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CENTER FOR RESEARCH AND TRAINING
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PREFACE

It is my pleasure to write this introductory note for the seventeenth volume of the Abstracts of Published Papers 2022. The Abstracts of Published Papers is an annual publication of Center for Research and Training East West University (CRTEWU) with an objective to keep an official log of academic publications of the faculty members of East West University. It includes the abstract of published research articles, book chapters, books, and conference papers of our colleagues.

It is indeed a matter of great satisfaction for Center for Research and Training East West University (CRTEWU) to publish the seventeenth volume of the Abstracts of Published Papers, which contains abstracts of the academic publication published in 2022. This publication is a collective effort of the faculty members of the university. Our scholars have enthusiastically and immensely contributed in areas of business, economics, social sciences, engineering, telecommunications, liberal arts and literature, population health, computer science, pharmacy, and technology. This volume contains abstracts of 193 research articles. Among them, 119 articles were published in international and three in national journals, seventeen book chapters were published abroad, as well as 54 papers were published in international conference proceedings. Considering their academic achievements, we sincerely congratulate all the research scholars.

The Center expresses its sincere thanks to Dr. Rafiqul Huda Chaudhury, Chairperson of CRTEWU and Member, Board of Trustees, and all the members of the Research Committee (RC) for their support and encouragement. Furthermore, thanks are also due to all the personnel of CRTEWU involved in this publication.

Professor Muhammed Shahriar Haque, PhD
Executive Director
CRTEWU, 2023

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Facebook-based Entrepreneurship: Does It Transform Success in Small Business: A Case Study of a Watch Business

M. Sayeed Alam[*] and A.F.M. Kabir Anwar[†]

ABSTRACT

The demand for wristwatch among all types of customers in Bangladesh is increasing. The watch market size in Bangladesh is estimated to be worth Tk180-200 crore. Bangladeshi watch market Traders estimate that the watch market is growing at a rate of more than 10 per cent per year. Despite the growth of this market 'The Watch Galleria,' a one year-old business, is struggling with low sales to survive in the competitive wristwatch's online market which is creating profit deficiency, increasing inventory, and increasing the chance of damage to the stock watches. Dilemma: Azim, the entrepreneur and owner of this small business, is a cardiologist by profession, and he began his business by selling watches to his physician community, and initially he was very successful with this niche marketing. Initially, he had four watch brands in his portfolio: Fossil, Emporio Armani, Tommi Hilfiger and Michael Kors brand with price range from 8500 BDT to 18500 BDT. With a satisfactory start, he failed to keep his business on the same track. He developed a better delivery system, a refund policy, and a more customized service policy, but despite all these initiatives, Azim's business is stagnant with low sales. Theory: The application and understanding of basic marketing principles contribute to the creation of a prosperous and thriving small business. Customer orientation, market segmentation, targeting, positioning and branding are all concepts that can be applied to small businesses. Marketers use social media networks to spread positive brand image. Online media helps marketers to reach and interact with the customers.

Keywords: Small Business, Marketing, Facebook, Watch Business, Dhaka

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South Asian Stories of Climate Resilience

A. K. Enamul Haque[*], Pranab Mukhopadhyay[†], Mani Nepal[‡] and Md Rumi Shammin[§]

ABSTRACT

South Asian countries are faced with the dual challenge of building resilience against climate change impacts and advancing the goals of sustainable development. Recent developments in community-based adaptation initiatives offer pathways to address both these challenges. While global initiatives to forge climate change agreements, curb greenhouse gas emissions, and build adaptive capacity have been slow, creative local initiatives have been emerging throughout developing countries. South Asia, a climate impact hotspot, has been experiencing the wrath of nature for decades and become a hotbed of novel initiatives that integrate traditional and scientific knowledge through multilevel partnerships between local communities, non-profit organizations, academic and research institutions, local and national government, and international organizations. This introductory chapter highlights the works of 59 scholars—predominantly from the region—that tell stories, research findings and innovative grassroots solutions from seven South Asian countries through a unique partnership for co-creation and sharing of knowledge on climate adaptation and community resilience.

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A Framework for Climate Resilient Community-based Adaptation

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ABSTRACT

Community-based approaches are becoming increasingly widespread in climate change adaptation initiatives in developing countries. These approaches have been adopted in programs dealing with natural disasters, promoting sustainable agriculture, ensuring water and food security, and developing resilient livelihood solutions in climate vulnerable communities. Sustainable Development Goals (SDGs) and the principles of resilience offer additional tools to explore opportunities for integrative, cost-effective, and resource-efficient models of climate change adaptation. This chapter deconstructs key concepts and definitions related to community-based climate change adaptation and community resilience and presents an integrative framework to foster the development of locally relevant, culturally appropriate, and resource-efficient solutions.

Keywords: Community-based Adaptation (CBA), Climate Solutions, Sustainable Development Goals (SDGs), Resilience Framework, Disaster Risk Reduction

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Waste Segregation at Source: A Strategy to Reduce Waterlogging in Sylhet

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ABSTRACT

Poor solid waste-management systems in cities in developing countries make them vulnerable to climate-induced risks. It has been pointed out in the literature that the waste management process needs to be holistic and inclusive from waste generation to disposal in order to make it efficient and sustainable. While women in their day-to-day activities at home play a critical role in waste management, they are often excluded in the public waste-management systems which are mainly managed by men. This research used women-centric approaches for motivating citizens using social and moral persuasion, economic incentives and social recognition to participate in municipal solid waste management. The findings indicate that the awareness campaign using motivational approaches eventually worked and that the women-centric approaches used are important for promoting home-based waste segregation at source. The study also revealed that a simple payment mechanism for waste disposal services at the household level is not enough to convert littered cities into clean cities. A women-centric approach also contributes to developing community-based solutions to adapt to climate-induced flooding and makes a city more resilient, addressing sustainable development goals.

Keywords: Waste Segregation, Climate-induced Risk, Gender Engagement, Resilience, Sylhet City Corporation

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Local Strategies to Build Climate Resilient Communities in Bangladesh

Estiaque Bari[*], **A. K. Enamul Haque**[†] and Zakir Hossain Khan[‡]

ABSTRACT

Climate risks threaten forests, riverbanks and agriculture communities in Bangladesh. This chapter examines three cases from Bangladesh where local communities have been using innovative methods for addressing these issues. With the pressure of high density of population, Bangladesh's forest cover has declined to as low as 10.7% despite the fact that 17.5% of the land is designated as forest land. Foresters across Bangladesh find it difficult to protect these lands due to high demand for fuelwood. The first case shows how developing an appropriate market chain is used to reduce pressure on forests. The second case shows how to use traditional knowledge to protect riverbanks from erosion in remote villages by using local and natural materials, reclaim agricultural land and also promote navigation. Given the threat of climate change and possible sea-level rise, these lands will be threatened with permanent waterlogging. The third and final case show how farmers in Bangladesh have used indigenous knowledge and begun producing agricultural crops using floating beds in waterlogged areas of Bangladesh. This is an effective adaptation strategy to deal with the vulnerability of countries against food insecurity in many of the developing countries.

Keywords: Bandalling, Climate Change, Floating Agriculture, LPG Distribution

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Small-Scale Solar Solutions for Energy Resilience in Bangladesh

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ABSTRACT

Small-scale solar solutions offer a cost-effective, climate-friendly alternative to delivering electric power to the off-grid rural population of Bangladesh. As of 2019, over 4 million solar home systems (SHSs) have been installed in these communities—creating over 70,000 jobs and providing electricity to more than 18 million people or 11% of the country's population. These systems are also part of Bangladesh's clean energy pathways as the nation develops. Small-scale solar solutions also contribute to a community's resilience to climate change. Using a field survey on 1000 households in five remote rural communities in South-eastern Bangladesh, this study reveals the opportunities and challenges of SHS. Results confirm that SHS displace greenhouse gas emissions. Even though the magnitude of reduction is relatively small, the collective impact can be significant if millions of homes in developing countries are powered by these systems. The study also found that certain demographic groups in target communities have poorer access to SHS systems. Most importantly, it identifies various co-benefits of solar systems such as new livelihood opportunities, women's empowerment, improved indoor air quality, etc. This chapter argues that small-scale solar solutions can help build more resilient communities and help accomplish several sustainable development goals and offers recommendations for more equitable deployment of these systems.

Keywords: Solar Home System (SHS), Microfinance, Clean Energy, Empowerment, Co-benefits

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Climate Resiliency and Location-specific Learnings from Coastal Bangladesh

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ABSTRACT

Considering the vulnerabilities of coastal communities against severe cyclones, our research explores how location-specific learning effects interplay with climate resiliency efforts based around private defensive strategies adopted by a socially heterogeneous coastal population. We analyzed a household survey data of southern coastal districts of Bangladesh that were exposed to 2007 Cyclone Sidr and 2016 Cyclone Roanu. Our empirical analysis reveals strong evidence of location-specific learning effects in terms of socially heterogeneous coastal households' gradual investments toward storm-resistant homes. Our results indicate that households' investment decision is influenced by their location relative to government-sponsored embankments and cyclone shelter programs. Location-specific learning effects on storm-resistant home improvements are also strongly evident if the households are living close to the nearest vehicular road, primary school, and the mangrove forest. Although household income and wealth play a significant role, access to non-governmental organizations and remittances have no significant influence. We recommend targeted post-disaster relief and rehabilitation programs for households living outside embankments and located further away from the mangrove forest. Access to external financing for storm-resistant homes, extending mangrove forest coverage along the coastlines, and information dissemination on best practices for low-cost storm-resistant homes are the other recommendations to develop climate-resilient coastal communities.

Keywords: Private Defensive Strategies, Climate Resilience, Learning Effects, Social Heterogeneity, Natural Forest, Bangladesh

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Evolution of Quality Assurance Practices in Enhancing the Quality of Open and Distance Education in a Developing Nation: A Case Study

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ABSTRACT

Purpose: The purpose of this study is to look at the challenges and successes that the case institution has had in implementing and maintaining quality assurance (QA) processes. The study also looks into the role of QA techniques in improving an institution's performance in a developing country. Design/methodology/approach: The research is qualitative. Nine significant persons were interviewed, including the institution's top administration, faculty members and related staff. Data were gathered to learn more about the background, incremental changes and numerous internal and external elements that influenced how QA was approached over time. Findings: The findings revealed the challenges and experiences of the evolution of QA practices in the case institution. The results show the changes in QA practices regarding three aspects, including people, place and program of case institutions under three phases. During phases I and II, the adoption and upgradation of QA practices were very slow; phase III showed significant improvement in all three aspects. In addition, the positive impact of QA practices is evident in improving the performance of students and teaching and nonteaching staff of the case institution. Practical implications: The findings of this research could aid open and distance learning (ODL) providers in other developing nations in understanding the challenges of such a system. It may also make it easier for other ODL providers to comprehend the QA-led success in stakeholder confidence, employability and reputation. Originality/value The research will give insights into how QA procedures are used and valued in ODL in developing nations.

Keywords: Quality Assurance, Developing Economies, Open and Distance Education, Bangladesh Open University and Performance

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Earnings Quality and Financial Flexibility: A Moderating Role of Corporate Governance

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ABSTRACT

The aim of this study is primarily to demonstrate how earnings quality is an influential determinant of financial flexibility. Secondly, how earnings quality affects financial flexibility. And finally, to provide evidence of the role of corporate governance between earnings quality and financial flexibility composing overall corporate governance index (CG-INDEX). This study considered unbalanced panel data from the year 2007 to 2020 from the database CSMAR yielding 14,088 firm-year observations. This study used liquidity as the proxy of financial flexibility, and also used a comprehensive index of corporate governance constructed by adopting the principal component analysis and STATA has been used for analyzing data. The study used System GMM regression for analysis and controls endogeneity by applying lag financial flexibility as an instrumental variable. The empirical results reveal that poor earnings quality significantly negatively influences the level of corporate financial flexibility. The results also demonstrate that corporate governance can significantly positively moderate the relationship between earnings quality and financial flexibility. This suggests that when the earnings quality is poor, firms are less likely to be financially flexible in holding liquidity. More specifically, firms with poor earnings quality will reduce their financial flexibility of firms; hence, firms need to provide high-quality earnings in order to be more financially flexible. Earnings quality is an important factor, which led the author to examine how earnings quality influences financial flexibility. Under the views of agency theory and positive accounting theory, poor earnings quality is a source of amplified shareholder's concern of increased informational asymmetry, which may adversely affect the firm's financial flexibility. Conversely, higher earnings quality reduces the information asymmetry which leads to higher financial flexibility. This study provides a way how to achieve financial flexibility with the assistance of corporate governance which is essential to combat financial crises and smooth business operations successfully.

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Green Finance and Decarbonization: Evidence from Around the World

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ABSTRACT

This paper studies the effect of green finance on decarbonization. Using a large sample of 46 countries, we show that green finance significantly reduces carbon emissions in the short and long run. This effect is driven by green bonds issued to support waste and pollution control and improve energy efficiency. The impact of green finance on carbon emissions is more pronounced in developed credit markets and economies with higher innovation success and higher climate change exposure. Our results are robust under the conditions of short-run and long-run homogeneity and the cross-sectional dependence in the sample.

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Policy Uncertainty, Oil Price, Stock Market and Precious Metal Markets Volatility Spillovers in the Russian Economy

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ABSTRACT

The Russian economy is emerging, meaning that natural resources play a dominant role in economic devel-opment. Given the considerable volatility in resource prices, we investigate the volatility spillovers among pol-icy uncertainty, international oil prices, exchange rate, stock index and metal prices covering the period of 2 July 2008 to 15 May 2020 for the Russian economy applying Dynamic Connectedness based on Time-Varying Parameter Vector Autoregression (TVP-VAR). Our empirical investigation demonstrates that gold price, Russian policy uncertainty, oil price and stock index are net volatility contributors, whereas palladium, plati-num, silver and exchange rate are net volatilities receivers. Market capitalisation and silver market are found to be the highest net contributor and net receiver, respectively. The palladium appears as a net volatility receiver initially, just after the global financial crisis. The Russian economic policy uncertainty appears to be the domi-nant volatility contributor from 2008 to 2014, but onward it turned to be a net volatility receiver. Over the year 2014, gold price was the prominent volatility contributor to another market when the oil price dropped signifi-cantly. The total connectivity of the markets are highly anchored with several exogenous shocks, including eco-nomic sanction, adoption of floating exchange rate, oil price plunge. Our empirical findings provide several pol-icy implications to portfolio managers and Russian regional stakeholders.

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IFRS Adoption and Real Earnings Management in Bangladesh: The Role of Board Characteristics

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ABSTRACT

The adoption of the international financial reporting standard (IFRS) has become an important research topic and received considerable attention from many empirical researchers worldwide. However, to the best of the authors' knowledge, it's one of the very few efforts to examine the relationship between IFRS adoption and real earnings management (REM) with the moderating role of board characteristics (board size, independence, expertise, CEO duality, and gender diversity). The study employs 94 firms listed on the Dhaka Stock Exchange (DSE) for six years, i.e., 564 firm year's observations, over two time periods as pre (2004–06) and post (2013/14-15/16) adoption of IFRS. The underpinning theory of the study is agency theory, which explains the relationship among variables. To perform regression analysis on balanced panel data, STATA was used with PCSE estimators. The results show that IFRS has a significant negative relationship with REM. Board expertise and gender diversity have a significant negative relationship with REM, whereas CEO duality has a significant positive association with REM. Moreover, it is documented that board size and CEO duality have a significant negative moderating effect on the relationship between IFRS and REM. In contrast, board expertise, board independence, and gender diversity have significant positive moderation. It implies that a strong corporate governance mechanism may help to attain the objectives of IFRS adoption in Bangladesh. Thus, the findings of this study may persuade regulatory authorities in Bangladesh to make corporate governance compliance mandatory with punitive action, which would also act as a guideline for developing countries.

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Inclusive Climate and the Performance of Employees from Muslim Diaspora in the Western Organizations

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ABSTRACT

This exploratory study focuses on the impact of inclusive organisational climate on the members of Muslim diaspora in the Western workforce. There are theories and evidence that view increasing diversity in the workforce as a positive rather than a negative phenomenon. This is one of the few research papers that exclusively focuses on the implications of inclusive management practices for Muslim employees in the Western organisations. Evidence from the Muslim employees working in different industrial sectors in Australia, New Zealand, United States, and Canada have been used to explore the positive outcomes of inclusive organisational climate propositioned by the growing Muslim community in the Western workplace. This exploratory qualitative study presents the findings from 30 interviews with purposively selected Muslim employees working in the Western economies. Recursive abstraction and thematic approach have been used to analyse the data. The findings supported the popular assumption that inclusive organisational environment positively influences the desired employee outcomes among the Muslim employees that may lead to the attainment of various organisational goals. The findings also revealed that Muslim workers in the Western workplace feel more comfortable and included in a work climate where co-workers from different backgrounds or orientation are interested and encouraged to discuss their faith, values, and practices openly instead of carefully avoiding such conversation in the social interaction. Inclusiveness, to the Western workers with Muslim identity, is more about the interaction and behaviour of their co-workers at a personal level and less about the organisational system level mechanisms. Social exchange theory underpins the phenomenon explored in this study. Implications have been drawn for managers and human resource experts in the Western organisations.

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Configuring the Effect of Multidimensional Retail Service Quality and Perceived Value on Customer Loyalty towards Retailers in Malaysia: Mediated by Customer Satisfaction and Trust

A.K. M. Ahasanul Haque, Naila Anwar Chowdhury, Suharni Maulan, Md Asadul Islam and **Md Atiqur Rahman Sarker**[*]

ABSTRACT

This study attempted to identify and provide an understanding regarding the factors that are integral for building customer loyalty towards retailers in Malaysia. A conceptual framework was developed based on prior literature. Afterwards, 361 useful data were collected from retail customers in Klang Valley through distributing self-administered questionnaires. SPSS and SEM were utilized for analyzing the data. Findings demonstrated that perceived value, customer satisfaction and trust carry significant effects on customer loyalty towards retailers. Results also showed that customer satisfaction as well as trust play the role of mediators in the association that takes place amid retail service quality, perceived value and customer loyalty. The findings will facilitate managers of retail organizations to formulate effective marketing strategies. At the same time, it is hoped that the outcomes of present study will be an important addition to literature and open the door for future research endeavors.

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Assessing the Impact of Internal Branding on Organizational Citizenship Behavior among Hotel Employees in Bangladesh

Dewan Mehrab Ashrafi[*], Ahasanul Haque[†], **Md. Atiqur Rahman Sarker**[‡] and Naila Anwar Chowdhury[§]

ABSTRACT

The purpose of the paper is to investigate the relationship between internal branding and organizational citizenship behavior in the hotel industry from the context of Bangladesh. A quantitative approach was employed to gain an understanding regarding the relationship between organizational citizenship behavior and internal branding. The sampling method is characterized by convenience sampling and 253 employees from various hotels holding different designations were surveyed through a structured questionnaire. Moreover, factor analysis and regression analysis have been carried out to assess the relationship between internal branding and organizational citizenship behavior. Results indicated that there is a significant positive relationship between organizational citizenship behavior and internal branding. Finding of this study can help the practitioners as well as policymakers of organizations to apprehend the crucial significance of internal branding. Nevertheless, it can assist human resource managers and practitioners in developing effective strategies to enhance organizational performance through organizational citizenship behavior.

Keywords: Bangladesh, Hotel, Internal Branding, Organizational Citizenship Behavior

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Employability of Transgender in Bangladesh: Problems and Prospect

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ABSTRACT

In this era of human rights movement, the transgender people still remain as one of the critically disadvantaged community in the country. Bangladesh legally recognized them as 'third gender' just in the year 2013 and since then a contradiction between being legally recognized and protection of their rights existed. The paper examines the consequence of the transformation of this socio-cultural status of Hijra into a legal one and analyses their basic rights, focusing on their employment right. The right to employment is a universal right for all, including the transgender, where the Constitution of Bangladesh also ensures equal rights and provides equality before law with the prohibition of gender discrimination in availing employment facilities. This research evaluates the problems and hindrances as well as the support and enforcement of existing social and legal system of the country in development of the lives of transgender. To come into conclusion, five In-depth Interviews (IDIs) from transgender and two Focus Group Discussions (FGDs) were conducted along with extensive field observations. The findings revealed, albeit the legal recognition and social adjustment of the Hijra's, present public mindset and the policy gap are major concerns till date.

Keywords: Transgender, Hijra, Third Gender and Employment Right

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Status of Basic Labor Rights in Leather Goods and Footwear Manufacturing (LGFM) Sector in Bangladesh

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ABSTRACT

The Leather Goods and Footwear Manufacturing (LGFM) sector is emerging as the fastest growing sector next to Ready Made Garment (RMG) sector in regard to export-oriented revenue earning in Bangladesh. The demand for LGFM is increasing day by day equally across the global and domestic markets. LGFM is mainly a labour-intensive manufacturing sector. It is facing challenges in managing employees and maintaining social compliances at this moment, which is also the concern of international buyers. Though the history of labour unrest in the LGFM sector is very little, the existence of grievances is good in numbers. This paper aims in identifying the practices of the Bangladesh Labour Act (BLA) 2006 in LGFM sector. It also finds out the areas of discrepancies that workers encounter in regards to their employment rights. This is a qualitative study and primary data have been collected mainly through four Focus Group Discussions (FGDs). The main finding of the study is the violation of employment rights and non-adherence to BLA 2006 by the management of LGFM. The study also speculates the possibility of labour unrest like RMG in this sector as addressed by the respondents. Therefore, this study can draw the attention of policy makers and employers to be concerned in ensuring the legal employment rights of LGFM workers. A recommendation has been made at the end of this study about the importance and ways of improvement in practicing BLA 2006 in the LGFM sector.

Keywords: Debt Capital, Enhancing Performance, Foods and Beverages Companies

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Work from Home during COVID-19 Outbreak: Problems and Remedies

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ABSTRACT

This research aims to study the challenges and remedies of Work From Home (WFH) during the COVID-19 pandemic. Many organizations around the globe are forced to let employees work from home, but very limited studies have highlighted the challenges of this working method. The research used a qualitative method through gathering data via six interviews from organizations in Malaysia. The research highlighted challenges of WFH in several themes, including lack of motivation, less socializing, pay cuts, a slew of distractions, low communication, and safety issues. The study limitations included pandemic restrictions, which could be overcome by using video conferencing software. Future research is recommended to test the relationships of the challenges with the performance.

Keywords: Work From Home (WFH), Problems, Remedies, COVID-19, Exploratory Study

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Labor Rights of Tannery Workers in Bangladesh: An Overview

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ABSTRACT

Tannery in Bangladesh has long history as profitable business though it has both environmental and health hazards. Labor rights of tannery workers are disrupted and their standard of living is miserable. Nevertheless, the job of tannery workers is tedious. The aim of this paper is to explore the current status of basic labor rights maintained in tanneries based on Dhaka and Narayanganj districts of Bangladesh. This study is qualitative in nature. Primary data have been collected from tannery workers through four Focus Group Discussions (FGDs) and five observations from five different factory visits in 2021. The findings reveal that tannery workers are exploited by insufficient employment benefits and lack of welfare facilities as stated in BLA-2006. They also suffer from occupational health, hygiene and safety crisis. Long working hour and pay below minimum wage are also common in this sector. In addition, tannery workers have serious observation on their pay, leave, job security, maternity benefit etc. This paper concludes with the observations that basic labor rights at tanneries in Bangladesh are not protected, which generate grievances. This study also recommends for practicing BLA-2006 in tannery sector in order to avoid further legal obligation and possible labor unrest.

Keywords: Bangladesh, BLA-2006, Labor Rights, Tannery

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Heterogenous Responses of Stock Market to Covid Related News and Sentiments: Evidence from the 1st Year of Pandemic

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ABSTRACT

In this paper, we study the impact of news and sentiments related to covid-19 on United Kingdom (UK)'s stock returns from February 4, 2020 to December 7, 2020. Our results show that covid-19 daily cases exert a significant negative effect on stock returns whereas covid-19 daily deaths have a significant positive impact. These findings hold when covid-related news and sentiments indices are controlled with the 2nd wave data, and when the US policies and equity market volatilities from infectious diseases are used as controls. The magnitude of the effect of covid cases and deaths indicates that the pandemic is not very harmful to the UK stock market.

Keywords: Covid-19, United Kingdom, Stock Market Returns, FTSE100

JEL Classification: G12G18

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Asymmetric Connectedness between Cryptocurrency Environment Attention Index and Green Assets

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ABSTRACT

Given the recent evolution of green bonds as hedging tool on the face of climate change and green energy transitions, as well as cryptocurrencies' popularity as portfolio diversifier, prior literature could focus on the potential impacts of environmental concerns in conjunction with cryptocurrencies on the performance of green financial assets. Against this backdrop, we analyse the impact of cryptocurrency environment attention index (ICEA) on clean energy stocks and green bonds using a range of econometric methods. Specifically, we use OLS, and quantile-based regression, quantile connectedness approach, and dynamic conditional correlations (DCC)-GJR-GARCH model to analyse the data. Quantile regression results suggest that ICEA exerts positive effects on S&P500 stocks in bearish market conditions and on water stocks in normal to bullish market conditions. Interestingly, clean energy stocks and green bonds have insignificant relationship with the ICEA based on OLS and quantile regression results. While, quantile connectedness results show that connectedness among the assets is low (high) at lower (higher) quantiles. Additionally, ICEA transmits (receives) weak spillovers to (from) other assets at lower quantiles, thus there is potential for diversification with clean energy stocks and green bonds in the portfolio against ICEA in bearish market conditions. Our DCC – GARCH based analysis shows that gold has positive relationship with the ICEA. DCCs also show that clean energy stocks have consistently positive relationship with ICEA, specifically during the period of high spikes of ICEA in 2017–2021, but green bonds failed to maintain consistent positive correlations with ICEA during such period. Finally, covid period reveals higher connectedness and changes in direction of contagion among assets, and lack of significant relationship between ICEA and asset returns. Our findings have important implications for the investors in the construction of optimal portfolio with carbon free assets in different markets states.

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An Investigation of the Effects of External Shocks on the Bangladesh Economy: An Application of the GVAR Modeling Approach

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ABSTRACT

This paper uses the global vector autoregressive (GVAR) modelling approach to study (1) the effects of negative output shocks on Bangladesh's following trading partners on Bangladesh's economy: the United States, China, Eurozone, India and Saudi Arabia (2) positive global oil price shocks. To represent Bangladesh's macroeconomics, the GVAR model contains four key macroeconomic variables as endogenous variables. They are (1) real gross domestic product (GDP), (2) real exchange rate, (3) short-term interest rates, and (4) inflation. The specified GVAR model is estimated using quarterly data from 32 countries/regions from 1993Q4 to 2016Q4. The findings of this paper are consistent with theoretical predictions that external shocks can and will be transmitted to an open economy operating under a fixed or managed floating exchange rate system. For example, quantitatively, if the real output of Bangladesh's trading partners' falls by 1%, its output will fall by 0.39%, while the inflation rate of Bangladesh's trading partners' rises by 1%, and Bangladesh's inflation rate will increase by 1.38%. Although the negative output shock of the US economy will not significantly affect the Bangladeshi economy, the negative output shock of the Chinese economy will have a negative and significant effect on the Bangladeshi economy. The negative output shock on the US economy has caused the real exchange rate of Bangladesh's currency to appreciate and raised its short-term interest rate, although it is not statistically significant. Contrarily, a negative output shock to China or other economies devalues the real exchange rate of the Bangladeshi currency, although it is not statistically significant. However, Bangladesh's interest rates have not responded to negative output shocks from its trading partners (except the United States and Saudi Arabia), and they are not statistically significant. One policy implication of Bangladesh's inflation being overly sensitive to external inflation shocks is that Bangladesh can and should make its currency exchange rate more flexible to protect its economy from external price shocks. Unexpectedly, the external oil price shock did not seem to have a significant impact on the Bangladeshi economy. One explanation is that the impact of foreign inflation on Bangladesh's economy may have reflected the impact of oil prices.

Keywords: External Shocks, GVAR Modelling, Bangladesh Economy

JEL Classifications: E32, E52, F36, F40

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Board Gender Diversity and Firm Risk in UK Private Firms

Mahnoor Sattar[*], Pallab Kumar Biswas[†] and Helen Roberts

ABSTRACT

This research aims to investigate the effect of board gender diversity on private firm risk. Using a sample of 27,352 UK private firms from 2005 to 2017, we report a negative association between board gender diversity and firm risk. In particular, we find that risk reduction is associated with women owner directors who may have a stronger incentive for better risk management. Firm risk is lower (higher) for boards with local (foreign) women directors suggesting that local market knowledge is more valuable for private firms. Lower director busyness in gender diverse boards is the channel that enables women directors to reduce firm risk by directing more attention to fiduciary responsibilities. Additional analysis reveals that more risky, small to medium-sized firms benefit the most from gender-diverse boards. Our findings are robust to alternate risk measurements and endogeneity corrections.

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Earnings Quality and Financial Flexibility: A Moderating Role of Corporate Governance

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ABSTRACT

The aim of this study is primarily to demonstrate how earnings quality is an influential determinant of financial flexibility. Secondly, how earnings quality affects financial flexibility. And finally, to provide evidence of the role of corporate governance between earnings quality and financial flexibility composing overall corporate governance index (CG-INDEX). This study considered unbalanced panel data from the year 2007 to 2020 from the database CSMAR yielding 14,088 firm-year observations. This study used liquidity as the proxy of financial flexibility, and also used a comprehensive index of corporate governance constructed by adopting the principal component analysis and STATA has been used for analyzing data. The study used System GMM regression for analysis and controls endogeneity by applying lag financial flexibility as an instrumental variable. The empirical results reveal that poor earnings quality significantly negatively influences the level of corporate financial flexibility. The results also demonstrate that corporate governance can significantly positively moderate the relationship between earnings quality and financial flexibility. This suggests that when the earnings quality is poor, firms are less likely to be financially flexible in holding liquidity. More specifically, firms with poor earnings quality will reduce their financial flexibility of firms; hence, firms need to provide high-quality earnings in order to be more financially flexible. Earnings quality is an important factor, which led the author to examine how earnings quality influences financial flexibility. Under the views of agency theory and positive accounting theory, poor earnings quality is a source of amplified shareholder's concern of increased informational asymmetry, which may adversely affect the firm's financial flexibility. Conversely, higher earnings quality reduces the information asymmetry which leads to higher financial flexibility. This study provides a way how to achieve financial flexibility with the assistance of corporate governance which is essential to combat financial crises and smooth business operations successfully.

Keywords: Earnings, Quality, Corporate Governance, Financial Flexibility

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The Interaction among Foreign Direct Investment, GDP Growth and Unemployment Rate in Emerging Economies Before and After the Covid-19 Pandemic: A Case Study on Bangladesh

Fariza Binte Mahbub[*], **Jannatul Ferdous Shetu**[†] and Lamia Lazmi Khandker

ABSTRACT

This study examines Gross Domestic Product (GDP) growth, Net Foreign Direct Investment (FDI), and Unemployment growth and their relationships with each other; whether there's a structural break for COVID-19; and how Bangladesh can use this information to ensure stable economic growth. Using a qualitative and quantitative approach, this paper uses time series analysis such as Augmented Dickey–Fuller (ADF) test, Johansen cointegration test, and Granger Causality are used to determine the underlining interconnection and any causal relationship among variables. The Bai-Perron test was performed to identify structural breaks in the series for COVID-19. Long-run equilibrium relationships exist between FDI and GDP growth and between FDI and the unemployment rate. There is a unidirectional relationship between the unemployment rate and GDP and between FDI and the unemployment rate. A structural break exists in all the variables that manifest the extent of the pandemic's effect. This study proposes several policy reforms too. Even though most recent research has focused on the impact of FDI on both developed and developing countries' economies during COVID-19; very few studies have focused specifically on Bangladesh, drawing on the impact of FDI on GDP, economic growth, and employment during then by examining the relationship and identifying a structural break among the variables.

Keywords: Foreign Direct Investment, GDP Growth, Unemployment, COVID-19

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Management Control Systems as the Protagonist in Public Sector Reforms: Observations from Worldwide Selected Literature

Anup Chowdhury[*] and **Nikhil Chandra Shil**[†]

ABSTRACT

Management control systems are used in private sector in assisting management to achieve the goals of the organizations. In the 1980s the performance of public organizations in industrial economies has been the target of severe questioning and the main reason for such questioning is the comparisons with private sector standards of returns on investment and it turned public sector organizations from service orientation to commercial orientation. In this context the practitioners started to adopt new management approaches as the basis for improving performance in the public sector. This new management approach or management control systems in the public sector creates the changes to the structures and processes of public sector organizations with the objective of getting them to run better. The introduction of this new management approach in the public sector was to promote a culture of performance. The present study is an effort to understand the role of management control systems in the worldwide public sector reforms agendas by illustrating literatures from various parts of the world.

Keywords: Management Control Systems, Public Sector Reforms, Literature Review

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Nexus between Governance and Economic Growth: Learning from Saudi Arabia

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ABSTRACT

This study aims to examine the impact of good governance on economic growth in the context of Saudi Arabia. Based on secondary sources, this study applies quantitative research methods to highlight any relationship between the predictors and outcome variables. An econometric model has been developed to this effect which is tested using 36 years of data. GDP per capita represents economic growth while oil price, general index, trade openness, government spending, corruption perceptions index, and worldwide governance indicators were used as governance parameters in this study. The Saudi Arabian economy has gone through various reform initiatives resulting redefining and refitting economic activities in areas like the ownership structure of companies, the overreliance on petroleum sector, measures addressed in Vision 2030. None of the studies perfectly captures the broader governance framework and its impact on economic performance from macro perspective. Considering this as a research gap, this study identifies various governance constructs within the country context and deploys a thorough analysis to understand the macroeconomic status and to highlight some policy issues for different stakeholder groups. The study confirms a positive relationship of general index, trade openness and oil price with economic growth. By bringing moderating (general index on the relationship between GDP per capita and oil price) and mediating (oil price on the relationship between GDP per capita and government expenditure) effect, this study brings additional insights on the macroeconomic dynamism of the country which has undergone major economic reforms.

Keywords: Governance, Economic Growth, Saudi Arabia, Mediation, Moderation, Hierarchical Regression Analysis

JEL Classification: F43, F63, G38, M48, O11, O47

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New Public Management as a Reform Initiative in the Australian Public Sector: Demonstrated Evidence from Literature

Anup Chowdhury[*] and **Nikhil Chandra Shil**[†]

ABSTRACT

During the last 40 years the three tiers of Australian government (Commonwealth, State and Local) have implemented a series of financial and administrative reforms related to the New Public Management. A large number of research studies concentrated on the implementation of this new ideal in different countries and levels of the public sector. These reforms have forced the Australian public sector to promote private sector models of organisation structure, management systems, accounting practices, and accountability relationships This study briefly focuses on a literature review of studies related with the changes in the public sector in Australia linked to New Public management.

Keywords: Australian Public Sector, New Public Management, Public Sector Reforms

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Understanding Change Management in Organizational Context: Revisiting Literature

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ABSTRACT

Every organization operates in dynamic and volatile environment and for this reason organizations should adopt the approaches to managing change. This conceptual study presents the tools for managing changes in the organization. The findings of this study offer a number of practical implications. It is expected to increase our understanding about the change management process in organizational context and this study will be of value to the academic researchers and practitioners. The study may be equally useful to the entrepreneurs who are engaged in initiating their new businesses.

Keywords: Change Management, Organization, Literature Review

JEL Classification: D21, M10, M19, O33

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Performance Evaluation of Selected Islamic Banks of Bangladesh

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ABSTRACT

The present study was carried out to evaluate the performance of selected Islamic banks in Bangladesh. Both quantitative and qualitative analyses were used. The relevant data and information were collected from relevant banks and stock exchanges. The performance of the banks was assessed through different variables, such as paid-up capital, investment-to-deposit ratio, classified investments, assets, net income, earnings per share (EPS) and dividends, which were then analyzed using various statistical measures, such as growth percentage, trend equations, the square of the correlation coefficient, and a correlation matrix. Fifty trend equations and R-squared were tested for ten different banks' activities. Among them, the trend values were positive for all the banks. The square of the correlation coefficient (R^2) of most of the equations is more than 0.8, indicating well-fitting trend equations. This study proves that the industry has scope to grow.

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Impact of Company and Country Antecedents on B2B Buyer Perceived Supplier Performance

Jashim Uddin[*], Gregory Elliott[†] and Shehely Parvin[‡]

ABSTRACT

Purpose: To date, country-of-origin research has commonly explored structural relationships among country image (CI) constructs, together with attitudinal constructs, using a variety of halo, summary construct and flexible models, drawing on consumer samples. There has been no previous attempt to examine or synthesize these three models with respect to business-to-business (B2B) buying behavior. To fill this gap, this study reconceptualized these three models with B2B constructs using multi-cue settings and tested on B2B samples. This study aims to examine and estimate the relative impact of company- and country-specific images on B2B buyers' evaluations of suppliers, and the direction of structural relationships with mediation among the constructs. Design/methodology/approach: Data collection was administered through a web-based structured questionnaire. The final sample consisted of 276 purchasing managers. Structural equation modeling was used to test the study's hypotheses. Findings: Company image is significantly influenced by product country image (PCI) but not by overall CI. The existence of a significant relationship between PCI and perceived supplier performance in a multi-cue setting is an important new finding. In addition, company image significantly influences supplier performance and mediates the relationship between PCI and supplier performance. Among the three models that test structural relationships among CI and other constructs, the reconceptualized halo model fits the data best. Practical implications: The study results revealed the contribution of company and country-related facets on B2B buyers' perceptions of supplier performance while purchasing intermediate goods internationally. The significance of PCI on supplier performance emphasizes the strength of the industry sector within a country that may enable an industry to build a product-specific CI in international marketing. Originality/value: This study advances the country-of-origin issue and debate concerning the strength of the country influence in the academic literature by addressing B2B buyers' international purchasing behavior of intermediate goods. Additionally, the examination of multiple country facets, multi-cue settings and the CI influence structure in a single study, from a B2B perspective, offers a novel dimension to CI studies.

Keywords: Country Image, Intermediate Goods, Product Country Image, B2B Buying Behavior, Company Image, Supplier Performance

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The Emergence of E-Learning and Online-Based Training During the COVID-19 Crisis: An Exploratory Investigation from Bangladesh

Shamsul Huq Bin Shahriar[*], Sayed Arafat[†], Intijamul Islam[‡], J. M. Ekram Hossain Nur[§], Saifur Rahman[**], Syful Islam Khan[††] and **M. Sayeed Alam**[‡‡]

ABSTRACT

Purpose – The extreme measures that have been taken by governments across the globe to minimize the spread of COVID-19 have had significant impacts on almost all the public sectors, especially on the economy and education. This study aims to address the approaches and prospective of online-based training and e-learning for employee learning and development during this COVID-19 crisis. Design/methodology/approach – With an emphasis on the qualitative approach and considering the complex COVID-19 emergency, required data were collected from in-depth interviews to interpret the experiences of the respondents. Findings – The findings suggested that the digital learning ecosystem offered flexibility of time, place and pace, which provided essential convenience during the COVID-19 crisis. From the human resource (HR) perspective, the e-learning culture has enabled the organizations to quickly adopt the new normal, secure sustainable continuity of organizational development and ensure decent work and growth within and across organizations. The adoption of e-learning and flexible working conditions following the setback has enabled the organizations to quickly cope up with the new normal, causing a significant paradigm shift in the organizational culture and corporate sector of Bangladesh. Research limitations/implications – The study will assist the HR of any organization to contemplate elearning systems as effective alternative training methods. Also, the study will be suggestive to traverse new dimensions and skillsets for the pedagogues. Originality/value – This study offers new evidential scenarios regarding the emergence of effective elearning initiatives and online-based learning programs for developing the workforce to be efficient and productive even in distressful and inconvenient COVID-19 situations.

Keywords: COVID-19, Pandemic, Online Training, Employee Development, E-Learning, Digital Learning Ecosystem, Physical Distance, Developing Country

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Remote Work and Changes in Organizational HR Practices During Corona Pandemic: A Study from Bangladesh

Shamsul Huq Bin Shahriar[*], Sayed Arafat[†], Md. Mahfuzur Rahman Khan[‡], J. M. Ekram Hossain Nur[§], Syful Islam Khan[**] and **M. Sayeed Alam[††]**

ABSTRACT

This study aims to offer insightful knowledge on organizational members' real-life experience of working in a 'new normal' environment and explores changes in organizational HR practices and the future of work culture during this pandemic. Applying the qualitative methodology through implementing an in-depth interview technique, this study revealed subjective insights on pandemic impacts within diverse organizations and their coping strategies, that is, remote work practices and technological adaptations. The study found out that HR functionalities powered by different online tools and remote work or flexible roster duties are ensuring employee betterment and organizational productivity at the same time. Pandemic countermeasure oriented or transformed HR practices like online training and e-recruitment are keeping the workforce steady in this distressing time, but the 'new normal' lifestyle and evolved work environment, practices are putting much stress on and changing the dimension of work policies like employee well-being, compensation, leave, and so on, through isolation, quarantine and strict health guideline type issues.

Keywords: COVID-19, Remote Work, Organizational Culture, Human Resources, HR Policies, Bangladesh

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What Factors Influence Consumer Overconsumption of Food? An Investigation from Dhaka During the COVID-19 Pandemic

Tanveer Kabir[*], **Nurun Naher Popy**[†] and **M. Sayeed Alam**[‡]

ABSTRACT

With the emergence of the ongoing pandemic more and more people in Dhaka have been made accustomed to remain within the confines of their homes. Households in Dhaka have contemporised the idea of working, studying and even shopping through online mediums. Numerous studies show a correlation between spending significantly long time indoors and consumer overconsumption, eventually leading up to an increase in cases of obesity. This study aims to find out the different factors that might influence consumer overconsumption behaviour during the pandemic from the perspective of Dhaka. Questionnaires were sent out to 250 individuals who are habituated with social media and online shopping. Owing to the countrywide lockdown and restrictions on socialising, the method of collecting survey responses was online. Three hypotheses were proposed in this research and which were tested by means of Structural Equation Modelling (SEM). The outputs derived from the SEM produced insight to some of the factors that influenced consumer overconsumption of food during the pandemic. The study reveals that psychological factors and social media directly influenced consumer overconsumption behaviour among individuals who were staying at home during the countrywide lockdown periods. The study results also suggest that there is no significant evidence to propose that the food delivery services, directly contribute to influencing the individuals staying at home to consume more food.

Keywords: Social Media, Overconsumption, Obesity, Online Delivery, Psychology, Dhaka

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Impact of Event Sponsorship in Purchasing Behavior of Consumers: A Comparative Study in the Local Conglomerate Companies of Bangladesh

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ABSTRACT

With the expansion of globalization in the business era, now most of the organizations tend to sponsor in many events to get the exposure of maximum number of customers. This Article examines the effects of event sponsorship and the factors that influence the purchasing behavior of the customers. A model has been developed to examine linkages among perceived quality, relationship quality, product event congruence and brand attitude with impact of event sponsorship in the purchasing behavior of the consumers. The statistical analysis revealed that the product or service quality and event resemblance of the sponsors have almost similar impact on improving the brand attitude but perceived quality showing insignificant effects on the outcome of purchasing behavior. Hence it is sufficing to say that with positive brand attitude creates a good impact in purchase decision of consumers. The study may provide a roadmap for the sponsors to understand how sponsorship actually works to influence in the purchase behavior of the customers. The findings suggest that relationship quality and product-event congruence has more influence on increased brand attitude than perceived quality. But other four variables also have positive impact on the purchasing behavior of consumers. A total of 262 responses collected for data analysis. Keywords: Perceived quality, relationship quality, product-event congruence, brand attitude, Purchase behavior.

Keywords: Perceived Quality, Relationship Quality, Product-Event Congruence, Brand Attitude, Purchase Behavior

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Board Gender Diversity and Capital Structure in Private Firms: Evidence from the UK

Mahnoor Sattar[*], Pallab Kumar Biswas and Helen Roberts

ABSTRACT

This study examines the effect of board gender diversity on the capital structure of 27,352 UK private firms. Findings indicate that women directors are associated with more long-term debt, and retained earnings. Moreover, token women on board are enough to yield a significant impact. Women director impact depends on firm size, risk, GFC period, and ownership concentration. Lower expense ratios and higher net profit margins show that higher long-term debt attributed to women directors benefit private firms. We also report that women director age, tenure, busyness, and nationality affect capital structure. Our findings are robust after addressing endogeneity concerns.

Keywords: Board Gender Diversity, Critical Mass, Women Directors' Attributes, Capital Structure, UK Private Firms

JEL Codes: G30, G32, G34, M14

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A Trend Analysis of Inward FDI between Vietnam and Bangladesh: Identifying How Vietnam is Doing Better

Fariza Binte Mahbub[*], **Jannatul Ferdous Shetu**[†] and Naima Jahan[‡]

ABSTRACT

Bangladesh and Vietnam are two competing emerging economies of Asia who were export-focused on the same industrial sector (Ready Made Garments) for decades now and have been at heels of the other. Both acquired remarkable success in repairing and building their economy but now Bangladesh is significantly lagging behind Vietnam in terms of attracting inward flow of FDI. As Bangladesh plans to graduate from their Least Developed Country (LDC) status by 2026, aims to reach the SDGs by 2030 and come out as an upper-middle-income country by 2031, it is of utmost importance to learn how their international competitors are performing better in attracting FDI and why they cannot. This paper firstly compares the FDI inflow trends of Vietnam and Bangladesh by running a two sample independent t-test. The result showed that there is a statistically significant difference in the average FDI inflow between the countries. This paper also looks into the factors that assisted Vietnam succeed in attracting FDI from a literature based qualitative approach, and the factors are Vietnam's' Doi Moi'economic reform policy, an open trade policy, an inexpensive labor force, a high rank in ease of doing business index, FTAs (Free Trade Area) and PTAs (Preferential Trade Agreement) with developed nations and export diversification. Lastly, the paper tries to identify the factors that cause Bangladesh to lag behind and they are a lack of proper implementation of policy reforms, lack of good governance, lack of automation and training of the labor force, a low rank in ease of doing business index (falling behind Vietnam in indicators such as 'Dealing with Construction Permits','Registering Property','Getting Electricity'and 'Enforcing Contracts'), failure to join more FTAs and PTAs with important trading partners and an export basket heavily concentrated on RMG and knitwear products.

Keywords: Bangladesh, Vietnam, Inward FDI, Export Diversification, Doing Business

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Planning for Future Expansion or Maintaining the Status Quo: The 22-Year Odyssey of Spondon Diagnostic

M. Sayeed Alam[*] and **Salma Akter**[†]

ABSTRACT

Phenomenon and Context: In Rajshahi City, Spondon Diagnostic began its journey 22 years ago. The owner, Mr. Rashed Hassan Chowdhury (Rubel), initiated this diagnostic with the intention of eliminating professional ambiguity and job pressure. This company was founded for the purpose of independence and personal liberty. Rubel received a great deal of assistance from his family and friends to establish these limited gynaecological tests and diagnostics facility. The patients of Rubel's older sister, a pioneering gynaecologist in Rajshahi for the past two decades, support the operation of this centre. Rubel accepted the challenge of opening a facility that provides only gynaecological consultation, diagnostics, and testing. There are currently over a hundred diagnostic centres offering specialized services to patients in this city (they contain chambers for different specialized doctors, facilities for tests and imaging of different types). Rubel's journey as an entrepreneur with Spondon and his niche marketing strategy for long-term success is undeniably a success story, despite the intense competition in the business world. Dilemma: Due to its considerate care, superior customer service, reasonable prices, and reliable test results for its target clients, Rubel is a reputable name in this industry. Despite his acceptance and client pleasure, his little firm faces growing challenges from new clinics and hospitals. Customers are growing savvy enough to select all services in one location (consultation, tests, and procedures). Customers' demands can put strain on the current niche approach paradigm. This company needs more space, consultants, testing facilities, and financial resources to grow. The dilemma facing Rubel in this scenario is whether to expand with investment into a full-service healthcare institution or to maintain the current state of business (a complete gynaecological health care institution) with more variables (operations facilities, all types of tests, and imaging facilities). The case: Individual. The Data Source: The owner interview served as our major data source. We performed our interviews with the owner without prior planning and with a great deal of flexibility. Before conducting the initial interviews, we explained the case study's objective. The conversations followed a loose chronological rhythm as they naturally moved to how it felt. Theory: This case study is a resource for entrepreneurship. The success of small business and personal branding is the focus of this case study research. Most small business success criteria are non-financial in nature. Customer satisfaction is the main priority of small business owners. This case study makes a useful contribution to the small business literature. This research is one of the resources for understanding how an entrepreneur success can be sustained in a competitive environment with its niche marketing approach.

Keywords: Small Business, Branding, Rajshahi, Spondon

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United IT Solutions Ltd.: How to Revive Business in the New Business Challenges?

M. Sayeed Alam[*] and **Salma Akter**[†]

ABSTRACT

Phenomenon and Context: Two young, fresh graduates of information technology, Md. Sayiful Islam, and S.M. Taj Ashrafi, founded "United IT Solutions ltd." in 2006. The two founders worked as IT support specialists for customers while they were still in school as a means of supplementing their income. At that time, they saw that the majority of organizations and businesses still kept their books on paper, with a few utilizing pricey, pirated accounting software. Also, there was a big lack of IT professionals with proper professional knowledge. Even though the IT industry was flourishing, there remained a severe shortage of qualified personnel. They claimed that S.M. Taj Ashrafi was skilled in software and web development and Md. Sayiful Islam was knowledgeable in hardware and networking-related difficulties. They were motivated to create their own venture in this new business sector by the overall situation and their experiences and skills. They took a risk with their meagre finances, hired a modest space at "Mohakhali new DOHS," and began their business with two personal computers and additional marketing staff. The business began to expand quickly. This case will eventually focus on United IT's ongoing struggles to adjust to the altered business environment and decline. Dilemma: United IT had a large number of clients including large corporate houses that played a vital role in their revenue and growth. But now corporate houses developed in-house IT departments and stopped all sorts of outsourcing which drastically impact their growth. Whereas in Bangladesh, the ICT industry's progress is prominent since "Digital Bangladesh" is a key component of the current administration's Vision 2021.The national trade organization for the software and IT service sector was founded in 1997 and is known as the Bangladesh Association of Software and Information Services (BASIS). Initially, there were just 17 member firms; by 2009, there were 326 members which means a highly competitive scenario. The challenges that "United IT Solutions ltd." is having because of these various obstacles have had a significant negative influence on their company's growth. The COVID-19 and Russia-Ukraine war-related economic crisis have made the situation more complicated today. The dilemma facing United IT in this situation is whether to continue as same or take different measures to revive its growth as earlier. The case: Single. The Data Source: Our main data source was the owner interview. We conducted the owner interviews on the spot and with a great lot of flexibility. We clarified the purpose of the case study before the initial interviews. Theory: The struggle and challenges faced by the United IT Solution Company are the focus of this case study. The small business and entrepreneurship literature will be enriched by this case study. This case study research is an example/resource of entrepreneurship growth in changed business realities. Business competition and strategies to survive in a harsh environment are shown here. Type of the case: Applied Decisional Protagonist: Present.

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Faculty of Sciences and Engineering

Real-time Data Analysis of COVID-19 Vaccination Progress Over the World

Bijan Paul, Aditi Roy, Khan Raqib Mahmud and **Mohammad Rifat Ahmed Rashid**[*]

ABSTRACT

The infectious disease of coronavirus is intensifying exponentially throughout the world. According to the World Health Organization statistics, all countries across the world are affected by the virus. Many countries are progressing in the process of vaccination to handle the "pandemic" situation. In this chapter, we analyze the data on COVID-19 and try to find out the scenario of vaccination progress all over the world. The advancements of data analysis have a significant impact on our daily lives. The text analysis based on medical data provides promising results for the health sector for future prediction. To develop a new model of machine learning, data analysis is a key to identify the current situation and training data for the new model. This chapter provides an initial benchmark to explain the current COVID-19 issues by analyzing statistical data for future and further research.

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Internet of Things (IoT)-based Industrial Monitoring System

Syeda Florence Madina, Md. Shahinur Islam, **Fakir Mashque Alamgir**[*] and
Mohammad Farhan Ferdous

ABSTRACT

IoT or the Internet of Things has gained popularity over the last decade solely for the ability it provides to devices to communicate wirelessly with other devices over the Internet. This provides a wide range of monitoring and control capabilities to users with access to the cloud. IoT technologies are now flooding the homes of tech enthusiasts by providing devices and appliances with the feature to connect at a common ecosystem, making the concept of a smart home one step closer to reality. This project aims at extending this concept beyond the houses and into the industries. It is a system for the monitoring, control, and security of an industrial area completely wirelessly through the use of simple devices and the connection to the Internet. This system enables a user to use their Internet-connected smart device to monitor the temperature, motion, and gas conditions of their desired area without them having to be there. The safety feature includes alarms to alert the user if any safety breach occurs. The DHT11 temperature sensor monitors the temperature, MQ-2 gas sensor checks for harmful gases, PIR motion sensor detects abnormalities, and an alarm is triggered when any safety limit is violated. These safety limits have been set through extensive literature review and are deemed approximately appropriate based on the size of the system. Thinger.io platform which is available online is used to allow the data from the sensors to be sent wirelessly to the user in real time. Thus, irrespective of which part of the world the user is, he/she can monitor their system remotely through the use of their device and can assure that the system is safe with all the sensors in place.

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12 Molecular Structure Characterization of Crude Oil and Its Products by Mass Spectrometry

Thamina Acter[*], Nizam Uddin[†] and Sunghwan Kim[‡]

ABSTRACT

Crude oil and its products, including light oils, heavy oils, fuels, tar, asphalt, lubricating oils, heavy oils, spilled oils, and hydrotreated oils, are complex mixtures containing thousands of chemical compounds with diverse structures. The chemical structural identification of crude oil and its products is extremely important for gaining insights into the chemistry of petroleum in the petrochemical industry. Mass spectrometry (MS), particularly ultrahigh-resolution MS (UHR-MS), is considered an important technique for the accurate analysis of the underlying mass and structure of crude oil components. Hydrogen/deuterium exchange (HDX) tandem MS and ionmobility (IM) spectrometry coupled with HR-MS have attracted significant attention for their application in investigating the molecular structures of petroleum and its products. The most effective HDX technique used for crude oil analysis is atmospheric pressure in-source HDX, which is suitable for the detailed structural identification of complex mixtures, such as crude oil. By combining atmospheric pressure ionization techniques, such as electrospray ionization (ESI), atmospheric-pressure photoionization (APPI), and atmospheric-pressure chemical ionization (APCI), the sample preparation step for HDX MS can be considerably simplified, enabling the attainment of highquality results and the specification of the heteroatom classes in crude oil. To isolate ions with specific m/z values and, thus, understand the core structures of oil compounds, the fragmentation patterns of the oil compounds are studied by tandem MS with collision-induced dissociation (CID) or infrared multiphoton dissociation coupled with HR-MS. In addition, IM separation with multiple cycles combined with quadrupole selection is considered a powerful technique for isolating ions with specific mobility values during complex mixture analysis. Recently, IM coupled with HR-MS, experimental collision cross-section (CCS) and theoretical CCS values was employed to study the chemical structures of petroleum compounds. Due to the separation of isomeric or isobaric ions in IM cells, improved peak capacities and highly accurate structural assignments of crude oil compounds can be achieved. This chapter provides an overview of some of the key applications of HDX, tandem MS, and IM-MS techniques to the structural analysis of crude oil and its products.

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Metabolic Scaling of Stream Dissolved Oxygen Across The U.S. Atlantic Coast

Shakil Ahmed[*] and Omar I. Abdul-Aziz[†]

ABSTRACT

We investigated the hypothesis of emergent 'biogeochemical' similitude (parametric reduction) and scaling of dissolved oxygen (DO) in coastal streams across the U.S. Atlantic Coast by employing dimensional analysis methodology from fluid mechanics and hydraulic engineering. Two mechanistically meaningful dimensionless numbers were discovered as the stream 'metabolic' number and the fraction of 'DO saturation' number. The 'metabolic' number represented the synergistic control on stream DO from various climatic, hydrologic, biochemical, and ecological drivers (e.g., water temperature, atmospheric pressure, stream width and depth, total phosphorus, pH, and salinity). A graphical exploration of the 'metabolic' versus the 'DO saturation' numbers led to collapse of data during 1998–2015 from diverse coastal streams into an emergent process diagram, indicating three metabolism regimes (high, transitional, and low). The high and low metabolism regimes were, respectively, characterized by the most and least favorable environmental conditions for stream DO depletion—through reduced dissolution and reaeration, as well as increased organic decomposition, respiration, and nitrification. The emergent process diagram led to a generalized power law scaling relationship of the 'DO saturation' number as a function of the 'metabolic' number (exponent ~ 1/3; Nash-Sutcliffe Efficiency, NSE = 0.83–0.85). The metabolic scaling law was leveraged to develop a generalized empirical model to successfully predict DO in diverse streams across the U.S. Atlantic Coast (NSE = 0.83). The emergent process diagram, metabolic scaling law, and prediction model of DO would help understand and manage water quality and ecosystem health of coastal streams in the U.S. and elsewhere.

Keywords: Dimensional Analysis, Predictions, Similitude, Stream Metabolism, Water Quality

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The Impact of Public-Private Partnerships for Roadway Projects on Traffic Safety: An Exploratory Empirical Analysis of Crash Frequencies

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ABSTRACT

Since the mid-2000s, Public–Private Partnerships (PPP) have been established in transportation infrastructure projects as an effective alternative to the traditional procurement process, such as design-bid-build where the design and construction are awarded separately and sequentially to private firms. PPP contracts ensure both greater participation of the private sector, as well as shared responsibility in project delivery. However, the interrelationship between various PPP approaches and the status of traffic safety during the project implementation has not been thoroughly explored to date. This paper seeks to provide new insights into the performance of different PPP contracting approaches by investigating them from the perspective of transportation safety. To that end, a statistical analysis is conducted in order to distinguish differences with respect to the characteristics of crashes that occurred during the contractual period of roadway projects. Using data from 645 PPP contracts that were executed across multiple States of the US between 1996 and 2011, count data models of crash frequencies are developed. To take into account the effect of unobserved factors on crash frequencies, correlated random parameter models with heterogeneity in the means are estimated. The results of the statistical analysis overall show that the determinants of crash frequencies and the magnitude of their impacts vary across PPP types. Contracts with higher cost, shorter duration, fewer lane-miles to be covered, more asset work activities, as well as contracts for roadways featuring better pavement and drainage conditions, low to medium AADT, and higher width of shoulder are more likely to observe fewer crashes. Additionally, several variables resulted in correlated random parameters (such as, contract size in lane-miles and truck percentage), with their distributional characteristics being affected by other exogenous factors (such as pavement characteristics), thus unveiling the heterogeneous patterns underpinning the safety performance of different PPP approaches.

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Education Certification and Verified Documents Sharing System by Blockchain

Ahmed Wasif Reza[*], Khairum Islam[**], Sidratul Muntaha[**], Omair Bin Abdur Rahman[**], Rabeya Islam[*] and Mohammad Shamsul Arefin[**]

ABSTRACT

The emergence of new and improved technological advances created severe problems in the security state of the educational certification system. Throughout this paper, a proposal has been made to improve security. Here, Blockchain technology has been introduced as reliable secure storage for the educational certification system, providing an additional facility to the users. That is the validation and authentication of the student's academic records. Moreover, for security purposes, Blockchain technology can replace the traditional academic certification system and contribute to a new model for sharing student information. After completion of data inclusion and hashing, the blocks will be inserted into the Blockchain network. This proposed model enhances document security and fraud reduction and additionally reduces a significant amount of authentication time almost up to double the current speed. With this system, we will get a certification process in which all data will be digitalized and secured in an unbreakable database with proper authentication and with a noticeable amount of time efficiency.

Keywords: Blockchain, Security, Educational Systems, SHA256, Hashing

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An Integrated Machine Learning Model for Indoor Network Optimization to Maximize Coverage

Ahmed Wasif Reza[*], Abdullah Al Rifat and Tanvir Ahmed

ABSTRACT

Indoor network optimization is not a simple task due to the obstacles, interference, and attenuation of the signal in an environment. Intense noises can affect the intelligibility of the signal and reduce the coverage strength significantly which results in a poor user experience. Most of the existing works are associated with finding the location of the devices via different mathematical and generic algorithmic approaches, but very few are focused on implying machine learning algorithms. The purpose of this research is to introduce an integrated machine learning model to find maximum indoor coverage with a minimum number of transmitters. The users in the indoor environment also have been allocated based on the most reliable signal strength and the system is also capable of allocating new users. K-means clustering, K-nearest neighbor (KNN), support vector machine (SVM), and Gaussian Naïve Bayes (GNB) have been used to provide an optimized solution. It is found that KNN, SVM, and GNB obtained maximum accuracy of 100% in some cases. However, among all the algorithms, KNN performed the best and provided an average accuracy of 93.33%. K-fold cross-validation (Kf-CV) technique has been added to validate the experimental simulations and re-evaluate the outcomes of the machine learning models.

Keywords: Coverage Maximization, Gaussian Naïve Bayes, Indoor Network Optimization, K-Means Clustering, K-Nearest Neighbors, Machine Learning; Support Vector Machine

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Automated Brain Disease Classification Using Transfer Learning Based Deep Learning Models

Farhana Alam, Sara Anisa Rahman, Farhana Chowdhury Tisha, Samia Sultana, Md. Ahied Mahi Chowdhury, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†]

ABSTRACT

The emergence of new and improved technological advances created severe problems in the security state of the educational certification system. Throughout this paper, a proposal has been made to improve security. Here, Blockchain technology has been introduced as reliable secure storage for the educational certification system, providing an additional facility to the users. That is the validation and authentication of the student's academic records. Moreover, for security purposes, Blockchain technology can replace the traditional academic certification system and contribute to a new model for sharing student information. After completion of data inclusion and hashing, the blocks will be inserted into the Blockchain network. This proposed model enhances document security and fraud reduction and additionally reduces a significant amount of authentication time almost up to double the current speed. With this system, we will get a certification process in which all data will be digitalized and secured in an unbreakable database with proper authentication and with a noticeable amount of time efficiency.

Keywords: Brain MRI, Tumor, Deep Learning, Classification, Transfer Learning

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Smart Pre-seeding Decision Support System for Agriculture

Ahmed Wasif Reza[*], Kazi Saymatul Jannat, Md. Shariful Islam and Surajit Das Barman

ABSTRACT

In recent years, the Internet of Things (IoT) brings a new dimension for establishing a precision network connectivity of sensors, especially in the agriculture and farming industry, medical, economic, and several sectors of modern society. Agriculture is an important area for the sustainability of mankind engulfing manufacturing, security, and resource management. Due to the exponential diminishing of the resources, innovative techniques to support the subsistence of agriculture and farming. IoT aims to extend the use of internet technology to a large number of distributed and connected devices by representing standard and interoperable communication protocols. This paper brings up a solution by IoT, presents the design and implementation of a smart pre-seeding decision support system for agricultural modernization. This project is accomplished by understanding the real-time circumstances in the agriculture field using wireless technology that highlighted the features including pH and temperature sensors, hardware, mobile application, system's frontend, and backend analysis, and stores the extracted information in the cloud using IoT. The system is made up of frontend data acquisition, data transmission, data processing, and reception, and is also experimentally validated to find out all possible crops that can be cultivated in a specific land with the required amount of fertilizers as well as the overall crops distribution lists.

Keywords: Agriculture, Internet of Things, Pre-seeding, Decision Support System

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An IoT-based Automatic Brain Tumor Detection System

Md. Lizur Rahman, **Ahmed Wasif Reza**[*] and Shaiful Islam Shabuj

ABSTRACT

Due to the advances in information and communication technologies, the usage of the internet of things (IoT) has reached an evolutionary process in the development of the modern health care environment. In the recent human health care analysis system, the amount of brain tumor patients has increased severely and placed in the 10th position of the leading cause of death. Previous state-of-the-art techniques based on magnetic resonance imaging (MRI) faces challenges in brain tumor detection as it requires accurate image segmentation. A wide variety of algorithms were developed earlier to classify MRI images which are computationally very complex and expensive. In this paper, a cost-effective stochastic method for the automatic detection of brain tumors using the IoT is proposed. The proposed system uses the physical activities of the brain to detect brain tumors. To track the daily brain activities, a portable wrist band named Mi Band 2, temperature, and blood pressure monitoring sensors embedded with Arduino-Uno are used and the system achieved an accuracy of 99.3%. Experimental results show the effectiveness of the designed method in detecting brain tumors automatically and produce better accuracy in comparison to previous approaches.

Keywords: Brain Tumor; Healthcare; Internet of Things; Magnetic Resonance Imaging; Wrist Wearables.

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Ahmed Wasif Reza[*], Abdullah Al Rifat and Tanvir Ahmed

ABSTRACT

Indoor network optimization is not a simple task due to the obstacles, interference, and attenuation of the signal in an environment. Intense noises can affect the intelligibility of the signal and reduce the coverage strength significantly which results in a poor user experience. Most of the existing works are associated with finding the location of the devices via different mathematical and generic algorithmic approaches, but very few are focused on implying machine learning algorithms. The purpose of this research is to introduce an integrated machine learning model to find maximum indoor coverage with a minimum number of transmitters. The users in the indoor environment also have been allocated based on the most reliable signal strength and the system is also capable of allocating new users. K-means clustering, K-nearest neighbor (KNN), support vector machine (SVM), and Gaussian Naïve Bayes (GNB) have been used to provide an optimized solution. It is found that KNN, SVM, and GNB obtained maximum accuracy of 100% in some cases. However, among all the algorithms, KNN performed the best and provided an average accuracy of 93.33%. K-fold cross-validation (Kf-CV) technique has been added to validate the experimental simulations and re-evaluate the outcomes of the machine learning models.

Keywords: Coverage Maximization, Gaussian Naïve Bayes, Indoor Network Optimization, K-Means Clustering, K-Nearest Neighbors, Machine Learning, Support Vector Machine

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Disease Detection of Apple Leaf with the Combination of Color Segmentation and Modified DWT

Sharad Hasan[*], **Sarwar Jahan**[†] and Md. Imdadul Islam

ABSTRACT

In this paper, we proposed a machine learning and computer vision-based automated apple disease detection and recognition system based on leaf symptoms. The proposed method is composed of three parts: diseased region segmentation, feature extraction, and classification. We have segmented the infected portion of the leaf using L*a*b* space-based color segmentation method. Here, average color markers in a*b* space and the nearest neighbor method have been used for classifying each pixel into either healthy, infected, or background regions. We have extracted two types of features: one is the proposed DWT feature and another is L*a*b* space-based color histogram features. Horizontal feature fusion is performed to create the final feature vector. The feature vectors have been classified using several classifiers keeping Random Forrest as the base classifier. In this paper, the experiment is made on Plant Village dataset, where image of Apple Scab, Black Rot, and Cedar Apple Rust disease are taken for both training and testing our model. The fusion of proposed DWT and color histogram features is a novel approach in detecting and recognizing apple leaf disease, which got an accuracy of 98.63%.

Keywords: Average Color Marker, Nearest Neighbor, Pixel Classification, Wavelet Coefficients, Color Histogram, Random Forest

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Solnet: A Convolutional Neural Network for Detecting Dust on Solar Panels

Md Saif Hassan Onim[*], Zubayar Mahatab Md Sakif, Adil Ahnaf Ahsan Kabir, Abul Kalam Azad, Amanullah Maung Than Oo[†], Rafina Afreen[‡], Sumaita TanjimHridy, Mahtab Hossain[**], **Taskeed Jabid[§]** and **Md Sawkat Ali[**]**

ABSTRACT

Electricity production from photovoltaic (PV) systems has accelerated in the last few decades. Numerous environmental factors, particularly the buildup of dust on PV panels have resulted in a significant loss in PV energy output. To detect the dust and thus reduce power loss, several techniques are being researched, including thermal imaging, image processing, sensors, cameras with IoT, machine learning, and deep learning. In this study, a new dataset of images of dusty and clean panels is introduced and applied to the current state-of-the-art (SOTA) classification algorithms. Afterward, a new convolutional neural network (CNN) architecture, SolNet, is proposed that deals specifically with the detection of solar panel dust accumulation. The performance and results of the proposed SolNet and other SOTA algorithms are compared to validate its efficiency and outcomes where SolNet shows a higher accuracy level of 98.2%. Hence, both the dataset and SolNet can be used as benchmarks for future research endeavors. Furthermore, the classes of the dataset can also be expanded for multiclass classification. At the same time, the SolNet model can be fine-tuned by tweaking the hyperparameters for further improvements.

Keywords: CNN, Solnet, Classification, Deep Learning, Image Processing, Solar Panel, PV, Dust

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The IoT-Based Intelligent Gas Leakage Detection and Fire Protection System

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ABSTRACT

Gas Leakage and its fatal effects are a great concern throughout the world, especially in developing countries like Bangladesh. Every year lots of people died and countless damages to assets occur due to the fire caused by the gas leakage. Not only that but gas leakage and explosion are also very harmful to the climate. Thus, a system to detect gas leakage and preventive measures is of utmost importance. In this project, we design and implement an intelligent IoT prototype to detect gas leakage, and the fire caught by gas leakage. Our goal is to minimize the effect of gas leakage by taking some protective measures. When the gas sensor, detects the gas leakage, the solenoid valve shuts off the gas line, and the exhaust fan starts to run. Again, when the flame sensor detects a fire, the sucker throws the fire extinguisher balls at the fire. The GSM SIM module notifies the user by sending a message to his smartphone. The buzzer sounds when a mishap occurs and the LCD monitor always shows the status of the system. In this way, we have efficiently designed and implemented a low-cost and intelligent gas leak detection and fire suppression system.

Keywords: Internet of Things, Intelligent System, Smart IoT prototype, Gas and Fire Detection, Sensors and Actuators

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Rule-based Synthesis of Ternary Reversible Up/Down Counters

Mozammel H. A. Khan[*]

ABSTRACT

A ternary bijective logic function can be implemented as a reversible circuit using ternary reversible gates. These gates can be constructed using existing technologies as well as quantum technology. Considerable amount of works have been reported in the literature on synthesis of ternary reversible combinational circuits. In comparison, synthesis of ternary reversible sequential circuits is in the infancy. In this paper, we present a truth table based rule generation and then rule based synthesis of n-qutrit ternary reversible level-triggered synchronous up/down counters. The presented method produces better circuits than those reported in the literature in terms of both quantum cost and ancilla inputs needed.

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Design and Implementation of Vehicle Mounted Wind Turbine

Halima Begum[*] and Md. Arafat Hossain

ABSTRACT

Vehicle Mounted Wind Turbine (VMWT) is a mounted horizontal axis wind turbine system for vehicles. This paper presents design and implementation of VMWT to generate electricity from vehicle. VMWT has several smart features including high rpm turbine, convenient weight, practical shape and portability. In addition, this paper evaluates the VMWT performance in terms of power generation. It is shown that, with proper designing, VMWT can generate approximately 200 W of power at vehicle speed of 80 km/hr. A number of design considerations have taken into account for designing VMWT to ensure its proper functionality in practical environment.

Keywords: Vehicle Turbine, Renewable Energy, Wind Energy, VMWT, Electricity

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Agrivoltaics Analysis in A Techno-Economic Framework: Understanding Why Agrivoltaics on Rice will Always be Profitable

M. Sojib Ahmed, M. Rezwan Khan*, **Anisul Haque**[*] and **M. Ryyan Khan**[†]

ABSTRACT

Agrivoltaics (AV) promises sustainable food and energy production from shared lands. While various literature studies AVs for leafy crops, there are limited equivalent works on AVs with major crops (e.g., rice, corn, wheat, etc.). Here, we present an end-to-end modeling framework to analyze location-specific AVs over paddy rice. We consider the local ambient conditions to find the spatially distributed rice production under panel arrays, the panel yield, and the economic aspects (costs, revenue, and profit) of the AV system. On a given land, solar energy has a far larger absolute profit than rice cultivation due to the 100s of folds higher investment possible in panels compared to paddy rice. Policy-level constraints are required to set a permissible reduction in rice for more energy. We find that, while maintaining 90% (or 80%) of the conventional rice production, the overall profit can be 22–115 (or 30–132) times higher than rice cultivation.

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A Critical Analysis of Solar Farm Configurations: Theory and Experiments

Jabir Bin Jahangir, Md. Al-Mahmud, Md. Shahadat Sarker Shakir, **Anisul Haque**[*], Muhammad A. Alam[†], **M. Ryyan Khan**[‡]

ABSTRACT

The bifacial photovoltaics (PV) technology promises several advantages over monofacials, including improved energy yield, lower operating temperature, and easier integration with agrophotovoltaics. There have been various experimental or computational studies comparing bifacials to monofacials; however, a theory-experiment combined analysis for accurate worldwide extrapolation is missing. Literature review reveals that many reported experiments study standalone systems that overrepresent the yield performance obtainable in farms. Moreover, most reported experimental studies are for configurations that are not necessarily designed close to the optimum. In this work, we experimentally study and analyze the fixed-tilted bifacial farm configiurations, namely south-facing monofacial, south-facing tilted bifacial (TBF), and ground-sculpted vertical bifacial (VBF) arrays, at Dhaka, Bangladesh (23.7 °N, 90.4 °E). The optimal TBF configuration, for 0.5 albedo, yields 21.3% and 73.3% more than the optimal monofacial and the optimal VBF configurations, respectively. Through a combination of experimental and numerical analysis, we compare the in-array performance of the configurations under different albedo conditions to analyze the physics and consolidate the predictions. There is a growing interest in PV array configurations beyond the conventionally ground-mounted south-facing TBF, such as agrophotovoltaics, floating-PV, industry-roof PV array, etc. This necessitates a critical analysis of various array configurations for broader PV expansion.

Keywords: Energy Management, Numerical Models, Photovoltaic Systems, Numerical Analysis, Solar Power Generation

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Transport and Performance Study of Double-Walled Black Phosphorus Nanotube Transistors

Khairul Alam[*]

ABSTRACT

Monolayer- and a few layers-black phosphorus (BP) is an emerging two-dimensional material for the post-silicon era. We study the transport mechanism and performance metrics of double-walled BP n-channel and p-channel gate-all-around nanotube (NT) transistors using a $k{\cdot}p$ Hamiltonian and a non-equilibrium Green's function quantum simulation. We effectively use the anisotropic effective masses along the zigzag and armchair directions of BP for high performance NT field-effect transistors. The heavy mass along the zigzag direction is used for quantization to increase the carrier density, while the lighter mass along the armchair direction is used for transport to maximize the carrier injection velocity. The on-state current is governed by the thermionic transport mechanism over the top of the potential barrier, while the off-state current is predominantly governed by intra-band tunneling current. Although the lighter mass in transport direction initiates intra-band tunneling current, the device can be successfully turned on and off with a high on/off current ratio of 1.4×10^5. The n-channel transistor has an on-state current of 724 µA µm−1, a subthreshold slope of 63 mV dec−1, a transconductance of 7.97 mS µm−1, a switching delay time of 3.92 ps, a cut-off frequency of 0.201 THz, and a dynamic power loss of 0.64 fJ µm−1, respectively. The corresponding performance metrics for the p-channel are 726 µA µm−1, 64 mV dec−1, 8.20 mS µm−1, 3.96 ps, 0.205 THz, and 0.65 fJ µm−1. Both the transistors are potential candidates for the International Technology Roadmap for Semiconductors 2026 low operating power devices.

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Current-Matching Erases the Anticipated Performance Gain of Next-Generation Two-Terminal Perovskite-Si Tandem Solar Farms

M. Tahir Patel[*], Reza Asadpour[†], Jabir Bin Jahangir[‡], **M. Ryyan Khan[§]**, Muhammad A. Alam[**]

ABSTRACT

The bifacial gain of various optimally-tilted, and tracking bifacial farms based on single-junction PERC and HIT technologies are well established. The solar module technology is, however, evolving rapidly with the commercial development of two, three, and four-terminal mono and bifacial HIT-Perovskite tandem cells underway. Given the complexity of current-matching in two-terminal tandem cells and significant variation of the weather conditions across the world, one wonders if the benefits of fixed-tilt and tracking cells obtained for single-junction solar cells would remain for tandem solar cells. In this paper, we use a detailed illumination and temperature-dependent bifacial solar farm model (supported by a detailed physical model for bifacial HIT-Perovskite tandem cells) to show that (a) row-to-row shading in solar arrays significantly suppresses the effective albedo collection and thereby the two-terminal (2T) tandem cell efficiency and relative gain compared to an optimal bifacial HIT cell, (b) the global energy yield potential of fixed-tilted and solar-tracking topologies would improve by adopting a 2T tandem design at optimal albedo, with maximum gain arising for tracking farms, (c) the 2T tandem cell/modules (subcell bandgaps, thickness) must be optimized for maximum benefit, and (d) even a relatively small deviation from the optimum will negate all benefits. Our results will broaden the scope and understanding of the emerging tandem bifacial technology by demonstrating global trends in energy gain for worldwide deployment and the need for location-specific tailoring of the module design.

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A Critical Analysis of Bifacial Solar Farm Configurations: Theory and Experiments

Jabir Bin Jahangir, Md. Al-Mahmud, Md. Shahadat Sarker Shakir, **Anisul Haque**[*], Muhammad A. Alam[†] and **M. Ryyan Khan**[‡]

ABSTRACT

The bifacial photovoltaics (PV) technology promises several advantages over monofacials, including improved energy yield, lower operating temperature, and easier integration with agrophotovoltaics. There have been various experimental or computational studies comparing bifacials to monofacials; however, a theory-experiment combined analysis for accurate worldwide extrapolation is missing. Literature review reveals that many reported experiments study standalone systems that overrepresent the yield performance obtainable in farms. Moreover, most reported experimental studies are for configurations that are not necessarily designed close to the optimum. In this work, we experimentally study and analyze the fixed-tilted bifacial farm configiurations, namely south-facing monofacial, south-facing tilted bifacial (TBF), and ground-sculpted vertical bifacial (VBF) arrays, at Dhaka, Bangladesh (23.7 °N, 90.4 °E). The optimal TBF configuration, for 0.5 albedo, yields 21.3% and 73.3% more than the optimal monofacial and the optimal VBF configurations, respectively. Through a combination of experimental and numerical analysis, we compare the in-array performance of the configurations under different albedo conditions to analyze the physics and consolidate the predictions. There is a growing interest in PV array configurations beyond the conventionally ground-mounted south-facing TBF, such as agrophotovoltaics, floating-PV, industry-roof PV array, etc. This necessitates a critical analysis of various array configurations for broader PV expansion.

Keywords: Energy Management, Numerical Models, Photovoltaic Systems, Numerical Analysis, Solar Power Generation

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A Novel Deep Learning-based Bidirectional Elman Neural Network for Facial Emotion Recognition

Fakir Mashuque Alamgir[*] and Md. Shafiul Alam

ABSTRACT

Facial emotion recognition (FER) is an interesting area of research. It has a wide range of applications, but there is still a deficiency of an accurate approach to provide better results. A novel FER system to maximize classification accuracy has been introduced in this paper. The proposed approach constitutes the following phases: pre-processing, feature extraction, feature selection, and classification. Initially, the images are pre-processed using the extended cascaded filter (ECF) and then the geometric and appearance-based features are extracted. An enhanced battle royale optimization (EBRO) for feature selection has been proposed to select the relevant features and to reduce the dimensionality problem. Then, the classification is carried out using a novel bidirectional Elman neural network (Bi-ENN) that offers high classification results. The proposed Bi-ENN-based emotion classification can accurately discriminate the input features. It enabled the model to predict the labels for classification accurately. The proposed model on evaluations attained an accuracy rate of 98.57% on JAFFE and 98.75% on CK+ datasets.

Keywords: Bidirectional Elman Neural Network, Classification, Deep Learning, Enhanced Battle Royale Optimization, Facial Emotion Recognition, Feature Extraction, Feature Selection

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Pulse Optimization and Device Engineering of 3D Charge-Trap Flash for Synaptic Operation

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ABSTRACT

We investigate 3D charge-trap (CT) nand flash cells using device-physics based multi-scale simulations to explore their potential and optimum operating conditions as electronic synapses of the neuromorphic hardware. A set of figure of merits (FOMs) has been adopted to indicate their goodness of operation under incremental pulse inputs. The results of this study suggest that excellent synaptic FOMs can be attained from 3D CT nands by designing and calibrating the input pulse trains. The impact of variations of device dimensions on charge capture and release phenomena have been investigated and linked to output characteristics in order to obtain intuitive guidelines for attaining desired synaptic functionalities. By co-designing gate dielectric stack and input pulses, the threshold voltage (VT) of the 3D CT cell can be sequentially increased and decreased in a linear and symmetric fashion, providing a large number of distinct VT levels with good retention characteristics. Statistical simulations suggest that device-to-device variations of electrical responses have a negligible impact on the synaptic capabilities of these devices. It has also been shown that the incorporation of deeper traps through material engineering improves synaptic reliability of the 3D CT cells under prolonged operations.

Keywords: Electrical Properties and Parameters, Artificial Neural Networks, Charge Trapping Flash, Flash Memory, Crystallographic Defects, Dielectric Materials

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How Gender Affects Motor Vehicle Crashes: A Case Study from San Antonio, Texas

Khondoker Billah[*], Hatim O. Sharif and Samer Dessouky[†]

ABSTRACT

Traffic crashes are among the leading causes of injuries and fatalities worldwide. The main assumption of this study is that traffic crash rates, injury severity, and driving behaviors differ by the driver's gender. Utilizing ten years (2011–2020) of data from the Texas Crash Record and Information System database, this study investigates how some of the most prominent driving behaviors leading to crashes and severe injuries (distracted driving, speeding, lane departure, and driving under influence) vary by gender in San Antonio, Texas. The spatial distribution of crashes associated with these driving behaviors by gender is also investigated, as well as the influence of some environmental and temporal variables on crash frequency and injury severity. This study adopted bivariate analysis and logistic regression modeling to identify the effect of different variables on crash occurrence and severity by gender. Male drivers were more likely to be involved in a speeding/DUI/lane departure-related crash and subsequent severe injuries. However, female drivers were slightly more associated with distracted-driving crashes and subsequent injuries. Nighttime, interstate/highway roads, the weekend period, and divider/marked lanes as the primary traffic control significantly increased the crash and injury risk of male drivers. Driving behavior-related crashes were mostly concentrated on some interstate road segments, major intersections, and interchanges. The results from this study can be used by authorities and policy-makers to prioritize the use of limited resources, and to run more effective education campaigns to a targeted audience.

Keywords: Motor Vehicle Crashes, Distracted Driving, Speeding, Logistic Regression, Bivariate Analysis

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Geo-Locating and Identifying Wrong-Way Driving Entrance Points in Bexar County Highways by Implementing Mathematical Modeling and Land-Use Impact Assessment

Md Farman Mia, Samer Dessouky, Jose Weissmann, Hatim O. Sharif[*] and **Khondoker Billah[†]**

ABSTRACT

Wrong-way driving (WWD) leads to high severity crashes and is a major concern for transportation managers. This study aims to identify WWD entry points of urban highway ramps and develop an analysis methodology using basic knowledge of WWD occurrences. The methodology examines the origin and driving behavior of impaired drivers by utilizing a land-use impact assessment (alcohol-serving establishments (ASE) proximity to exit ramps) and analyzing three distinct mathematical models: wrong-way driving events excluding 911 call analysis, wrong-way driving events including 911 call analysis, and 911 calls without wrong-way driving crashes. Data were collected and implemented from Google Maps, the 911 call database, wrong-way crash database, ASE location database, and a video camera database of a recent WWD study. Out of a total 543 exit ramps, 213 exit ramps are associated with approximately 98% of total WWD entries. The hotspots analysis of WWD entrance locations have found four major hotspots locations in Bexar County, Texas study area: 410 Loop near Culebra Road and Jackson Keller Road, 1604 Loop near US-281 highway, and IH-10 near the Medical Drive area. Outcomes of this study include a methodology for determining WWD entry locations of regional highways.

Keywords: Wrong-way Driving, Countermeasure, Land-use Impact, Alcohol Serving Establishment

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Desalination and Acid-base Recovery in A Novel Design of Microbial Desalination and Chemical Recovery Cell

Azhar Al Hinai[*], Tahereh Jafary[†], Halima Alhimali, **Sadik Rahman**[‡] and Abdullah Al-Mamun

ABSTRACT

Microbial desalination cell (MDC) is deemed as an environmentally friendly technology for water treatment using organic matters present in wastewater for the desalination process. Microbial desalination and chemical recovery cell (MDCC) is a modified version of MDC that desalinates saline water using wastewater as fuel, generates electricity, and concurrently produces value-added products. However, several factors have limited the MDCC performance and its development, e.g., pH imbalance, ions accumulation and high internal resistance. MDCCs, so far, are fabricated through modifying the dual-chamber microbial fuel cell (MFC) by placing the desalination and recovery chambers between the anodic and cathodic chambers, which not only increases the distance between two electrodes, but also brings different types of membranes between them leading to high internal resistance. This research, for the first time, demonstrated a novel design of MDCC, which is a modified version of a single chamber membrane-less MFC, named as SMDCC; with the focus of removing barriers between the anode and cathode while upholding desalination and chemical recovery features of MDCC. The study focused on assessment of SMDCC performance in terms of electrolyte pH, acid and base recovery and desalination rate at different salt concentrations and in absence and presence of applied power supply.

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Sustainable Leachate Pre-Treatment Using Microbial Desalination Cell for Simultaneous Desalination and Energy Recovery

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ABSTRACT

Leachate treatment technologies struggle with low treatment efficiencies due to complex and toxic chemicals in leachate. Therefore, mixing leachate with low-density wastewater could be beneficial. This research studied the feasibility of pretreating a mixture of leachate and municipal wastewater (1:4) in a microbial desalination cell (MDC) for the first time. The study examined the MDC potential in removing organics and NH3-N from leachate-wastewater mixture along with measuring the desalination efficiency and energy recovery at different applied external resistance (Rext). The results showed that MDC-1 (at Rext = 1 Ω) showed a higher desalination rate (DR) (35.71 mg/h) and higher NH3-N removal (36%) with lower COD removal (28%) compared to MDC-100 (at Rext = 100 Ω) with DR = 17.98 mg/h, NH3-N removal of 10% and COD removal of 78.26%. The results revealed that Rext could regulate the pollutants (organics, NH3-N) removal and desalination efficiency. The lack of soluble organics could also result in significant discrepancies in bioelectrochemical performance. MDC-100 showed four times higher energy output (5.63 W·m−3) compared to MDC-1 (1.39 W·m−3), while MDC-1 showed five times higher columbic efficiency (29.3%) compared to MDC-100 (5.52%). Future studies should investigate the best MDC configurations for the optimum leachate-wastewater ratio for sustainable leachate treatment.

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Towards Sustainable Application of Wastewater in Agriculture: A Review on Reusability and Risk Assessment

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ABSTRACT

The use of marginal-quality waters, not limited to brackish/saline and treated sewage effluent (TSE), is called reclaimed water. Reclaimed water is a sustainable source in the future for use in agriculture, essentially required to offset the food demand of a rapidly growing population. Moreover, the sustainable recovery of reclaimed water is essential for humanity to satisfy extreme sanitation and water-supply demands. To increase access to water supply, alternate water resources' use, existing water resources' degradation, and improved water-use efficiency are imperative. There is a high potential to address these factors by using reclaimed water as an alternative source. The reclaimed water treated at a tertiary level has the potential for use in crop production, especially for forage crops, irrigating urban landscapes, recreational and environmental activities, industry, and aquifer recharge to increase strategic water reserves in water-scarce countries. This way, we can save precious freshwater that can be utilized for other purposes. Eminently, freshwater applications for industrial and agronomic sectors account for 20% and 67%, respectively, depleting freshwater resources. The use of reclaimed water in agriculture can significantly reduce pressure on freshwater. However, if the quality of reclaimed water does not comply with international standards, it may cause serious health risks (diseases) and soil pollution (heavy metals).

Keywords: Agriculture, Health Risks, Food Security, Pollution, Reclaimed Water

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A Comprehensive Study on Air-Cathode Limitations and Its Mitigation Strategies in Microbial Desalination Cell—A Review

Noor Juma Al Balushi, Jagdeep Kumar Nayak, **Sadik Rahman**[*], Ahmad Sana and Abdullah Al-Mamun

ABSTRACT

Microbial desalination cells (MDCs) are promising bioelectrochemical systems for desalination using the bacteria-generated electricity from the biodegradation of organic wastes contained in the wastewater. Instead of being a sustainable and eco-friendly desalination technology, the large-scale application of MDC was limited due to the high installation cost of the metal-catalyst-coated cathode electrode and the poor performance of the cathode in long-term operation due to catalyst fouling. Such cathodic limitations have hindered its large-scale application. The cathodic limitation has arisen mainly because of three losses, such as (1) Ohmic loss, (2) mass transfer loss, and (3) activation loss. The catalyst-assisted cathodic reduction reaction is an electrochemical surface phenomenon; thereby, the cathode's surface charge transfer and thermodynamic efficiency are crucial for reaction kinetics. This review article aims to provide an overview of the MDC process, performance indicators, and summarizes the limiting factors that could hinder the process performance. Then, the article represented a comprehensive summary of the air-cathodic limitations and the mechanisms applied to improve the air-cathodic limitations in MDC to enhance the cathodic reaction kinetics through cathode surface modification through catalysts. The study is significantly different from other review studies by the precise identification and illustration of the cathodic losses and their mitigation strategies through surface modification. The details about the role of photocatalysts in the minimization of the cathode losses and improvement of the performance of MDC were well presented.

Keywords: Microbial Desalination Cell, Air-Cathode, Cathodic Limitations, Cathode Surface Modification

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Multiple Mechanisms Confer Resistance to Azithromycin in Shigella in Bangladesh: A Comprehensive Whole Genome-based Approach

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ABSTRACT

Shigella is the second leading cause of diarrheal deaths worldwide. Azithromycin (AZM) is a potential treatment option for Shigella infection; however, the recent emergence of AZM resistance in Shigella threatens the current treatment strategy. Therefore, we conducted a comprehensive whole genome-based approach to identify the mechanism(s) of AZM resistance in Shigella. We performed antimicrobial susceptibility tests, polymerase chain reaction (PCR), Sanger (amplicon) sequencing, and whole genome-based bioinformatics approaches to conduct the study. Fifty-seven (38%) of the Shigella isolates examined were AZM resistant; Shigella sonnei exhibited the highest rate of resistance against AZM (80%). PCR amplification for 15 macrolide resistance genes (MRGs) followed by whole-genome analysis of 13 representative Shigella isolates identified two AZM-modifying genes, mph(A) (in all Shigella isolates resistant to AZM) and mph(E) (in 2 AZM-resistant Shigella isolates), as well as one 23S rRNA-methylating gene, erm(B) (41% of AZM-resistant Shigella isolates) and one efflux pump mediator gene, msr(E) [in the same two Shigella isolates that harbored the mph(E) gene]. This is the first report of msr(E) and mph(E) genes in Shigella. Moreover, we found that an IncFII-type plasmid predominates and can possess all four MRGs. We also detected two plasmid-borne resistance gene clusters: IS26-mph(A)-mrx(A)-mph(R)(A)-IS6100, which is linked to global dissemination of MRGs, and mph(E)-msr(E)-IS482-IS6, which is reported for the first time in Shigella. In conclusion, this study demonstrates that MRGs in association with pathogenic IS6 family insertion sequences generate resistance gene clusters that propagate through horizontal gene transfer (HGT) in Shigella.

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Progress in Nanomaterials Fabrication and their Prospects in Artificial Intelligence towards Solid Oxide Fuel Cells: A Review

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ABSTRACT

As an excellent source of sustainable green energy, solid oxide fuel cells (SOFCs) become a compelling energy conversion and storage device which has been attractive to stakeholders worldwide for their high fuel efficiency, lower air pollution, reduced cost, and admirable steadiness. The electrodes, anode, and cathode, are the significant components of SOFC, facilitate byproducts transportation via electrochemical reaction, and fuel oxidation with electron and ion transportation. SOFCs with a lower operating temperature will reduce system and operating costs while increasing long-term durability. The performance of electrodes in SOFCs has been developed and investigated using a variety of material compositions, as the key determinant of efficiency is dependent on lower operating temperatures. Nanostructured materials, in particular, have demonstrated the greatest potential for improving electrodes at low operating temperatures by enhancing the surface area and improving electrocatalytic activity. Artificial intelligence (AI) is used to create the theoretical SOFC model to minimize the time necessary to identify the operational optimum over a wide range of parameters as well as the total cost of the system. In this review, we have highlighted the development of nanostructured electrodes, their preparation techniques, and the function of AI in the creation of a range of nanoelectrodes and SOFC modeling as well as their significant roles in improving SOFC performance.

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A New Approach of Using the Goldfeld-Quandt Test of Heteroscedasticity for Multiple Linear Regression

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ABSTRACT

Goldfeld-Quandt test appears to be a powerful test of heteroscedasticity when the assumption upon which the test was built holds. The test procedure requires ordering observations of one explanatory variable such that the arrangement of observations from other variables in the regression model follows. However, for multiple explanatory variables, identifying this suitable variable to be used in the ordering becomes a problem when there is no prior knowledge of which variable causes the heteroscedasticity problem. This study has proposed a way of identifying this variable prior to conducting the Goldfeld-Quandt test. The performance of the proposed procedure is evaluated by the simulation study and real data set. The results show that the proposed procedure successfully identifies the explanatory variables which need to be used in the Goldfeld-Quandt test procedure.

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Influence of Curvature and Torsion on the Friction Factor of Helical Pipe Flow

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ABSTRACT

Three-dimensional (3D) direct numerical simulations (DNS) were used to investigate the friction factor of helical pipe for an extensive range of curvature, torsion parameter, and the Reynolds number. In order to explore the friction factor of the helical pipe, performed steady solutions by steady 3D calculations, where the friction factor was calculated in the appearance of well-developed flow regions, being in good agreement with the experimental data. It is found that the tendency of the friction factor of the helical pipe sharply upturns when weak rotational forces due to the pitch-induced torsion are provided then reduces after taking a global maximum value of the friction factor, and finally slowly approaches that of a straight pipe when strong rotational forces gradually appear. After a comprehensive analysis of the ongoing exploration over the parametric ranges the existence of global maximum peak of the friction factor obtained whatever the values of curvature and Reynolds number. It is interesting that the present paper explored the bound of torsion parameter where the friction factor of the helical pipe is applicable to the toroidal pipe and straight pipe. For finite values of curvature over the extensive ranges, there occurs an interaction between Reynolds number and rotational forces, when various interesting phenomena arises, which reveals the crucial importance of the curvature and torsion parameter in the dynamics of helical pipe flow.

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Thermal Performance of a Hollow Cylinder with Low Conductive Materials in A Lid-Driven Square Cavity with Partially Cooled Vertical Wall

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ABSTRACT

Extensive research has focused on mixed convection in a lid-driven cavity. However, the thermal characteristics of a hollow cylinder made of low-conducting materials such as wood, high-density plastic, bricks, and concrete are not explored, even though they have a lot of real-world applications in engineering and technology. Thus, the thermal performance of a hollow cylinder with several low conductive materials such as wood, high-density plastic, bricks, and concrete is investigated in this study. A square enclosure with a moving lid and partially cooled right vertical wall is considered. A heated hollow cylinder is placed in the center of the enclosure as a heat source. A set of governing equations with the appropriate initial and boundary conditions of this model is solved using a finite element approach based on Galerkin weighted residual method. The numerical study is performed by varying the thermal conductivity (K) of the cylinder's materials with transient conditions, and outcomes are depicted in terms of streamlines, isotherms, and different thermo-hydrodynamic properties such as average shear rate, drag force, average rate of heat transfer and heat absorption rate. The results indicated that the heat transfer rate of wood is initially greatest at the top but gradually decreases to the rock-bottom. Furthermore, the heat absorption rate of all materials decreases significantly over time; on average, wood absorbs 31% more heat than concrete.

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Mixed Convection Heat Transfer in A Lid-Driven Enclosure with A Double-Pipe Heat Exchanger

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ABSTRACT

The numerical investigation of mixed convection in a heat exchanger with double-pipe, where the upper lid is given a constant velocity, is presented in this paper. The governing equations, as well as the boundary conditions, define the physical problem. The boundary conditions and governing equations are translated into non-dimensional form and solved by means of a finite-element methodology based on the Galerkin weighted residual. The investigation is conducted for three different governing parameters; namely, Prandtl number (Pr), Richardson number (Ri) and Reynolds number (Re). The outcomes are presented in terms of streamlines, isotherms and average heat transfer rate. Computations are done for a range of Ri $(0.01 \le Ri \le 10)$, Re $(50 \le Re \le 500)$, and Pr $(1 \le Pr \le 10)$ for different dimensionless time $(\tau = 0.1,\ 0.5,\ 1)$. It is found that the influence of Ri on streamlines, isothermal lines, and heat transfer rate is significant and the maximum heat transfer is gained when values of Ri and Re are higher and Pr is lower. It is also found that the flow strength increases substantially with time and multiple vortices emerge as the convection rate increases.

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Global Stability Analysis and Parameter Estimation for a Diphtheria Model: A Case Study of an Epidemic in Rohingya Refugee Camp in Bangladesh.

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ABSTRACT

In this article, we have developed a deterministic Susceptible-Latent-Infectious-Recovered (SLIR) model for diphtheria outbreaks. Here, we have studied a case of the diphtheria outbreak in the Rohingya refugee camp in Bangladesh to trace the disease dynamics and find out the peak value of the infection. Both analytical and numerical investigations have been performed on the model to find several remarkable behaviors like the positive and bounded solution, basic reproductive ratio, and equilibria such as disease extinction equilibrium and disease persistence equilibrium which are characterized depending on the basic reproductive ratio and global stability of the model using Lyapunov function for both equilibria. Parameter estimation has been performed to determine the values of the parameter from the daily case data using numerical technique and determined the value of the basic reproductive number for the outbreak as $\mathcal{R}_0 = 5.86$.

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Nanoarchitectonics of Polyaniline-Derived Porous Carbons for Efficient Adsorptive Denitrogenation of Liquid Fuel

Nazmul Abedin Khan[*] and Sung Hwa Jhung[†]

ABSTRACT

Highly porous polyaniline-derived carbons (pDCs) were used as adsorbents to adsorb/remove hazardous organonitrogens (ONs) from liquid fuel for the first time. The nitrogen-rich pDCs were obtained via the carbonization of polyaniline (pANI) under an inert atmosphere. Further, the pDCs were activated in the presence of KOH (as a chemical activating agent) at different pyrolysis temperatures (600 to 800 °C) to increase the porosity or surface area of the pDCs. One pDC prepared at 700 °C (named pDC-700) showed very efficient adsorptions of representative ONs (indole and quinoline) from liquid fuel. The pDC-700 had a maximum adsorption capacity of 458 mg/g of quinoline which is the highest among the reported values with carbon-based adsorbents. The maximum adsorption capacity of the same adsorbent for the adsorption of indole (385 mg/g) was also very competitive against other carbonaceous adsorbents. The high adsorption capacities of the pDC-700 could be interpreted by a synergistic effect of an efficient hydrogen bonding (between the heteroatoms of pDC-700 and the adsorbates) and high microporosity of the adsorbent ($SA_{BET} > 2000$ m^2/g). In addition, a simple solvent washing could regenerate the pDC-700 for the successive utilization in adsorptions effectively.

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Analysis of Coffee Bean with Laser Desorption Ionization High-Resolution Mass Spectrometry

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ABSTRACT

This study evaluates the application of laser desorption ionization high-resolution mass spectrometry (LDI-HRMS) to identify coffee components. The coffee analysis was performed based on origins, roasting temperatures, and extraction methods. The LDI-HRMS experimental results were compared with electrospray ionization (ESI) HRMS analysis, which revealed major compositional differences of coffee ingredients between LDI and ESI data. It was also observed that bitter components in coffee increased with the increasing roasting temperature, and espresso was found to have more carbohydrate-derived compounds. This study clearly shows that coffee components can efficiently be identified with LDI. Moreover, a more systematic database can be constructed by combining it with LDI-imaging because LDI is simple, fast, and requires small amount sample consumption.

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Ion Mobility Mass Spectrometry for Structural Elucidation of Petroleum Compounds

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ABSTRACT

To gain insight into the chemical composition and characteristics of petroleum, its characterization and structural identification at the molecular level is essential. To this aim, mass spectrometry techniques, especially ultrahigh-resolution mass spectrometry and its coupling with other complementary tools such as hydrogen–deuterium exchange, tandem mass spectrometry are important analytical methods. In particular, the analytical power of ion mobility (IM) coupled with high-resolution mass spectrometry (IMMS) in structural characterization has expanded its scope from biomolecules to petroleum since 2009, providing improved peak capacities and more accurate structural assignments in petroleum samples. The separation of gas-phase ions in IM devices is based on their size or shape (e.g., collisional cross section), charge, and drift gas. Information on the structure of petroleum ions is then obtained by comparing the theoretical and experimental collision cross-sections obtained using IMMS. Considering the relevance that the construction of a systematic guideline of IMMS for the molecular characterization of petroleum would have in the context of petroleum technology, we describe in this review some instructive examples of the application of IMMS to the analysis of petroleum compounds and petroleum products, along with its future perspective, with the aim of providing a potent guide for petroleum specialists who want a comprehensive and concise overview of the implications of the IMMS technology for petroleum analysis.

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Application of Differential Geometry on a Chemical Dynamical Model via Flow Curvature Method

A. K. M. Nazimuddin[*] and Md. Showkat Ali[†]

ABSTRACT

Slow invariant manifolds can contribute major rules in many slow-fast dynamical systems. This slow manifold can be obtained by eliminating the fast mode from the slow-fast system and allows us to reduce the dimension of the system where the asymptotic dynamics of the system occurs on that slow manifold and a low dimensional slow invariant manifold can reduce the computational cost. This article considers a trimolecular chemical dynamical Brusselator model of the mixture of two components that represents a chemical reaction-diffusion system. We convert this system of two-dimensional partial differential equations into four-dimensional ordinary differential equations by considering the new wave variable and obtain a new system of chemical Brusselator flow model. We observe that the onset of chemical instability does not depend on the flow rate. We particularly study the slow manifold of the fourdimensional Brusselator flow model at zero flow speed. We apply the flow curvature method to the dynamical Brusselator flow model and acquire the analytical equation of the flow curvature manifold. Then we prove the invariance of this slow manifold equation with respect to the flow by using the Darboux invariance theorem. Finally, we find the osculating plane equation by using the flow curvature manifold.

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Oscillatory Wave Patterns and Spiral Breakup in the Brusselator Model using Numerical Bifurcation Analysis

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ABSTRACT

This article addresses the core breakup analysis of the spiral dynamics of an oscillatory system of chemical reactions, the so-called Brusselator model. We first obtain stable oscillatory periodic solutions corresponding to the stable limit cycle near a Hopf bifurcation point when the diffusion terms are neglected. Then, we investigate the occurrence of periodic traveling wave solutions of the model and perform the stability analysis of these solutions on the parameter plane. A stability boundary is also identified on the parameter plane. In the two-dimensional spatial domain, we illustrate rotating spiral waves and their instability that leads to a spiral breakup from the center of rotation.

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Slow Invariant Manifold Analysis in a Mitotic Model of Frog Eggs via Flow Curvature Method

A. K. M. Nazimuddin[*] and Md. Showkat Ali[†]

ABSTRACT

A slow-fast dynamical systems can be investigated qualitatively and quantitatively in the study of nonlinear chaotic dynamical systems. Slow-fast autonomous dynamical systems exhibit a dichotomy of motion, which is alternately slow and quick, according to experiments. Some investigations show that slow-fast dynamical systems have slow manifolds, which is supported by theory. The goal of the proposed study is to show how differential geometry may be used to examine the slow manifold of the dynamical system known as the mitotic model of frog eggs. The algebraic equation of the flow curvature manifold is obtained using the flow curvature technique applied to the dynamical mitosis model. Using the Darboux invariance theorem, we then argue that this slow manifold equation is invariant with regard to the flow.

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Identification of Influential Observation in Linear Structural Relationship Model with Known Slope

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ABSTRACT

A number of identification techniques are available in the literature to detect influential observations in linear regression models. However, the issue of the identification of influential observations in errors-in-variable models is still not very explored. In this paper we propose a new method for the identification of influential observations based on the COVRATIO statistic when the slope parameter is known. We determine the cut off point for this model on the basis of Monte Carlo simulation study and show that this cut off point performs well in the identification of influential observation in linear structural relationship model with known slope parameter. Finally, we present a real world example which also supports the findings obtained by the simulations earlier.

Keywords: Influential Observations, Errors-In-Variable Model, COVRATIO Statistic, Power of Performance

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A New Optimization Scheme for Robust Design Modeling with Unbalanced Data

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ABSTRACT

The Lin and Tu (LT) optimization scheme which is based on mean squared error (MSE) objective function is the commonly used optimization scheme for estimating the optimal mean response in robust dual response surface optimization. The ordinary least squares (OLS) method is often used to estimate the parameters of the process location and process scale models of the responses. However, the OLS is not efficient for the unbalanced design data since this kind of data make the errors of a model become heteroscedastic, which produces large standard errors of the estimates. To remedy this problem, a weighted least squares (WLS) method is put forward. Since the LT optimization scheme produces a large difference between the estimates of the mean response and the experimenter actual target value, we propose a new optimization scheme. The OLS and the WLS are integrated in the proposed scheme to determine the optimal solution of the estimated responses. The results of the simulation study and real example indicate that the WLS is superior when compared with the OLS method irrespective of the optimization scheme used. However, the combination of WLS and the proposed optimization scheme (PFO) signify more efficient results when compared to the WLS combined with the LT optimization scheme.

Keywords: Optimization, Robust Design, Unbalanced Data, Weighted Least Squares

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Characterization of Petroleum-Related Natural Organic Matter by Ultrahigh-Resolution Mass Spectrometry

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ABSTRACT

Because petroleum-related natural organic matter (NOM), such as humic substances, is extremely heterogeneous and complex, characterizing and identifying its chemical structure at the molecular level is attracting considerable attention. Among the different techniques for mass analysis, ultrahigh-resolution mass spectrometry methods, such as FT-ICR MS and its coupling with other complementary methods, have proven to be crucial for structurally characterizing complex environmental mixtures owing to their excellent analytical power. In particular, their ultrahigh resolution, unrivaled mass accuracy, remarkable ionization specificity, excellent ion activation, and high degree of flexibility for combination with hybrid instruments offer a reliable platform for analyzing petroleum-NOM molecules. This account, aimed at contributing to the advancement of petroleum-NOM molecule analysis, summarizes the application of FT-ICR MS with different ionization sources and its coupling with other complementary methods developed by our research group.

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Arjunolic Acid Downregulates Elevated Blood Sugar and Pro-Inflammatory Cytokines in Streptozotocin (STZ)-Nicotinamide Induced Type 2 Diabetic Rats

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is a worldwide health issue primarily due to failure of pancreatic β-cells to release sufficient insulin. Purpose: The present work aimed to assess the antidiabetic potential of arjunolic acid (AA) isolated from Terminalia arjuna in type 2 diabetic rats. Study design: After extraction, isolation and purification, AA was orally administered to type 2 diabetic Sprague Dawley rats to investigate antidiabetic effect of AA. Method: T2DM was induced via single intraperitoneal injection of streptozotocin-nicotinamide (STZ-NIC) in adult male rats. After 10 days, fasting and random blood glucose (FBG and RBG), body weight (BW), food and water intake, serum C-peptide, insulin and glycated hemoglobin (HbA1c) was measured to confirm T2DM development. Dose dependent effects of orally administered AA (25 and 50 mg/kg/day) for 4 weeks was investigated by measuring BW variation, fasting and postprandial hyperglycemia, oral glucose tolerance test (OGTT), and levels of serum HbA1c, serum total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL), high density lipoprotein (HDL), serum and pancreatic C-peptide, insulin, growth differentiation factor 15 (GDF-15), serum and pancreatic inflammatory cytokines. Results: The oral administration of AA in preclinical model of T2DM significantly normalized FBG and RBG, restored BW, controlled polyphagia, polydipsia and glucose tolerance. In addition, AA notably reduced serum HbA1c, TC, TG, LDL with non-significant increase in HDL. On the other hand, significant increase in serum and pancreatic C-peptide and insulin was observed with AA treatment, while serum and pancreatic GDF-15 were non-significantly altered in AA treated diabetic rats. Moreover, AA showed dose dependent reduction in serum and pancreatic proinflammatory cytokines including TNF-α, IL-1β and IL-6. Conclusion: For the first time our findings highlighted AA as a potential candidate in type 2 diabetic conditions.

Keywords: Arjunolic Acid, Streptozotocin-Nicotinamide, Type 2 Diabetes

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Iron Overload and Breast Cancer: Iron Chelation as a Potential Therapeutic Approach

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ABSTRACT

Breast cancer has historically been one of the leading causes of death for women worldwide. As of 2020, breast cancer was reported to have overtaken lung cancer as the most common type of cancer globally, representing an estimated 11.3% of all cancer diagnoses. A multidisciplinary approach is taken for the diagnosis and treatment of breast cancer that includes conventional and targeted treatments. However, current therapeutic approaches to treating breast cancer have limitations, necessitating the search for new treatment options. Cancer cells require adequate iron for their continuous and rapid proliferation. Excess iron saturates the iron-binding capacity of transferrin, resulting in non-transferrin-bound iron (NTBI) that can catalyze free-radical reactions and may lead to oxidant-mediated breast carcinogenesis. Moreover, excess iron and the disruption of iron metabolism by local estrogen in the breast leads to the generation of reactive oxygen species (ROS). Therefore, iron concentration reduction using an iron chelator can be a novel therapeutic strategy for countering breast cancer development and progression. This review focuses on the use of iron chelators to deplete iron levels in tumor cells, specifically in the breast, thereby preventing the generation of free radicals. The inhibition of DNA synthesis and promotion of cancer cell apoptosis are the targets of breast cancer treatment, which can be achieved by restricting the iron environment in the body. We hypothesize that the usage of iron chelators has the therapeutic potential to control intracellular iron levels and inhibit the breast tumor growth. In clinical settings, iron chelators can be used to reduce cancer cell growth and thus reduce the morbidity and mortality in breast cancer patients.

Keywords: Breast Cancer, Oxidative Stress, Iron Overload, Iron Chelator, Estrogen

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POS-393 Potential Beneficial Effects of Stevioside in Chronic Kidney Disease (Ckd) Patients (Stage-I To Stage-Iii): A Prospective Clinical Trial in A Tertiary Hospital in Bangladesh

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ABSTRACT

Introduction: Stevioside is well known as high-potency naturalsweeteners since hundreds of years. Nowadays, stevia is getting keyinterest among the pharmaceuticals, food manufacturers, and the consumers. Currently, the global public policies are very concern about thehigh prevalence of obesity, diabetes, hypertension, CKD, and othercomorbidities. Antidiabetic, and antihypertensive effects of stevia weredemonstrated by some animal and clinical studies. The beneficial effectof stevia against renal injury was showed by animal trials. Therefore,this clinical study was designed to evaluate and establish the reno-protective effects of stevioside with less side effects for the develop-ment of novel pharmacological intervention to prevent or reduce in theprogression of CKD in patients of Stage I to Stage III concomitantlygiven with current modern medicines. Methods: A total of ninety-seven (97) participants were enrolled inthis prospective, interventional, randomized, single-blind, placebo-controlled study, comparing Angiotensin-II Receptor Blocker andCa2+Channel Blocker with Stevia or placebo initially. The steviosidecapsules 500 mg (250 mg each) twice a day or matching placebo wasprescribed to the participants with conventional antihypertensiveand antidiabetic treatment along with other cardiovascular medica-tion. Written informed consent was collected. Three (3) separategroups were taken to evaluate the drug. Age matched healthy par-ticipants were included as a control. Patients were asked to returnfor follow up visits every three (3) months. This study was con-ducted in the tertiary level Kidney Foundation Hospital andResearch Institute, Mirpur-2, Dhaka, Bangladesh. The blood andurine sample had been taken for the biochemical, hematologicalinvestigations. A structured and validated questionnaire was usedfor baseline, 1st,2nd, and wash out period assessment. The simplifiedMDRD equation was used to estimate GFR. Stages of CKD weredetermined by the KDOQI guidelines and the criteria of US NationalKidney Foundation. The study protocol was approved to the ethicalguidelines by IRB (KFHRI/ECC-001/2016).The statistical analysiswas performed by SPSS Statistics for Windows, Version 23 (Chicago:SPSS Inc.).Results: Both hypertension and diabetes were found to be correlatedwith chronic kidney disease. At baseline, 44.3% CKD patients of stageIII were found and the values were reduced to 38.2% at the 2ndfollowup, however the number of patients was increased to 40.5% at thewashout period. Significant changes were found in blood urea, serumcreatinine, serum total protein, serum uric acid, fasting blood sugar,ACR, cholesterol, potassium, chloride levels among the treatment groupand significant reduction of systolic ($p<.043$) and diastolic bloodpressure ($p<.001$) calcium ($p<.025$), microalbumin ($p<.003$), UTP($p<.005$), postprandial blood sugar ($p<.001$), ESR ($p<.023$), triglyceride($p<.007$), HDL ($p<.049$), HsCRP ($p<.007$) levels were found at the2ndFollow up period.Conclusions: Treatment with stevia improved most of the renal andcardiovascular parameters in the CKD patients. Intake of stevia orallywith regular drug regimen demonstrated the protective roles in theprogression of CKD in human. This study indicated that the beneficial effects of stevia can reduce the risk of hypertension, diabetes, cardio-vascular disease, and improve the quality of life in chronic kidneydisease.

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Physicochemical, Pharmacokinetic and Cytotoxicity of the Compounds Isolated from an Endophyte Fusarium oxysporum: In Vitro and In Silico Approaches

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ABSTRACT

The present study was intended to characterize the secondary metabolites of the endophyte Fusarium oxysporum isolated from the plant Aglaonema hookerianum Schott. And to investigate the cytotoxic and other pharmacological properties of the isolated compounds as part of the drug discovery and development process. Different chromatographic techniques were adopted to isolate the bioactive compounds that were identified by spectroscopic techniques. The cytotoxic properties of the compounds were assessed in the Vero cell line via the trypan blue method. Moreover, physicochemical, pharmacokinetic, bioactivity and toxicity profiles of the compounds were also investigated through in silico approaches. After careful spectral analysis, the isolated compounds were identified as 3β,5α-dihydroxy-ergosta-7,22-dien-6-one (1), 3β,5α,9α-trihydroxy-ergosta-7,22-dien-6-one (2), p-hydroxybenzaldehyde (3), 3-(R)-7-butyl-6,8-dihydroxy-3-pent-11-enylisochroman-1-one (4) and beauvericin (5). An in vitro study in the Vero cell line revealed that the presence of the compounds reduced the number of cells, as well as the percentage of viable cells, in most cases. An in silico cytotoxic analysis revealed that compounds 1, 2 and 5 might be explored as cytotoxic agents. Moreover, compounds 3 and 4 were found to be highly mutagenic. The present study suggested that further thorough investigations are necessary to use these molecules as leads for the cytotoxic drug development process.

Keywords: Fusarium Oxysporum, 3β,5α-Dihydroxy-Ergosta-7, 22-Dien-6-One, 3-(R)-7-Butyl-6, 8-Dihydroxy-3-Pent-11-Enylisochroman-1-One, Beauvericin, Vero Cell Lines, In Silico

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Polyphenolics with Strong Antioxidant Activity from Acacia nilotica Ameliorate Some Biochemical Signs of Arsenic-Induced Neurotoxicity and Oxidative Stress in Mice

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ABSTRACT

Neurotoxicity is a serious health problem of patients chronically exposed to arsenic. There is no specific treatment of this problem. Oxidative stress has been implicated in the pathological process of neurotoxicity. Polyphenolics have proven antioxidant activity, thereby offering protection against oxidative stress. In this study, we have isolated the polyphenolics from Acacia nilotica and investigated its effect against arsenic-induced neurotoxicity and oxidative stress in mice. Acacia nilotica polyphenolics prepared from column chromatography of the crude methanol extract using diaion resin contained a phenolic content of 452.185 ± 7.879 mg gallic acid equivalent/gm of sample and flavonoid content of 200.075 ± 0.755 mg catechin equivalent/gm of sample. The polyphenolics exhibited potent antioxidant activity with respect to free radical scavenging ability, total antioxidant activity and inhibition of lipid peroxidation. Administration of arsenic in mice showed a reduction of acetylcholinesterase activity in the brain which was counteracted by Acacia nilotica polyphenolics. Similarly, elevation of lipid peroxidation and depletion of glutathione in the brain of mice was effectively restored to normal level by Acacia nilotica polyphenolics. Gallic acid methyl ester, catechin and catechin-7-gallate were identified in the polyphenolics as the major active compounds. These results suggest that Acacia nilotica polyphenolics due to its strong antioxidant potential might be effective in the management of arsenic induced neurotoxicity.

Keywords: Arsenic, Neurotoxicity, Biomarker, Acacia Nilotica, Phenolics, Flavonoids, Acetylcholinesterase, Antioxidant Activity

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Meal Ingestion of Ceraceomyces Tessulatus Strain BDM-X (Agaricomycetes) Protects against Nonalcoholic Steatohepatitis in Mice

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ABSTRACT

Nonalcoholic steatohepatitis (NASH) is becoming the most common cause of hepatocellular carcinoma (HCC) in developed countries. Oxidative stress plays a major role in the pathogenesis of NASH due to steatosis; hence, novel therapeutic approaches might include natural antioxidants. Ceraceomyces tessulatus strain Basidiomycetes-X (BDM-X), a novel edible mushroom, possesses potent antioxidant activity. This study aimed to investigate the hepato-protective effect of C. tessulatus BDM-X in a novel NASH-HCC mouse model. To prepare this animal model, 2-day-old C57BL/6J male pups were exposed to low-dose streptozotocin (STZ); at 4 weeks of age, they were randomly divided into two groups. The NASH group (NASH) received a high-fat diet (HFD32) up to 14 weeks of age; the C. tessulatus BDM-X group (BDM-X) received HFD32 up to age 10 weeks, followed by HFD32 + 20% BDM-X (percent weight per weight in the diet) up to age 14 weeks. Mice not treated with STZ and fed a normal diet served as a control group. We found that C. tessulatus BDM-X improved serum aminotransferase levels as well as histopathological features such as steatosis, inflammatory foci, and pericellular fibrosis in NASH mice. Hepatic protein expression of sterol regulatory element binding protein isoform SREBP-1 and peroxisome proliferator-activated receptor PPARα was significantly increased in NASH mice. C. tessulatus BDM-X treatment normalized the expression of both proteins. Our data suggest that C. tessulatus BDM-X may protect the liver against lipogenesis in NASH-HCC mice.

Keywords: Ceraceomyces Tessulatus, Functional Food, Lipogenesis, Nonalcoholic Fatty Liver Disease, Medicinal Mushrooms, Fungi

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Ramipril, an Angiotensin-Converting Enzyme Inhibitor Ameliorates Oxidative Stress, Inflammation, and Hepatic Fibrosis in Alloxan-Induced Diabetic Rats

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ABSTRACT

Angiotensin-II is considered as a peptide responsible for the vascular dysfunction and complications in various tissues including liver through inducing free radicle mediated oxidative stress. This study aimed to evaluate the effect of ramipril, an angiotensin-converting enzyme inhibitor (ACE inhibitor), on oxidative stress, inflammation, and fibrosis in the liver of alloxan-induced diabetic rats. In this investigation, rats were divided into four groups (six rats in each group): control, control+ ramipril, alloxan, and alloxan+ ramipril. A single dose (90 mg/kg) of alloxan was given intra-peritoneally to induce type two diabetes. After the induction of diabetes, ramipril (10 mg/kg) was administered to each animal for 21 days. An oral glucose tolerance test (OGTT) was performed. All animals were sacrificed at the end of the study. Blood and liver tissues were collected from each animal and stored for further biochemical studies. Liver marker enzymes and oxidative stress parameters were also assayed followed by histological examination in the liver. Alloxan administration in rats showed oral glucose intolerance and increased fasting blood glucose levels. Ramipril (10 mg/kg) treatment in alloxan administered rats improved the OGTT and lowered fasting blood glucose level. This study also revealed the elevation of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) enzymes activities in the alloxan administered rats which were attenuated by ramipril treatment. Oxidative stress parameters such as advanced protein oxidative products (APOP), nitric oxide (NO), and malondialdehyde (MDA) were also increased in alloxan administered rats which were diminished by the treatment of ramipril. Moreover, alloxan administration increased inflammation and fibrosis in the liver, which was further prevented by ramipril treatment. In conclusion, ramipril alleviated oxidative stress and fibrosis in the liver by suppressing oxidative stress. This investigation suggests that ACE inhibitors may be useful for treating diabetic complications and liver injury in alloxan-administered rats.

Keywords: Diabetes, Alloxan, Hepatic Fibrosis, Ramipril, Iron Overload, Oxidative Stress

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Impact of Prolonged COVID-19 Lockdown on Body Mass Index, Eating Habits, and Physical Activity of University Students in Bangladesh: A Web-Based Cross-Sectional Study

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ABSTRACT

Objectives: This current study aims to assess the prevalence and factors associated with body mass index (BMI), dietary patterns, and the extent of physical activities among university students following the prolonged coronavirus disease 2019 (COVID-19) lockdown in Bangladesh. Methods: A cross-sectional web-based survey was conducted between July 10 to August 10, 2021, through a pre-designed Google Form to collect the data from Bangladeshi university students (age: ≥18 years). Informed consent was electronically obtained from each participant, and a simple snowball technique was employed during the sampling. Frequency and percentage distribution, paired t-test, chi-square [χ2] test, and multinomial and binary logistic regression analyses were consecutively applied to analyze the collected data. Results: Among the total participants (n = 1,602), 45.1% were female and 55.6% were 22-25 years' age group students. The BMI (mean ± standard deviation, SD) during the COVID-19 lockdown was 23.52 ± 7.68 kg/m2, which was 22.77 ± 4.11 kg/m2 during the pre-lockdown period (mean difference = 0.753; p < 0.001). The multinomial logistic regression analysis found a significant impact of gender [male vs. female: adjusted relative risk ratio (RRR) = 1.448; 95% confidence interval (CI) = 1.022, 2.053; p = 0.037], age (years) (<22 vs. >25: RRR =0.389, 95% CI = 0.213,0.710; p = 0.002, and 22-25 vs. >25: RRR = 0.473, 95% CI = 0.290, 0.772; p = 0.003), monthly family income (BDT) (<25,000 vs. >50,000: RRR = 0.525, 95% CI = 0.334,0.826; p = 0.005), university type (public vs. private: RRR = 0.540, 95% CI = 0.369, 0.791; p = 0.002), eating larger meals/snacks (increased vs. unchanged: RRR = 2.401, 95% CI = 1.597, 3.610; p < 0.001 and decreased vs. unchanged: RRR = 1.893, 95% CI = 1.218, 2.942; p = 0.005), and verbally or physically abuse (yes vs. no: RRR = 1.438, 95% CI = 0.977, 2.116; p = 0.066) on obesity during COVID-19 pandemic. Besides, the female students and those who have constant eating habits, were more likely to be underweight. Additionally, the binary logistic regression analysis found that the students from private universities [others vs. private: adjusted odds ratio (AOR) = 0.461, 95% CI = 0.313, 0.680; p < 0.001], urban areas (urban vs. rural: AOR = 1.451, 95% CI = 1.165, 1.806; p = 0.001), wealthier families (<25,000 BDT vs. >50,000 BDT: AOR = 0.727, 95% CI = 0.540, 0.979; p = 0.036), and who were taking larger meals/snacks (increased vs. unchanged: AOR = 2.806, 95% CI = 2.190, 3.596; p < 0.001) and had conflicts/arguments with others (no vs. yes: AOR = 0.524, 95% CI = 0.418, 0.657; p < 0.001), were significantly more physically inactive. Finally, the level of education and smoking habits significantly influenced the eating habits of university students during the extended strict lockdown in Bangladesh. Conclusion: The current findings would be helpful tools and evidence for local and international public health experts and policymakers to reverse these worsening effects on students mediated by the prolonged lockdown. Several effective plans, programs, and combined attempts must be earnestly implemented to promote a smooth academic and daily life.

Keywords: Bangladeshi University Students, Cross-Sectional Web-Based Study, Eating Behaviors, Obesity, Overweight, Physical Inactivity

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Fluorescence Resonance Energy Transfer based Biosensor from Thermophilic Bacterial Periplasmic Binding Protein to Measure Branchedchain and Aromatic Amino Acids

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ABSTRACT

Aim: Exploring the ligand binding capacity of leucine-isoleucine-valine binding protein from Thermotoga maritima. Background: The Fischer ratio, ratio of concentrations between branched-chain and aromatic amino acids, has been considered as an indicator of hepatic disease involving metabolic dysfunctions since its instigation in the 1970's. These amino acids are usually measured by high performance liquid chromatography, gas chromatography and enzymatic spectrophotometry. Considering the future potential of periplasmic binding proteins in clinical diagnosis, leucine-isoleucine-valine binding protein from a thermophilic bacterium Thermotoga maritima was purified and characterized, and evaluated its binding properties with twenty amino acids. The protein's stereo-specificity was also tested due to its importance in astrobiology research. Amino acids and carbohydrates are both known to exist in extraterrestrial environments, and stereo-chemistry is the key aspect for distinguishing between abiotic and biotic origin. Results: Single amino acid substitutions were generated by overlapping polymerase chain reaction mediated mutagenesis using mutagenic primers to construct two mutants of leucine-isoleucine-valine binding protein (LIVBP). The first mutant of LIVBP in which phenylalanine (F) at 118 position was replaced with cysteine (C) was termed as LIVBP-F118C and the resultant plasmid was named as pKM242. Another mutant of LIVBP in which aspartic acid (D) at 221 position was replaced with cysteine was termed as LIVBP-D221C and the resultant plasmid was named as pKM244. Since the LIVBP-F118C showed higher labeling and fluorescence resonance energy transfer efficiency compared to that of D221C, the LIVBP-F118C was used for further study. Conclusion: Fluorescence resonance energy transfer technology was applied to measure dissociation constant (Kd) where chimeric isoleucine-valine binding protein (LIVBP) was engineered to conjugate a donor fluorophore at amino-terminal and an acceptor fluorophore at the incorporated cysteine residue. Ligand binding studies revealed that LIVBP from Thermotoga maritima was able to bind with fourteen amino acids out of twenty including branched-chain amino acids (BCAAs) and aromatic amino acids (AAAs) with Kd values ranging from 10-6 to 10-9 M. The Kd values of BCAAs, AAAs, methionine and cysteine were observed at nM level. Highest Kd value was observed for L-leucine (37.2 nM) and L-phenylalanine (44.6 nM). These results indicated that LIVBP from Thermotoga maritima has a broader substrate specificity than previously reported for LIVBP from other organisms, which might be helpful for the development of a miniaturized and noninvasive biosensor to measure BCAAs and AAAs.

Keywords: FRET, Thermotoga Maritima, Biosensor, Fischer Ratio, Branched-Chain Amino Acids, Aromatic Amino Acids, Periplasmic Binding Proteins

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Screening and Characterization of L-asparaginase Producing Bacterial Strains from the Soil in Bangladesh

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ABSTRACT

Although the enzyme L-asparaginase (L-ASNase) from Escherichia coli, Erwinia and Serratia has been applied to treat certain lymphomas and leukemias, several medical complications such as severe immunological responses leading to hypersensitivity, anaphylaxis, etc. have limited its application. The researchers have documented that such impediments are due to the different biochemical and kinetic properties of L-ASNase, which are directly dependent on genetic variations in microbial strains. Thus, there is a compelling need to explore novel L-ASNase producing microorganisms that would exhibit different serological properties while retaining similar and/or better therapeutic effects against cancer cells. Heretofore, L-ASNase producing bacterial strains from Bangladesh have never been isolated and characterized. Therefore, the main objective of this research was to isolate and characterize these strains from unexplored and ecologically different habitats that could lead to developing a potential therapeutic drug with fewer immunological responses and side effects over the existing drugs in order to treat cancer patients in the near future. Two L-ASNase producing bacterial strains were successfully isolated from the soil of Hatirjheel lake in Dhaka for the first time. Molecular characterization revealed that both strains belonged to Pseudomonas aeruginosa and their DNA sequences were submitted to NCBI GenBank. The accession number OK446669 was obtained for the strain of P. aeruginosa EWUKR-1 and OL307081 for P. aeruginosa EWUKR-2. The specific activity of L-ASNase from EWUKR-2 (212.1 ± 14.8 U/mg protein) was significantly higher than that of EWUKR-1 (16.3 ± 0.8 U/mg protein) when they were grown in modified M9 media containing 0.5 g/l glucose at 370C for 24 hours. The experimental results revealed that both of these bacterial strains were extracellular L-ASNase producers. The enzyme from P. aeruginosa EWUKR-2 was partially purified using saturated ammonium sulfate followed by dialysis and concentrated using Vivaspin-20 centrifugal concentrator having MWCO of 30 kDa. The optimum temperature and pH of the partially purified enzyme were 370C and 7.5, respectively. The purification-fold after ammonium sulfate precipitation and yield of the concentrated enzyme were 2.8 and 101%, respectively. SDS-PAGE analysis revealed that the molecular weight of L-ASNase from P. aeruginosa EWUKR-2 was around 43 kDa.

Keywords: Bangladesh, L-Asparaginase, Soil, Bacteria, Therapeutic Drugs, Cancer

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Prospective Asian Plants with Corroborated Antiviral Potentials: Position Standing in Recent Years

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ABSTRACT

Viral diseases are extremely widespread infections caused by viruses. Amongst numerous other illnesses, viral infections have challenged human existence severely. Over the history of mankind, new viruses have emerged and presented us with new tests. The range of viral infections varies from familiar infectious diseases such as the common cold, flu, and warts to severe ailments such as AIDS, Ebola, and COVID-19. The world has been racing to find an effective cure for the newly evolving viruses. Toxic effects, non-selectivity, drug resistance, and high price are the most common complications of conventional treatment procedures. Nature is a marvelous source of phytoconstituents with incredible varieties of biological activities. By tradition, medicinal plants have been utilized for the treatment of countless infectious diseases worldwide, some of which contain a broad spectrum of activities. Modern drug discovery and development techniques offer highly efficient separation techniques, inauguration of vector-based schemes where the original infectious virus is cloned to the non-infectious one for antiviral screening targets. The objective of the review was to gather available data on 20 both cultivated and native plants of Asia giving antiviral activities and provide comprehensive information on the phytochemical analysis of the plants and potential antiviral compounds isolated from these plants.

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Perception of Mucormycosis Infection among Bangladeshi Healthcare Workers: An Exploratory Cross-Sectional Study in the Year Following the COVID-19 Pandemic

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ABSTRACT

Background: Mucormycosis, a severe fungal infection, is an emerging public health concern during the COVID-19 pandemic. This study aimed to investigate the perception of mucormycosis among Bangladeshi healthcare workers. Results: An exploratory cross-sectional study was carried out among the Bangladeshi healthcare workers from May 25, 2021, to June 5, 2021. The study found 422 responses from the healthcare workers of Bangladesh. Among the respondents, nearly half of them (45.26%) were doctors (n = 191). This study explored that the healthcare workers' mucormycosis perception scores were significantly associated with their age, gender, profession, monthly income, marital status, job type, and death of friends and family members due to COVID-19. Conclusions: This study emphasized the healthcare workers' mucormycosis perception along with other associated factors. The findings could help policymakers to mitigate mucormycosis and related infectious diseases emergencies in the post-COVID-19 situation.

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Prevalence Rate of Attention Deficit Hyperactivity Disorder (ADHD) and Computer Vision Syndrome (CVS) Symptoms Predisposition among Digital Device Users of Bangladesh

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ABSTRACT

Background: Around 5.29% of the world population is suffering from ADHD, and 60 million people are suffering from CVS, with an increasing rate of prevalence of these disorders. This study aimed to determine the prevalence rate of ADHD and CVS symptoms among the Bangladeshi population. Results: To assess the aim of the study, a cross-sectional survey was conducted online through stratified sampling, and 197 responses were collected from the participants. Our survey method follows these criteria where the ARSV1.1 standard questionnaire was followed for the ADHD questionnaire, and a self-administered questionnaire was established based on the symptoms of CVS. The male age ranges from 18–24 have the highest value of ADHD (34%) coincided with > 6 h digital device usage (51%), and the Stroop effect is significantly correlated with the ADHD score (0.498, $p < 0.01$). The Stroop effect value is also higher among the males aged 18–24, digital device users for > 6 h (48%). Conclusions: With the advent of science, it is impossible to avoid digital devices as necessary. Notwithstanding, safe and appropriate use of digital media is a must for healthy living.

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Association between Preference and E-Learning Readiness among the Bangladeshi Female Nursing Students in the COVID-19 Pandemic: A Cross-Sectional Study

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ABSTRACT

Background: The COVID-19 pandemic jeopardized the traditional academic learning calendars due to the closing of all educational institutions across the globe. To keep up with the flow of learning, most of the educational institutions shifted toward e-learning. However, the students' e-learning preference and e-learning readiness did not identify, particularly among the Bangladeshi female nursing students, where those can pose serious challenges. A cross-sectional study was carried out among the female nursing students between December 26, 2020, and January 11, 2021. A total of 237 students were recruited who have enrolled in e-learning at least the last 30 days of the participation. Multivariable linear regression models were fitted to find the association of students' preference, e-learning readiness domains, and other variables. Results: A cross-sectional study was conducted among the female nursing students to assess perceived e-learning readiness in the subdomains of readiness, availability, technology use, self-confidence, acceptance and training. The findings of the study revealed that the prevalence of preference for e-learning was 43.46%. The students did not prefer e-learning compared to 'prefer group' has significantly less availability of technology ($\beta = -3.01$, 95% CI -4.46, -1.56), less use of technology ($\beta = -3.08$, 95% CI -5.11, -1.06), less self-confidence ($\beta = -4.50$, 95% CI -7.02, -1.98), less acceptance ($\beta = -5.96$, 95% CI -7.76, -4.16) and less training need ($\beta = -1.86$, 95% CI -2.67, -1.06). The age, degree, residence, parents' highest education, having a single room, and having any eye problems were significantly associated with the variation of availability of technology, use of technology, self-confidence, acceptance, and training need of e-learning. Conclusions: The outcomes of the study could be helpful while developing an effective and productive e-learning infrastructure regarding the preparedness of nursing colleges for the continuation of academia in any adverse circumstances like the COVID-19 pandemic.

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Major Cropping Pattern Prediction in Bangladesh from Land, Soil and Climate Data Using Machine Learning Techniques

Sabbir Ahmed, Shamima Yesmi, Lata Rani Saha, A. K. M. Sadat and **Mozammel H. A. Khan** [*]

ABSTRACT

The cultivation of crops on land periodically throughout the year is a cropping pattern. This research considered the prediction of major cropping patterns in Bangladesh through only the cultivation-related factors like land, soil, and climate data using Machine Learning techniques. We have considered 52 Upazilas in Bangladesh for data collection which was extracted from the book series Land and Soil Resources Usage Guidelines (in Bangla) published by SRDI, MoA, Dhaka, Bangladesh. The predictor features are a mixture of categorical and numerical data. On the other hand, the number of predicted classes is very large. So, we have used a machine learning model to introduce an effective cropping pattern prediction method that can handle mixed data points with a large number of classes. Machine learning algorithms such as K-nearest neighbors (KNN), Decision Tree (DT), Random Forest Classifier (RFC), XGboost (XGB), and Support Vector Machine (SVM) have been used for cropping pattern prediction. Our models can accurately predict cropping patterns. We have achieved more than 95% accuracy using our dataset for most of the machine learning models that we have used. Also, we have created a back-end and front-end system to use those trained machine learning models easily to predict cropping patterns.

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Neighborhood Distance Estimation for Tree-Based Hybrid Genetic Algorithm for Density Based Data Clustering

Mashuk Khan, Md. Ahied Mahi Chowdhury, Noureen Alam Meem and **Mozammel H. A. Khan** [*]

ABSTRACT

Clustering algorithms partition data points of a dataset depending on their similarity. As this process is unsu-pervised, validation is a crucial part of this method. Generally, the optimal clusters are verified using external information about the dataset which represents the true clusters of the data points. But in real life datasets, these ground truth information are not always present. That is why internal validation is used which can validate the clusters only using features of the data points. In this paper, internal validation (S_Dbw) is used on a previously proposed tree-based hybrid genetic algorithm for density based data clustering so that the minimum neighborhood distance can be estimated without using ground truth information. Four datasets from UCI Machine Learning Repository were used in this experiment. The proposed model outperforms the existing algorithms for Seeds and Parkinson's datasets. For Wine dataset the result is close but less accurate. But for Iris dataset, the model does not perform well because of overlapping of the clusters.

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Disease Detection of Bangladeshi Crops Using Image Processing and Deep Learning – A Comparative Analysis

Nafisha Binte Moin, Nabila Islam, Shamima Sultana, Lubaba Alam Chhoa, S. M. Ruhul Kabir Howlader and **Shamim H. Ripon**[*]

ABSTRACT

Crops diseases can have many adverse effects on the economy and management of food resources in a developing country like Bangladesh. Bangladesh is an agricultural-centric country where Rice, Potato, Corn/Maize, and Wheat are a few of the major crops. Crop diseases can cause low yield of food which can cause harm to the people of a country. Proper disease detection is essential but there remains a challenge in identification of crop diseases and its proper treatment. With the advancements of image processing and deep learning, crops diseases can be detected in a matter of seconds. In this study, several experimentations have been done for both diseased and healthy crops images using six widely popular CNN models namely Xception, VGG16, ResNet152V2, InceptionResNetV2, DenseNet201, and MobileNetV2 for four separate major crops of Bangladesh. An accuracy of 95.52% has been achieved for Corn and 98.55% accuracy is secured for Potato by applying Densenet201, while 64.30% is achieved for Rice. On the other hand by applying MobileNetV2 an accuracy of 98.28% is obtained for Wheat. The experiments are conducted for both colored and grayscale images. However, notable improvement is not observed for images that are converted to grayscale. Significant improvement in disease detection has been observed for most of the corps except for Rice. A further improvement has been achieved by applying SAM.

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Paddy Disease Detection Using Deep Learning

Md. Fahim Faez Abir, Kamrul Hassan Rokon, Sk Mohammad Asem, Abdullah Abdur Rahman, Nasim Bahadur and **Md. Nawab Yousuf Ali**[*]

ABSTRACT

Crops diseases can have many adverse effects on the economy and management of food resources in a developing country like Bangladesh. Bangladesh is an agricultural-centric country where Rice, Potato, Corn/Maize, and Wheat are a few of the major crops. Crop diseases can cause low yield of food which can cause harm to the people of a country. Proper disease detection is essential but there remains a challenge in identification of crop diseases and its proper treatment. With the advancements of image processing and deep learning, crops diseases can be detected in a matter of seconds. In this study, several experimentations have been done for both diseased and healthy crops images using six widely popular CNN models namely Xception, VGG16, ResNet152V2, InceptionResNetV2, DenseNet201, and MobileNetV2 for four separate major crops of Bangladesh. An accuracy of 95.52% has been achieved for Corn and 98.55% accuracy is secured for Potato by applying Densenet201, while 64.30% is achieved for Rice. On the other hand by applying MobileNetV2 an accuracy of 98.28% is obtained for Wheat. The experiments are conducted for both colored and grayscale images. However, notable improvement is not observed for images that are converted to grayscale. Significant improvement in disease detection has been observed for most of the corps except for Rice. A further improvement has been achieved by applying SAM.

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SMOTE based Credit Card Fraud Detection Using Convolutional Neural Network

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ABSTRACT

Nowadays, fraud correlated with credit cards became very prevalent since a lot of people use credit cards for buying goods and services. Because of e-commerce and technological advancement, most transactions are happening online, which is increasing the risk of fraudulent transactions and resulting in huge losses financially. Therefore, an effective detection technique, as the quickest prediction option, should be developed to deter fraud from propagating. This paper targeted to develop a deep learning (DL)-based model on SMOTE oversampling technique to predict the fraudulent transactions of credit cards. The system used three popular DL algorithms: Artificial Neural Network (ANN), Convolutional Neural Network (CNN), and Long Short-Term Memory Recurrent Neural Network (LSTM RNN), and measured the best performer in terms of evaluation metrics. However, the results confirm that the CNN algorithm outperformed both ANN and LSTM RNN. Additionally, compared to previous studies, our CNN fraud detection program recorded high rates of accuracy in identifying fraudulent activity. The system achieved an accuracy of 99.97%, precision of 99.94%, recall of 99.99%, and F1-Score of 99.96%. This proposed scheme can help to reduce financial loss by detecting credit card scams or frauds globally.

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Developing a Classification CNN Model to Classify Different Types of Fish

Farhan Ahmed, Bijoy Basak, Simonta Chakraborty, Tumpa Karmokar, **Ahmed Wasif Reza**[*], Omar Tawhid Imam[†] and Mohammad Shamsul Arefin[‡§]

ABSTRACT

Identifying any fish type can be difficult for people who are not familiar with fish. Implementation of a fish classification machine learning model can become helpful in this scope. The purpose of this paper is to build such a fish classification machine learning model. With this classification model, people will be able to identify the class or type of fish even without much experience with fish. Different types of fish have different nutrition, vitamin, and fat content. Thus, this model can be helpful to ensure better nutrition intake as well. As we have to classify types of fish, we implemented a Convolutional Neural Network (CNN) with Keras along with a modified VGG16 transfer learning model. With the CNN model, the accuracy of our training is 96.67%, and classification accuracy with the modified VGG16 is 97.44%. For validation, with the CNN model, accuracy is 99.92%, and classification accuracy with the VGG16 is 99.76%.

Keywords: Fish Dataset, Feature Extraction, VGG16, Machine Learning, Transfer Learning, Image Augmentation, Image Classification

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A Sustainable E-waste Management System and Recycling Trade for Bangladesh in Green IT

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ABSTRACT

E-waste is the electrical waste that we decide not to use anymore or don't want anymore. The most disappointing thing is that we can hardly recycle only 10% of electronic garbage globally. Now, what about 90% of the waste? Unfortunately, 90% of the waste we do not recycle, or we can not, and that 90% causes huge damage to the whole world. Recycling is needed because Toxic chemicals such as lead, and chromium can be found in many outdated electrical gadgets. Also, some examples are mercury, cadmium, and beryllium. These chemicals seep into the soil when e-waste is thrown into landfills, damaging both the groundwater and the air. A lot of recycling business models exist but we have tried to develop a sustainable recycling process business model by analysis. We have gone to two companies and tried to know their business process model also we have collected some data. We have tried to implement our business process model. As we have said our goal is to make a sustainable business process model so our system is also capable of trade for Bangladesh in green IT. This paper assists the reader in learning about e-waste management and the recycling process, as well as how they interact during the activation process.

Keywords: E-waste, Sustainable Recycling, Green IT, Industrial Infrastructure, Renewable Energy

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Minimizing E-waste through Improved Virtualization

Maimuna Akter Liza, Alfe Suny, Ryan Mohammad Bin Shahjahan, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†‡]

ABSTRACT

Consumption of electronics has increased in recent decades and become increasingly important. Consumer demand and ongoing technical advancement cause a serious problem as a consequence of this need and consumption. One of the issues now plaguing the world that is growing the quickest is E-waste. This article looks at how virtualization may abate the amount of e-waste produced and save resources. A comparison of E-waste management strategies and the optimal choice taking into account green computing has been shown. The model, which uses annual product sales data as well as historical and projected sales data as inputs, is a material flow analysis model. Future sales data are predicted using polynomial regression analysis for goods with increasing yearly sales and the sales rate for products with declining annual sales. Software that enables a single computer to perform several identical executions, each of which runs an operating system, is known as a hypervisor, or virtual machine monitor. By using those resources and the information from the models, the overall discussion on virtualization's potential to reduce e-waste may be evaluated. As fewer portable computers and desktop computers are used, less electrical equipment is needed, which reduces the amount of power required. The hypervisor may also be set up to show how much less electronic waste results from virtualization. Therefore, even if virtualization won't completely eradicate e-waste, it will significantly reduce it while having no negative effects on the environment.

Keywords: Electric Consumption, E-waste, Virtualization, Hypervisor, Eco-friendly

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A Policy Framework for Improving E-waste Management in Bangladesh

Sinthia Sarkar Ananna, Nishat Sultana Supty, Iffat Jahan Shorna, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†‡]

ABSTRACT

This paper aims to show the importance of e-waste management techniques for environmental sustainability, proposing a policy framework for improving e-waste management in Bangladesh. E-waste is one of the world's fastest-growing waste categories, expanding at a rate of 3–5% each year. Our main focus is to develop a better concept for an e-waste recycling system that is both sustainable and energy-efficient. The study examines the policy, its shortcomings, and the accompanying concerns and options for addressing this rising problem. Therefore, this paper suggests that e-waste policy development may necessitate a more personalized approach. This study provides a thorough overview of Bangladesh's generation of electronic and electrical waste, as well as current, sustainable e-waste management initiatives and the recycling industry. Several environmentally friendly E-waste management strategies have been put forth, along with potential roadblocks to their implementation.

Keywords: E-waste, Sustainability, Recycling Trade, E-waste Management

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Developing an Energy Cost Calculator for Solar

Plabon Banik, Md. Sabik Alam Rahat, Md. Abid Hasan Rafe, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†‡]

ABSTRACT

One of the most important variables affecting a country's socioeconomic maturity is access to electricity. Bangladesh is now suffering from a severe electricity shortage. Around 65% of people do not have access to power, and most of them live in villages. The generated electricity was unable to meet demand, resulting in load shedding of up to 1500 MW. Solar Home Systems technology can be a wise effort to fix this problem in this case by harnessing energy from the country's free-flowing renewable source. The main purpose of this paper is to make people more aware of using the solar system.

Keywords: Socioeconomic Maturity, Electrical Shortage, Load Shedding, Solar Home System, Home System Technology

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Towards Building a Sustainable System of Data Center Cooling and Power Management Utilizing Renewable Energy

Sumona Yeasmin, Nazia Afrin, Kashfia Saif, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†‡]

ABSTRACT

Data centers have become essential to the increasing IT industry. This research proposes a sustainable data center cooling and powering management system using renewable energy. The study offers a hybrid approach for cooling and powering data centers with renewable energy (wind and solar) based on geographical location and availability, including a survey with experts who have experience working related to data centers. This research has taken several surveys to analyze the proposed model's feasibility and shown a smaller data center's calculation and cost-saving estimation to evaluate the approximate costs after incorporating renewable sources in powering data centers. The study also aims to utilize grid electricity as a secondary source and renewable energy as a primary one. The feasibility of the suggested strategy was assessed in this research using the physical location of Bangladesh and the advice of experts.

Keywords: Sustainability, Hybrid Power Management, Sustainable Data Center, Renewable Energy

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Improved Virtualization to Reduce E-waste in Green Computing

Meharaj-Ul Mahmmud, Md. Saif Laskar, Mehrab Arafin, Md. Sajeeb Molla, **Ahmed Wasif Reza**[*] and Mohammad Shamsul Arefin[†‡]

ABSTRACT

In this era of modern technologies, a huge amount of e-waste is being produced endlessly. The excessive production rate of e-waste is a great threat to our environment. Our work mainly focuses on the many ways of e-waste reduction and finding new alternatives. The problem we intend to solve with our research is to reduce the production rate of e-waste in an optimized way. The goal of this research is to formulate a sustainable way to reduce e-waste production. This paper approaches the problem by evaluating previous data and reviewing related works. This research proves that virtualization could be a promising alternative for reducing the production rate of e-waste. Virtualization is an essential part of cloud computing as it allows us to employ real-world characteristics across several virtual environments, or virtual machines (VMs). This research also tries to highlight the negative consequences of e-waste, the importance of decreasing it, and how it may be reduced through virtualization. The sole beneficiary of this research would be the big corporations in the electronic devices manufacturing industry.

Keywords: Virtualization, E-waste, Green Computing, Green IT

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Developing a Tool to Classify Different Types of Fruits Using Deep Learning and VGG16

Mobassir Ahsan, Mahfuza Yousuf, Md. Saifur Rahman, Farhana Islam Proma, Omar Tawhid Imam[*], **Ahmed Wasif Reza**[†] and Mohammad Shamsul Arefin[‡§]

ABSTRACT

In this paper, we present two methods for the classification of fruits of Bangladesh from image processing techniques. We have used deep learning convolutional neural network in our model and VGG16 in another model. From both models, we have found 99% accuracy. Initially, we used only five classes (apple, orange, jackfruit, watermelon, banana) for building these models. Evaluating our model gives us accuracy on the test dataset and by inputting one fruit image our model predicts the fruit what it is. We have checked and experimented with our model several times that it can detect fruit accurately from single fruit images. If our model goes through further improvement, it can be an application that will help shopkeepers or farmers on fixing price calculations on both online and offline platforms.

Keywords: Fruits Classification, VGG16, Convolutional Neural Networks, Deep Learning, Image Processing

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Designing a Sustainable E-waste Management Framework for Bangladesh

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ABSTRACT

The main goal of this paper is to research and design a sustainable framework to deal with the E-Waste problem in Bangladesh. E-waste is currently one of the biggest problems in Bangladesh. But there are yet to be any sustainable and realistic solutions for it. Thus, a working, efficient and sustainable framework to manage the e-wastes of Bangladesh has become a crucial need in current times. In this paper, we have researched and thoroughly analyzed this problem in the context of Bangladesh and have explored multiple ways to deal with it. Here we have designed multiple complete frameworks for e-waste collection, exchange, reuse, and recycling for sustainable e-waste management and presented them in a way that can easily be integrated with the environment of Bangladesh. Our framework also incentivizes the rural citizens to be part of the e-waste reuse process by having second-hand shops which would greatly boost the e-waste management efforts. Should our framework get implemented successfully, it will be possible to collect, exchange, reuse, and recycle e-waste in the most effective ways suitable for Bangladesh. Bangladesh's e-waste management standards will be improved, and an enormous amount of energy and materials can be saved, which will help us to protect the environment and ensure the safety of human health.

Keywords: E-waste Management, Framework, Recycling, Reuse, E-waste Collection

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A Sustainable Approach to Reduce Power Consumption and Harmful Effects of Cellular Base Stations

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ABSTRACT

Cellular base stations consume a lot of energy since it requires a 24-h continuous power supply which results in an increased operational expenditure (OPEX) and environmental pollution. This OPEX and harmful effects should be decreased to achieve sustainable and profitable businesses for mobile operators. In this case, a hybrid renewable energy solution like solar energy and wind power is proposed which will be used to power these cellular base stations. Solar energy can power daytime and wind power can power both day and nighttime. Thus, together they can supply power efficiently. When a particular base station fails, or its workload is high then its workload can be transferred to another base station for a certain amount of period. Sometimes a base station's workload can be transferred to another idle base station. Base stations can be switched to sleep mode when data traffic is low. This can help to save a lot of electric energy. The final result will be a sustainable cellular base station. Most of the goals can be achieved by our proposed method like less energy consumption, carbon-free service, and less radio frequency (RF). This paper proposes a new solution like hybrid renewable energy along with sleep mode. Mobile operators can be benefitted from this paper to make their business sustainable and more cost-effective.

Keywords: Cellular Base Station, Solar Energy, Wind Power, Sleep Mode, Power Consumption, Sustainability, Radio Frequency

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A Sustainable Approach between Satellite and Traditional Broadband Transmission Technologies Based on Green IT

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ABSTRACT

Although satellite internet has low performance in the case of data transmission compared to traditional internet services such as broadband internet networks and cellular networks, it may have a low environmental impact as well. Traditional internet services are located on earth so the latency is fairly high. However, if the environmental impact is the only consideration, satellite internet may be a viable option. This research paper tries to analyze this aspect of the internet. Based on green IT which internet service can provide the best and if there is a way to make internet services more efficient? This paper aims to provide as much information regarding this and provide a solution to this. In this paper, a thorough investigation has been conducted to include direct or indirect environmental impact, power consumption, greenhouse emission, building material, etc. A comparative analysis shows if satellite internet can negate the environmental impact of traditional internet services. Based on the study, solutions have been provided for traditional internet services using real-time simulation and machine learning algorithms. The simulation of cabling gives a significant reduction in cable use and the implemented machine learning algorithms in routing devices yield a 30% energy consumption reduction and an almost 25% GHG reduction per month. This paper contributes to the overall process to make the internet greener. This paper can especially help decide which internet service is based on environmental friendliness. This paper can also help internet service providers to reduce costs in connectivity.

Keywords: Environmental Impact, Space Environment, Terrestrial Environment, Green IT, Satellite, Broadband, Cellular Network, Greenhouse Emission, Power Eonsumption, Machine Learning

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Image Classification for Identifying Social Gathering Types

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ABSTRACT

Convolutional neural networks are current times state-of-art algorithms widely used in image classification. This paper has explored the image classification of social gatherings with state-of-the-art neural network models. We introduce image classification with the modified VGG16 model and the modified InceptionV3 model. Images are first pre-processed and then given input to the models for multi-class classification. We have modified layers in the models, resulting in the best accuracy for our dataset. Data augmentation and layer modification schemes are applied in this paper. The algorithm learns to identify the classes of an image by performing feature extraction and data augmentations of each image. Throughout this research, we discovered that the approaches suggested in this paper improve the performance of the models. Our task was based on four classes of social gathering images. We concluded that the layer-modified VGG16 model with augmentation gives us the best results with a training accuracy of 90.99% and validation accuracy of 87.18%.

Keywords: Social Gathering, VGG16, Data Preprocessing, Image Classification

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Sustainable and Profitable IT Infrastructure of Bangladesh Using Green IT

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and Mohammad Shamsul Arefin[†]

ABSTRACT

The purpose of this paper is to analyze the impact of traditional business infrastructures on the environment and to provide a sustainable and profitable "Green IT" infrastructure for businesses in Bangladesh from the analysis. As traditional business models mostly harm the environment, organizations in foreign countries started to switch to Green infrastructure. Governments started implementing and regulating green initiatives across their country. But green infrastructures for businesses in Bangladesh are not well explored or implemented. Also, a question such as, "Why should businesses migrate to green IT? How green IT initiatives can be profitable for business?" needs to be answered. We analyzed our collected qualitative data with the Experimental Analysis. The result is a standard green framework that can be implemented by IT organizations in Bangladesh. Soon it may become a necessity for all IT business organizations to implement a green infrastructure to make business more sustainable and profitable.

Keywords: Green Computing, Green IT, Sustainability, IT Infrastructure, Green Building, Clean Energy, E-waste Management, Green Data Eenter, Green Finance

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Flower Recognition Using VGG16

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ABSTRACT

The purpose of our model is to classify five types of flowers from input images. The flowers are Sunflower, Rose, Tulip, Daisy, and Lavender. We have also built our own CNN model for the task and compared it with the modified VGG16 network. Our modified VGG16 model gives better accuracy than the existing works. We have achieved a test accuracy of 96.64% by using the proposed model. As the accuracy is quite good, we were able to recognize the flowers accurately. Agriculture institutes and flower nurseries can be benefitted by using this model.

Keywords: Flower Recognition, VGG16, Model, Accuracy

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Human Posture Estimation: In Aspect of the Agriculture Industry

Meharaj - Ul- Mahmmud, Md. Ahsan Ahmed, Sayed Monshurul Alam[*], Omar Tawhid Imam[†], **Ahmed Wasif Reza**[‡] and Mohammad Shamsul Arefin[§]

ABSTRACT

Pose estimation is an artificial intelligence and computer vision approach. Human Posture Estimate is a more advanced version of pose estimation technology that graphically depicts the position and orientation of a human body. It's one of the most appealing fields of research, and it's gaining popularity thanks to its practicality and versatility—utilized in a range of industries, including gaming, healthcare, agriculture, augmented reality, and sports. This research project intends to establish a deep learning-based human posture identification system that can be used to identify diverse agricultural operations, with the intention of introducing the concept of automation into the agriculture field. A proprietary dataset of farmer postures is used to run this system. The picture from the dataset is pre-processed before a deep neural network is used to detect body points in the image, and OpenCV creates a graphical representation of the points. The angle between body components is crucial in determining posture, which is derived from various calculations. Finally, the result is compared to a threshold value before being processed. Our model could accurately measure a farmer's or human's posture in three major categories: sitting, bending, and standing with a test accuracy of about 77%.

Keywords: Human Pose Estimation, Gaussian Blur, Agriculture Posture Estimation

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Developing a Tool to Classify Lethal Weapons by Analyzing Images

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ABSTRACT

This paper shows how modified VGG16 and a customized model can be used for a weapon classifier system. The basic concept is to detect weapon type by its shape, length, angle, rotation degree, etc. The layered structure of VGG16 has been primarily used along with some extra layers for step-by-step classification. The images have been preprocessed with image augmentation using parameters such as shear, size, and rotation. The VGG16 model has been used for its prediction accuracy with less time complexity. The VGG19 model has better accuracy compared to the VGG16 but the time complexity is higher. The better accuracy of VGG19 is insignificant and negligible. VGG16 has 1×1 convolutional layers. VGG16 has small-sized convolution filters allowing the model to have a large number of weight layers. Instead of using a large number of hyper-parameters, the model uses a 3×3 convolution layer and a 2×2 max pool layer making the layer arrangement more consistent throughout the architecture. The trained mode acquired a test accuracy of 96.5% when tested with new input images.

Keywords: Weapon Classifier System, VGG16, VGG19, Augmentation, Convolution Layer, Classification

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A Sustainable E-waste Management System for Bangladesh

Md. Shahadat Anik Sheikh[*], Rashik Buksh Rafsan, Hasib Ar Rafiul Fahim, Md. Tabib Khan and **Ahmed Wasif Reza**[†]

ABSTRACT

The use of electronic devices is increasing rapidly as it is an essential part of our life in today's world. Shown in numbers, it has grown from zero to 7.2 billion in only three decades. There is a 5–10% annual rise in the quantity of used electronic equipment, which, if not correctly disposed of, can result in environmental dangers that harm human health, marine life, and soil fertility. For developing countries like Bangladesh, managing this massive stream of electrical and electronic garbage is challenging due to the lack of solid organizational and governmental e-waste management infrastructure. Lack of public knowledge, policies, and funding in waste management are only a few of the significant causes driving this situation. In this study, a majority of the adopted E-waste management systems and their limitations, along with the proposal of a new and sustainable E-waste management system, have been discussed. The implementation gap of government rules and policies has been highlighted here. The successful application of these recommended strategies could improve Bangladesh's E-waste management capability.

Keywords: E-waste Bangladesh, E-waste Collection, Effective E-waste Management

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A Hybrid Cloud System for Power-Efficient Cloud Computing

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ABSTRACT

Around our world clients needs services that are informative and technologically advanced. Advanced technologies like cloud computing allow the clients or the consumer to pay an efficient amount of money according to the service that they are getting. It permits any application for being hosted in a research or corporational structure. The included networked computers, cables, power supply, etc. in the data center is the main bone of cloud computing. The data centers consume a great amount of power to fulfill their work process which increases the cost and also affects the environment of the work by increasing the carbon footprint. To keep the carbon emission to check it is very necessary to check the electricity and power consumption. Keeping the energy in check we have solved the issue of efficient cloud computing.

Keywords: Efficient Energy, Power Usage, Policy, Cloud Computing, Algorithm

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Trade-offs of Improper E-waste Recycling: An Empirical Study

Md Shamsur Rahman Talukdar, Marwa Khanom Nurtaj, Md Nahid Hasan, Aysha Siddeka, **Ahmed Wasif Reza**[*] and Md. Shamsul Arefin[†‡]

ABSTRACT

The term "E-waste" refers to any electronic equipment that has been abandoned and discarded or reached the end of its service life. As electronics is one of the largest growing industrial sectors, the recycling of E-wastes has evolved into a serious global issue. E-waste contains both metals and chemicals. A growing country like Bangladesh is now estimated to create 2.8 million tons of E-waste every year. Around 15–25% of it gets recycled, while the remaining end up in open soil, farmland, and water. Many hazardous elements from improper E-waste disposal can cause health diseases for workers and their families like breathing problems, skin infections, and stomach problems. Also, improper disposal of E-waste can harm the environment and have a negative impact on our climate. In this paper, we analyze the environmental effects and health issues of electronic waste. We found that there is a significant lack of understanding on how to reuse, rescale, and refurbish electronic equipment. People everywhere may avoid health and environmental problems by managing E-waste effectively, collecting E-waste properly, and raising awareness about the dangers of improper e-waste disposal can save people all over the world from challenges.

Keywords: E-waste, Environmental Impacts, Health Impact, Improper Recycling, Disposal

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Energy Consumption Issues of a Data Center

Nabila Islam, Lubaba Alam Chhoa and **Ahmed Wasif Reza**[*]

ABSTRACT

Nowadays, local or private data centers are a revolution that is developing rapidly. Many companies and educational organizations are building local data centers for security reasons. However, the energy consumption issues of data centers are rapidly increasing which needs to be addressed to develop green data centers. Many methods and techniques had been developed for minimizing the energy consumption of data centers. In this paper, an energy-efficient proposed model has been suggested for East West university's local data center for upgrading to a green data center. It is found that approximately 20% to 30% of energy will be saved after redesigning the data center.

Keywords: Green Data Center, Energy Consumption, Cooling System, Virtualization

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Detection of Covid-19 from X-Ray Images Using Ma-chine Learning Models

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ABSTRACT

Corona virus disease (COVID-19) is one of the deadliest scourge mankind have ever seen. It's a highly infectious influenza virus which may transmit from one person to another without causing any symptoms. In compliance with WHO (World Health Organization) data, corona virus (COVID-19) was first found in China in 2019 and has spread swiftly to individuals in other countries, with an estimated total of 349,641,119 cases (till 25 January) globally. As counter measures to this condition, screening afflicted people is mandatory which requires time and is also costly. Radiological scanning is a plausible measure for achieving this. In this case, the chest X-Ray is the most at hand and cost-effective alternative. In this work, we present a Deep CNN (Convolutional Neural Network) based method for perceiving COVID-19 infected people by analyzing chest X-Ray images. Here, four pre-trained CNN models (AlexNet, VGG16, InceptionV3, and EfficientNetB4) are suggested to analyze chest X-ray radiographs. Among these models, EfficientNetB4 gives us the highest accuracy to detect COVID-19.

Keywords: Covid-19, Chest X-ray, CNN, EfficientNetB4

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Convolutional Neural Network based Real Time Pneumonia Detection Using Transfer Learning and Image Augmentation

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ABSTRACT

This paper aims to identify the detection of pneumonia disease using chest x-ray images by applying deep learning methods. Deep learning methods have tracked down their applications in different areas, and they are in effect broadly utilized in clinical medicines and diagnostics. To analyze viral/bacterial infections such as pneumonia, the assessment of chest X-ray images is frequently used, and the productivity of diagnosis can be altogether improved with the utilization of Computer-Aided Diagnostic (CAD) frameworks. Deep learning method such as Convolutional Neural Network (CNN) architecture is utilized in this paper for the characterization of chest X-ray images to analyze pneumonia. We have used the chest X-ray image dataset from Kaggle consisting of 4110 images. Image augmentations were performed on the dataset to oversample the dataset for the model to perform better. Then, at that point, we have built a custom CNN model and, also, we have utilized the transfer learning mechanism with CNN by using MobileNetV2 as the base model for the image classification problems. The average classification accuracy for our proposed CNN and MobileNetV2 based transfer learning method was 97%, and 97% for unbalanced and 97%, and 97%, for balanced datasets respectively. The satisfactory outcome of both models can significantly improve the accuracy and speed of pneumonia diagnosis. This would be very helpful in this pandemic situation in developing countries with limited resources and capabilities in the healthcare sector.

Keywords: Pneumonia, Deep Learning, CNN, X-ray, Transfer Learning, Augmentation, Machine Learning

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A Breast Cancer Detection Model Using a Tuned SVM Classifier

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ABSTRACT

Breast cancer has become a common disease that affects women all over the world. Early detection and diagnosis of the breast cancer is crucial for an effective medication and treatment. But, detection of breast cancer at the primary stage is challenging due to the ambiguity of the mammograms. Many researchers have explored Machine learning (ML) based model to detect breast cancer. Most of the developed models have not been clinically effective. To address this, in this paper, we propose an optimized SVM based model for the prediction of breast cancer where Bayesian search method is applied to discover the best hyper-parameters of the SVM classifier. Performance of the model with default hyper-parameter for the SVM is compared to the performance with tuned hyper-parameter. The comparison shows that performance is significantly improved when the tuned hyper-parameter is used for training SVM classifier. Our findings show that SVM's performance with default parameters is 96% whereas the maximum accuracy level 98% is obtained using tuned hyper-parameter.

Keywords: Support Vector Machines, Training, Search Methods, Simulation, Medical Services, Predictive Models, Breast Cancer

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Lowering the Power Consumption of Healthcare Centers in Bangladesh Using Low-Power Consuming Computing Devices

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ABSTRACT

Bangladesh's hospital receptions and wards use high-specification computers to do petty work such as patient information management, providing service information, billing and others. It is entirely unnecessary as the work performed by these computers can be done by any other low-power computing devices like thin clients or other small single-board computers. Based on this situation, the problem was identified, which was to evaluate the reduction of power consumption possible by using Low-power computing devices instead of traditional desktop computers in hospital receptions, pathology, and hospital wards. Other research studies also did a similar kind of work comparing power consumption between regular and single-board computers. Data were collected from several hospitals after visiting and observing the computer usage and hardware information used there. Alongside, the power consumption was also collected. The power consumed by a similar single-board computer, a Raspberry Pi-based system that can replace the hospital's computer system infrastructure, was also compared. It was found that a Raspberry Pi-based system can perform the same tasks consuming 4.2 times less energy than the current system. Finally, as future work, we can expand our study to other sectors like banks and offices where the existing system can be replaced with a Low-power Computing device-based system. Also, special software can be made for Raspberry Pi to optimize energy consumption further.

Keywords: Computers, Performance Evaluation, Pathology, Energy Consumption, Power Demand, Hospitals, Electronic Waste

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Zero-Shot Entity Representation Learning for Temporal Knowledge Graph

Tanni Mittra[*] and Muhammad Masroor Ali[†]

ABSTRACT

Temporal Knowledge Graphs (TKG) are multi-relational graphs where time is an important dimension. The research interest in TKG is increasing very rapidly. Despite recent advancements, there still exist some unexplored areas such as, Zero-Shot Learning (ZSL) which aim's to identify the embeddings of unseen entities. To deal with zero-shot learning we use both structural and textual descriptions of entities. For structural representation, we incorporate time directly into the vector space. For textual representation, we collect text descriptions of entities and use Convolutional Neural Networks (CNN) to capture the semantic features of the text descriptions. We utilize both of the aforementioned representations in the same vector space. Thus, we can utilize both structural and semantic representations of an entity which helps us to analyze the context of the entity. To test our model we utilized YAGO and Wikidata, two commonly used temporal knowledge graphs. We compare our method with two baseline methods. The evaluation result shows that our proposed method outperforms other methods for identifying relationships of unseen entities with proper time annotations.

Keywords: Representation Learning, Knowledge Engineering, Annotations, Semantics, Knowledge Graphs, Convolutional Neural Networks

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A Machine Learning Based Approach to Analyze Food Reviews from Bengali Text

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ABSTRACT

Nowadays, people share their opinion about restaurants and food items on different online platforms. Before visiting any restaurant people often read the reviews about the food items. Again, the food industry measures the satisfaction level of consumers through these reviews and tries to improve the food quality according to the demand. However, it's a difficult task to manually go through the reviews. To make the task easier analyzing the reviews automatically would be a great achievement. Although there exists a good number of research works to analyze food reviews written in the English language. Unfortunately, very few focuses on food review analysis in Bangla language. Because of this unstructured research works in this field, we explore six different machine learning algorithms to classify food reviews from Bangla text into three categories i.e. good, neutral and bad. We collect almost 4000 food reviews from different online sites. Among them, 80% data is used for training and 20% is used for the testing purpose. To extract the feature two different feature extraction techniques Term Frequency – Inverse Document Frequency (TF-IDF) and CountVectorizer (CV) are used using unigram, bigram and tri-gram models. Our experimental results reveal that SGD classifier can reach up to 93% accuracy on bi-gram features that are extracted using TF-IDF technique.

Keywords: Sentiment Analysis, Bengali Sentiment Analysis, Food Review Classification, Machine Learning, Natural Language Processing, Count Vectorizer, TF-IDF

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Machine Learning Based Recognition of Bangla Handwritten Characters

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Musharrat Khan[*]

ABSTRACT

In this paper, we propose a method to recognize Bangla handwritten characters using CNN based machine learning techniques. Our proposed model takes input of single Bangla character images and recognizes it. We worked with 50 basic Bangla characters, 10 numeral digits and 13 special characters. A total of 24231 images from CMATERDB dataset have been used here. Our proposed model achieved 99.06% accuracy on alphabets, 99.75 % accuracy on digits and 99.15% accuracy on special characters. We look forward to upgrade this model to a complete Bangla handwritten speech recognition system in future.

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Heart Disease Prediction Using Interquartile Range Preprocessing and Hypertuned Machine Learning

Kawser Rashid, Md. Ashraful Islam, Rakib Ali Tanzin, Md. Lutfullahil Labib and **Musharrat Khan**[*]

ABSTRACT

Machine learning and data mining techniques have recently revolutionized detection of chronic diseases such as heart disease. Existing literature has established the potential of using machine learning algorithms to develop models to automate the detection of heart disease. Doing so will drastically reduce the overall cost of heart disease treatment. This will make treatment more accessible to the broader population in developing and underdeveloped countries. However, existing machine learning methods cannot offer the level of accuracy and cost effectiveness needed for real life implementations. In this study, we aimed to tackle these problems by proposing machine learning models that offer near perfect accuracy and performance. We applied several supervised hyper tuned machine learning classifiers, and low-cost neural networks and compared the accuracy and performance of these models. We achieved a peak accuracy of 99.02 percent with KNN. Thus, our study shows the viability of using simple machine learning with hypertuning for real life implementation of automated heart disease detection.

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BaNeP: An End-to-End Neural Network Based Model for Bangla Parts-of-Speech Tagging

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ABSTRACT

In Natural Language Processing, Parts-of-Speech tagging is a vital component that significantly impacts applications like machine translation, spell-checker, information retrieval, and speech processing. In languages such as English and Dutch, POS tagging is considered a solved problem (accuracy: 97%). However, for low-resource languages like Bangla, challenges are still there. In this article, we have proposed a novel RNN-based network named BaNeP to determine parts of speech for Bangla words. The proposed network extracts structural features through a bidirectional LSTM-based sub-network, and intricate contextual relations among words of a sentence are identified through an elaborate weighted context extraction procedure. These features are then combinedly utilized to generate the final Parts-of-Speech prediction. Training the model requires only an annotated dataset vanishing the need for any hand-crafted features. Experimental results on the LDC2010T16 dataset show significant accuracy improvement compared to existing Bangla POS taggers.

Keywords: Bangla, POS Tagging, RNN, Sequence Labeling

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Banel: An Encoder-decoder Based Bangla Neural Lemmatizer

Md. Towhiduzzaman, Md. Tauhidul Islam Bhuiyan, Md. Ashraful Islam[*], Abdullah Al Maruf and **Jesan Ahammed Ovi**[†]

ABSTRACT

This study presents an efficient framework of deriving lemma from an inflected Bangla word considering its parts-of-speech as context. Bangla is a morphologically rich Indo-Aryan language where around 70% words are inflected, and some words have around 90 different inflected forms making it one of the most challenging languages for lemmatization. The unavailability of a sufficiently large appropriate dataset in Bangla makes the task even more strenuous. A reliable robust Bangla lemmatizer will create new possibilities for other dependent fields like automatic language translation and grammatical correction to flourish in Bangla. In this paper, we have described a new larger Bangla dataset for lemmatization and an encoder-decoder-based sequence_to_sequence framework for it. After tuning the hyper-parameters, the proposed framework yielded 95.75% character accuracy and 91.81% exact match on the testing split of the prepared dataset which is significantly higher than existing other approaches in Bangla for lemmatization.

Keywords: Tagging, Sequential Analysis, Feature Extraction, Labeling, Hidden Markov Models, Machine Translation, Natural Language Processing, Speech Processing, Neural Networks, Information Retrieval, Recurrent Neural Networks, Text Recognition

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Interpretable Learning Model for Lower Dimensional Feature Space: A Case Study with Brown Spot Detection in Rice Leaf

Md Amit Khan[*], Nafiz Sadman[†], Kishor Datta Gupta[‡] and **Jesan Ahammed Ovi**[§]

ABSTRACT

Detecting brown spot in rice leaf is an urgent complication in the agricultural field as Brown Spot disease lessen the rice yield remarkably. Several segmentation techniques have been applied to identify and extract the infected portion of the rice-leaf and machine learning algorithms such as decision trees, support vector machines are applied to detect this infection. In particular, a combination of Convolution Neural Networks with these algorithms has also tried to resolve this problem. Although this attempt has achieved success in providing accuracy (96.8%), these kinds of approaches raise issues regarding the size and interpretability of feature space and interpretability of the decision model. Indeed, Deep learning networks automatically create a feature space that usually contains a massive number of features (numerous of them are not necessarily appropriate). This vast number of features extends the non-interpretability of the machine learning model. Furthermore, training the model with these many features is computationally expensive. To resolve these issues, we propose a method to extract a few interpretable features from rice-leaf images and construct a low-dimensional feature space; however, interpretation shows that they deserve significant credit for the decent accuracy of our classification model.

Keywords: Training, Support Vector Machines, Machine Learning Algorithms, Image Resolution, Statistical Analysis, Computational Modelin,Conferences

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Agri-food Traceability Using Blockchain Technology to Ensure Value Chain Management and Fair Pricing in Bangladesh

Syeda Tasfia Tasnim, Md Ariful Islam, Rawnak Jahan Taifa, Sraboni Mahbub and **Mohammad Rifat Ahmmad Rashid**[*]

ABSTRACT

The agri-food supply chain plays the most vital role in the socioeconomic sphere to the producer and consumer's avail. In the traditional agri-food supply chain in Bangladesh, the farmers need to hinge on the intermediaries for selling their products as there is a limitation of communicative medium between producers and consumers. Also, the fair pricing of agri-food products and transparency are significant issues in the traditional supply chain system. In this paper, we propose a conceptual blockchain-based agri-food supply chain model for Bangladesh where the farmers can communicate with consumers and sell products directly without any inter-agency. This model helps to incorporate transparency in the agri-food supply chain and fair pricing of the agri-food products between producers and consumers.

Keywords: Supply Chains, Crops, Pricing, Consensus Algorithm, Media , Fasteners, Blockchains

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Arduino and NodeMCU based Smart Soil Moisture Balancer with IoT Integration

Mubarak K. Kankara[*], Al Imtiaz[†], Imran Chowdhury[‡], **Md. Khalid Mahbub Khan**[§] and Taslim Ahmed[**]

ABSTRACT

Without proper moisture in the soil, the process of agriculture can fall in danger, which can lead to even an economic collapse for a country. However, over-irrigation, under irrigation, or improper water distribution can result in crop damage and reduced productivity, which leads to waste of valuable resources including water. To contribute to addressing this issue, a smart soil moisture balancer is developed based on Internet of Things (IoT), with the help of a soil moisture sensor, water pump control, water flow meter, water level indicator, Arduino Uno, and NodeMCU with built-in Wi-Fi (IEEE 802.11b Direct Sequence) module. The developed system intelligently controls the irrigation pump's switching based on the data collected from a soil moisture sensor. The water level indicator provides data on water availability in the storage, and the water flow meter provides data on water flow rate, which gets transmitted to the ThingSpeak IoT server that stores the data and generates graphs to help with the analysis and making future decisions. A prototype of the developed system is made, verified, and tested to be working perfectly as designed and programmed. In the experiment with the prototype, it is found that the system saves 36.17% of water in case of sandy soil, 37.08% and 32.90% in case of clay soil and loamy soil, respectively. On average, the system saves 35.38% of the water, which in turn can save other intertwined resources like time and energy, keeping the efficiency of the irrigation system.

Keywords: IoT, Soil Moisture, Irrigation, Water Flow Meter, Pump Control, Water Level Indicator, Sensor, Arduino Uno, Nodemcu, Thingspeak

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Remote Health Monitoring System using Microcontroller – Suitable for Rural and Elderly Patients

Md. Khurshed Alam[*], Imran Chowdhury[†], Al Imtiaz[‡] and **Md. Khalid Mahbub Khan**[§]

ABSTRACT

Without proper moisture in the soil, the process of agriculture can fall in danger, which can lead to even an economic collapse for a country. However, over-irrigation, under irrigation, or improper water distribution can result in crop damage and reduced productivity, which leads to waste of valuable resources including water. To contribute to addressing this issue, a smart soil moisture balancer is developed based on Internet of Things (IoT), with the help of a soil moisture sensor, water pump control, water flow meter, water level indicator, Arduino Uno, and NodeMCU with built-in Wi-Fi (IEEE 802.11b Direct Sequence) module. The developed system intelligently controls the irrigation pump's switching based on the data collected from a soil moisture sensor. The water level indicator provides data on water availability in the storage, and the water flow meter provides data on water flow rate, which gets transmitted to the ThingSpeak IoT server that stores the data and generates graphs to help with the analysis and making future decisions. A prototype of the developed system is made, verified, and tested to be working perfectly as designed and programmed. In the experiment with the prototype, it is found that the system saves 36.17% of water in case of sandy soil, 37.08% and 32.90% in case of clay soil and loamy soil, respectively. On average, the system saves 35.38% of the water, which in turn can save other intertwined resources like time and energy, keeping the efficiency of the irrigation system.

Keywords: Health Monitoring, Heartbeat Sensor, Oxygen Saturation, Temperature Sensor, Microcontroller, GSM Module, IR Sensor, Photodiode

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Albedo and Temperature Aware Analysis of Bifacial vs Monofacial Floating Photovoltaics in Bangladesh

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ABSTRACT

The floating photovoltaic (FPV) systems are installed over water bodies, such as ocean shores, lakes, lagoons, or other commonly under-utilized water bodies. This relaxes the need for large area of lands which is scarce in some countries. Panels in FPV are typically mounted on a pontoon-based floating structure or installed over water surface. In this work, we present a numerical model and analyze how bifacial and monofacial modules perform in FPV systems. Typically, temperatures are lower over water bodies. We study the gains of FPV from this cooler environment while focusing on the yield in two locations in Bangladesh, namely: Cox's Bazar and Dinajpur. We analyze effects of different albedo (due to water or pontoons) as well as the effects of varying ambient temperature. Our results show that any FPV system produces more energy than land-mounted systems (due to better efficiencies of cooled cells). There can be considerable gain of using bifacial panels. We observe < 3% bifacial gain for panel arrays mounted over water (i.e., effectively no pontoon-area coverage), while FPVs over white pontoons can have bifacial gains > 5%.

Keywords : Photovoltaic Systems, Sea Surface, Focusing, Lakes, Reliability Engineering, Numerical Models, Land Surface Temperature

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A Cross-Country Techno-Economic Assessment of Soiling-Affected Solar Farms in Bangladesh

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Redwan N. Sajjad[†] and **M. Ryyan Khan**[‡]

ABSTRACT

With the rapid capacity expansion of photovoltaics (PV) power plants, it is now increasingly important to efficiently operate these systems. One of the operational challenges is the cleaning and maintenance to mitigate yield-degradation due to soiling. While large PV plants have their cleaning strategies, these may not be optimal. It is important to understand the cleaning periods to maximize revenue and profit, and the economic losses involved away from the optimal. In this paper, we present energy and economic analysis under various periodic cleaning cycles across Bangladesh. The soiling rates are estimated from our long-term experiments in Dhaka. We also present a rain and soiling-aware, location-specific PV output model to predict energy output and revenue for 6-different locations in Bangladesh. We find that, across these locations, the profit of a solar farm can decrease by 22-35% if the panels are cleaned every 1.5 months (~50 days) instead of the optimal cycles.

Keywords : Economics, Photovoltaic Systems, Rain, Soil Measurements, Predictive Models, Maintenance Engineering, Cleaning, Numerical Models

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A Techno-Economic Analysis of Bifacial Panels Under Soiling in South-Asian Urban Area

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ABSTRACT

In-field photovoltaic (PV) panels accumulate dust over time which degrade the output. If unaddressed, this can significantly reduce the revenue. Many of the prior works include experiments and numerical calculations to analyze soiling rates and its effects on monofacial panel output and cleaning cycles throughout the globe. While Asia contributes to a large fraction of the global PV capacity, it also encompasses regions with very high soiling rates. In this work, we experimentally study effects of soiling on monofacial and bifacial panels at 0°, 20°, and 30° tilt angles in urban SouthAsia (Dhaka, Bangladesh). Two sets all these configurations are used to measure output of clean and unclean panels. The measured data are used to find the performance ratio and the soiling rates for each configuration. Finally, we numerically model and predict cleaning cycle dependent revenues for monofacial and bifacial panels for the selected tilt angles. Over the two-month study period, even with five rain events (natural cleaning) the revenue of the panel without manual cleaning is surpassed by that of the optimally cleaned panels. This signifies the importance of optimal cleaning cycle analysis.

Keywords : Photovoltaic Systems, Rain, Soil Measurements, Numerical Analysis, Asia, Urban Areas, Predictive Models

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Interposed versus Juxtaposed Solar Array Configurations for Agrivoltaics

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ABSTRACT

The agrivoltaics (AV) farm are traditionally configured as interposed photovoltaic (IP-AV) panel arrays on crops, however IP-PV requies heightened panel fixtures to provide clearance for cropping machines. This complicates the architecture and increases the price. One wonders if one could achieve the same integrated output (with same crop-loss) by subdividing the land for panels and crops for a juxtaposed (JP-A V) setup. If viable, the JP-AV configuration would simplify AV design considerably. Here we have used state-of-art PV and crop modeling tools (i.e. Purdue Solar Farm Simulator and APSIM) to numerically explore the design considerations of these AV setups in China and India. We find that for a finite land constraint, IP-A V will always yield higher output and the design can be optimized to produce 4 times higher energy than JP-AV. In both cases, output per panels are comparable. IP-AV essentially allows for more panels to be installed on the finite land while maintaining the predefined or allowable crop-loss. These results have important implcations for policymaker in deciding on renewable energy readmaps for a country with limited lands and PV equipment manufacturers in deciding the creating innovative trackers for AV systems.

Keywords : Photovoltaic Systems, Renewable Energy Sources, Fixtures, Crops, Numerical Models

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Cyber Threat Detection Using Machine Learning Algorithms on Heterogeneous MiniVHS-22 Dataset

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ABSTRACT

Large and varied amounts of data are needed for the research of emerging machine learning (ML) techniques for detecting network threats, such as malware-related threats. The research community has been using a number of network traffic datasets that have been proposed in recent years. The majority of these datasets contain, however, only a few classes of bot and malware, lacking significant diversity and generalization to identify threats. In this work, we considered a modified version of the VHS-22 dataset that we termed as MiniVHS-22. This dataset contains flow parameters extracted using a software network probe from four datasets and a network traffic malware monitoring website. Our methodology evaluates seven different machine learning techniques. More than 99% of the threats associated with malware are successfully identified by the Random Forest Classifier, Decision Tree, and Multilayer Perceptron. Additionally, we used different dimensionality reduction techniques such as the Principal Component Analysis (PCA), and Linear Discriminant Analysis (LDA) with varying numbers of principal component values. Sophisticated network traffic threat detection systems can be developed using the results of our investigation.

Keywords : Dimensionality Reduction, Telecommunication Traffic, Multilayer Perceptrons, Malware, Decision Trees, Computer Crime, Probes

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Genomic Diversity and Resistome Profiling of Multi-Drug Resistant Salmonella Enterica Subsp. Enterica Isolated in Bangladesh

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ABSTRACT

The Salmonella enterica cause 21.6 49 million illnesses and 216,0 0 0 deaths worldwide during 20 0 0 and remains a sub- stantial global health concern. Multidrug-resistance (MDR) in Salmonella is increasing but its whole-genome sequence (WGS) based resistome profile was merely evaluated in Bangladesh. In this study, we aimed to identify the key genomic features of MDR Salmonella. Both Salmonella strains (Z12888 and Z13019) were isolated from diarrheal patients and subjected to WGS analysis based on their antimicrobial resistant (AMR) profiles to the five different classes of antibiotics (Macrolides, Penicillins, Tetracycline, Quinolones and Cephems). Genomes were sequenced on Illumina MiSeq platform and analyzed using several bioinformatics approaches. The MDR Z12888 strain was resistant to all five groups of antibiotics and its genome was substantially rich with AMR genes, virulence factors and mobile genetic elements (MGEs). Five different types of plasmid (IncHI2, IncN, IncQ1, Col440I and ColpVC) were identified in Z12888 strain. It also possessed 17 AMR genes (against 7 classes of antibiotics) of which seven genes were plasmid-borne. The AMR genes were arrayed as resistance gene cassettes like int 1- aac C -aad A7- qac Edelta1- sul 1 in an integron region, and sul 2- aph (3) Ib and ant (2) Ia- dfr A14 were in plasmids. We found 117 MGEs in the MDR strain Z12888 of which 31 were plasmid borne. Fimbrial protein encoding genes (fae C-F and fae H), secretion system effector genes (sse K1 and ste B), and flagellar chemotaxis associated gene tsr were uniquely found virulence factors in Z12888 strain. Additionally, 6 phage integrations were detected in Z12888. On the other hand, non- MDR Salmonella enterica Z13019 was harboring one IncX3 family plasmid with quinolone resistant gene qnr B7. Three phages and 68 MGEs (5 plasmid borne MGEs) were also detected in Z13019. The AMR genes were originated as pathogenicity islands in chromosome or MGEs. Epidemiological mapping of AMR profiles in large population may guide the current treatment strategy more precisely and effectively.

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Resistome Profiles and Genome Dynamics of Multi-Drug Resistant Shigella Spp. Isolated in Bangladesh

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ABSTRACT

Multi-drug resistance (MDR) in Shigella remains public health burden, especially in resource-limited settings like Bangladesh. However, genome-wide studies to track the origination and epidemiology of antimicrobial resistant (AMR) genes are scarce here. Therefore, the study was designed to assess outraging drug resistance in Shigella and to map AMR genes in the genome. Shigella strains were isolated from stool specimens of diarrheal patients in Bangladesh. MDR phenomena were determined by antimicrobial susceptibility tests (AST). Whole-genome sequencing (WGS) was performed on the Illumina platform and the genomes were analyzed using many bioinformatics approaches. We screened 11 MDR and 2 non-MDR Shigella strains from the AST results and subjected them to WGS analysis. Analyzing the genomes, we identified 27 AMR genes of 9 different classes arrayed as pathogenicity islands in mobile genetic elements (MGEs). The extended-spectrum beta-lactamase (ESBL) gene bla CTX-M-15 was present in 4 MDR strains as IS 1380 - bla CTX-M- 15- Wbu C gene cassette in Tn7 transposon. The bla CTX-M-15 gene was not novel but the island was very new in Shigella. Another plasmid-mediated ESBL-gene bla TEM-1 was neighboring the erm B- IS 26-mph (A) -mrx-mph (R)(A)-IS 6100 macrolide resistant gene cluster. The aminoglycoside-resistant gene aad A1 was found in the Tn7 transposon of 6 MDR strains arrayed with dfr A gene, integrases (int 1 and int 2), and different transposes. Macrolide resistance genes were identified in two separate plasmid-borne gene cassettes like erm B-IS 26-mph (A) -mrx-mph (R)(A)-IS 6100 and unique mph (E)- msr (E)-IS 482 -IS 6 in 3 and 2 MDR Shigella strains respectively. The incidence rate of the highly pathogenic erm B-IS 26- mph (A) - mrxmph (R)(A)-IS 6100-bla TEM-1 containing plasmid was found to be exponentially increasing globally. Type-1 CRISPRs were identified in 85% of the strains where most of the spacers were incorporated from the Escherichia coli H240 plasmid. Drug-resistant gene clusters evolve and propagate among enteropathogens through MGEs. The rise of stronger Shigella superbug can be predicted from the study, however, global epidemiological tracking of MDR related MGEs in Shigella is needed to unveil the AMR-network.

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Prevalence of Antibiotic Resistance Enterobacteriaceae in the Slums in Dhaka City

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ABSTRACT

Objective: This study aimed to identify the antibiotic resistance scenario of enteric bacteria like Salmonella and Shigella in the slums in Dhaka city. Methods: A total of 45 samples which were categorized into three sectors: raw vegetables, soil (dry and wet), and water was collected from 15 different slums in Dhaka city. From these samples Salmonella-Shigella agar was used to isolate Salmonella spp. and Xylose Lysine Deoxycholate agar was used to isolate Shigella spp. All isolates were subjected to different biochemical tests for species identification. Biofilm formation abilities of the isolates were measured using crystal violet assay. The antibiotic disc diffusion test was performed using 14 different antibiotics including as ampicillin, amoxicillin, penicillin, amikacin, gentamicin, azithromycin, erythromycin, cefixime, cefoxitin, ceftriaxone, imipenem, ciprofloxacin, chloramphenicol, and tetracycline. Finally, PCR was done for Salmonella and Shigella to confirm the presence of 8 antibiotic resistant genes: tetA, sul1, cat1, mecA, aacA-aphD, ermA, blaZ, and pbp2a. Results: Within 15 slums, Salmonella was detected in 8 slums and Shigella was detected in 13 slums. In total, 50 isolates were identified where 15 were Salmonella spp. and 35 were Shigella spp. The highest OD value of Salmonella was 0.242 and for Shigella, it was 0.1005 ($p<0.05$), these isolates were resistant to 10 antibiotics which indicate that isolates with higher OD values will be resistant to more antibiotics. All the Salmonella isolates were resistant to ampicillin, amoxicillin, penicillin, gentamicin, erythromycin, and imipenem; only chloramphenicol was sensitive to all isolates. In the case of Shigella, all isolates were resistant to ampicillin, penicillin, cefixime, erythromycin, chloramphenicol, and imipenem, where only azithromycin was sensitive to all isolates. The presence of tetA, sul1, mecA, ermA, blaZ gene was observed in Salmonella spp. Whereas cat1 gene was observed in Shigella spp. isolates. However, there was no consistent correlation between higher biofilm formation and high antibiotic resistance was observed. Conclusion: This study indicates that antibiotic-resistant Salmonella and Shigella were present in the surrounding environment of the slums in Dhaka city, which may pose a great risk for food safety and public health.

Keywords: Salmonella, Shigella, Antibiotic Resistance, Biofilm, Public Health

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Multiple Resistance Mechanisms Conferring Reduced Susceptibility to Azithromycin in Shigella in Bangladesh: A Whole Genome Based Comprehensive Approach

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ABSTRACT

Shigella causes second highest diarrheal deaths worldwide, where azithromycin (AZM) offers a potential treatment option to treat Shigella infection. The recent emergence of reduced susceptibility to AZM (RSA) in Shigella threatens the current treatment strategy. Therefore, we aimed a comprehensive whole genome based approach to better understand the mechanisms causing high rate of RSA in Shigella. Antimicrobial susceptibility tests were performed to identify RSA in Shigella. Polymerase chain reaction (PCR), sanger sequencing and whole genome sequence (WGS) based approaches were applied to investigate the presence of macrolide resistance genes (MRGs), mutation(s) in ribosomal protein genes (rpID and rpIV) and 23S rRNA genes, and plasmid born MRGs. Among 150 Shigella strains between 2016 and 2018, 57 (38%) showed RSA in Bangladesh. PCR for 15 MRGs showed that all of the RSA Shigella isolates were carrying macrolide-2′-phosphotransferase (mphA) gene, ermB gene was found in 41% (24/57) strains, and msrE gene was detected in two strains. No potential mutation(s) was found in the two ribosomal protein genes or 23S rRNA genes to define RSA in Bangladesh. The WGS analysis revealed the presence of phosphotransferase mphE in the two strains along with msrE for the first time in Shigella spp. All four MRGs were shown to be plasmid borne and belonged to IncFII family. Moreover, NCBI Blast followed by Gview alignment of the identified IncFII family type plasmids in RSA strains were found to be very similar to the previously reported highly pathogenic pKSR100 plasmid. The IS26-mphA-mrxA-mphR(A)-IS6100 pathogenic gene cluster was identified in two of the IncFII type plasmids. The ermB gene was present adjacent to the pathogenic gene cassette. The mphE and msrE MRGs were identified within the mphEmsrE-IS482-IS6 pathogenic gene cluster in S. flexneri and S. boydii. Reference based mapping and comparative visualization of the annotated plasmid sequences showed that the antimicrobial resistance gene clusters were neighbored by multiple copies of IS6 (e.g. IS26 and IS6100) family insertion sequences. In conclusion, inactivation of AZM through phosphotransferase was the key mechanism of RSA along with the 23S rRNA methylation in Shigella strains in Bangladesh. The rapid dissemination of MRGs in Shigella might be associated with the plasmid originated resistance gene cassettes guarded with pathogenic IS6 family insertion sequences. Our study highlights the need for new alternatives of AZM to fight against Shigellosis in low- and middle-income countries.

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Design and Evaluation of Nanocarrier Embedded Hybrid Hydrogels for Topical Delivery of Hydrophobic Molecules.

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ABSTRACT

Menopause is a substantial event in women's life as it significantly impacts their physiological and psychological wellbeing. As menopause commences, oestrogen and progesterone hormone productions are greatly reduced due to ovarian follicle depletion, resulting diverse symptoms eg vasomotor symptoms (hot flashes, osteoporosis), psychological symptoms (anxiousness, depression, excitation, irritability, mood swings), and physical symptoms (fatigue, insomnia, vertigo, tachycardia, weight gain, muscle & joint ache, breathing problem, vaginal dryness, bladder control problem)[1, 2]. Despite 2-to 4-folds higher chance of having clinical symptoms [3], which reduces quality of life in many women [4], hormonereplacement therapy (HRT) for postmenopausal women are often neglected, especially in developing countries like Bangladesh. Until now, no HRT formulations are produced locally or imported despite having over 80 million women population and well-established local pharmaceutical companies (which exports medicines to many European countries). The typical HRT in menopause is oestradiol (E2). There are many E2 formulations available worldwide for HRT, chiefly as hydrogels or as transdermal patches. The hydrogels formulations are generally applied daily, whereas the patches are replaced every 3-4 days. Even Though patches can provide sustained release of E2, the inconvenience of carrying an external sticky material on the skin reduces its patient compliance. Moreover, patches are more expensive compared to hydrogels making it less accessible for developing countries. The aim of this project is to design lipid core nanocarriers (LCN) embedded hydrogels (HLCN) to provide sustained transdermal delivery of E2 to improve patient compliance, and to reduce treatment cost compared to transdermal patches. The LCNs can release hydrophobic drugs in a sustained manner [5] and can be used for transdermal delivery of hydrophobic drugs [6].

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Comparing in Vitro Permeability of a Nanocarrier-Hydrogel Hybrid System with an Alcoholic Hydrogel for Sustained Transdermal Drug Delivery

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ABSTRACT

Nanocarriers are commonly used as various types of drug delivery systems. However, the topical application of aqueous dispersions of nanocarriers is limited due to high fluidity of the formulations. In contrast, the topical application of various types of hydrogels are common for the good consistency and spreadability properties. For example, most marketed topical preparations of oestradiol (E2), which are used as hormone replacement therapy in menopausal women, are alcoholic hydrogels. Though, such formulations must be applied daily and chronic usage of alcohol can be damaging to the skin. In this paper, a lipid nanocapsule (LNC)-hydrogel hybrid system containing E2 was developed without the use of any alcohol or other organic solvents with an aim to achieve sustained transdermal drug delivery. In the LNCs, more than 95% of the drug was encapsulated and the dispersion was used to prepare a hydrogel using carboxypolymethylene. Moreover, an alcoholic hydrogel containing E2 was formulated to compare the in vitro transdermal E2 permeability using synthetic model STRAT-M®. Additionally, an apparatus for the permeability study was developed by modifying USP dissolution apparatus-I and its suitability was realized by comparing its results with the permeability in Franz diffusion cell apparatus. The LNC-hydrogel hybrid system showed more stable and sustained delivery of E2 compared to the alcoholic hydrogels. Therefore, the E2-LNC-hydrogel hybrid system can be a promising formulation for hormone replacement therapy in menopausal women with the potential to increase dosing intervals, reduce hormone label fluctuations by its more stable flux, and eliminate the damaging effects of chronic alcohol application on the skin.

Keywords: Nanocarrier-hydrogel Hybrid, Lipid Nanocapsule, Hydrogel, Transdermal Drug Delivery, Oestradiol

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Faculty of Liberal Arts and Social Sciences

Moving Beyond Victimhood: Female Agency in Bangladeshi War Movies

Farzana Akhter[*]

ABSTRACT

Anneke Smelik in her book *And the Mirror Cracked: Feminist Cinema and Film Theory* said that "[c]inema is a cultural practice where myths about women and femininity, and men and masculinity, in short, myths about sexual difference are produced, reproduced, and represented." Smelik's utterance cannot be truer in the case of Bangladeshi war movies where the main intention so far has been to conserve the gender stereotypes by representing the male body as an active agent while projecting the female body as submissive and devoid of any agency. Although women have participated in the liberation war of Bangladesh in multifarious ways, from providing practical support for the combatants to fighting dauntlessly alongside men, their active participation in war and nation-building has been surreptitiously pushed to invisibility. Instead, most Bangladeshi war movies represented the female body as passive subjects either as mothers, desolate and helpless rape victims, or, at best, as icons of motherland that needed her men to free her from the enemy aggression. Women's agency is challenged by silencing their voices and marginalizing their bodies so as to valorize masculine prowess and military heroism. In this paper, analyzing Bilkis, the central character of Nasiruddin Yousuff's acclaimed movie *Guerrilla,* I debunk the general perception of women's role in the liberation war 71 war as mere objects or helpless subjects and highlight women's role as freedom fighters. I thus argue that Bilkis subverts the stereotypical view of the female body only as a passive victim and demonstrate how the female body can be an active agent capable of orchestrating the defeat of the enemy and thereby contributing to the freedom of the country. In doing so, I am primarily invested in showing how the visual culture also played a part in muffling the voices of such women, and how by incorporating the missing voice of the female body, *Guerrilla* reclaims female agency and most importantly, challenges the issues of historical accuracy and politics of representation.

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Teacher Student Relationship Through Generations

Ahmed Ahsanuzzaman and **Anowara Rayhan Arusha**[*]

ABSTRACT

The relationship between teachers and students has a great impact on aspects such as students' motivation, their styles of engagement, commitment to their academic goals, their sense of satisfaction, their cognitive and affective development and their final achievement (Barch, 2015; Brown, 2014). Traditionally, in Asian countries teaching is based on the teacher-centred model and students are tied to the old-fashioned teacher-student relationship. In Bangladesh, classes are generally teacher-centred and the class size is usually large. It is difficult to interact with each student in the classroom. However, in the contemporary global context, teachers are expected to foster students' affective learning, and create a supportive, relaxed, equal and empathetic learning environment to stimulate and inspire their self-directed learning (Yan, 2019). This chapter aims to explore the teacher-student relationship at the Department of English, University of Dhaka, one of the oldest higher educational institutions in the country. In doing so, it presents the findings of a study conducted among the current students, alumni, and teachers of the department. We have used Shaver and Mikulincer's (2011) attachment theory to understand and explain the dynamics of teacher-student relationship at the university level.

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Surviving Crises and Imagining Utopia in Han Kang's Human Acts

Md Abu Shahid Abdullah[*] and Tanvir Mustafiz Khan

ABSTRACT

This chapter will interpret the narrative depiction of crises in Han Kang's Human Acts which portrays the characters' struggle against dictatorship. It will compare and contrast Hang Kim's interviews of the Gwangju survivors who withstood the brutality of the torture during and after the timeline of the uprising yet refused to give up fighting with the characters' sufferings in Human Acts to analyze the manner of the crises portrayed in the novel and to critically interpret the characters' individual and collective responses to the crises. Based on the theoretical frameworks of 'apocalyptic fiction' by Frank Kermode and 'state control' by Louis Althusser, this paper will also argue that, after the initial apocalyptic scenario, consecutive crises in the novel occur because of the binary conflict or contrasting ideas among individuals or groups. It will analyze how Kang's stream of consciousness narrative portrays its characters' suppression and recollection of memories both as a means to cope with their trauma and to redeem their identities. Last but not least, it will interpret Human Acts as an allegorical commemoration to the Gwangju Uprising, which took place in the city of Gwangju, South Korea, in 1980, and observe whether it takes a narrative shift to a utopian tone to remain true to the historical aftermath of the uprising.

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Asserting Identity and Establishing Alternative Mode(s) of Speaking: Slavery and the Search for Female Freedom in Ntozake Shange's Sassafrass, Cypress & Indigo

Md Abu Shahid Abdullah[*]

ABSTRACT

Ntozake Shange's Sassafrass, Cypress & Indigo mirrors the inequalities and brutalities of white colonialism on black people where the history of the Americas is seen and depicted from a (de)colonial female viewpoint. In bringing down different literary genres from oral and written cultures and intertwined temporalities and spiritualties, she connects the experiences of black women in the Americas with the experience of colonialism, slavery and its brutalities such as rape, dominance and male violence. Shange highlights the assertion of female identity and subjectivity and the liberation of women; she, however, is well aware of the danger of being silenced again. She offers an insight into the uncertain way of regaining female subjectivity within the heterosexual relationship. By emphasising the lives of black women, Shange demonstrates the way art—music, dance and weaving—plays a significant role towards female emancipation and self-expression, particularly the ways music works as a unifying factor among black people. However, the act of reclaiming black women's artistic and political subjectivity is interwoven with unresolved domestic tension where by denying the accepted notions of marriage, Indigo overcomes the language of domesticity. Through Indigo's rejection of the reconception of the idea of domestic life, the traditional home place metamorphoses into a site of protest or defiance. The subversion of homeplace is further strengthened by reexamining the historical experiences which are made understandable through Indigo's magic, having a substantial root. By depicting the search or struggle for female freedom through spirituality, Shange provides them with a voice against a cruel world that has subjugated and silenced them. Shange also shows the black slaves' connection with spirituality as a way of seeking solace for their suffering and escaping their bitter lives.

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Trauma, Memory and Identity Crisis: Reimagining and Rewriting the Past

Md Abu Shahid Abdullah[*]

ABSTRACT

By dealing with various traumatic events, this volume shows the impact of trauma on the victims' memory and identity on both individual and collective levels. Bringing together scholars from varying social, cultural, ethnic and political backgrounds, it foregrounds the suffering of the marginalised, thus giving them a narrative, a voice. The book shows the way in which the victims of trauma confront the past, instead of running away from it, share their stories with others, and thus (re)assert their shattered identity. It also highlights the way in which (trauma) narratives can enable the traumatised to challenge official history and to come up with an alternative version of it. Put another way, trauma narratives provide the victims and survivors the opportunity to reimagine, to reinvent and to rewrite the past in order to secure a peaceful future, and help them find a place in history.

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Persons with Disabilities in COVID 19: Bangladesh Perspective

Nabila Farhin[*] and Rabeya Basri

ABSTRACT

Persons with disabilities (PWD) remain vulnerable and susceptible to discrimination in crisis, whereas they are entitled to inclusive protection. During the COVID-19 pandemic, global health and other public services nearly collapsed, putting the disability needs on the backfoot. Hence, the World Health Organization (WHO) and the United Nations (UN) provided comprehensive and disability-inclusive disaster management guidelines for the member states to secure PWD. Even though Bangladesh adopted response plans in compliance, disability integration failed to reach the level of expectation. The cardinal disability rights instrument, the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) 2006, obliges the state parties to target and mainstream disability rights during risks and emergencies. Though Bangladesh has the Rights and Protection of Person with Disability Act (RPPDA) 2013 in compliance, the scope of the legislation during crises remains uncertain. This qualitative research investigates whether the current safeguard measures are adequate in protecting PWD of Bangladesh amid the COVID-19 pandemic. The paper first critically examines the existing national disability safeguard measures and then explores the extent of the protection during the pandemic in compliance with international guidance. Relevant primary sources like national and international legislation, guidelines, and policies are analyzed. Secondary sources like authoritative journal articles, books, and newspaper reports are explored to investigate the disability situation. The pandemic management strategies in Bangladesh fall short in disability protection without comprehensive planning and adequate enforcement mechanism. Disability-inclusive disaster regulatory measures and proper monitoring are necessary to yield better protection in future crises.

Keywords: Persons with Disabilities PWD, COVID-19 Pandemic, Bangladesh, Disability

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Disability Considerations in Disaster Risk Information Dissemination in Bangladesh

Nabila Farhin[*]

ABSTRACT

Disaster risk information entails comprehensive information about risks and hazards, exposure of the affected groups, and their vulnerability. Dissemination of disaster information is crucial in the prevention, recovery and rehabilitation stages of Disaster Risk Management (DRM). Persons with Disabilities (PWD) are entitled to risk information during disasters in accessible formats (braille, text-to-speech, sign language, images, texts etc.) as per the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) 2006. In compliance with UNCRPD, Bangladesh enacted the Rights and Protection of Persons with Disability Act (RPPDA) 2013, which calls for PWDs' priority access to information about risks, natural disasters and emergencies. The National Plan for Disaster Management (2021-2025) also highlights disability-inclusive risk information dissemination. The qualitative research investigates whether the existing legislation is adequate to ensure disability access to disaster risk information. The paper first examines the PWD right to risk information guaranteed under international laws. Then it explores compliance of Bangladesh with international standards. Finally, it investigates PWD's accessibility to risk information during recent disasters in Bangladesh. The paper critically examines primary sources like international and national statutes, rules, regulations and guidelines. Secondary sources like authoritative journal articles, books and newspaper reports are contextually analysed. Even though the RPPDA guarantees PWD priority access to risk information, it depends on governmental actions during disasters. Their accessibility needs have not been highlighted in the disaster information dissemination platforms. The PWDs in Bangladesh are, therefore, systematically excluded from accessing disaster risk information.

Keywords: PWD, Disaster Risk Information, Bangladesh

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Revisiting Manhattan Music in the Time of COVID-19: Body Politics, Anti-Asian Racism and Negotiation of Ethnic Identity

Farzana Akhter[*]

ABSTRACT

The rise in COVID-19 cases has not only generated anxiety and uncertainty but has also caused an upsurge in anti-Asian racism all over the world. The racially motivated attacks have forced us to rethink the concept of migration, integration, and racism in a global context. In this paper, I look back at Meena Alexander's *Manhattan Music* and relying on Arjun Appadurai's critical theory in *Fear of Small Numbers: An Essay on the Geography of Anger* I investigate the dynamics that go into making the dominant culture hostile towards immigrants and ethnic populations. Drawing a connection between my reading of the novel and the COVID-fueled racism, I debunk the myth of assimilation as a means of integration and attest that race and ethnicity still play crucial role in the politics of power. That is, despite the ethnic protagonists' negotiation of their subjectivity, their ethnic body will continue to be victims of racial politics and used as scapegoats as long as white supremacy prevails and is considered normative. Revisiting *Manhattan Music* and rendering the connection between race, ethnicity and racism opens up avenues for critical rethinking and compels us to ever more consider the intersection of ethnic identity and race today in an era of global pandemic that has targeted Asian migrants in and beyond America.

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Manifestation of Remix Culture in Bollywood Songs: A Postmodern Analysis

Shahnaz Ameer[*]

ABSTRACT

Bollywood songs have been enjoying their popularity not only in India but throughout the world. With the increase in royalty payment and sinking sales, Indian music industries have taken it to remix songs to survive in the market. This paper will use Fredric Jameson's idea of "Postmodernism" to argue that the Indian music industry has become a showcase of style and effects, with less emphasis on its content. In the current scenario, the real touch is lost and what remains is a pastiche, which has led to Jameson's "deconstruction of expression". By adding a cosmetic touch to super hit old songs, history is undermined, while using people's nostalgia for old songs as a tool of promotion or late capitalism. Similarly, Steve Conner (1989) talks about the "elastic saleability" of the cultural past, with its regular recycling of its own history, which leads to successful capitalism. In this process, viewers are hegemonised by the big music industries. On the other hand, artists and directors seem to have either lost their ability to create original content or surrendered to the tempting profits earned from making copies of the real.

Keywords: Bollywood, Pastiche, Deconstruction of Expression, Depthlessness, Historicism, Nostalgia, Postmodernism, Hegemony

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Affective Factors and the Role of Teachers in Developing Learner Autonomy

Anowara Rayhan Arusha[*]

ABSTRACT

Learners' affective factors play a crucial role in their learning of a foreign language. In Bangladesh, adequate attention is often not given to the learners' affective factors, which results in poor performance of students. This paper aims to examine the role of teachers and learners in understanding the affective factors in language learning and how these will encourage learner autonomy in tertiary level students. An online survey was conducted with a sample of 100 undergraduate and master's students of the English Department from 4 different universities in Dhaka. Data were collected through questionnaires on foreign language classroom anxiety, motivation, background information, and students' perceptions of their English teachers' role in learning a foreign language. Results show that there is a negative correlation between anxiety and language learning and a positive relationship between motivation and language learning. Moreover, the roles and responsibilities of teachers in developing learner autonomy are crucial. The discussion on the complex impact of affective factors on English learning in EFL contexts can be an avenue for future intervention studies.

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Impact of Textual Enhancement on EFL Learners' Noticing and Acquisition of Noun and Verb Phrases. In: Khan, R., Bashir, A., Basu, B.L., Uddin, M.E. (eds) Local Research and Glocal Perspectives in English Language Teaching

Akhter Jahan[*] and Subramaniam Govindasamy[†]

ABSTRACT

It has been argued that textual enhancement (TE)—modifying the written input visually—can raise the saliency of target forms. This focus on form procedure can enable learner's noticing of forms which is a crucial factor in language learning and acquisition. The fourteen-week quasi-experimental study reported in this chapter examined whether multiple exposures to enhanced texts could promote participant's noticing and thereby grammatical development of three pairs of forms related to certain uses of articles, modal auxiliaries, and voice in the noun and the verb phrases. One hundred Bangladeshi tertiary learners participated in the study. They were divided into three groups: enhanced, non-enhanced, and control. A reading comprehension task, a noticing question, and two grammar tasks were used to elicit data. A pre-test along with post-tests was conducted. Six sets of texts were used. The data were analyzed quantitatively. The results revealed that multiple exposures to TE would be effective in increasing the noticing and acquisition of the targeted forms to different extents depending on their distinctive features. Based on the findings, we argue that teachers should take those features into account and introduce the forms by focusing on their form-meaning-function mappings in the class to promote learners' grammatical development.
Keywords: Textual Enhancement, Input, Noticing, Grammatical Development

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Equity, Fairness, and Social Justice in Teaching and Learning in Higher Education During the COVID-19 Pandemic

Moninoor Roshid, Shaila Sultana, Md. Naushaad Kabir, **Akhter Jahan**[*], Rubina Khan, Md. Zulfeqar Haider

ABSTRACT

Equity is crucial in maintaining human rights in the education sector. It has become more crucial due to the abrupt global spread of coronavirus and the initiation and affordances of unequal accessibility to online teaching, specifically in resource deficit peripheral countries like Bangladesh. Hence, it seems pertinent to explore if online education ensures educational equity, fairness, and social justice for students and teachers in Bangladesh. Data were collected from teachers and students at private universities in Bangladesh through online surveys followed by Focus Group Discussions (FGDs), and the data were analysed through descriptive statistics and thematic analysis. Based on the findings, the paper shows that students from underprivileged backgrounds in rural and sub-urban areas in Bangladesh do not have educational equity. They do not have access to uninterrupted internet facilities and amenities required to attend online classes. Fairness seems to be absent too. Both students and teachers feel that academic integrity in assessment has not been maintained adequately. Universities have not taken appropriate redistributive policies and removed institutional mechanisms that discriminate against low-income people. Consequently, social justice seems compromised. In the end, the paper suggests possible ways to ensure equity, fairness, and social justice in online pedagogy in higher education.

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University Students' and Teachers' Wellbeing During COVID-19 in Bangladesh: A Qualitative Enquiry

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ABSTRACT

The wellbeing of teachers and students has emerged as a common concern in research studies in recent times, specifically during the critical period of COVID-19. Based on the findings drawn from the qualitative data through focus group discussions of five groups of teachers (16 females and 8 males) and students (10 males and nine females) at the tertiary level of education in Bangladesh, this paper shows that online teaching during COVID-19 is affected by personal and social challenges, and consequently, both teachers and students experience anxieties and stresses. Teachers are anxious because of the university authorities' surveillance, frequent pay cuts, and fear of losing jobs due to students' low enrollment in universities. They also suffer from physical discomforts, such as back pain, blur vision, and headache because of the prolonged engagement with online activities. Students, especially those from a non-privileged background located in peripheral rural contexts, seem to suffer more from contextual realities that are non-conducive for technology-based learning. Increased numbers and various forms of online assessments also seem to become a burden for them. In general, educational experiences of online teaching seemed to have a peripheral role in their conceptualization of wellbeing. The paper concludes that the insurmountable attention given to online pedagogic practices across the world needs to be balanced out by an equal effort in improving the wellbeing of both teachers and students.

Keywords: Qualitative Enquiry Wellbeing, Online Teaching, Higher Education, COVID-19, Bangladesh

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"Integrative" Or "Instrumental"?: Motivation that Works Closely During the Adolescence Days of Female English Language Learners of Different Universities of Bangladesh

Md. Shazed Ul Hoq Khan Abir[*]

ABSTRACT

From my experience of four years of teaching basic English language skills development courses in two different Universities of Bangladesh, I found that – students with a tendency to be 'integrated with' the culture that comes with the language being taught, have a higher motivation to perform better than other students in classroom communication, as well as in formal exams. In this gender specific case study, focusing on the female students who have done basic English skill development courses with me in two specific universities of Bangladesh, I have attempted to figure out - whether their integrative motivation towards the target language (English) culture is the main driving force to learn English better, or whether is it their instrumental need to learn that particular language that makes them better learners of English. Through personal interviews with my research participants, who showed better competence and obtained better grades than others in my Communicative English class - I tried to figure out their root of motivation to master linguistic competence. In this case study, I have considered (Gardner & Lambert, n.d.) distinction of integrative and instrumental motivation as my primary source.

Keywords: Bangladeshi SLA Students, Bangladeshi Female SLA Students, Integrated Motivation, Motivation, Second Language Acquisition

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Digital Library Services to Support Online Learning Amid COVID-19: A Study of a Private University Library in Bangladesh

Dilara Begum[*] and **Md. Hasinul Elahi**[†]

ABSTRACT

Purpose: The purpose of this paper is to discuss the East West University Library's (EWUL's) response to COVID-19 situation through their transformation to digital services. The paper tries to explain how these digital library services support the user community of East West University (EWU) in online teaching and access to information resources. Design/methodology/approach: This paper describes the EWUL's several digital services that are used to meet the needs of its user community during the COVID-19 pandemic. The reflective practice approach has been undertaken for this study on the basis of the authors' personal experiences working at an academic library. The authors used the reflective practice approach to assess the library's practice during crisis situation, make the use of technological interventions in service providing and also to re-innovate the digital services for future. Findings: During the pandemic, the library shifted all the possible physical or on-site services to digital services, i.e. online resource facilities and remote access to these, federated searching, Web online public access catalog, engaging users through social media, specialized knowledge space, online document delivery, article on request, information literacy training, virtual reference service, etc. The user engagement in all these services is also notable. Research limitations/implications: The nature of this study is limited to the COVID-19 pandemic and within a particular geographic location. Practical implications: This paper has implications and possible applications for other university libraries in developing countries, which intends to transform their services into digital for ensuring better service quality for their respective user community. Originality/value: This paper makes a valuable contribution to the literature on how a private university library of a developing country is responding to pandemics such as COVID-19.

Keywords: Online Learning, Bangladesh, COVID-19, Digital Library Services, East West University Library, Higher Education

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The Rohingya Refugee Crisis: Analysing the International Law Implications of Its Environmental Impacts on Bangladesh

Md. Pizuar Hossain[*]

ABSTRACT

Bangladesh is hosting many Rohingya refugees, who were forced in different periods starting from the late '70s to leave the Rakhine state (formerly Arakan state) of Myanmar (formerly Burma). The most significant number of them fled to the Cox's Bazar region of Bangladesh in 2017. This article thus examines the international law implications of the environmental impact of the unprecedented and unanticipated 2017 Rohingya mass influx on the ecological resources of the Cox's Bazar region of Bangladesh. It argues that Myanmar's implementation of atrocious and discriminatory policies through its militia's violent acts forcing the Rohingya to leave Myanmar and take shelter in Cox's Bazar caused environmental damage in Bangladesh. The core argument is that Myanmar should be held liable based on customary international law and treaty obligations. Hence, this article explores selected international law avenues offering only a preliminary overview of Myanmar's potential state responsibility for paying compensation to Bangladesh and undertaking steps to prevent further environmental harm and restore biodiversity in the areas where the Rohingya refugees are settled.

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Repatriation of the Rohingya Refugees: Geo-politics and the Potential Role of International Court of Justice

Md. Pizuar Hossain[*]

ABSTRACT

The Rohingya crisis began hitting the airwaves on a massive scale after 25 August 2017. Since then, a significant number of the Rohingya fled from the Rakhine State of Myanmar to some of its neighbor countries. Myanmar as a State and its military are alleged to have violated the human rights norms and the Genocide Convention against the Rohingya in different times. The Cox's Bazar region of Bangladesh, which borders Myanmar, now hosts the largest number of them in the refugee camps. Those who fled after 25 August 2017 joined the existing Rohingya residents in Bangladesh. Although bilateral agreements were made between Bangladesh and Myanmar with the cooperation of the United Nations High Commissioner for Refugees during the late'70s and'90s, implementation of both the agreements was arguably ineffective. Furthermore, the Rohingya crisis is not left without geopolitics due to, inter alia, having economic interests of some countries over the Rakhine State of Myanmar. Consequently, there is little possibility for safe and voluntary Rohingya repatriation to their homeland under international law. Hence, this study explores the geopolitical aspects of the crisis in line with the justice efforts made for the Rohingya. It also analyses the potential role of the International Court of Justice to order for the Rohingya repatriation in the realm of the genocide case between The Gambia and Myanmar.

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1971 Killing of the 'Bengali' Intellectuals: An Analysis from the Perspective of the 1948 Genocide Convention

Md. Pizuar Hossain[*]

ABSTRACT

The lessons of the history of past genocidal incidents expose that the educated and the leaders, collectively called 'intellectuals', have often been a distinct target by the perpetrators. Bengali intellectuals were also targeted and killed by the Pakistani military and its local collaborators during the 1971 Bangladesh Liberation War. As the Bangladesh genocide, committed by the Pakistani military and its local collaborators, is still internationally overlooked, the issue of killing the Bengali intellectuals during such genocide has not obtained much attention. This study identifies the killing of the intellectuals as one of the genocidal policies employed by the Pakistani military and its local collaborators during the war. The massacre of the Bengali intellectuals in the 1971 Bangladesh Liberation War is examined in this article from the perspective of the 1948 Genocide Convention. The authors have critically analyzed the killing of the Bengali intellectuals in light of the definition of 'genocide' and the travaux preparatoires of the Convention to explore whether it forms a genocidal policy.

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In Search of the Protection of Minority Rights in Bangladesh: Laws, Fallacy and Reality in "Yearbook on Human Rights and Bangladesh: Leadership in Prospect

Mridul Bepari[*] and Mizanur Rahman

ABSTRACT

Minority rights within present context of Bangladesh portray diversified discrepancies, which have failed to attract jurisprudential concentrations from the part of the state. In order to avoid the pressure created by different activist groups, most of the times the existence of minorities is denied by the state authorities. Human rights activists argue that there are many minority communities living in Bangladesh in terms of their religion identity, ethnicity and mother languages. That is why this research paper aims at depicting their existence and the mariginalisation process they are undergoing. Setting the scene of the research, this paper has consulted the international instruments talking about the rights of the minorities.

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Effects of the Nature of Urban Development on Land Surface Temperature (LST) at the Neighbourhood Scale in Dhaka City, Bangladesh

Md Anwar Hossain, Shahana Sultana and **Md Rezwan Siddiqui**[*]

ABSTRACT

This study investigated the effects of the nature of urban development on land surface temperature (LST) and the strengths of different biophysical and anthropogenic factors in explaining the spatial variation of LST at the neighbourhood scale in Dhaka city, Bangladesh. Landsat 5 TM and Landsat 8 Operational Land Imager (OLI) images were used to retrieve LST. The study found that the mean LST in Dhaka increased at a rate of 1.26°C per decade between 1991 and 2014. LST is found to be higher in the built-up areas, particularly in informally developed areas (i.e., slum settlements) and unplanned mixed-use areas. The OLS analysis indicates that along with bio-physical factors population density, building density and slum concentrations also have a significant effect on the spatial variation of LST at neighbourhood scales. The study findings suggest a planned development with the provision of vegetation cover and water bodies can significantly reduce the LST in Dhaka.

Keywords: Land Surface Temperature, Urban Development, Slums, Neighbourhood, Planning, Dhaka

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Bangladesh at Fifty: Changes and Challenges in Population and Development

Mohammad Mainul Islam, **Md. Anwer Hossain**[*] and Rahul Kumar Sanjowal

ABSTRACT

Bangladesh turned 50 in 2021 having made remarkable progress in population and development, such as reducing total fertility and maternal mortality, boosting contraceptive prevalence, reducing infant and child mortality, increasing life expectancy at birth, and enhancing gender parity in schooling, women's empowerment, and overall development. This paper explores the past and determines the drivers of population change and development challenges, the current situation, and future trends and issues up to 2041—the year benchmarked for the country to attain 'developed' status. The study uses censuses, national-level surveys, population projections, and UN and World Bank data. Reducing total fertility, curbing child marriage, addressing adolescent motherhood and their unmet need for family planning, reducing high maternal mortality ratios, the double burden of diseases and malnutrition, addressing population ageing, high youth unemployment, low female labor force participation, and increased climate change vulnerabilities are critical challenges. The demographic dividend needs urgent action. To reach the SDGs by 2030, the country must eliminate unmet contraception needs, preventable maternal deaths, and gender-based violence, and harmful practices, including child marriages.

Keywords: Population and Development, Demographic Transition, Population Dynamics, Bangladesh

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Reproductive Health and Rights in the COVID-19 Era: Why and How are Rights and Choices Still the Answer?

Md. Anwer Hossain[*]

ABSTRACT

Though the global population has been growing for hundreds of years at a rate that increased or decreased with unprecedented booms or busts and consecutive rebounds, the ongoing COVID-19 pandemic has led to population alarmism that might put individual or couples' rights and choices at stake. This paper draws on historical as well as contemporary shreds of evidence and argues that whether the countries of the world face a COVID-19-induced short-term baby boom or baby bust, the solution lies in prioritizing the reproductive health and rights of all people, and thereby, calls for a global recognition that there is no effective alternative other than upholding the rights and the choices of individuals in shifting fertility rates as per the need of each country.

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Bangla Version of the Brunel Mood Scale (BRUMS): Validity, Measurement Invariance and Normative Data in Non-Clinical Sample

Md. Mahmudul Hasan[*] and M. H. A. Khan

ABSTRACT

Mood assessment is an effective way to monitor mental health states and detect potential psychiatric symptoms. The Brunel Mood Scale (BRUMS) is one of the most widely used self-report measures for assessing mood responses. The current study examined the psychometric properties of the Bangla version of BRUMS and validated it with the Positive Mental Health scale (PMH-scale). The participants were 1015 Bangladeshi university students (62% men) aged from 18 to 27 (M = 21.95, SD = 1.95). The confirmatory factor analysis (CFA) approach was used to test the factor structure of the BRUMS and measurement invariance for sex. The CFA revealed that the originally proposed 6-factor model of BRUMS had an acceptable fit which confirms factorial validity. Moreover, each subscale (anger, confusion, depression, fatigue, tension, and vigor) of the BRUMS showed high internal consistency (α ranged from .77 to .87) and retest reliability (ICC ranged from .71 to .91). Concurrent validity of the BRUMS was supported through the hypothesized relationships with mental health (PMH-scale). Full measurement invariance by sex was confirmed for the 6-factor model indicating that the BRUMS is equally applicable to men and women. Finally, normative data were established which allows group comparison of mood scores. This study indicates that the Bangla version of BRUMS can be reliably used to assess mood response which facilitates mood-related research and intervention to improve mental health and reduce psychiatric disorders in Bangladesh.

Keywords: Bangla BRUMS, Mood, Emotion, Mental Health, Measurement, Invariance

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Morningness-Eveningness Preference and Shift in Chronotype During COVID-19 as Predictors of Mood and Well-Being in University Students

Md. Mahmudul Hasan[*], K. S. Jankowski and M. H. A. Khan

ABSTRACT

It is suggested that social obligations, such as early work/school starts, have a disadvantageous impact on sleep behavior that can further transfer to mental health problems. Lockdown as a result of the COVID-19 pandemic created a unique opportunity to research human sleep-wake behavior in naturalistic conditions of decreased social obligations. This study aimed to test whether a change in habitual sleep-wake timing (shift in chronotype) during the COVID-19 lockdown impacted mood and well-being, and whether the impact differs according to morningness-eveningness preference. University students (N = 1011; Meanage = 21.95 ± 1.95 years) filled out self-report questionnaires containing measures of chronotype (midpoint of sleep) before and during the COVID-19 lockdown, morningness-eveningness preference, mood, and well-being. The impact of morningness-eveningness preference and shift in chronotype was tested via multiple regression analyses. Results showed that participants shifted their chronotype in line with their morningness-eveningness preference, and that shift toward earlier sleep-wake timing was related to better moods and well-being. Moreover, higher levels of positive mood (vigor) and well-being were found in individuals who shifted their sleep-wake timing earlier and were higher on morningness.

Keywords: Chronotype, COVID-19, Morningness-Eveningness, Sleep Habits, Circadian Rhythm, Mood, Well-Being

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Sex Differences in the Relationship between Morningness-Eveningness Components, Mood and Well-Being among Bangladeshi University Students

Md. Mahmudul Hasan[*], Juan F. Díaz-Morales and Mozibul H. A. Khan

ABSTRACT

On the Morningness/Eveningness (M/E) continuum, eveningness has been related to mood disorder and poor well-being. M/E differs between men and women throughout their lifespan. However, there is a lack of information on sex differences in the relationship between M/E, mood, and well-being. This study aimed to test sex differences in the M/E, mood, and well-being relationship with consideration of two components of M/E, morning affect, and morning preference. A sample of 981 Bangladeshi university students (607 men) aged 18 to 27 (M = 21.95) completed Bangla versions of the Composite Scale of Morningness (CSM), BRUnel Mood Scale (BRUMS), and Positive Mental Health scale (PMH-scale) through an online survey. Multiple regression analyses were used to test the relationship of M/E components with mood and well-being. The results showed that the relationship between M/E, mood, and well-being was greater in women than in men. A lower score on both M/E components was related to higher negative moods (anger, confusion, depression, fatigue, and tension) and poor well-being. In regression analysis, only morning affect was found to be significant, which means that morning affect mainly contributes to the relation between M/E, mood, and well-being. Finally, sex by morning affect interaction indicated that the relation was higher for women. Therefore, higher eveningness could be more hazardous for women than men. Greater insight into the independent contribution of morning affect may facilitate understanding of the chronotype effects on psychological outcomes in men and women.

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Bangla Version of the Composite Scale of Morningness: Factor Invariance and Validity with Sleep Habits, Mood and Mental Health

Md. Mahmudul Hasan[*], Juan F. Díaz-Morales and Mozibul H. A. Khan

ABSTRACT

The Composite Scale of Morningness (CSM) is a self-report measure of circadian preference that is related with one's physical and mental health. This study aimed to explore the psychometric properties of the Bangla version of the CSM and validate it with sleep habits, BRUnel Mood Scale (BRUMS) and Positive Mental Health Scale (PMH-scale). The sample consisted of 1164 (38.8% women) Bangladeshi university students aged between 18 and 27 (M = 21.9, SD = 1.88). Using confirmatory factor analysis, the competing factorial models of the CSM and measurement invariance for sex were tested. The Bangla CSM showed high internal consistency reliability (α = .88) and excellent retest reliability (ICC = .92). The cut-off values for the Bangla CSM were 26 or less for evening-types (lower 10 percentiles) and 46 or more for morning-types (upper 10 percentiles). The Bangla CSM consisted of two components: morningness and morning affect. From eight factorial models, the two-factor bifactor model was found invariant for sex. Higher CSM score (morningness) was significantly related with earlier sleep times, better mood and mental health, which support its validity. The CSM is a valid and psychometrically robust tool for assessing morningness-eveningness in Bangladeshi students.

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Bangladeshi Nursing Students' Perceived Preparedness and Readiness for Disaster Management

Md Khalid Hasan, **Helal Uddin**[*] and Tahmina Bintay Younos

ABSTRACT

This study assesses Bangladeshi nursing students' perceived preparedness and readiness for disaster management activities and examines the influencing factors for the disaster readiness of the students. A self-administered descriptive cross-sectional survey was conducted among nursing students of eight nursing education institutes and hospitals in Dhaka city using the modified Disaster Preparedness Evaluation Tool (DPET) in Bengali (the lingua frank in the country). Three hundred and eighty respondents' data were analyzed using SPSS 25 software. Overall, student nurses' perceived levels of disaster preparedness (mean = 3.12; SD = 0.59), disaster response-ability (mean = 3.65; SD = 0.60), and disaster recovery-ability (mean = 3.45; SD = 0.69) were moderate; however, their perceived readiness for disaster management was low. The levels of disaster preparedness were significantly higher in respondents of public nursing institutes than in the respondents of private nursing institutes ($p = 0.006$). In addition, significant moderate positive correlations were found among the respondents' disaster preparedness, response-ability, and recovery-ability scores ($p \leq 0.01$). Moreover, ordinal logit regression analysis showed that disaster response-ability (OR = 1.97; 95% CI: 1.27–3.05), disaster recovery-ability (OR = 1.59; 95% CI: 1.10–2.29), and gender (OR = 1.90; 95% CI: 1.10–3.28) had a statistically significant influence on the readiness for disaster management of the nursing students. Furthermore, more than half of the respondents recommended more workshops and training on disaster management to increase their disaster management capacity. In addition, one-fourth of them suggested more drills and practical knowledge for enhancing their disaster management capacity. As tomorrow's frontline health workers, student nurses should be well prepared and ready to effectively manage future disasters and emergencies in Bangladesh.

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Coronavirus (COVID-19) Crisis and Suicide in Bangladesh: Some Explanations through Durkheim's Sociology of Suicide

Anisur Rahman Khan[*], **Helal Uddin**[†], **Anowarul Kayes Shimul**[‡] and **Masum Billah**[§]

ABSTRACT

Whilst the world is experiencing an unprecedented and devastating public health crisis due to the COVID-19 pandemic, scholars have apprehended that economic, social and mental health consequences brought by the pandemic might intensify suicidality amongst people. At this backdrop, this content analysis traces the relationship between suicidality and the COVID-19 pandemic employing Emile Durkheim's classical theoretical postulation of the sociology of suicide in the context of Bangladesh. The analysis is based on case reports identified through online newspaper search spanning from January 01 to May 15, 2020. During this period, 10 Covid-19 induced suicide cases were identified. The analysis of the findings captures the linkages between COVID-19 crisis and suicidal behavior according to Durkheim's four-fold typology of the social causation of suicide. The identified cases were fit into egoistic (2), anomic (5) and fatalistic (3) categories. No case was relevant to the altruistic category. As there is no national suicide prevention strategy in Bangladesh, this analysis highlights several immediate and short prevention strategies. Furthermore, this analysis contributes to our sociological understanding that Durkheim's macro-level theory has the potentials to analyze micro-level/case-based suicide incidents.

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Street-based Female Sex Workers and their Vulnerabilities: A Study in the Municipalities of Bangladesh

Rasel Hussain[*] and Amit Kumar Saha

ABSTRACT

The World Health Organization (WHO) estimated that 79.3 million people have been infected with HIV since the pandemic began; 36.3 million died, and nearly 37.7 million people were living with HIV by the end of 2020. The risk groups, including sex workers and injecting drug users, remain to be expanding gradually around the globe. Street-based sex workers (SBSWs) and their clients might have contributed to the increasing rate of sexually transmitted infections (STIs) and the human immunodeficiency virus (HIV) among people in Bangladesh and even worldwide. Both qualitative and quantitative methodologies were used in this research. SBSWs sexual conduct, perceptions of STIs and HIV/AIDS, knowledge of HIV/AIDS, and prevention methods (i.e., condom-usage behavior) were studied in this research using a cluster sampling methodology. Data shows that the median age of sex workers is around 25 years old, which represents the youth group of people. The study came with the findings that a majority (75%) of the female sex workers were married at one point in their lives; 86% of them had sex with clients within the last 24 hours where 41% of them never used condoms, while half of them mentioned that the customers were uninterested in using condoms during sexual intercourse. All these findings clearly indicate the linkage and sources of multiple forms of vulnerabilities.

Keywords: Street-based Sex Workers, Sexual Behaviour, HIV/Aids, Stis. Bangladesh

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Cultural Globalization and Its Stimulus on Urban Youth: A Sociological Study among University Students in Bangladesh

Rasel Hussain[*]

ABSTRACT

The purpose of this quantitative study is to illustrate the influence of globalization on cultural traits among young people, with a focus on the underlying function of cultural globalization. To achieve the study's goal, an online survey was conducted in 2020 among students from six top public and private institutions in Dhaka, with a sample size of 300 students studying at the Bachelor and Master level. The core issue of the study focuses on the concept of globalization as a process that transforms local cultures and impacts people's lives, particularly the young communities in their towns. The current discussion on cultural globalization and its effects on behaviors, choices, norms, values, dietary habits, dress patterns, and the notion of sexuality is being molded and altered by the process, gathering, and access to information, media, and other accessible societal institutions. This study documented those global values. Consumerism have a large-scale impact on urban youth, resulting in many changes in their lifestyle and preferences, as well as cultural orientation; traditional cultural values are no longer identical among them, instead their lifestyle has greatly diminished and assimilated into Western-Indian norms.

Keywords: Bangladesh, Cultural Globalization, Cultural Impact, Dhaka, Urban Youth

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Pathways to the Studies on Men and Masculinities in Bangladesh

Anisur Rahman Khan[*], **Rasel Hussain**[†] and Md. Mizanur Rahman[‡]

ABSTRACT

In any society, the analysis of gender must include 'men and masculinities'. But 'men and masculinities' as research attention is relatively underdeveloped in Bangladesh. This article provides an overview of the current studies on 'men and masculinities' in Bangladesh. Using Pub Med and Google Scholar databases, 37 closely relevant full-text documents were reviewed. This review uncovers that the ideal/hegemonic version of Bangladeshi masculinity is predominantly constructed/epitomized, amongst others, as being the provider, powerful, physically strong, a good sexual performer, and having the ability to control wife. Across studies, the discourses, narratives, and practices of various masculinities in Bangladesh are expressed in the context of religion, migration, sexuality, fatherhood, suicide, violence, women empowerment, sports, and marginality. In some cases, the ideal/hegemonic version of Bangladeshi masculinity encounters serious tensions, ambiguities, resistances, and contestations. Alternative masculine discourses and narratives which reject and resist hegemonic masculine ideals and practices were also noted. This review ends with a call for a future research direction.

Keywords: Bangladesh, Masculinity, Men, Review

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Thwarted Belongingness, Perceived Burdensomeness, and Acquired Capability for Suicide among University Students of Bangladesh: Scales Validation and Status Assessment

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ABSTRACT

Background: Identification of prior mental events of suicide attempts has immense importance in suicide prevention. However, it has not been studied in Bangladesh as there was no available psychometrically valid instrument measuring it. Objectives: We aimed to test the psychometric properties of the interpersonal needs questionnaire (INQ-15) and acquired capability for suicide scale-fearlessness about death (ACSS-FAD) in Bangla along with the determination of the level of thwarted belongingness, perceived burdensomeness, and acquired capability for suicide. Materials and methods: We collected data between 29 March and 14 April 2022 from 1,207 students of medical colleges and universities in Bangladesh by Google form. We assessed the psychometric properties of Bangla INQ and ACSS-FAD scales and examined factors associated with thwarted belongingness, perceived burdensomeness, and acquired capability for suicide. Results: The mean age of the participants was 22.82 ± 1.68 (range 18-29) years, 51% were females, 84% were graduate students, and 92% were unmarried. Both of the scales revealed acceptable levels of reliability. Confirmatory factor analysis revealed a two-factor structure of Bangla INQ after dropping three items from thwarted belongingness domain (item 9, 11, and 12) and a single factor structure for Bangla ACSS-FAD after dropping three items (item 1, 4, and 6). Perceived burdensomeness was significantly higher in females, students with a history of mental illness, family history of suicide, and the history of suicidal attempts. Fearlessness about death was significantly higher among females, non-Muslim participants, and history of suicidal attempts. Conclusion: The current study revealed psychometric properties of two suicide scales (INQ and ACSS-FAD) in Bangla that can be used in subsequent studies. Prevention strategies targeting to females, persons with psychiatric disorder, history of previous attempt(s) should be prioritized specially among the young age group.

Keywords: Interpersonal Needs Theory, Psychometric Properties, Reliability, Students, Suicide in Bangladesh, Validity

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Masculinity and Men's Suicide Attempts in Bangladesh

Anisur Rahman Khan[*], Isaac Dery and Rebecca Helman

ABSTRACT

Drawing on Raewyn Connell's theoretical notion of hegemonic masculinity, this study examines relations between masculinity and suicide attempts in Bangladesh. In-depth interviews were conducted with 17 men from the Jhenaidah district, who had previously attempted suicide. Participants discussed how "real men" were expected to be primary providers, demonstrate their material power and sexual prowess. However, the men disclosed that they encountered difficulties in achieving these versions of hegemonic masculinity in their real lives. Within this context, suicide attempts operated as a redemptive means to overcome perceived masculine "crises." These findings demonstrate that suicide is a socially and culturally constituted phenomenon, which should be understood beyond an individualized and mental health framework. Suicide intervention strategies in Bangladesh must include critical analyses of masculinities, as well as measures to change rigid processes of gendered socialization.

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Social Meanings of Attempted Suicide of Men in Bangladesh

Anisur Rahman Khan[*], Sipho Dlamini and Kopano Ratele

ABSTRACT

Émile Durkheim's Le Suicide (1897/2005) paved the way for the development of the sociology of suicide. However, Durkheim's positivistic approach in studying suicide was trenchantly challenged by, amongst others, Jack Douglas, who, in Social Meanings of Suicide (1968), advocated extricating the social meanings of suicide from the interpretive tradition of social research. Drawing on Douglas' approach to the sociology of suicide, this paper reports and reflects on part of a study conducted across several rural areas of Jhenaidah, an area in Bangladesh highly affected by suicide, with 17 males who have attempted suicide. The responses of the participants were interpreted with a view to understanding the social meanings associated with their suicide attempts. Although there was a diversity of individual experiences among the participants with regard to suicide attempts, the paper synthesises these and reflects on three themes which most closely represent the commonalities of experience of the 17 men, namely: (i) inability to provide; (ii) intimate relationship stress; and (iii) loss of social status. In conclusion, the paper contributes to understanding suicide attempts by men as social meaningfully events, delineating the roles and complexities associated with constructions of masculine identities.

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Men and Climate Change: Some Thoughts on South Africa and Bangladesh

Anisur Rahman Khan[*], Kopano Ratele, Isaac Icon and Shahriar Khandaker

ABSTRACT

This article highlights the impacts of climate change on men from two countries from the Global South, namely Bangladesh and South Africa, as we reflect on climate change as a major consideration in work on the un/making of dominant and marginal masculinities. Climate change has a gender face, showing differential hazards for men and women linked to the structures of gender in society. A limited range of discourses about the impacts of climate change on men is however evident in the literature when attention is paid to masculinity and climate change, with much of the literature focused on women. In this paper, we draw attention to men and issues related to masculinities in the context of climate change discussions related to these two countries. The paper points to several climate-induced impediments such as drought, floods, salinity, lightning, high temperatures that challenge the fulfilment of men's socially prescribed roles and responsibilities.

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Everyday Peacebuilding among Ghanaian Men: Ambiguities, Resistances and Possibilities

Isaac Dery, Cuthbert Baataar and **Anisur Rahman Khan**[*]

ABSTRACT

Dominant peacebuilding scholarship and praxis tends to focus on African men's adherence to violent fragile masculinities in conflict prone-societies, and African masculinities are often approached, analysed, measured and theorised through externally derived standards and concepts. This article, by contrast, investigates the extent to which men can contribute to everyday peacekeeping. It does so by drawing on ethnographic interviews with men in northwestern Ghana. It illuminates how discourses and practices of male headship and breadwinner, as everyday masculine subjectivities, may contribute to creating fruitful possibilities for everyday peacebuilding subjectivities of men at the micro-levels. The article argues that approaching African masculinities through externally designed frameworks risks impoverishing critical understanding of the tensions, ambiguities, resistances and contestations of multiple configurations of masculinities beyond liberal, western-centric conceptualisations of masculinities. It further highlights that critical intervention seeking to address the systems and structures that may legitimise, and re/produce violence and social disorder must invest in carefully rethinking the everyday struggles of men within their locatedness. Peacebuilding scholars should invest in broadening discourses and representations of masculinities by offering nuanced understandings of how men can and are embracing peaceful and nonviolent masculinities in their everyday meaning-making.

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Configuring Traditional Masculinities among Young Adults in Northwestern Ghana: Surveillance, Ambivalences, and Vulnerabilities

Isaac Dery, Refiloe Makama, **Anisur Rahman Khan**[*] and Cuthbert Baataar

ABSTRACT

Most academic scholarships, particularly from the global North continue to theorize African men, especially poor black men as problematic, abusive, and violent. Such scholarship often fails to foreground how men's gendered subjectivities are likely to be shaped by intersecting inequalities. The danger of such neglect is that African men continue to be pathologised as being unable to cope with western liberal conception of gender equality. Drawing on interviews with young men in northwestern Ghana, our findings highlight those young men may construct masculinities and femininities in ways that reproduce harmful gender norms, relations, and power inequalities. Despite the problematic constructions of gender, the narratives of participants appear to offer some potential in imagining alternative masculine discourses which reject and resist hegemonic masculine ideals. Based on this, we argue that a sincere appreciation of how young men may progress towards imagining progressive masculine subjectivities ought to develop clearer understandings of the ambiguities, ambivalences, and conflicting appeals of multiple voices of masculinities.

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Female Perpetrated Domestic Violence Against Men and the Case for Bangladesh

Anisur Rahman Khan[*] and Najuwa Arendse

ABSTRACT

Whilst domestic violence against women receives significant international attention and prominence within the scholarly, media and policy discourses, much silence and reservation is evident in the case of domestic violence against men by women. The dominant societal notion portrays women as the natural victims and men as perpetrators, making it challenging to contextualize men's experiences of domestic violence in the intimate relationship. Against this backdrop, using Bangladesh as a case study, this article highlights key factors contributing to the silences, subjugations and controversies associated with domestic violence against men in order to present the state of current knowledge for such violence. Currently, there is a paucity of scholarly information on domestic violence against men and policy, legal and social supports available for these victims require attention. It is thus, suggested to break the social prejudice associated with such violence and adopt appropriate policy and legal interventions including gender-neutral laws to protect men at home from violence perpetrated by women.

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Masculinity and Suicide in Bangladesh

Anisur Rahman Khan[*], Kopano Ratele, Rebecca Helman, Sipho Dlamini and Refiloe Makama

ABSTRACT

Suicide is a serious but under-researched public health problem in Bangladesh. In light of this, we sought to explore the association between masculinities and suicide. We interviewed 20 family members/friends of men who died by suicide across 12 rural areas of the Jhenaidah district, Bangladesh. We found that male suicide was attributed to men's inability to fulfil hegemonic masculine demands such as financial provision and meeting the sexual needs of their spouses. Suicide was also linked to men's loss of self-respect and respect from others. Some participants mentioned that men committed suicide as an act of self-sacrifice, while others cited mental and physical illness. As a result of these findings, we propose that addressing socio-cultural and religious issues associated with men's troubles may help to prevent suicide. At the same time, changing the restrictive gender roles and masculinity-related ideals is also needed to counter the problem.

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Is there a Gradient in the Association between Internet Addiction and Health?

Muhammad Zakir Hossin , Azharul Islam , **Masum Billah**[*], Mahjabeen Haque, Jalal Uddin

ABSTRACT

Background: Internet Addiction (IA) is often shown to be associated with health issues, but no study explicitly examined a possible gradient in the association between different levels of IA and health. This study aimed to examine if the levels of IA had a graded relationship with poor sleep quality, psychological distress, and self-rated health among university students in Bangladesh. Methods: In this cross-sectional study, a sample of 625 students from six universities/colleges responded to an online survey that contained measures of internet addiction test (IAT), general health questionnaire (GHQ-12), sleep quality, and self-rated health. Modified Poisson regression models were fitted to estimate the adjusted risk ratios (RR) and confidence intervals (CI) of the associations between IA and health outcomes. Results: The IA levels were associated with each of the three health outcomes in a linear fashion. Compared to the lowest IA quintile, the highest quintile remained associated with an increased risk of poor-quality sleeping (RR: 1.77; 95% CI: 1.26, 2.48), psychological distress (RR: 2.09; 95% CI: 1.55, 2.82), and worse self-rated health (RR: 1.46; 95% CI: 1.09, 1.96) after adjusting for socio-demographic covariates. There were also dose-response associations between IAT z-scores and health outcomes. The association between IAT z-scores and psychological distress was significantly stronger in males compared to females (p-value for interaction<0.05). Conclusions: The study found strong gradients between levels of addiction to internet and health outcomes, suggesting that increased health risks may exist even at lower levels of internet addiction. The findings highlight the need for departure of current research from a focus on the classic dichotomy of problematic versus not problematic internet use and a move toward recognizing the potential hierarchical effects of IA on health.

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Climate Migration and Challenges of Urban Poor in Bangladesh

Mumita Tanjeela[*] and **Masum Billah**[†]

ABSTRACT

While the links between climate-induced migration and urban challenges have been documented, there remains a paucity of research, policy, and action on different challenges of urban poverty compared with rural poverty in Bangladesh. However, the urban poor have continued to be overlooked in development and climate contexts. This paper reviews the underlying factors of climate-induced population migration and its connection with multi-pluralistic challenges for urban poor individuals in Bangladesh. It also explains multiple responses to urban hazards and revisits urban policies related to resilience and sustainability. A desk review of different existing resources, such as academic papers, organizational research reports, newspapers clippings, and documentaries, was conducted to achieve the overall purpose for this paper. Both theoretical and empirical evidence were identified and mainstreamed by categorizing them into specific domains to reinvestigate the groundbreaking factors associated with climate migration and thereby demonstrate the bridge between policies and practices related to urban challenges. Marx's conflict theory was applied to reiterate existing inequalities associated with urban problems and hazards and then contextualized to weigh and analyze newly generated urban disparities experienced at the individual to national level. Rising sea levels, natural hazards, sudden onset disasters were identified as the drivers of climate-induced migration that forcefully displace people from their homeland to nearby cities. Limited access to public healthcare services; huge population density; inadequate food, water, and sanitation overcrowding; lack of housing; limited coping mechanisms; and little adaptive capacity with climatic conditions seriously worsen the existing problems for urban poor in Bangladesh.

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Understanding the Struggles of Bangladeshi Women in Coping with Climate Change through a Gender Analysis Lens

Mumita Tanjeela[*]

ABSTRACT

Climate-induced disasters affect a wide range of communities in Bangladesh. Among them, women are the most affected groups. Climate change increases their socioeconomic vulnerabilities by directly impacting their families' food security, water consumption, health, and overall livelihood. Unlike in many patriarchal societies, Bangladeshi women often face challenges of unequal social relations and hierarchies, which enforce gender differentiated vulnerabilities. In this context, this paper intends to reveal what barriers Bangladeshi women face and how they cope with many uncertainties relating to changing contexts, particularly at the household, community, and institutional levels. The paper draws from the author's Ph.D. research, which was carried out in four districts of Bangladesh, focused on four types of climate change impacts and adaptation practices. Qualitative data collection methods were used such as focus group discussions, in-depth Interviews with women, and observations of their household and community-level activities for the study. In addition to that, key informant interviews were conducted with local and national level experts, government officials, and development workers to reveal institutional barriers confronted by women. Findings explore women's gendered struggles in preparing for and responding to climate change through their lived experiences. Moreover, the study sheds light on the limited gender-responsive environment drawing attention to the need for strategies and actions for gender-transformative approaches to develop climate-resilient households and communities with women at the center.

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Climate-Induced Migrant's Hopeful Journey Toward Security: Pushing the Boundaries of Gendered Vulnerability and Adaptability in Bangladesh

Sufia Khanom[*], **Mumita Tanjeela**[†] and Shannon Rutherford[‡]

ABSTRACT

Every year 10,000 climate-induced migrants in Bangladesh leave their homes seeking safer locations away from the climate-induced disasters they have experienced. They commonly migrate to nearby urban areas or the capital city after losing their livelihoods in their place of origin. However, the unplanned urbanization, limited capacities of urban infrastructures, service sector deficiencies, man-made disasters, and other social vulnerabilities further push these migrants into an (in)secure state. Hopes of security and capacity to adapt in their new homes can be impacted by the patriarchal society where gender is often associated with unequal social relations and hierarchies. These might extend from every day to long term (in)security. This study draws on qualitative data collected as part of research conducted for two PhD projects. In both cases, climate-induced migrants were forced to migrate from their places of origin due to sea level rise, river erosion, and soil salinity to Dhaka (capital city) and Coxes Bazar (coastal city) of Bangladesh. In this context, are their adaptive capacities influenced by gender relations? How are these adaptive capacities shaped through different institutions? And how can these adaptive actions improve/strengthen human security? Gendered power relations are the main analytical framework for this paper as power is an influential factor to shape adaptive capabilities. It argues that (in)security, as an outcome of unsustainable adaptability, further pushes climate-induced migrants in vulnerable conditions in their newly settled urban areas. The vulnerability, capacity to adapt, and (in)security are gendered. This will contribute to understand for whom, where, and how the exclusive adaptative initiatives would further place the climate-induced migrants in vulnerable and (in)secure conditions in their newly settled areas.

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From Crises to Opportunities in Higher Education in Bangladesh

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ABSTRACT

Online teaching has become part and parcel of higher education as the pandemic caused by COVID-19 has made us go digital. Most of the higher education institutions in Bangladesh suddenly shifted from face-to-face teaching to online teaching in June 2020. Since all the educational institutions got back to face to face classes from March 2022, it is time to reflect on those virtual experiences to identify what teachers have achieved and how learners have benefited from the digital stop-gap practices. Therefore, this qualitative study aims to share the challenges and explore the opportunities which emergency remote teaching may have presented to the tertiary level teachers and learners of Bangladesh. Data were collected from 24 teachers from 11 private universities and 19 students from 7 private universities of Bangladesh through focus group discussions. Follow-up interviews were also conducted with 6 teachers and 6 students from 6 universities. The discussions and the interviews were recorded, transcribed, and analyzed thematically. Findings reveal that despite the technological and pedagogical challenges, the integration of technology in teaching and learning during the pandemic has created opportunities for developing learners' autonomy and self-regulation, and teachers' technological pedagogical content knowledge. However, online assessment and feedback strategies did not prove to be satisfactory for the teachers and the students. These findings may have further implications for higher education in the post-COVID climate in Bangladesh.

Keywords: Emergency Remote Teaching, Opportunities, Challenges, COVID-19

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English as a Status Marker on Facebook: The Case of Bangladeshi University Students

Monisha Biswas[*]

ABSTRACT

Nowadays, Facebook seems to have become a platform for people to show off their statuses (social, economic, educational, etc.) to the extent that their choice of language here can be linked to a status symbol. This study specifically examines the reasons and different ways Bangladeshi university students use English on Facebook to achieve status. Data were collected through observations of Facebook posts, a survey of 117 university students, and a semi-structured interview of 10 undergraduate students. The study found that most of the participants preferring English for Facebook posts and comments feel more educated, impressive, and prestigious. However, most participants agreed to preferring Bangla for personal messages. Interestingly, English is found to be preferred when writing to someone respectful in a formal context. Even participants with a weaker command of English were found to be using the language on Facebook without being bothered about linguistic accuracy. The study also found that all participants used code switching and code mixing between English and Bangla languages. These findings imply that English is mostly used by these university students to exhibit their high education status and language identities in public on Facebook.

Keywords: English, Status, Language Identity, Bangladeshi University Students, Facebook

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