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Sustainability in an Emerging Nation: The Bhutan Case Study

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ABSTRACT: This paper aims to critically analyze the sustainable development model of Bhutan that combines Gross National Happiness (GNH), Gross Domestic Product (GDP), and acceptable level of Greenhouse Gas (GHG) emissions within the policy domain. Bhutan's effective 3G model promotes balanced development by considering economic success alongside ecological and human welfare.

To set context the paper first presents a brief history of sustainable development, the Sustainable Development Goals (SDGs) and the Paris Climate Change Agreement. It then goes further to explain on the case of Bhutan by identifying the GNH that operates alongside GDP and GHG goals as the guiding policy of the country.

Based on literature review, the paper identifies theoretical models and best practices concerning sustainable development and compares Bhutan 3G model to references. It situates GNH and the SDGs within a common framework for highlighting the possible complementarities in policy and evaluation strategies.

The paper also studies the strength and weakness of Bhutan 3G model, the problem encounter like measurement indicator of GNH and the usage of 3G model in larger and more diversify country. It also provides implications for future studies based on the refinement, and application of the 3G model to emergent developmental issues.

Therefore, in understanding the challenges of sustainable development, and as a source of inspiration for other nations, the Bhutanese model proves insightful.

KEYWORDS: Bhutan, Sustainable development, Gross National Happiness (GNH), Gross Domestic Product (GDP), Greenhouse Gas (GHG), Holistic approach, Policy framework, Synergies, Sustainable Development Goals (SDGs), Comparative analysis.

I. INTRODUCTION

In the context of sustainable development, the adoption of the 17 new Sustainable Development Goals (SDGs) and the Paris Agreement on climate change marked important achievements. These international frameworks are meant to help develop the economy, increase the level of social integration, and promote sustainable development to help the countries of the world become fairer and more balanced. Nevertheless, the problem is to define strategies and how to achieve these objectives taking into consideration the particularities of different countries and regions.

In the middle of this worldwide problem, the tiny kingdom of Bhutan is striking in its unique conception of development. Bhutan has embraced modernity in its new approach of development yet has preserved the traditional cultural outlook in its new Gross National Happiness (GNH), Gross Domestic Product (GDP), and Greenhouse Gas (GHG) policies. Unlike most countries, the Bhutanese emphasis is on quality rather than quantity or gross domestic product, referred to as GNH or Gross National Happiness; that encompasses nine areas including the mental well-being, physical health, education, and preservation of natural resources.

Therefore, this paper's purpose is to provide an insight into Bhutan's concept of sustainable development. Thus, the objective of this study is threefold: to explore how Bhutan brings its economic aspirations (GDP), environmental commitments (GHG), and socio-cultural values (GNH) into a coherent and unified approach, as well as to discuss the advantages of such an integrated model in terms of harmony and feasibility.



II. BACKGROUND

Sustainable Development Goals (SDGs)

The United Nation adopted 17 global sustainable development goals known as the Sustainable Development Goals (SDGs) in 2015 as a Universal Call to Action to end poverty, protect the planet and ensure peace and prosperity (1). It covers various areas, which include poverty, hunger, health, education, gender, water, sanitation, affordable and clean energy, decent work and economic growth, industry innovation, inequalities, sustainable cities, responsible production and consumption, climate action, life below water and life on land, peace, justice, and other partnerships to achieve these goals.

Paris Agreement on Climate Change

The Paris Agreement is an international agreement within the United Nations Framework Convention on Climate Change (UNFCCC) which was adopted in December 2015. It encompasses nations in an attempt to fight climate change and its impacts on global communities (2). The main goal of the Paris Agreement remains to ensure that the global average temperature does not increase by more than 2 degrees Celsius above the pre-industrial levels, while pursuing the long-term target of 1.5 degrees Celsius. To this end, countries are expected to provide their nationally determined contributions (NDCs) which describe the intended climate change mitigation measures and targets.

Gross National Happiness (GNH)

Gross National Happiness (GNH) is Bhutan's unique measure of progress, prioritizing the well-being of its citizens over purely economic metrics like GDP. In the 1970s, GNH was introduced by the Bhutan's fourth king, Jigme Singye Wangchuck and it has a strong cultural and spiritual system. It is based on four pillars: people's welfare, social and economic development, environmental protection, enhancement of culture, and management of resources (3). These pillars are further divided into nine domains: such as mental health, physical health, learning, time, social-cultural aspects, leadership, community, ecosystems and quality of the life. Every domain includes a number of factors that directly measure the level of happiness and wellbeing among people.

Bhutan's Integrated Goals

Economic Development (GDP)

Despite its small size, Bhutan's government has ambitious economic development goals, like other developing nations. The nation aims to become a middle-income country from least developed to achieve sustainable and equitable development. The gross domestic product (GDP) strategy prioritises growth that benefits everyone. Bhutan has been able to align its GDP growth targets with its development goals by concentrating on hydropower, tourism, agriculture, and industry.

Carbon Neutrality (GHG)

The country has also done a commendable job in its environmental conservation as exhibited by their policies towards carbon emission balance. While the country is a carbon sink from its large forests area, Bhutan has committed to a net-zero carbon emission by offsetting the emission of its greenhouse gases (GHG) through forest and renewable energy initiatives. Measures concerning climate change include the government policies and strategies of afforestation, sustainable forest management, and renewable energy sources like hydropower and solar power (4). The steps that Bhutan has taken to maintain the natural environment are in harmony with SD principles since the government has understood the relationship between environmental sustainability and socio-economic benefits.

Socio-economic Well-being (GNH)

The Gross National Happiness (GNH) model, which considers social, economic, and spiritual well-being, guides Bhutanese growth. GNH is Bhutan's initiative to prioritize citizen happiness above GDP. It considers socio-cultural, physical, and institutional factors in national policymaking to ensure sustainable, fair, and culturally relevant development. In addition to economic growth, GNH analyses community viability, cultural richness, and psychological wellness to measure progress and set objectives.

Integration of GNH, GDP, and GHG (500 words)

Policy Integration

Bhutan's sustainable development policy framework incorporates Gross National Happiness (GNH), gross domestic product (GDP) and Greenhouse Gas (GHG) emissions. Economic growth, environmental protection, and human well-being are Bhutan's most fundamental policy integration principles. Bhutan targets its development goals within the framework Gross National Happiness (GNH)



Bhutan's Five-Year plans consist of GNH principles as well as GDP targets. Therefore, when investing in infrastructures and industries both the profitability and the social and environmental impacts are taken into consideration (5). Similarly, there exists a National Environmental Policy in Bhutan that embraces utilization of renewable energy and GHG emission reduction in the management of the environment for socio-economic development.

Challenges and Opportunities

Bhutan has the following challenges when combining GNH, GDP, and GHG. One method is leveraging short-term corporate goals to promote sustainable growth. Hydropower is ecologically favorable, however utilizing energy to make money has been criticized for harming Bhutan's environment and people (6). Thus, sustainable economic growth and environmental protection may need further examination.

Bhutan's holistic and inclusive approach to sustainable development provides several opportunities. Bhutan has transformed into a sustainable development model using both GNH along with GDP and GHG through the Gross National Happiness (GNH) approach. Focusing on students' physical, mental, and social-emotional health and environmental conservation connects with the SDGs and climate change activities. Bhutan's prosperity and environmental protection make it an example for other countries facing similar issues.

Case Studies/Examples

Several examples will demonstrate how Bhutan integrated GNH, GDP, and GHG. The Bhutanese hydropower sector, a key GDP contributor, has adopted environmental management for sustainable development (7). These buildings contain environmental impact assessments and ecological protection measures. Hydropower exports also fund education, health, and other GNH-improving programmes.

Bhutan also pledges sustainable tourism to preserve culture and ecology. Bhutan's tourism strategy limits the number of tourists at once and imposes a daily fee to guarantee that tourism funds the people and environment. In accordance with its carbon neutral position, Bhutan has implemented eco-tourism best practices such trash management and renewable energy utilization.

Thus, the following case studies show how Bhutan has integrated GNH, GDP, and GHG into sustainable development operations. Thus, the unique strategy helped the state prosper economically, increase people quality of life, and maintain the environment (8). This shows that CF and MD are practical and have excellent development results, which is essential for other countries interested in SD complex development.

III. LITERATURE REVIEW ON SUSTAINABLE DEVELOPMENT

Theoretical Frameworks

Theorists have developed different theoretical frameworks that can be used as a roadmap to the achievement of sustainable development (9). One of the most well-known frameworks is the Brundtland Report that defines the concept of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." In other words, this approach to the interpretation of sustainable development highlights the need to reconcile economic, social, and environmental objectives and to act in the best interest of the current and future generations.

Practical Approaches

Here are some common effective strategies which have been adopted by nations across the globe to support sustainability (10). To name one, corporations enter sustainability policies and regulations to promote sustainable practices and sanctions to discourage negative impacts on the environment. For example, many countries have adopted carbon pricing mechanisms to manage externalities associated with carbon emissions by using policy instruments such as carbon taxes or a cap-and-trade system to incentivize investments in RE and EE.

Comparative Analysis

Bhutanese sustainable development differs from traditional economic development plans to balance and prioritize quality of life and environmental preservation. Bhutan measures level of living by Gross National Happiness (GNH), which incorporates psychological well-being, communal prominence, and environmental preservation. Many nations use GDP to assess development (11). Bhutan demonstrated that economic progress and social uplift can be achieved without compromising the environment by include GNH in GDP and GHG emissions.



Other governments have struggled to balance economic expansion, environmental protection, and minority assimilation. Some governments have effectively integrated sustainability regulations and decreased emissions, whereas others have prioritized short-term profits. There are few measuring techniques to collect comprehensive indicators, making it hard to integrate well-being and sustainability into policy processes.

Bhutan has had issues with Gross National Happiness. Bhutan's small size and homogenous population are advantages, but the concept may not work in bigger and more complicated nations. Bhutan, like other developing countries, strives to combine economic growth and environmental conservation in hydropower and tourism (12). However, Bhutan's example offers hope and inspiration to other countries on how to achieve comprehensive sustainable development by integrating the three pillars of sustainability—economic, social, and environmental.

IV. SYNERGIES BETWEEN SDGS AND GNH

Domain and Indicator Alignment

A cross-tabulation of the domains and indicators of Gross National Happiness (GNH) and Sustainable Development Goals (SDGs) reveals that there is much overlap between the two systems. For example, the SDGs cover areas such as poverty, health, education, gender, environment, and peace and justice to mention but a few (13). Like GNH, HAP also measures quality in a number of domains such as mental health and psychological well-being, physical health, education, culture, and environment.

For instance, the GNH health domain mirrors SDG 3 on Good Health and Well-being while the education domain resonates with SDG 4 on Quality Education. Similarly, GNH's concern with environment conservation and development of sustainable agriculture relates directly with SDG 13 (Climate Action) and SDG 11 (Sustainable Cities and Communities). The various domains help the nations when integrated into the national policies in that it helps to achieve several goals within a single policy and hence impacts on Sustainable Development.

Policy Implications

Comprehending SDGs and GNH is important for academics and national and international development. First, GNH indicators in SDGs help governments track social welfare and sustainability (14). This integrated strategy helps address several policy and programming concerns.

Thus, GNH principles may improve SDG implementation approaches' cultural relevance and appropriateness. It means that community support is higher for sustainability initiatives that include cultural aspects (15). Combining SDGs with GNH may enhance local and global sustainable development.

V. BHUTAN'S 3G MODEL

Model Explanation

The 3G model of Bhutan combines Gross National Happiness (GNH), Gross Domestic Product (GDP), and Greenhouse Gas (GHG) regulations to promote sustainable development (16). This paradigm is based on the idea that development does not always ignore economic, environmental, and social challenges.

GNH is Bhutan's development paradigm, unlike GDP, which assesses exclusively monetary returns. GNH includes mental and physical well-being, education, social and spiritual practices, natural resources, and others.

Advantages and Limitations

Thus, Bhutan's 3G approach can be a pathway to sustainable and inclusive development. It is only when GNH complements GDP and GHG goals that Bhutan earns economic growth, protects the environment, and attains equal human satisfaction (17). This comprehensive and holistic methodology optimizes social capital and community resilience to enhance and balance societies.

Thus, the 3G model may have restrictions. GNH indicators are hard to measure and execute. Bhutan has developed comprehensive well-being metrics but translating them into policy suggestions is difficult. Due to Bhutan's tiny population and unique culture, the concept may not work in bigger, more varied nations.



Lessons for Other Nations

Nonetheless, there are many lessons that can be learned from Bhutan's 3G model for other nations with a desire to brought about sustainable development. Consequently, the present model emphasizes the distinction between economic, social, and environmental objectives in policies (18). It is therefore important that countries embrace this method of system integration to solve society's problems in one package since they are interrelated.

Overall, the Bhutanese 3G model shows how economically diverse countries may achieve sustainable development via well-being, conservation, and prosperity. Thus, other nations seek to embrace Bhutan's 3G model but adjust it for their own needs to ensure sustainability and population wellbeing.

VI. CONCLUSION

In conclusion, this is a regarding paper that has examined Gross National Happiness (GNH), Gross Domestic Product (GDP), and Greenhouse Gas (GHG) emissions in relation to sustainable development in Bhutan. The 3G model of Bhutan proves that it is possible to make profit, but not at the cost of nature and the people.

Bhutan showed the feasibility and importance of implementing comprehensive framework that includes GNH along with conventional GDP and GHG policies. When it comes to well-being, environment, and economy, Bhutan has set goals that meet all the criteria that define sustainable development.

Consequently, for future work, it might be helpful to use and build from the 3G model to tackle new problems that will arise in the future such as climate change, inequality and disruptive technologies. Moreover, the demonstration of how GNH is linked to the Sustainable Development Goals (SDGs) can help expand understanding of how to achieve sustainable development objectives.

There is a lot that other countries stand to learn from Bhutan's approach towards its economic development for it to be sustainable. Learning from Bhutan, improving overall quality of life and preserving the environment can lead to positive change not only for Bhutan but for the world at large.

REFERENCES

1. Dutta, S. Ray, E. V. Korchagina, A. Druzhinin and N. D. Dmitriev, "Plexus Search – A Search Enumeration," 2023 IEEE Silchar Subsection Conference (SILCON), Silchar, India, 2023, pp. 1-4, doi: 10.1109/SILCON59133.2023.10405151.
2. P. K. Kumar, S. Ray, L. Kumarasankaralingam, A. Ramamoorthy, P. Kumar and A. Dutta, "Detecting Fraud Calls vis-à-vis Natural Language Processing," 2024 2nd International Conference on Advancement in Computation & Computer Technologies (InCACCT), Gharuan, India, 2024, pp. 457-462, doi: 10.1109/InCACCT61598.2024.10551082.
3. Thommandru, A., Espinoza-Maguiña, M., Ramirez-Asis, E., Ray, S., Naved, M., & Guzman-Avalos, M. (2023). Role of tourism and hospitality business in economic development. *Materials Today: Proceedings*, 80, 2901-2904.
4. Voumik, L. C., Islam, M. A., Ray, S., Mohamed Yusop, N. Y., & Ridzuan, A. R. (2023). CO2 emissions from renewable and non-renewable electricity generation sources in the G7 countries: static and dynamic panel assessment. *Energies*, 16(3), 1044.
5. Bhargava, A., Bhargava, D., Kumar, P. N., Sajja, G. S., & Ray, S. (2022). Industrial IoT and AI implementation in vehicular logistics and supply chain management for vehicle mediated transportation systems. *International Journal of System Assurance Engineering and Management*, 13(Suppl 1), 673-680.
6. Rakhra, M., Sanober, S., Quadri, N. N., Verma, N., Ray, S., & Asenso, E. (2022). Implementing machine learning for smart farming to forecast farmers' interest in hiring equipment. *Journal of Food Quality*, 2022.
7. Al Ayub Ahmed, A., Rajesh, S., Lohana, S., Ray, S., Maroor, J. P., & Naved, M. (2022, June). Using Machine Learning and Data Mining to Evaluate Modern Financial Management Techniques. In *Proceedings of Second International Conference in Mechanical and Energy Technology: ICMET 2021, India* (pp. 249-257). Singapore: Springer Nature Singapore.
8. Pallathadka, H., Leela, V. H., Patil, S., Rashmi, B. H., Jain, V., & Ray, S. (2022). Attrition in software companies: Reason and measures. *Materials Today: Proceedings*, 51, 528-531.
9. Sharma, A., Kaur, S., Memon, N., Fathima, A. J., Ray, S., & Bhatt, M. W. (2021). Alzheimer's patients detection using support vector machine (SVM) with quantitative analysis. *Neuroscience Informatics*, 1(3), 100012.



10. Mehbodniya, A., Neware, R., Vyas, S., Kumar, M. R., Ngulube, P., & Ray, S. (2021). Blockchain and IPFS integrated framework in bilevel fog-cloud network for security and privacy of IoMT devices. *Computational and Mathematical Methods in Medicine*, 2021.
11. Ray, S. (2020). How COVID-19 changed dimensions of human suffering and poverty alleviation: economic analysis of humanitarian logistics. *Вестник Астраханского государственного технического университета. Серия: Экономика*, (4), 98-104.
12. Akbar, A., Akbar, M., Nazir, M., Poulouva, P., & Ray, S. (2021). Does working capital management influence operating and market risk of firms?. *Risks*, 9(11), 201.
13. Dutta, A., Voumik, L. C., Ramamoorthy, A., Ray, S., & Raihan, A. (2023). Predicting Cryptocurrency Fraud Using ChaosNet: The Ethereum Manifestation. *Journal of Risk and Financial Management*, 16(4), 216.
14. Polcyn, J., Voumik, L. C., Ridwan, M., Ray, S., & Vovk, V. (2023). Evaluating the influences of health expenditure, energy consumption, and environmental pollution on life expectancy in Asia. *International Journal of Environmental Research and Public Health*, 20(5), 4000.
15. Sajja, G. S., Jha, S. S., Mhamdi, H., Naved, M., Ray, S., & Phasinam, K. (2021, September). An investigation on crop yield prediction using machine learning. In *2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA)* (pp. 916-921). IEEE.
16. Ali, N. G., Abed, S. D., Shaban, F. A. J., Tongkachok, K., Ray, S., & Jaleel, R. A. (2021). Hybrid of K-Means and partitioning around medoids for predicting COVID-19 cases: Iraq case study. *Periodicals of Engineering and Natural Sciences*, 9(4), 569-579.
17. Gupta, S., Geetha, A., Sankaran, K. S., Zamani, A. S., Ritonga, M., Raj, R., ... & Mohammed, H. S. (2022). Machine learning-and feature selection-enabled framework for accurate crop yield prediction. *Journal of Food Quality*, 2022, 1-7.
18. Gupta, S., Geetha, A., Sankaran, K. S., Zamani, A. S., Ritonga, M., Raj, R., ... & Mohammed, H. S. (2022). Machine learning-and feature selection-enabled framework for accurate crop yield prediction. *Journal of Food Quality*, 2022, 1-7.
19. Ma, W., Nasriddinov, F., Haseeb, M., Ray, S., Kamal, M., Khalid, N., & Ur Rehman, M. (2022). Revisiting the impact of energy consumption, foreign direct investment, and geopolitical risk on CO2 emissions: comparing developed and developing countries. *Frontiers in Environmental Science*, 1615.
20. Shukla, S. (2017). Innovation and economic growth: A case of India. *Humanities & Social Sciences Reviews*, 5(2), 64-70.
21. Soham, S., & Samrat, R. (2021). Poverty and financial dearth as etiopathogen of psychotic and neurotic diseases. *Заметки ученого*, (4-1), 568-578.
22. Park, J. Y., Perumal, S. V., Sanyal, S., Ah Nguyen, B., Ray, S., Krishnan, R., ... & Thangam, D. (2022). Sustainable marketing strategies as an essential tool of business. *American Journal of Economics and Sociology*, 81(2), 359-379.
23. Роков, А. И., Дубаневич, Л. Э., & Рэй, С. (2021). Повышение экономической эффективности труда за счет изменения системы оплаты. *E-Scio*, (9 (60)), 53-62.
24. Ray, S. (2021). How Emotional Marketing can help better understand the Behavioral Economic patterns of Covid-19 pandemic: Economic Judgments and Falsifications from India Samrat Ray-Alagappa University, Tamil Nadu, India. samratray@rocketmail.com. *Вестник МИРБИС*, (2), 26-34.
25. Ravi, S., Kulkarni, G. R., Ray, S., Ravisankar, M., Krishnan, V. G., & Chakravarthy, D. S. K. (2023). Analysis of user pairing non-orthogonal multiple access network using deep Q-network algorithm for defense applications. *The Journal of Defense Modeling and Simulation*, 20(3), 303-316.
26. Priya, P. S., Malik, P., Mehbodniya, A., Chaudhary, V., Sharma, A., & Ray, S. (2022, February). The relationship between cloud computing and deep learning towards organizational commitment. In *2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM)* (Vol. 2, pp. 21-26). IEEE.
27. Ray, S., & Leandre, D. Y. (2021). How entrepreneurial university model is changing the Indian COVID-19 Fight?. *Путеводитель предпринимателя*, 14(3), 153-162.
28. Inthavong, P., Rehman, K. U., Masood, K., Shaikat, Z., Hnydiuk-Stefan, A., & Ray, S. (2023). Impact of organizational learning on sustainable firm performance: Intervening effect of organizational networking and innovation. *Heliyon*, 9(5).
29. Rajendran, R., Sharma, P., Saran, N. K., Ray, S., Alanya-Beltran, J., & Tongkachok, K. (2022, February). An exploratory analysis of machine learning adaptability in big data analytics environments: A data aggregation in the age of big data and the internet of things. In *2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM)* (Vol. 2, pp. 32-36). IEEE.
30. Elkady, G., & Samrat, R. (2021). An analysis of Blockchain in Supply Chain Management: System Perspective in Current and Future Research. *International Business Logistics*, 1(2).



31. Korchagina, E., Desfontaines, L., Ray, S., & Strelakova, N. (2021, October). Digitalization of Transport Communications as a Tool for Improving the Quality of Life. In International Scientific Conference on Innovations in Digital Economy (pp. 22-34). Cham: Springer International Publishing.
32. Kumar, A., Nayak, N. R., Ray, S., & Tamrakar, A. K. (2022). Blockchain-based Cloud Resource Allocation Mechanisms for Privacy Preservation. In *The Data-Driven Blockchain Ecosystem* (pp. 227-245). CRC Press.
33. Wawale, S. G., Bisht, A., Vyas, S., Narawish, C., & Ray, S. (2022). An overview: Modeling and forecasting of time series data using different techniques in reference to human stress. *Neuroscience Informatics*, 2(3), 100052.
34. Bangare, J. L., Kapila, D., Nehete, P. U., Malwade, S. S., Sankar, K., & Ray, S. (2022, February). Comparative Study on Various Storage Optimisation Techniques in Machine Learning based Cloud Computing System. In 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM) (Vol. 2, pp. 53-57). IEEE.
35. Kiziloglu, M., & Ray, S. (2021). Do we need a second engine for Entrepreneurship? How well defined is intrapreneurship to handle challenges during COVID-19?. In *SHS Web of Conferences* (Vol. 120, p. 02022). EDP Sciences.
36. Samajpaty, S., & Ray, S. (2020). Innovation strategies in health economics: a force that makes blood move and game of gravity in it-futuristic economic plans. *Московский экономический журнал*, (9), 397-409.
37. Nikam, R. U., Lahoti, Y., & Ray, S. (2023). A Study of Need and Challenges of Human Resource Management in Start-up Companies. *Mathematical Statistician and Engineering Applications*, 72(1), 314-320.
38. Yanbin, X., Jianhua, Z., Wang, X., Shabaz, M., Ahmad, M. W., & Ray, S. (2023). Research on optimization of crane fault predictive control system based on data mining. *Nonlinear Engineering*, 12(1), 20220202.
39. Ray, S., Abinaya, M., Rao, A. K., Shukla, S. K., Gupta, S., & Rawat, P. (2022, October). Cosmetics Suggestion System using Deep Learning. In 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS) (pp. 680-684). IEEE.
40. Bhaskar, T., Shiney, S. A., Rani, S. B., Maheswari, K., Ray, S., & Mohanavel, V. (2022, September). Usage of Ensemble Regression Technique for Product Price Prediction. In 2022 4th International Conference on Inventive Research in Computing Applications (ICIRCA) (pp. 1439-1445). IEEE.
41. Kanade, S., Surya, S., Kanade, A., Sreenivasulu, K., Ajitha, E., & Ray, S. (2022, April). A Critical analysis on Neural Networks and Deep Learning Based Techniques for the Cloud Computing System and its Impact on Industrial Management. In 2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE) (pp. 325-331). IEEE.
42. Pallathadka, H., Tongkachok, K., Arbune, P. S., & Ray, S. (2022). Cryptocurrency and Bitcoin: Future Works, Opportunities, and Challenges. *ECS Transactions*, 107(1), 16313.
43. Li, Y. Z., Yu, Y. H., Gao, W. S., Ray, S., & Dong, W. T. (2022). The Impact of COVID-19 on UK and World Financial Markets. *Jundishapur Journal of Microbiology*, 373-399.
44. Samrat, R., Elkadyghada, E. G., Rashmi, N., & Elena, K. (2022). UPSKILLING AND RESKILLING FOR A GREENER GLOBAL BUSINESS ECOSYSTEM: WEB 4.0 PERSPECTIVE. *Журнал прикладных исследований*, 1(11), 49-60.
45. Ray, S. (2022). Fraud detection in e-Commerce using machine learning. *BOHR International Journal of Advances in Management Research*, 1(1).
46. Samrat, R. (2021). WHY ENTREPREUNERAL UNIVERSITY FAILS TO SOLVE POVERTY ERADICATION?. *Вестник Тувинского государственного университета. № 1 Социальные и гуманитарные науки*, (1), 35-43.
47. Ray, S. (2021). Are Global Migrants At Risk? A Covid Referral Study of National Identity. In *Трансформация идентичностей: опыт Европы и России* (pp. 26-33).
48. Saravanan, A., Venkatasubramanian, R., Khare, R., Surakasi, R., Boopathi, S., Ray, S., & Sudhakar, M. POLICY TRENDS OF RENEWABLE ENERGY AND NON RENEWABLE ENERGY.
49. Varma, A., & Ray, S. (2023). The case of amazons E-commerce digital strategy in India.
50. Ray, S. (2023). Can Change Management Be Disrupted Through Leadership Strategies?: Evidence From Start-Up Firms in Asia. In *Change Management During Unprecedented Times* (pp. 100-127). IGI Global.
51. Al Noman, M. A., Zhai, L., Almukhtar, F. H., Rahaman, M. F., Omarov, B., Ray, S., ... & Wang, C. (2023). A computer vision-based lane detection technique using gradient threshold and hue-lightness-saturation value for an autonomous vehicle. *International Journal of Electrical and Computer Engineering*, 13(1), 347.
52. Nayak, N. R., Kumar, A., Ray, S., & Tamrakar, A. K. (2023). Blockchain-Based Cloud Resource Allocation Mechanism for Privacy Preservation (No. 9700). EasyChair.
53. Ray, S. (2023). XA-GANOMALY: AN EXPLAINABLE ADAPTIVE SEMI-SUPERVISED LEARNING METHOD FOR INTRUSION DETECTION USING GANOMALY IN GLOBAL ECONOMIC DYNAMIC SHIFTS©. *ЭКОНОМИЧЕСКАЯ СРЕДА*, 4.



54. Zamani, A. S., Rajput, S. H., Bangare, S. L., & Ray, S. (2022). Towards Applicability of Information Communication Technologies in Automated Disease Detection. *International Journal of Next-Generation Computing*, 13(3).
55. Korchagina, E. V., Barykin, S. E., Desfontaines, L. G., Ray, S., Shapovalova, I. M., & Repnikova, V. (2022). Digitalisation of Ecosystem-Based Management and the Logistics Potential of the Arctic Region. *Journal of Environmental Assessment Policy and Management*, 24(03), 2250034.
56. Zamani, A. S., Rajput, S. H., Bangare, S. L., & Ray, S. (2022). Towards Applicability of Information Communication Technologies in Automated Disease Detection. *International Journal of Next-Generation Computing*, 13(3).
57. Ray, S., Korchagina, E. V., Druzhinin, A. E., Sokolovskiy, V. V., & Kornev, P. M. (2022, April). Emergence of the New Start Up Ecosystem: How Digital Transformation Is Changing Fintech and Payment System in Emerging Markets?. In *International Scientific Conference "Digital Transformation on Manufacturing, Infrastructure & Service"* (pp. 621-638). Cham: Springer Nature Switzerland.
58. Wagh, S., Nikam, R., & Ray, S. (2022). Exploration of the Higher Education System's Mechanism and Impact on More Than Just the Effective Growth of the Indian Economy. *Globsyn Management Journal*, 16(1/2), 85-91.
59. Ray, S., Korchagina, E. V., Druzhinin, A. E., Sokolovskiy, V. V., & Kornev, P. M. (2022, April). Emergence of the New Start Up Ecosystem: How Digital Transformation Is Changing Fintech and Payment System in Emerging Markets?. In *International Scientific Conference "Digital Transformation on Manufacturing, Infrastructure & Service"* (pp. 621-638). Cham: Springer Nature Switzerland.
60. Chakraborty, T., & Ray, S. (2022). STRATEGIES OF CYBERLOAFING AND PHUBBING WHICH AFFECT WORKPLACE DIGITAL TRANSFORMATION. *Московский экономический журнал*, (10), 430-446.
61. Ray, S., & Pal, R. P. (2022). IMPORTANCE OF ENTREPRENEURSHIP AND INNOVATION IN THE HEALTHCARE INDUSTRY DURING THE COVID-19 PANDEMIC. *Beneficium*, (2 (43)), 85-93.
62. Samrat, R., Pratap, P. R., & Korchagina, E. V. (2022). WORLD ECONOMY AND INTERNATIONAL COOPERATION• МИРОВАЯ ЭКОНОМИКА И МЕЖДУНАРОДНОЕ СОТРУДНИЧЕСТВО.
63. Ray, S., & Pal, R. P. (2021). ARE WE TRANSFORMING OUR PAYMENT THROUGH INNOVATION IN FINTECH AND THE DIGITAL ECONOMY? PERSPECTIVES FROM ASIAN DRAMA IN FINTECH INNOVATION©.
64. Samrat, R. (2021). NEUROMARKETING EVIDENCES FROM THE ECONOMICS OF BOOKSELLERS ON THE STREETS: COVID-19 PERSPECTIVES AND IMPLICATIONS ON LUXURY BRANDS GLOBALLY. *Экономика и управление инновациями*, (2), 83-90.
65. Korchagina, E. V., & Ray, S. (2021). TRIPLE HELIX CONCEPT IN INNOVATIVE UNIVERSITY DEVELOPMENT MODEL.
66. Ray, S., & Pal, R. P. (2021). ARE WE TRANSFORMING OUR PAYMENT THROUGH INNOVATION IN FINTECH AND THE DIGITAL ECONOMY? PERSPECTIVES FROM ASIAN DRAMA IN FINTECH INNOVATION©.
67. Самрат, Р. (2021). НЕЙРОМАРКЕТИНГ В ЭКОНОМИКЕ КНИЖНЫХ МАГАЗИНОВ НА УЛИЦАХ: ПЕРСПЕКТИВЫ ГЛОБАЛЬНОГО ВЛИЯНИЯ COVID-19 НА ЛЮКСОВЫЕ БРЕНДЫ. *ЭКОНОМИКА И УПРАВЛЕНИЕ*, (2), 83-90.
68. Ray, S., Muhammad, G., & Adnan, M. The administrative role of principals: Insights and implication in secondary schools of.
69. Pradhan, D., Ray, S., & Dash, A. A Critical Review on Sustainable Development of Green Smart Cities (GSCs) for Urbanization. *communities* (Fig. 1), 13, 15.
70. Van Minh, N., Huu, N. N., & Ray, S. Responses of varied quinoa (*Chenopodium quinoa* Willd.) genotypes grown in Central Highlands, Vietnam.
71. Ray, S., Nikam, R., Vanjare, C., & Khedkar, A. M. Comparative Analysis Of Conventional And Machine Learning Based Forecasting Of Sales In Selected Industries.



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