality by five factors, i.e., extraversion, agreeableness, consciousness, neuroticism and openness. Subsequently, a stated choice experiment within the product category of denim jeans was conducted and consumers' preference for a sustainable product attribute was estimated. We found social consumers to be significantly more agreeable than consumers, who put little importance to sustainable product attributes in choice decisions. This results also yield a high face-validity because the factor 'agreeableness' encompasses altruistic behaviour.

In accordance to the FFT for human personality, we then relied on Aaker's (1997) brand personality approach, which describes brand personality by five traits, i.e., competence, sincerity, ruggedness, sophistication and excitement. Using discovered positive relationships from literature between the human personality trait 'agreeableness' and a brand's personality trait 'sincerity'. Sincere brands are associated with adjectives like genuine or honest. Hence, sustainable brands should highlight this brand personality trait to attract sustainable consumers.

Keywords

marketing; brand personality; sustainable brands; consumer personality

SSG2018.0024

P2P platform - exponential system design for sustainability in fashion

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Abstract

The challenges and objectives for Sustainable Development of the United Nations require a global commitment and advise the use of the methodology of the Circular Economy to accelerate it. According to Agenda 2030, the future of Research and Innovation for the Circular Economy in Portugal should be based on a collective approach, together with the collaborative economy, involving the Academy in the first place, with projects - multidisciplinary models of interaction in civil society. First of all, the success of the Circular Economy depends on social innovation, in order to have a well-informed, participatory and collaborative society that better integrates the technical-scientific knowledge.

Throughout its production chain, the textile and clothing industries together, are considered the most polluting in the world. The textile and clothing system operates in a completely linear manner: large amounts of non-renewable resources are extracted to produce clothing that is used for a short period of time only. Afterwards, materials are dumped in landfills or incinerated, contributing to the global warming (ellenmacarthurfoundation, 2017). All these problems became even more serious after the 2000s, when appeared the fast fashion chains, with a rapid pace of production and consumption. The lack of knowledge of the consumers about the production system, the use of natural resources and the exploitation of labor greatly contributes to the success of the fast fashion chains.

A new business model that would help shifting the perception of clothing as a disposable item to be a durable product is proposed. It would break prejudices, allowing to live new experiences. There is research that proves that users, when they have access to platforms for the first time, they start to use them frequently. "Increasing the number of times clothes are worn may be the most powerful way to capture value, reduce resource pressure and reduce negative impacts. (ellenmacarthurfoundation, 2017)"

The key issue for changing a culture of the disposable is education. For this, social innovation, through active intervention within universities, should support the transition to incorporate the principles of circular economy in its teaching programs. This project has the potential to prepare users to live experiences and transform their mentalities, in addition to making them as transforming agents of a society of thinking and acting in a circular way.

The product service business system (PSS) model integrates the approaches and contributions of design to fashionable sustainability. Its implementation is proposed in Covilhã, Portugal, with the provision of eco-efficient, collaborative and sustainable services in fashion products, which can be replicated in its entirety, or by parts, in other places and contexts, adopting, for this, modularity as an adaptive resource.

Digital technology has the potential to contribute to sustainability by digitizing services for the purpose of dematerializing clothing and allowing temporary access to them. The online platform is a tool to connect source and demand: an experience of sharing and access to clothing, without the need to buy it. This business model, through this access, would help to change the perception of clothing, from a disposable to a reused product, with increased usage time. The user can contribute to the improvement of the platform through experience either in co-design or in the co-creation of systemic solutions for platform improvement and management. The design of systems, products and services

contributes in this process towards sustainability. Optimizing, distributing and redistributing existing products through online platforms and apps encourages the dematerialization of products through the sustainable management of available resources. It stimulates the circularity, through a new business model, inducing changes in consumer behavior, with socio-environmental benefits.
The Informatics Department of the University of Beira Interior (UBI), an important partner, will collaborate in the creation of the digital platform that will work in P2P form. Networking, collaboration, co-design and co-development of solutions have to be appropriate for all actors in the value chain. Thus, the challenge imposed by education with students is to make use, whether at the level of citizenship or at the level of technical and scientific training, both of which are fundamental for society to contribute to national goals, seizing solutions. The Department of Textile Science and Technology of UBI can help streamline processes and simplify outdated procedures by putting into circulation the stocked collections created by undergraduate and graduate students in Fashion Design of UBI.
It is important for the success of the initiative that the University actively encourage networking, in collaboration with other departments, students, society, corporations and government agencies, to integrate properly into the major European sustainable development networks.
Education and training are crucial for the transition to the circular economy, ensuring the development of well-informed, conscious and empowered citizens and professionals. The approach should be of multi- and trans- disciplinarily character. Social innovation for citizenship education, acting on consumer behaviours and patterns, will play a relevant role. It focuses on information and communication technologies in networks, through platforms, data management and analysis, big data, analytics and cognitive and artificial intelligence.
The implementation of this project, entitled "Exponential System Design for Sustainability in Fashion," will be a disruptive innovation at the level of mentalities, intensifying awareness and creating a more sustainable society. The context of the problem in which the business model is inserted is necessary to know and to advance the situations for which the enterprise will be subject. The tools PESTLE and Business Model Canvas promote a good orientation to the analysis by suggesting several significant factors. From the application of these tools, one can perceive the useful potential of the technological and social factors, since the proposed business model will impact on the way people relate when they access a product and, consequently, on their lifestyles.

Keywords
fashion; sustainability

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The urban tree, the stake for a better quality of the environment - case of the public places of a Saharan city

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Abstract

Public places are for the meeting of the population, communication and conviviality, so that these spaces play their role they must be ruled by a comfortable physical environment. The optimal use of these spaces deserves a detailed knowledge of all the elements that can improve the quality of their environment. The objective of this article is to study and analyze the role played by the vegetation represented by the urban tree introduced in the public places (very open spaces) to intervene positively to the qualification of their environments. The bad quality of the environment of the public places of the Saharan cities pushes people to abandon them and to join the built up spaces. The population of Saharan cities (hot climate and arid zone) is looking for a public space with a pleasant environment that meets their aspiration, especially during the summer period when the majority of people are affected by the thermal stress because of the lack of freshness and the shadow. Which they seek to shelter against the sun's rays by any means. In addition that the vegetation can offer to the physical environment of the public places of the Saharan cities like social function, climatic, aesthetic, ecological it minimizes and intercepts the solar rays, which is a very important factor of the thermal comfort to the outside, it reduces the temperatures of the air, it generates shade, it absorbs the radiative fluxes. In general, it participates in the positive modification of physical environments: heat, humidity and light. The investigation "in situ" affected the environment of the public places studied in its climatic dimensions: ambient temperature, humidity, wind speed, sunshine, solar radiation (global, direct and diffuse) ... etc. In addition, the insertion of vegetation represented by the urban tree through a numerical simulation as a mask against solar rays.

The results confirm the primordial role of the urban tree in the creation of the shade that has improved the thermal comfort of the public places of the Saharan city Biskra / Algeria. Then the quality of their environment. It should be noted that the public places chosen are very open spaces where the ratio $h/w < 1$. The technique followed in this work is a combination of measurements of the necessary climatic factors "in situ" and numerical simulation by means of software. The simulation was for three situations of the public places of the city of Biskra / Algeria; the first before the insertion of the urban tree in the places chosen for the analysis (the initial state of the places), the second situation, after the insertion of trees, the proposal of the designer of the place and the last situation is the optimal proposal where there is a tangible decrease in the level of direct radiation, diffuse, the temperature of the soil and other parameters.

Keywords

environment; urban tree; shadow; thermal comfort; solar radiation; RayMan; Saharan city; public place

SSG2018.0026

Spatial considerations of using mussel shell mulch to reduce scarab pest damage in vines

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Abstract

Adult grass grubs (*Costelytra zealandica* White: Coleoptera: Melolonthinae) have become an important threat to several horticultural crops in New Zealand in the last 40 years. Among those, grape vines have been severely damaged, producing important economic losses. In an attempt to reduce the current non-sustainable management of this pest based on synthetically derived pyrethroids, an innovative sustainable solution was recently proposed to reduce the damage caused by this scarab pest, which includes the use of recycled crushed mussel shells placed in the under-vine area. By changing the landing behaviour that *C. zealandica* displays, crushed mussel shells reduced its damage in grape vines by 73%. However, this approach have some knowledge gaps for achieving a real agroecological outcome that winegrowers can easily adopt such as knowing the distance from the edge towards the centre of the vineyard block that needs to be treated with crushed mussel shells, without having an increasing number of adults landing on untreated grape vine plants. In this work, we demonstrate that the optimum distance that needs to be covered with crushed mussel shells is at least 22,5 m from the edge of the block from where the scarabs are invading the grape vines. Our findings highlight the importance of understanding the behavioural effects that sustainable management strategies can have on pest's distribution. The results presented here can contribute to generating a protocol that can reduce the damage caused by *C. zealandica* in New Zealand and other Scarabaeidae beetles with similar flight behaviour around the world, but also in recycling waste mollusk shells which otherwise will increase environmental pollution by disposing those shells in local landfills.

Keywords

sustainable pest management; seafood waste recycle; Melolonthinae, herbivorous beetles

SSG2018.0027

The efficiency of probabilistic optimization of transactions on financial market

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Abstract

In his previous work [1] one of the authors of this abstract has proposed the probabilistic model of financial market, which was based on the assumption that the time of a change-point appearance on financial market quotations time series and the difference of prices in neighbouring change-points is a vector random value. The model allows estimating a probability density function of change-points appearance on financial market time series and calculating probability functions of exceeding a certain value of price before the next change-point.

Obtaining these probability functions makes possible to optimize trading transactions parameters such as take profit and stop loss by maximizing the mathematical estimation of profit from transaction.

To test the efficiency of proposed method of take-profit and stop-loss optimization, a simulation was conducted on 4 different trading systems on three different time scales: 2 minutes, 1 hour and 6 hours. During the simulation the signals of trading systems were used to determine the moment of opening a transaction while the results of probabilistic optimization were used to determine take-profit and stop-loss values.

The simulation result has shown an increase of the efficiency of the tested trading systems by a set of profitability criteria, including an improvement of profit factor (the ratio of total profitable transactions volume to total losses volume) by 10–25% and a significant decrease in number of loss-making transactions (reducing the number of loss-making transactions up to 25% while the number of profitable transactions remains roughly unchanged).

The method of change-point risk assessment is an original solution of authors of this article. The way of its integration to trading process is proposed for the first time and the results that were obtained from the simulation are new.

The proposed probabilistic model and methods of optimizations of take-profit and stop-loss based on this model thereby help to increase the quality of analysis and forecasting of market data. The proposed methods can be useful for persons and organizations which carry out stock investment, as well as organizations which provide consulting services in financial area.

Reference

[1] Lutsenko O. & Baybuz O. 2013. Model of probabilistic assessment of trend stability at financial market. Kharkiv: Eastern European Journal of Enterprise Technologies, Vol. 6, No 3(66): 50-54

Keywords

change-point; probability; exchange market; simulation

SSG2018.0028

Insurance and climate change

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Abstract

Purpose: What is the perception of insurances and climate change? Human behaviour also leads to climate change, which has been repeatedly and independently confirmed by the Intergovernmental Panel on Climate Change (IPCC). The consequences of climate change are then manifest in extreme weather situations with corresponding massive financial losses for insurers and insured persons. Indicators, values and consequences get investigated.

Design/methodology/approach: Any here discussed objectives are only a small extract of all existing or potential objectives. The research method used by the author was an analysis of existing and published literature within Web of Science and elsewhere like the IPCC and her organisations (in total more than 15 references), mainly from the last decade. The approach of the topic is to define and evaluate the actual status quo of climate change regarding results for people from the US American and German point of view.

Findings: Research findings are shown within a brief summary to offer an opportunity for further analysis, discussions, or results. The climate change is an accepted possibility to measure effects on nature, based on numerical indicators and values. The emergence of external costs must be borne in full by the insurers and thus the insured persons. Ecology, Society and insurances have to go hand in hand and people have to be taught their current behaviour regarding environment costs money – direct and indirect.

Research/practical implications: results and implications for practice, applications and con-sequences are identified. Climate change and its effects can be evaluated in the short, mid and long term run. The insured persons bear all costs incurred through the risk calculation of the insurer.. Avenues of future research should always include Insurance contributions that are payable by all and thus directly and indirectly bill the climate impact damage to the insured.

Originality/value: This paper sees climate change from the economics point of view (a re-search gap so far) and is in contrast to most existing literature which has the approach from the environment (natural sciences/technique) or society/politics.

Keywords

climate change; costs for insurers and insured persons

SSG2018.00029

The role and importance of nationally and internationally recognized food products in the development of the agri-food sector in Romania

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Abstract

The field of bioeconomy benefits from the significant potential of Romanian agriculture, in the context of a local food industry that is becoming more and more active and with increasing standards, of the successful applied research in the field, as well as in the context of global trends such as the high demand for quality and safe foods. Besides food industry (including topics such as food safety and food optimization), the development of horticultural, forestry, livestock and fisheries sectors are sub-domains with obvious potential for Romania.

In this context, the food producers in Romania have accepted the challenge offered at both European and national level to the possibility of registering the products so that they can gain recognition both nationally and internationally. Producers joined in this process with other actors in the Romanian market such as certification bodies or accredited analysis laboratories. The orientation of small and medium enterprises in the food industry towards the Romanian agri-food product with the potential to be included in the category of food products with national and international recognition and its promotion, for example, in the most sophisticated version by registering as a protected designation of origin (PDO), protected geographical indication (PGI) or traditional specialty guaranteed (TSG), bearing the mark of local specificity, may represent a survival chance for both agricultural and food industry producers in the current market economy context.

The paper will tackle the role and the importance of the food products in the Romanian rural economy, with main focus on the following aspects: the delimitation of the concept of food product recognized at national and international level as well as the regulation of the national and the European related to Romanian food products recognized at national and international level. In addition, the paper will review the main food products already recognized at national and international level and their characterization. The consumer perception as regards the Romanian food products recognized at national and international level will be also addressed in the paper.

The studies will serve as a starting point for the identification of sustainable solutions of utilization of nationally and internationally recognized Romanian food products, including the identification of local, regional and national models of their valorization as well as models of valorization adapted to the consumer.

Keywords

food products market in Romania; recognized food products; national and EU regulations; consumers

Acknowledgments

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SSG2018.0030

Courtyard building morphology's design analysis based on a bioclimatic on-site measurement - case of hot and arid region

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Abstract

This paper aims to solve a design dilemma between a specific building's morphology and a hostile climate conditions. In hot and dry regions, courtyard building is the most building designs used to face such extreme climatic factors especially hot air temperatures. In the search of the optimum courtyard building form that can be passively adapted to extreme climate conditions, an on-site measurement campaign has been conducted, using a digital monitoring instrumentations, to record: air temperature, relative humidity, illumination levels and wind speed values in an existing courtyard buildings samples with various morphologies for both summer and winter seasons in order to extract morphological indicator values which will be used later in building's conceptual process by designers. The important findings are related to the existing of a reversed formula using extreme climatic factor values to calculate the optimum morphological indicators for the best courtyard building design in hot and dry regions.

Keywords

courtyard building's morphology; bioclimatic design; on-site measurement campaign; hot and dry regions

SSG2018.0031

Harvest Map - alternative sources of building materials

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Abstract

Circulation of building materials in urban areas depends on their properties, time of usage and on urban typologies. It is determined by the amount of waste, related pollution and its social perception. Urban metabolism of construction waste is affected by multiple planning, infrastructural, environmental, economic and social aspects. The significant problem in the reuse of building materials is insufficient data concerning their location, quantity, technical state and availability. Planners, designers and contractors – willing to implement reused materials in their design works – are forced to source materials individually for each project which often extends the design and construction process and increases its cost. Thus, this kind of projects happen rarely.

To face this key challenge, the Harvest Map tool has been recently invented in the Netherlands. The tool shows – in a visual form - accessible sources of construction waste or other materials, which can be reused for construction purposes. Sources include: landfills, local materials' surpluses, abandoned buildings, wastelands, factories, processing infrastructure, services etc. The tool presents data concerning the location of waste, its type, quantity, parameters, technical and aesthetical state, availability and potential ways of reusing. Harvest Maps were created for such cities as: Enschede, Apeldoorn, Dordrecht, Utrecht, Amsterdam, Rotterdam, Eindhoven and New York. There are also two online Harvest Maps for the whole country of the Netherlands and for the metropolitan region of Brussels. In Poland, a research study in form of a Harvest Map was developed for the municipality of Konstancin-Jeziorna.

This paper, after the brief description of main constraints and determinants of sustainable circulation of construction waste in urban areas, will present the Harvest Map tool. The general information is followed by the analysis of individual maps for different cities and related projects as well as of online databases. Moreover, the local research developed for the municipality of Konstancin-Jeziorna is examined and general guidelines for sourcing construction waste in Polish cities are established. This detailed presentation of the Harvest Map tool demonstrates how building materials can be sourced, processed and managed in urban areas as well as how policymakers, urban planners, designers, contractors and other interested stakeholders can participate in the reuse of construction waste. It shows how an open-access, free, participatory and innovative tool can create and boost sustainable circulation of building materials and enable more frequent implementation of reused materials in architectural projects.

Keywords

harvest map; construction waste; reuse; sustainable building materials; urban mining

SSG2018.0032

Asia and decarbonisation: role of demand for renewable energy

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Abstract

Now that the measure of CO_2 emissions has broken through 410 on the standard Keeling curve (Earth CO_2 website), one may start drawing a scenario for climate change repercussions, here for the Asian continent. It pollutes most of all continents in terms of both greenhouse gases and many other pollutants. The threats to mankind comes in the form of sea level rise, fresh water shortage, less of potable water, shrinking of lakes and rivers, deoxygenation of oceans, less fish food and agriculture produce, energy shortages, omnipresent air conditioning, urban smog, water and sea pollution due to sewage and failures with landfills. Asia, hosting more than half of mankind, will suffer massively from global warming with millions of ecological refugees. The UN's program, the COP21 by the UNFCCC, cannot stop Asia from reaching Hawking irreversibility, because it entails too weak global governance that is cheatable. The promise of complete decarbonisation is an illusion.

Keywords

carbon dioxide; renewable energy

SSG2018.0033

Poverty reduction and sustainability - role of Agricultural Value Chain in organic products: case of tribal regions in India

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Abstract

Problems: Land and forests are two resources which are central to the tribal people, the poorest social group in India. They are mostly cultivators and well skilled in agricultural activities. More importantly, they own the second highest average cultivable land in India (NSSO, 2015) and in some states like Odisha they are at the top of land holdings (Haan and Dubey, 2005). Another encouraging fact of their land ownership is- even equally distributed as compared to other communities (NSSO, 2015). It is opposite to the theory (Sen, 1999 and others) that, higher ownership of asset (land) and even better distribution of it reduces the chances being poor.

It implies something wrong with their agricultural practice; either the level of output is low or the price realised is low or both. The problems are both, it suffers from low productivity as well as low price that keeps their income low and makes them poor. In other words it is because of lack of opportunity to convert their resources, products and practices into income.

Solutions: Tribal agriculture practice is mostly organic and sustainable in nature because of no use of chemical fertiliser and pesticides. According to Padel (2013, p.33), the tribal people, majority of whom are small-scale cultivators uses largely organic methods of subsistence-based farming practices.

Unfortunately, they sell their products at a distress rate in a market where there is buyer's monopoly because of three reasons- weak bargaining arising out their extreme poverty, perishable nature of their commodities and lack of government initiatives in the form various marketing and value additions facilities. They not only suffer problems in the marketing of their agricultural but also in the NTFPS (Non Timber Forest Products), which is an important source of livelihood for them.

The promotion of organic products and linking them with market could solve most of their problems in a sustainable way. Organic products fetch them good price because of growing regional, national and international market for it. Secondly, tribal people grow a high proportion of High Value Products (HVP) and horticulture products.

A well developed Agricultural Value Chain (AVC) with proper marketing facilities will help them realise good price of their products. The AVC in the early stage could be financed by Government or any agency. The government should establish better connectivity, cold storage, banking facilities and collective market in the villages. In the next stage it should form various farmers producers organisation with a basic training of social entrepreneurship development along with technical support in production, harvesting, procurement, grading, pooling, handling, processing, marketing, and selling of primary produce to the members.

Objective: The present work seeks to suggests, marketing and value addition opportunities in tribal regions for agricultural and Non Timber Forest Products, which are organic in nature. It establishes the true objective of sustainable development that the world is looking for.

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Keywords
sustainability; organic product; poverty; Agricultural Value Chain; social entrepreneurship

SSG2018.0034

Subsurface textile irrigation as a proposal to promote female empowerment in the Brazilian semi-arid region

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Abstract

Smallholder family farming is an important economic activity in the world, developed in small farms, where the product harvested is used for own consumption and the surplus can be sold. In Brazil, family agriculture is present in approximately 85% of rural properties, responsible for about 70% of the food consumed in the country. This type of activity has great relevance for the Brazilian socioeconomic context, but due to many difficulties related mainly to the water scarcity in semiarid regions, the production is very inefficient. In addition, there are still problems related to the gender division of labor, which potentialize the difficulties experienced daily and enhance the marginalization of the female population, reducing future prospects and causing damages to their quality of life. In small farms, as in other economic areas, there is a historically established gender division, where men engage in farming as a source of income for the family, while women focus on small household services with low direct income. Although the women´s workload at home is very high, there is still a lack of recognition about the importance of their activities for the family. In this scenario, the development of grassroot technologies that contribute significantly to the optimization of the productive area, can be a relevant strategy to promote the increase of income for the family, empowering women also. The objective of this study was to report the experience of the use of a low cost subsurface irrigation technology to increase the production, with low water consumption, in the Brazilian semi-arid region, also promoting women´s empowerment. This low cost technology is built with waste from the textile industry, used PET bottles, sand and gravel, developing a textile irrigation device by capillarity. The project was carried out in two municipalities, Pereiros (State of Rio Grande do Norte) and São Raimundo Nonato (State of Piauí), both located in the Brazilian semi-arid region (Figure 1). We know that irrigation is a technique of applying water to the soil, artificially, to provide adequate soil moisture for a given crop. This process offers several advantages, such as: increase productivity; increase profit and value of the rural property; allow planting of several cultures; perform two or more crops per year in the same area; minimize investment risks; improve the economic conditions of rural communities; and to keep families in rural areas, due to the demand for labor, reducing the rural exodus. Subsurface irrigation is a technique in which water is applied directly to the root of the plant and has many benefits, including reducing losses through evaporation and saving water compared to other irrigation systems, allowing the safe and effective use of water resources. Using this technique, women had the opportunity to improve agricultural production and sell surplus production, creating a new source of income for the family and providing more autonomy and independence for these families (Figure 2). Therefore, the development of these low-cost devices, besides promoting women´s empowerment, can promote the economic development of the Brazilian semiarid.

Fig. 1. Construction of the subsurface textile irrigation device used to promote female empowerment

Fig. 2. Implantation of the low-cost subsurface irrigation system based on capillarity

Keywords
female empowerment; Grassroot technology; subsurface textile irrigation; Brazilian semi-arid region

SSG2018.0035

A Sustainable Solutions for Growth (SSG) conference social model for innovation management

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Abstract

A Sustainable Solutions for Growth (SSG) conference is designed as a platform for reporting, discussing, improving, disseminating and implementing emerging innovative and sustainable solutions facilitating economic growth. SSG is designed as a highly interdisciplinary event bringing together researchers, innovators, consultants, entrepreneurs and investors under common goal - creating, evaluating, implementing and benefiting from sustainable solutions. SSG will thus initiate and support innovative commercial projects that bring benefits to all involved stakeholders associated with SSG. It is an internationally unique conference with ambitions to share leading ideas, expertise and highlight emerging business opportunities. SSG aims to be one of the most effective channels transferring innovative sustainable solutions from innovators to the practice thereby these solutions may start to generate revenues.

SSG has thus a unique social model for innovation management. Participants may join the SSG network by registering either as researchers, innovators, consultants, entrepreneurs or investors. Digital conference Proceedings including abstracts and contact details of all accepted contributions will be published on-line in gold open-access. The most promising innovative sustainable solutions presented at SSG might be implemented in the business practice thus generating revenues and bringing benefits to investors, entrepreneurs, innovators, consultants and researchers associated with SSG. Post-conference activities will take the form of an international virtual incubator.

Keywords

innovation management; social model; Sustainable Solutions for Growth; international virtual incubator

SHORT COMMUNICATIONS - SUSTAINABLE SOLUTION

SSG2018.0036

A robot caregiver for elderly alone at home

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Abstract

Nowadays in developed countries people get older and older, often alone, being almost able to care for themselves, except in case of sudden not infrequent events, like falls. Families are not anymore able or willing to integrate them, nor the presence of a dedicated person or even hospitalisation is really needed: the same is true after short hospitalisation, when a kind of protected demission is at least temporarily useful, to minimise both the risks of being back alone after having been fully cared on one side, and to loose personal caring ability in case of too long not anymore needed hospitalisation.

A feasible sustainable solution is an assistive domotic instrumentation at home, able to detect problems like falls, or sleep apnoeas, or even myocardial infarction in order to allow immediate care if needed. In the framework of the Innovation 4 Welfare European Union action coordinating some of the most advanced Lands in European Countries, a prototypal robotic solution has been developed under the direction of the Mechatronic Institute of Linz University in which our contribution is here briefly reported.

A non invasive chap sensor applied to the chest of the monitored subject is able to record skin temperature (abruptly locally increasing in case of myocardial infarction), ElectroKardioGram and accelerations in the 3 spatial directions and to transmit it wireless, through Bluetooth technology to a toy humanoid robot following the subject.

The robot is instrumented with a receiver and a microprocessor able to process the said signals in order to identify possible harmful events: when the algorithm suspects harm, the robot interviews the subject and if not satisfied by the answers (a little artificial intelligence is also programmed on board) calls the remote assistance, making them able first to interact with the patient by tele-operating the robot (this is one reason in order to choose it: the other is psychological, being the little humanoid perceived like a kind of lovely pet by the subject) and in case to activate help. A campaign of experiences has revealed how such a tool could be considered as a sustainable approach to the problem, allowing an almost normal safe life to the experimented subjects.

Keywords

elderly assistance; man-machine interaction; remote monitoring; telemedicine; robots at home

Acknowledgments

Partners within the Robo MD EU project are warmly acknowledged.

SSG2018.0037

Inventdrone

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Abstract

The chief objective/vision: To provide end to end aerial solutions such as Aerial Mapping, Aerial Surveying, Aerial Inspections, Monitoring and Delivery for real time applications using Unmanned Aerial Vehicles (UAV) a.k.a. Drones.

Problem in the UAV Market: Even though there are so many applications can be addressed by drones, the strict licensing issues throughout the world prevent their commercialization in outdoor environment. Hence it is the time to identify innovative and sustainable indoor solutions through customized drones to make the UAV market profitable. This will definitely open the door for so many young innovators who can confidently enter in to the UAV market in near future.

The Opportunity Identified : Inventory within warehouses have to be cross-checked and counted day in and day out manually using labor, this takes around 6-7-man hours per day easily. This involves checking of precise placement of boxes in its allocated slot within the warehouse, cross referencing data as to whether any of the inventory boxes are misplaced or damaged. This consumes a lot of man power but most importantly, it requires an extensive amount of time. We aim to address this problem by using autonomous drones named Inventdrone that can fly indoors to automate warehouses by inspecting inventory and maintaining data records. This problem statement that we're aiming to address is quite new in the field of Warehouse Automation and Inventory Management involving autonomous drones has not been done anywhere across the globe as such.

Sustainable Solution: Through On-board and Mobile Software Development Kits, we configured our Inventdroner (quad copter) with Pixhawk as its flight controller,and customizes it to support specific applications and use cases. Flying a drone indoors or within enclosed spaces autonomously is a very challenging task due to the absence of GPS. We solve this by substituting the GPS with Ultra wide Band Beacons that are placed in specific positions indoors according to the user's requirement. A mobile beacon is appended to the drone, all of the stationary beacons triangulate the position of the drone in real-time and feeds-in its location directly to the onboard computer of the drone which can then be operated wirelessly and programmed to fly autonomously within enclosed spaces.

Features: Our innovation is the integration of a Wireless substitute of GPS on to the Onboard Computer and the Sensory Circuits of the Drone for automated indoor flight routine. We are using time-of-flight in ultrasonic and trilateration and synchronization over radio in ISM band. We identified the possibilities to trace with high precision (+-2cm) over 90m in 2D, but with similar deployment with additional beacons it will be 3D. The system coverage can be expanded beyond 90 meters with cellular like approach such as installing additional beacons every 30 meters. The communication can be made via UART, USB or I2C. We connected out mobile beacon to Pixhawk board's GPS input and let Pixhawk to believe that it is connected to GPS.

Potential Benefits:

- Improves Automation within Warehouses and helps to manage inventory.
- Reduces time taken for manual surveys.
- Reduction in time taken results in reduction of cost factor thereby providing an efficient solution for this problem statement.
- Automation results in job loss but our innovation opens up various employment opportunities during large scale fabrication such as maintenance, repairs, electronic engineering and production assistance.

- Further improvements in technology in the field of Internet of Things can be incorporated along with this innovation.

Keywords
inventory management; multirotor; indoor navigation; ultra wide band beacons

Acknowledgments
Special thanks to J. Iliyas from Caterpillar India Pvt Ltd who has given us the opportunity to customize our product.

SSG2018.0038

Human energy harvesting - a sustainable solution for wearable electronic systems

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Abstract

Portable devices are gaining popularity and as electronics keep having a tendency to decrease their size, wearable smart devices can be created for wide field of applications such as communication, physical activity logging, health monitoring etc. Currently batteries is the main choice for power source, but regular charging or replacing is inconvenient and puts additional stress onto the environment. A long-living or fully autonomous solution would be using energy harvesters, which convert otherwise lost different types of energy into electrical. Talking about wearable electronics, the closest energy sources are thermal and motion energy of the wearer.

This project studies options to create combined energy harvesting system for human motion and thermal energy.

A completely wearable human motion energy harvester with corresponding power management and energy accumulation system, capable of autonomous work and producing stable few volts output on a storage capacitor, is presented for the first time. Main parts of the developed device are flat, spiral-shaped inductors and permanent magnets. Voltage pulses in such flat inductors can be induced during the motion of a permanent magnet along its surface. Such motion type is the most suitable for apparel, since separate parts do not need direct contact, only relative motion. Due to the flat structure, inductors can be completely integrated into the parts of the clothes and it is not necessary to allocate extra place for movement of the magnet as in usual electromagnetic harvesters. The average power up to 0,5 mW is developed during the walking tests by such harvesters, integrated into different types of the apparel. It was approved by testing different prototypes of clothes with energy harvesters that voltage of generated impulses is high enough to be effectively rectified with commercially available diodes and a part of generated energy can be stored for further usage.

To increase the total energy that can be harvested by system, it is preferable to use several different energy sources. In case with human body, it is possible to scavenge waste heat of human body using thermoelectrical generators. Battery of five thermoelectrical elements can generate up to 1mW of electrical power if placed on lower leg.

Thermoelectrical elements consist of arrays of semiconductors which when exposed to temperature difference, generate electrical energy. Therefore, generated power depends on activity level and ambient temperature. As such generators don't depend on motion directly, it is possible to achieve more continuous energy delivery.

Voltage generated by both generators is not sufficient to power electronic devices directly therefor it has to be increased using step-up circuits and afterwards stored and managed by electronic solutions designed for energy harvesting. Energy that is generated and transformed, can be stored in same storage element – capacitor, battery etc.

Stored energy amount is sufficient for powering conventional low power microcontrollers, sensors and communication systems.

Keywords

microwatt power management; human energy harvesting; wearable electronics; thermoelectric, Seeback

Acknowledgments
This research was supported by the European Regional Development Fund within the project "Synthesis of textile surface coating modified in nano-level and energetically independent measurement system integration in smart clothing with functions of medical monitoring 1.1.1.1/16/A/020.

SSG2018.0039

Decentralized micro waste to energy solution

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Abstract

The handing of Municipal Solid Waste (MSW) is an unsolved, costly challenge. Worldwide waste disposal has reached 11 million tons per day with cost growing from $205 billion a year in 2010 to $375 billion by 2025 (The World Bank, 2013). On the other hand, Waste-to-Energy (WtE) solutions occupy less than 6% of the total waste management market - expecting to reach US$36 billion by 2020 (World Energy Resources Waste to Energy).

Zohar CleanTech LTD has patented a Decentralized Smart Waste solution providing a localized WtE approach providing for local energy requirements, while eliminating the amount and cost for transportation of waste for recycling or to landfills. The energy produced in the ZoharTech WtE process can used for heating, air conditioning and electricity with almost no environmental impact. The unique ZoharTech reactor covers a small footprint compared to existing large-scale systems in the world. The system can be installed at the base of a buildings in place of waste compactors or containers at a similar cost to existing waste compactors.

At the core, The ZoharTech contains a micro-reactor using a thermal plasma technology enabling the near complete gasification of household waste into high energy synthetic gas (syngas) and produces slag as a by-product from the inorganic ingredients of the waste. The slag is an environmentally friendly material that can be used in construction or road surfaces.

The Company's development plan is designed to reduce the investment risk by developing the system in concurrent phases. The initial phase, currently underway and partly funded by the Ministry of Energy in Israel, is the development and testing of a low-cost, innovative plasma reactor that will produce syngas. Subsequent phases will cover the development of the waste handing system and then commercialization of the system.

Keywords

waste-to-energy; plasma gasification; waste management

SSG2018.0040

Could economic and environmental sustainability coexist? Role of tribal agricultural technology: case of India

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Abstract

Problem: The major challenge of the world is to reduce poverty and to protect environment. The Sustainable Development Goals (SDGs) of the UN calls for an end to poverty in all its manifestations by 2030 (Goal 1). The precondition to achieve this goal is to achieve high economic growth. The world believes economic growth is primary and only solution for all the economic problems. On the other hand, to achieve high economic growth, it is inevitable to destroy environment that poses further threat to Climate Change (SDGs Goal 13). It is because, the basis of high economic growth is industrialisation, since agriculture has natural limit for it.

Environmental degradation is an inherent part of economic development and concept 'Sustainable Development' became widely popular. Nevertheless, no developmental activities could take place without the damage to environment. Loosely, sustainable development could be achieved, but strictly not. In a strict sense, the concept of sustainable development also has a component of damage, though minimum. Question arise - is 'Sustainable Development' possible?

Solution: Yes, there is an alternative that has the potential of fulfilling majority of the goals of SDGs. It reduces poverty, without harming environment. It brings sustainable development in its true spirit. That is 'tribal agricultural technology' and its promotion through organic farming. Originally, tribal agriculture is organic agriculture. The organic nature of their cultivation is modern form of cultivation, since Green Revolution Technology (GRTs) is becoming environmentally unsustainable and tremendously harming environment.

The tribals/indigenous people on the other hand are poorest in India and at the bottom of all development indicators - poverty, literacy or health outcomes. The low productive tribal agriculture could be an opportunity for transforming the traditional farming to more productive organic farming. The increased productivity will help earn more and income out of poverty. It achieves poverty reduction of poorest people not with resource exploitation (as in the case of extraction based industrialisation policy or Green revolution Technology) but with resource conservation.

Objectives: In this context the paper seeks to explain, poverty and levels of living of the poorest people (indigenous/tribal) in India. Secondly, it suggests the role of their agricultural practice and technology in bringing truly sustainable solutions both for their economic conditions and environment, particularly in a situation when the world is running out of such alternatives.

The output produced will be innovative product and with innovative process. It establishes all forms of sustainability- environmental sustainability, social sustainability or economic sustainability that the present world is looking for. The outcome will be seen just in a year.

Keywords

sustainability; tribal agriculture; traditional knowledge; organic farming; poverty

SSG2018.0041

Novel techniques for antibiotic susceptibility testing and carcinogenic effects of drugs

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Abstract

Microcalorimetry, a quantitative measure of heat output from growing and respiring cells, can measure antibiotic action on cells quantitatively in vivo. The technique is able to measure drug protein interactions quantitatively both for antibiotics alone and in combination. The technology is at TRL 5 stage – proven in a laboratory environment and 5 patents have been filed in Europe and the US. Several suitable micro calorimeters are available commercially, that with minimal modification can be used to measure bacteria growth and susceptibility to antibiotics. A pilot program to take the technology to market in the infectious disease area has been put in place and funding of up to 5 million EU is sought to bring the product to market. For the oncology area micro calorimetry can be used to identify initiation of RNA synthesis and thus the carcinogenic nature of a new drug. It is currently at TRL3-4 stage. Broad spectrum antibiotics have the ability to initiate RNA synthesis and many have shown growth promoting effects in animals. Using this technique proof of concept has been achieved showing initiation and continuation of a nonsense RNA synthesis by certain broad spectrum antibiotics and the ability of bacteria to produce an internal protein source contributing to resistance to antibiotics and potentially converting normal cells to cancer cells. It is time to change the standard approach to infectious disease management and oncology drug development. This means a re-review of bacterial infections and resistance such as MRSA, TB and hard to fight gram negative infections and related antibiotic susceptibility. Micro calorimetry is a useful tool in managing infectious diseases with new easy to use instruments at reasonable prices. In Oncology these instruments can be used in drug development and potentially to identify cancer cells.

Keywords

microcalorimetry; infectious disease management; carcinogenicity

SSG2018.0042

A research & business thematic conference on renewable energy sources: lessons learned from implementation in the business practice

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Abstract

This abstract briefly summarises lessons learned from implementation in the business practice of a research & business thematic conference on renewable energy sources. First, the business idea was created. Second, a R&D project was launched that aimed at creation of a business model for the event that would attract a sufficient number of international participants. Within the project all aspects of the entrepreneurship were investigated in details with emphasis on market research, participants' profiles, competitor analysis, customer expectations, etc. It created reports, conference materials and a web based system that was subsequently tested and implemented under realistic conditions. Finally, based on the research outcomes RESRB 2017 conference was successfully organised in Wrocław and RESRB 2018 in Brussels. It needs to be emphasised that innovative conference products needs to be unique and hence require dedicated R&D efforts. Due to extreme competition only the highest quality and unique research and business conferences have potential to serve participants both from academia and business. The system for managing the entrepreneurship must be simple for conferences participants and at the same time require minimum efforts from organisers. With such a system the conference can propose competitive fees, be unique and with its high quality win the competition with millions of other international conferences which is today a real challenge for most conventional not enough innovative entrepreneurships.

Keywords

research; business; renewable energy sources

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SSG2018.0043

RingAir: understand and monitor your city's environmental quality real time

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Abstract

People track everything. Why don't we track one of the most essential factors that affect our health, the quality of the air that we breathe? With the help of modern technologies and innovative communication solutions we aim to increase public awareness and decision-making power in monitoring and shaping the quality of one's environment, expanding the exercise of the right for clean air and health-conscious thinking. We develop RingAir, a free portable device (i.e. a trendy smart bell) for environmental monitoring real time BigData stored on the Libertaria network's blockchain, which assures data transparency, irreversibility and security. RingAir supports sustainable economic and social change, as well as social inclusion, by fuelling bottom-up social responsibility movement in the field of environmental quality, supporting solution-oriented collaborations among different social players, detecting key areas for addressing air pollution, incentivizing new "green" product and service developments for urban design and planning, and initiating a dialogue on the topic of quality of the environment with local authorities. We introduce a citizen science approach to data collection. We collaborate with the open-minded community of urban bikers of the city of Budapest, who are directly influenced by changing air quality. We place RingAir smart bells on the bicycles of the main bicycle delivery companies. Based on the collected data we develop an application showcasing a real time city-wide air quality map, allowing the user a possibility to choose a more healthy (less polluted thus less harmful) way of getting from point A to point B. RingAir app is also a platform for advertising "green" sustainable solutions from different providers. Our goal is to confront people with real time data on the quality of the air they breathe and empower them by a smart application and access to data, so they are able to make better informed choices. The innovative environmental real time BigData collection and storage creates an opportunity for BigData solutions for local governments, research institutes, tourism, real estate and urban design developers, in the form of customized purchasable historical data analyses and forecasts. It also provides a platform for introducing purchasable "green" location certificates. RingAir is an essential part of a smart city concept.

Keywords

RingAir; blockchain; BigData; decentralization; air pollution

SSG2018.0044

Constraining a geological model for sustainable development of hydrogen gas from subsurface rocks

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Abstract

The discovery of hydrogen gas in rocks of the Tambaoura Basin (Western Africa) opens new potential for changing the balance of the world's production of energy. In order to make a sustainable solution, two fundamental problems will have to be addressed: (1) the geological model of sustainable development of hydrogen gas in subsurface rocks needs to be worked out, and (2) a world-wide application of such a predictive geological model with source constraints will need to be implemented. Work on the first problem has been advanced (Jerzykiewicz, 2012) and has been presented at the 2016 AAPG conference in Barcelona (Jerzykiewicz in Briere et al.). The results of this frontier work are encouraging and more work is still in progress. Several possibilities have been proposed to explain long lasting high pressures for hydrogen gas in the discovery well in Bourakebougou (Gazbougou #1 well). Both exogenic (serpentinization, anaerobic fermentation and spontaneous electrolysis) and endogenic processes (mantle degassing, rock crushing, anaerobic corrosion, and petroleum cracking) as the sources of hydrogen have been hypothesized. The most optimistic scenario is the possibility that the volume of hydrogen in the discovery well is a result of a steady supply from active sources (both inorganic and organic). Such a sustainable scenario would be the preferred supportive constraint considering an extremely low preservation potential of hydrogen gas in nature. Further work is needed to constrain the geological model developed for the discovery well area in order to make it applicable to other areas of the Tambaoura Basin and to similar basins of the world. Accordingly the exploration should be carried out in two stages: (1) defining favorable geological conditions that led to the release and accumulation of hydrogen gas in the discovery area, and (2) finding out geologically analogous terrains in other basins of the world for the sustainable development of hydrogen gas. If this is accomplished then sustainable solution for changing the balance of the world production of energy might be possible with new discoveries of hydrogen gas.

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Keywords

discovery; hydrogen; Africa; subsurface; energy source; geological model

SSG2018.0045

Oscosurvismeter for organic nanoformulations

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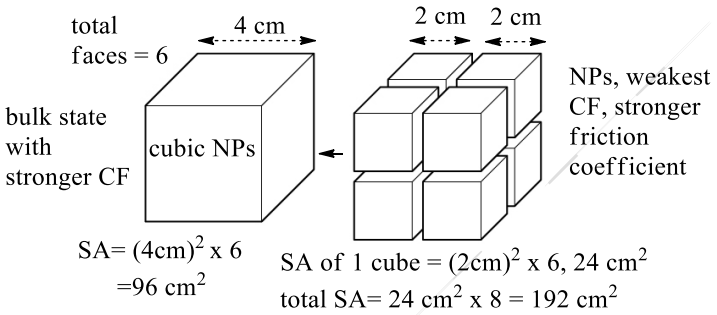
Abstract

Nanoemulsions have been indispensable part of every section of science and society for rendering a most legitimate and efficient solution via non-polluting models for offering a most ready state materials. Fig. c1 depicts that the molecular materials naturally tend to form their bulk state by exponentially reducing their available surface area which fundamentally performs activities because their stronger cohesive forces (CF) keep molecules together.

Fig. c1: Surface area = SA



The two states of the materials substantial affect surface area and surface energy (surface tension), friction coefficient (viscosity), electric conductance, osmotic pressure and other useful properties which act as sensor for developing applications of the materials. The bulk state exceptionally develops stronger cohesive forces which make larger volume and less available surface area which is a fundamental concept of nanoscience and technology. In fact, technically and safety wise, the nanoformulations are the foundation and a core mechanism for constructing the desired nanomaterials and nanoemulsions of varieties of materials like TTDMM, TTDHM dendrimers, melamine-formaldehyde-polyvinylpyrrolidone polymer resin, and supramolecules. The free radicals scavenging activities by suitable antioxidants, encapsulation of nanodrugs and their release, nanocoating, cosmetic nanoemulsions especially a monolayer forming nanoemulsion of nail polish, fluorescent dyes based nanoemulsions, even for digital inks, nanomedicinal nanoemulsion and nano-food syrups and supplements, the CF of bulk phase plays a key role. The CF and friction coefficient in a most critical balance form noted by friccohesity induce higher stability in these processes.

For understanding the inner mechanism of abovesaid sciences, a dispersion of dispersate in dispersion medium becomes a critical or the master control. Also in adequate force working at liquid interlayers is needed so that their coalescence, coagulation could not occur as these formations inhibit an available surface area which is responsible for expressing the wanted activities. In fact the coagulation forms a bulk state on reducing a surface area which defunct the activities as surface area to volume ratio decrease. Thus the stoichiometry of hydrophobicity and hydrophilicity of molecules critical modulates the surface area based activities. So there is a need to determine their balanced of state hydrophobicity and hydrophilicity of molecules. Generally the medicinal molecules which are added as additives are also more hydrophobic and less hydrophilic. The molecules have pi-bond, lone pair of electrons, pi-conjugations, and electrostatic poles formed due to a presence of electronegative atoms like O in their structures. These structural coordinates of molecules strongly respond to the UV-Vis light when are subjected to the UV-Vis spectrophotometric determinations. These induce state of structural change via electronic transitions which could be harmful to the body or the surface in case of nanothin films, pains, and coating. This concept is similar to the 'organic farming' which could be

named as ‘organic model of characterization’ of the sensitive molecular materials. Thus it is clear that any organic green and sustainable model is urgently needed to assists ‘organic nanoformulations’ to determine philicphobic stoichiometric balance with green method where no external forces are used to damage the structure by inducing any change. For example, we have conducted experiment by applying magnetic fields to the pepsin nanoemulsion in presence of F3+ with d5 electrons, which strongly denatured the pepsin by inducing structural changes. Also for such formulations the purpose and care is given to protect their structures to prevent triggering SAR (structure activity relationship), SFR (structure friccohesity relationship) considering all these structure damaging steps for finding a solution the greener and sustainable model named as oscosurvismeter is invented and patented with USPTO. The device tracks a fundamental structure responding parameters like CF and friction coefficient, conductance, osmotic pressure. These parameters fundamentally are the key to perfectly determine nanoemulsions formulation and their thermodynamic stability which also ensure conducting osmotic pressure of ECF (extracellular fluid) and ICF (intracellular fluid). The oscosurvismeter is open for competent companies who could manufacture and sale in the market which could be a big boon in areas of pharmaceuticals, cosmetics, thin film coating, paper dyeing, textile, food sciences, petroleum and petroleum products and many others.

Keywords
oscosurvismeter; nanoemulsions

SSG2018.0046

Multifunctional materials derived from biowastes in leather industry

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Abstract

Massive growth of industrial production to support the booming world population is intimately linked to the rapid exhaustion of natural resources, a grand challenge facing humanity today. One such challenge is environmental sustainability and pollution mitigation, which have received considerable attention in several industries including leather. Leather industry produces huge quantities of bio-waste that can be used as a precursor for the bulk synthesis of composite, bio- and nano-materials. In this context, our research group has developed a range of multifunctional novel materials such as a) hybrid biodegradable scaffolds [1-4], b) self-doped carbon nanomaterials [5,6], c) conducting nanobiocomposites [7-8], d) chromium-carbon core-shell nanomaterials [9] and e) magnetic nanobiocomposites [10-12] by utilizing the collagen based wastes generated from leather industries. The developed multifunctional materials exhibit outstanding properties such as biodegradability, biocompatibility, electrical conductivity, magnetism and luminescence. The derived materials were demonstrated as an efficient candidate in high-value applications such as Li-ion batteries, oxygen reduction reaction, catalysts in organic reactions, electromagnetic interference shielding, tissue engineering and also as a proficient absorbent towards oil contamination and toxic dyes. These approaches highlight new avenues for converting leather industry bio-wastes into useful multifunctional materials in scalable and inexpensive ways thereby minimizing pollution and enhancing environmental sustainability. In view of these results, it is anticipated that the sustainable leather production and growth is truly feasible in the future.

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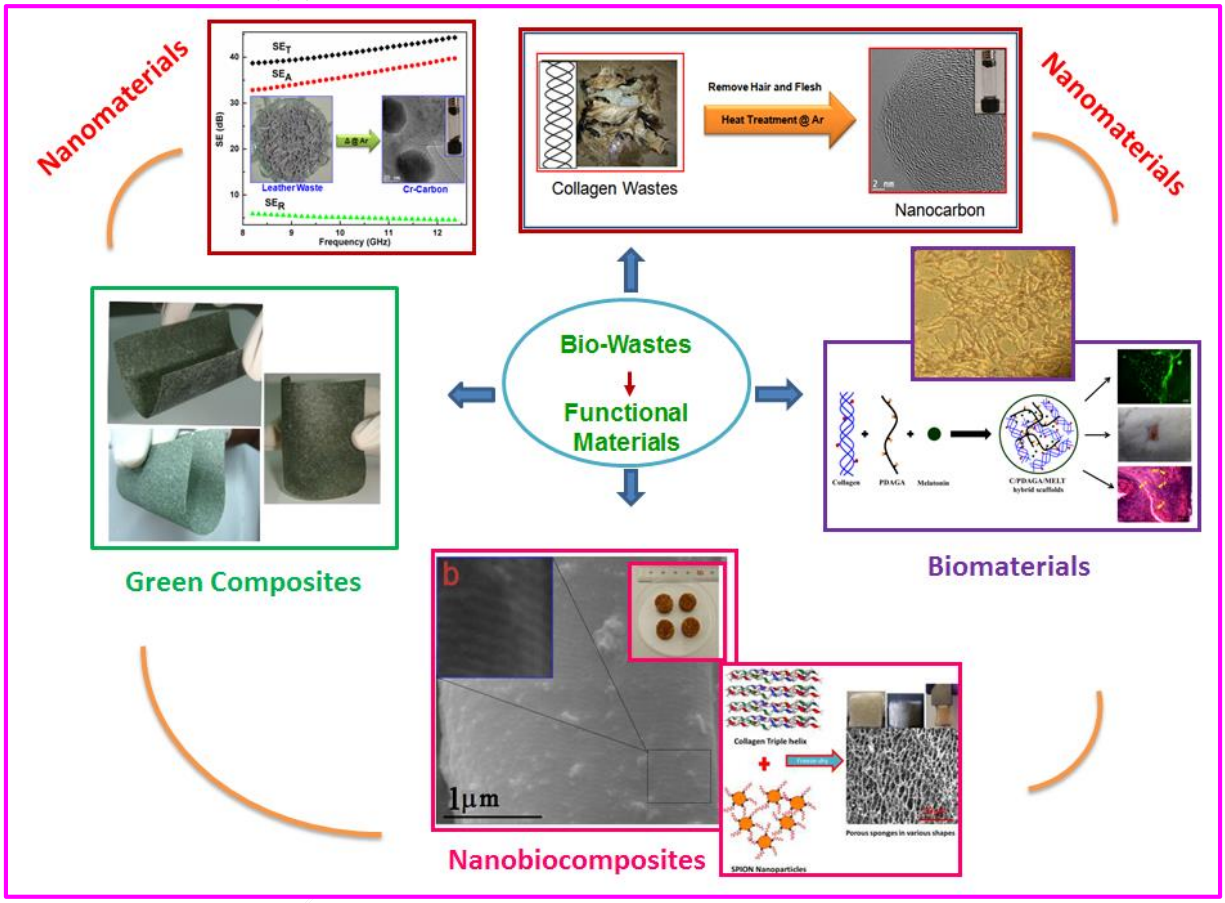

Fig. 1. Project scheme.

Keywords
multifunctional materials; leather industry; biowastes

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Feedback from conference participants

It was a real pleasure participating in this conference with an exceptional unique model focusing on sustainable solutions. The quality of the programme was very good and I enjoyed all the keynotes and several oral lectures. Some of presented sustainable solutions were very interesting as business opportunities for entrepreneurs and investors. I appreciate that I was also able to contribute to shaping the future SSG conferences via panel discussion. I am interested to take part in post-conference activities such as an international virtual incubator (IVI).
Peter. S. Nganga

Thanks for organizing a great conference!
Grant D. Wach

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