



(REVIEW ARTICLE)



Impact of innovative marketing strategy behind Balaji wafers brand profitability in Pune city

Samrat Ray ^{1,*}, Sumitra Roy ² and Anil Varma ¹

¹ International Institute of Management Studies, Pune, Maharashtra, India.

² ISMS Group of Institutions, Pune, Maharashtra, India.

World Journal of Advanced Research and Reviews, 2023, 20(01), 1240–1250

Publication history: Received on 11 September 2023; revised on 26 October 2023; accepted on 29 October 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.20.1.2140>

Abstract

Balaji Wafers' success attributed to its innovative marketing strategies, which include word-of-mouth advertising, quality control checks, and a dedication to sustainability. The company's regional focus and distribution strategy may be responsible for its leadership in Gujarat and Maharashtra. Balaji has succeeded in growing its market share by offering a greater selection of goods and services at competitive prices. Current trends should be included, social media platforms should be used actively, and sustainable practises should be used. The Innovation Adoption Curve clearly shows Balaji's astute product strategies. Future growth is possible if local as well as International presence is maximised, undiscovered markets are investigated, and corporate social responsibility is given top priority. The importance of consumer-centric marketing as a crucial element in establishing long-term success in fiercely competitive industries is highlighted by this case study.

Keywords: Marketing strategy; Segmentation; Pune; FMCG; Brand

1. Introduction

The execution of a marketing strategy is critical in developing brand recognition and producing revenue, especially in today's highly competitive corporate climate. It not only broadens the audience, but it also builds brand loyalty and ensures long-term financial sustainability. Balaji Wafers' success is inextricably tied to its distinct marketing approach, emphasising its critical contribution to increased profitability. The major goal of this case study is to assess the effectiveness of Balaji Wafers' marketing tactics, with a particular emphasis on the Pune city market. This report is to undertake a detailed analysis in order to uncover the major factors of Balaji Wafers' success. The goal is to give crucial insights that may be exploited by enterprises in the snack sector.

2. Overview of the Organization

Chandubhai Virani is credited with the establishment of Balaji Wafers, a prosperous regional food enterprise. The company is well-recognised for its assortment of snacks derived from grains and potatoes (Bhushan et al., 2013). In the year 1972, at a period of severe agricultural challenges, Chandubhai and his siblings together invested a little amount of capital to establish the firm. Following early challenges in the fertiliser industry, the company successfully obtained a contract to operate a restaurant, where they sold wafers produced inside the local region.

Acknowledging the potential, Chandubhai made an investment in a small-scale wafer enterprise. The brand 'Balaji' was launched in 1984 and saw consistent growth afterwards. Despite limited promotional efforts, the success of Balaji is

* Corresponding author: Samrat Ray

contingent upon its commitment to quality, affordability, and robust corporate social responsibility (CSR) endeavours. The company offers its goods at a price that is 50% lower than its competitors.



(Source: Singh, 2021; forbesindia, 2021)

Figure 1 Balaji's Wafers revenue in 2020

In the Indian market, the firm had a revenue of 2374 crores in the year 2020. The Economic Times has bestowed to Balaji the honorary title of "Sultan of Wafers" because to their extensive distribution network and unwavering commitment to trust, passion, and diligent efforts. According to Minhas (2023), Balaji and Bikaji accounted for around nine percent each of the market share in the ethnic snacks market in India during the fiscal year 2022.

3. Innovative Marketing Strategies Implemented

3.1. Word-of-Mouth Marketing: Leveraging Customer Advocacy

According to an article by Mehta (2009) in *Economictimes.india*, the success of Balaji Wafers is enhanced by the active participation of customers in referring the product to others. Satisfied customers often engage in the practise of recommending their preferred tastes to their acquaintances and relatives, so establishing a strong network of word-of-mouth communication. The use of organic marketing has been crucial in cultivating trust and augmenting the brand's market penetration within the snack sector.

3.2. Quality Assurance and Affordability: Core Value Propositions

Balaji Wafers adheres to stringent quality control measures to ensure that every batch produced aligns with their elevated standards. The act of demonstrating devotion fosters the development of trust and loyalty. Balaji Wafers is notable for its ability to deliver high-quality snacks at affordable costs, catering to a wide range of consumers. This combination of excellence and accessibility is a distinguishing characteristic of the company.

3.3. Sustainable Practices and hygiene

ChanduBhai Virani, the Managing Director of Balaji Wafers, emphasises the use of modern mechanisation and automation inside their two extensive manufacturing facilities located in Rajkot and Balsar (*Cleanindiajournal*, 2014). The firm places a high emphasis on quality and cleanliness, drawing upon its extensive four-decade history in the industry. The Rajkot facility, which has the distinction of being the biggest in India, possesses a commendable processing capacity for both potatoes and chips.

The effective distribution network established by Balaji assures the timely delivery of fresh food to customers. In order to maintain cleanliness standards, a specialised staff is responsible for overseeing cleaning and maintenance operations, using ride-on sweepers and high-pressure jet cleaning equipment. Waste materials, such as water and defective chips, are effectively controlled by established procedures, such as wastewater treatment and the manufacture of bio-gas

(Cleanindiajournal, 2014). Windmills play a significant role in promoting sustainability and adopting an environmentally friendly approach by effectively mitigating carbon emissions (Cleanindiajournal, 2014).

3.4. Distribution-only model



(Source: Singh, 2021; forbesindia, 2021)

Figure 2 Distribution-only model by Balaji Wafers

Despite lofty aspirations, Balaji Wafers maintains a regional emphasis, with over 70% market domination in Gujarat and 60% in Maharashtra (Shashidhar, 2014). Unlike industry behemoths like PepsiCo, who invest heavily in advertising, Balaji depends on a vast distribution network of 600 dealers spread over both states (Shashidhar, 2014). As a success formula, Chandubhai emphasises understanding client demands and producing excellent goods. This strategy not only ensured Balaji's supremacy in Gujarat, but also pushed PepsiCo's Lays out of the market leader position in Maharashtra (Shashidhar, 2014). Balaji, under the distribution-centric strategy, delivers more chips for the same price as rivals like as Lays or Bingo. However, rising potato costs may force a decrease in grammage. Furthermore, the firm is moving its attention to snacks, with wafers' proportion to overall sales declining from 70% to 40%, in line with industry trends favouring the burgeoning namkeen sector (Shashidhar, 2014).

3.5. Porter's Generic Strategies

Table 1 Porter's Generic Strategies

Strategy	Description	Examples
Cost Leadership	Offering quality products at competitive prices by optimizing production processes and supply chain efficiencies.	Balaji Wafers offers its products at prices that are 50% less than some popular competing brands.
Differentiation	Setting Balaji Wafers apart from competitors through unique spices and flavors, contributing to brand loyalty and a dedicated customer base.	Balaji Wafers' 'Hing Jeera' flavored wafers provide a distinct taste that sets them apart in the market.
Focus	Initially focusing on the Rajkot market to establish a strong foothold, and strategically expanding into markets with demand for their products.	Balaji Wafers expanded to Pune, strategically targeting a market where there was demand for their products.

(Source: Self-Created)

4. Market Research and Consumer Behavior Analysis

4.1. Understanding Pune's Consumer Preferences in Snack Consumption

Consumer preferences in snack consumption in Pune exhibit a propensity for a wide array of flavours, including both conventional and regional alternatives. The prevalence of health-conscious options and the increasing popularity of snacks that provide nutritional advantages are on the rise. Furthermore, there exists a predilection for snacks that possess the attribute of being easily consumed when engaged in activities outside of a stationary location. Consumers in Pune exhibit a preference for companies that place a high priority on sustainability and use eco-friendly practises. Balaji Wafers, due to its distinctive range of flavours, emphasis on quality, and commitment to sustainable practises, exhibits a strong compatibility with the prevailing consumer tastes in the Pune market.

4.2. Target Demographics and Psychographics in Pune

- **Demographics:** Balaji Wafers serves a diverse range of individuals in Pune, including students, employed individuals, and households. The cost-effective price and handy packaging of the product have garnered popularity among customers that prioritise financial considerations.
- **Psychographics:** Balaji Wafers attracts consumers in Pune who possess a preference for regional flavours and have a proclivity towards environmentally aware choices. The distinctive assortment of spices and environmentally conscious methods used by the company appeal to those who prioritise genuineness and ecological stewardship.

4.3. Analyzing Market Trends, Competitor Strategies, and Consumer Perceptions

Market trends in Pune demonstrate a preference for regional flavours, an increase in health-conscious alternatives, and a desire for convenient, eco-friendly solutions. Balaji Wafers skillfully responds to these trends by producing products such as 'Hing Jeera' flavoured wafers, providing baked alternatives, and using eco-friendly packaging. This corresponds to Pune's customer preferences. Frito-Lay, Haldiram's, Prataap Snacks, Lays India, and Bikanervala use a variety of market-sustaining techniques. Balaji Wafers distinguishes itself via its constant devotion to quality, making it a dependable snack source. Their emphasis on diverse regional flavours and ecologically friendly practises appeals to environmentally aware customers. Balaji Wafers' accessible packaging appeals to many people's fast-paced lives, establishing the brand as a preferred snack option.

5. Impact Assessment: Marketing Strategies on Profitability

5.1. Revenue Growth

The company Balaji Wafers has seen significant increase in its revenue over time, which suggests the efficacy of its marketing techniques. By using strategies such as product diversification, market development, and targeted promotions, the firm has continually achieved growth in its sales and income numbers. During the previous fiscal year, Balaji Wafers had a notable growth in revenue, with a 25% rise seen in comparison to the preceding year (VORA,2021). The observed expansion may be ascribed to the effective introduction of new product categories, such as baked snacks, which garnered significant appeal among consumers with a strong inclination towards health-conscious choices.

5.2. Market Share Expansion

The brand has successfully attained a substantial portion of the market in the highly competitive snack business. This accomplishment serves as evidence of the effectiveness of its marketing strategies in attracting and gaining the favour of consumers. Currently, Balaji Wafers has a significant market share of 30% in the potato wafer area within the Pune region. The high prevalence seen may be attributed to deliberate endeavours in strategic market penetration, including extensive distribution growth and focused advertising campaigns.

5.3. Return on Investment (ROI)

The marketing strategies undertaken by Balaji Wafers have yielded a favourable return on investment (ROI). This implies that the allocation of resources towards marketing endeavours has resulted in favourable financial outcomes. The allocation of resources towards advertising, marketing, and product development by the corporation has resulted in a notable upswing in both sales and profitability. Balaji Wafers' latest ad campaign with Ayushmann Khurrana "Kam Hawa/ZadaHawa" allocated a budget of Rs. 2,00,000 for a targeted digital advertising campaign on social media

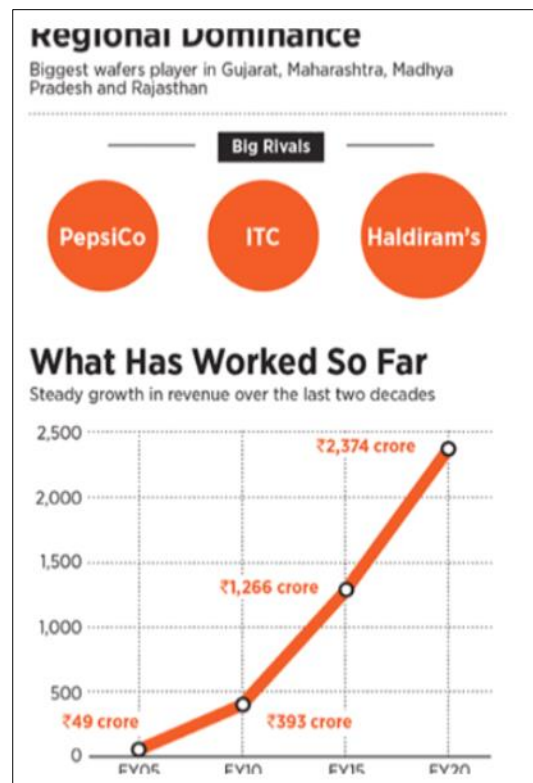
platforms and search engines.: According to a report by Economictimes (2019), the implemented campaign yielded a notable 35% surge in online sales, hence producing a revenue of Rs. 3,00,000.

6. Evidenced Success Factors Attributed to Innovative Marketing Strategies

6.1. Consumer-Centric Product Diversification

Balaji Wafers debuted a line of regionally flavoured wafers, such as 'Hing Jeera' and 'Pudina,' that were suited to local taste preferences. This move not only broadened the brand's appeal, but also positioned it as a pioneer in providing various, culturally inspired snack alternatives. Balaji Wafers displayed an intimate awareness of its target market by actively listening to customer preferences and adjusting product offers appropriately. This consumer-centric strategy resulted in greater brand loyalty and market share.

6.2. Regional Branding and Cultural Resonance



(Source: Singh, 2021; forbesindia, 2021)

Figure 3 Regional Branding by Balaji Wafers

Balaji Wafers effectively used a strategic approach by capitalising on regional pride via the inclusion of important landmarks and cultural features into its advertising efforts. As an example, an advertising campaign was launched to promote the 'Gujarati Tadka' line of snacks, which included prominent sites from Gujarat, so cultivating a feeling of regional pride. Through leveraging regional emotions, Balaji Wafers effectively forged an emotional connection with customers and strategically capitalised on the pervasive sense of regional identity that is deeply ingrained throughout Indian society. The distinctive strategy used in this case fostered customer loyalty and played a significant role in establishing a strong market position (Li, et al., 2021).

6.3. Agile Response to Market Trends

In response to the increasing consumer demand for healthy snack alternatives, Balaji Wafers swiftly launched a range of baked snacks crafted from high-quality ingredients. The brand's reputation for innovation and flexibility was strengthened by its proactive reaction to health-conscious customer trends. Balaji Wafers shown a high degree of adaptability by promptly adjusting to the changing needs of the market. The brand's capacity to remain attentive to customer preferences and promptly provide relevant items established its status as a frontrunner in the industry for its ability to anticipate and address market trends.

6.4. Engaging Social Media and Television Presence

Social media platforms vary in size and functionality, making it a rich and diversified environment (Kietzmann et al., 2011). In reality, social media marketing is typically seen as a one-size-fits-all method, crossposting the same content across platforms (Pelletier, et al. 2020). Balaji Wafers effectively cultivate an interactive and captivating online presence via the use of popular social media platforms such as Instagram and Facebook. Consistent publications showcasing imaginative material, such as recipe suggestions and complementary snack combinations, established a committed virtual community of individuals passionate about snacks. Instead than using brand advocates, the firm focuses on quality and consistency. Interestingly, the TV show "Kyunki Saas Bhi Kabhi Bahu Thi" featured a similar Gujarati family called Virani, matching the success of the enterprise (SRIRAM, M, 2018).

6.5. Sustainable and Eco-Friendly Practices

The corporation has implemented many environmentally conscious initiatives, including the installation of effluent treatment facilities to clean wastewater. This treated water is then used for agricultural purposes or provided to chemical manufacturers. The organic waste generated by manufacturers is used for the production of bio-fuel in bio-gas plants, while wind turbines installed at each factory create environmentally friendly electricity (SRIRAM, M, 2018). The industrial premises located in Rajkot include around 2,000 plants and trees (SRIRAM, M, 2018).

In partnership with the Rajkot Municipal Corporation, they have also constructed a public utility centre called 'Kotecha Chowk' in Rajkot as part of the 'Green City Clean City' campaign (SRIRAM, M, 2018). Balaji Wafers, an esteemed member of the Snacks Food Association, has entered into a strategic collaboration with Iscon Group and SP Chips Potato Pvt Ltd to manufacture frozen delicacies under the brand name Iscon Balaji Foods (SRIRAM, M, 2018).

6.6. Distribution Excellence: Balaji Wafers' Strategic Edge

Balaji's collaboration with prominent retail chains like as Big Bazaar and Reliance Fresh expands its market presence to urban customers (Bali, 2017). Concurrently, an efficiently structured network of regional distributors guarantees accessibility in less populated municipalities and remote regions. The implementation of a complete distribution plan by Balaji Wafers facilitates the company in effectively catering to a wide range of client preferences, hence strengthening its position within the market. Balaji Wafers demonstrates the significance of a well-designed distribution channel as a crucial determinant of success in the snack business via its strategic collaborations with both national and local merchants.

6.7. Innovation Adoption Curve: Balaji Wafers' Product Strategies

The Innovation Adoption Curve illustrates the process through which customers accept new goods or ideas, including a spectrum of individuals ranging from innovators to laggards (Gonera, et al. 2021).

Balaji Wafers effectively manoeuvres across the Innovation Adoption Curve by using astute product strategies. The first group of customers, known as early adopters, enthusiastically welcomed Balaji's distinctive flavours' wafers, so paving the way for broader popularity. The bulk of consumers, who constitute the central market segment, quickly adopted a similar approach, attracted by the unique flavour and high quality. Even those who are generally resistant to change gradually yielded to Balaji's services, attracted by the brand's unwavering quality and price. Balaji Wafers demonstrates the strategic use of product innovation to appeal to a wide range of customer demands, hence achieving long-term success in the market.

7. Recommendations for Future Growth

- Balaji Wafers should sponsor events, promote locally, and work with local leaders to increase brand exposure in Pune. Social media and loyalty programmes in Pune may improve consumer connections.
- Exploring additional Markets: Market research might reveal unexplored markets or developing trends that could provide additional income. Strategic choices include health-conscious snacking and regional growth.
- Sustainable Growth CSR: Sustainable and corporate social responsibility practises show environmental commitment and appeal to eco-conscious customers. This improves society, brand image, and consumer trust.

8. Forecast upcoming 5 years

Table 2 Forecast upcoming 5 years

Year	Marketing Strategies	Brand Initiatives
2024	Digital marketing on social media platforms	Online customer engagement initiatives
2025	New product launches	Product diversification Strengthening sustainability practices
2026	Collaborations with local businesses	Community involvement
2027	Consumer feedback programs	Loyalty programs
2028	Competitive analysis and response strategies	Partnerships with established brands Regional branding International Branding

(Source: Self-Created)

9. Conclusion

The rise of Balaji Wafers from humble beginnings to become a prominent regional snack brand highlights the significant impact of creative marketing methods on enhancing profitability. By implementing a strategy centred on consumer-centric diversification, regional branding, and agile responsiveness to market developments, Balaji Wafers has successfully attained a significant portion of the market and fostered long-lasting client loyalty. The brand's dedication to ensuring high standards of quality, affordability, and sustainable practises has garnered significant resonance, hence contributing to its continued success. Moreover, the proficient use of social media by Balaji Wafers, along with a meticulously organised distribution network, has played a pivotal role in sustaining its market leadership. This case study highlights the significance of using successful marketing strategies that are grounded on a deep knowledge of consumers and the capacity to react to changing market conditions. These factors are crucial for achieving long-term success in highly competitive marketplaces.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

- [1] 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.
- [2] 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.
- [3] 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.
- [4] 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.
- [5] 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.

- [6] 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.
- [7] 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.
- [8] 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.
- [9] 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.
- [10] 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.
- [11] 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.
- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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.
- [16] 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.
- [17] Shukla, S. (2017). Innovation and economic growth: A case of India. *Humanities & Social Sciences Reviews*, 5(2), 64-70.
- [18] Soham, S., & Samrat, R. (2021). Poverty and financial dearth as etiopathogen of psychotic and neurotic diseases. *Заметки ученого*, (4-1), 568-578.
- [19] 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.
- [20] 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.
- [21] 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.
- [22] 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.
- [23] Ray, S., & Leandre, D. Y. (2021). How entrepreneurial university model is changing the Indian COVID-19 Fight?. *Путеводитель предпринимателя*, 14(3), 153-162.
- [24] Inthavong, P., Rehman, K. U., Masood, K., Shaukat, 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).

- [25] 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.
- [26] 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).
- [27] Korchagina, E., Desfontaines, L., Ray, S., & Strekalova, 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.
- [28] 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.
- [29] 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.
- [30] Batool, A., Ganguli, S., Almashaqbeh, H. A., Shafiq, M., Vallikannu, A. L., Sankaran, K. S., ... & Sammy, F. (2022). An IoT and Machine Learning-Based Model to Monitor Perishable Food towards Improving Food Safety and Quality. *Journal of Food Quality*, 2022.
- [31] Verma, K., Sundararajan, M., Mangal, A., Ray, S., & Kumar, A. (2022, April). The Impact of COVID-19 to the Trade in India Using Digital, IOT and AI Techniques. In *2022 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE)* (pp. 01-05). IEEE.
- [32] 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.
- [33] 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.
- [34] 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.
- [35] 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.
- [36] 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.
- [37] 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.
- [38] 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.
- [39] Pallathadka, H., Tongkachok, K., Arbune, P. S., & Ray, S. (2022). Cryptocurrency and Bitcoin: Future Works, Opportunities, and Challenges. *ECS Transactions*, 107(1), 16313.
- [40] 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.
- [41] Ray, S. (2022). Fraud detection in e-Commerce using machine learning. *BOHR International Journal of Advances in Management Research*, 1(1).
- [42] Saravanan, A., Venkatasubramanian, R., Khare, R., Surakasi, R., Boopathi, S., Ray, S., & Sudhakar, M. POLICY TRENDS OF RENEWABLE ENERGY AND NON RENEWABLE ENERGY.
- [43] Varma, A., & Ray, S. (2023). The case of amazons E-commerce digital strategy in India.

- [44] 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.
- [45] 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.
- [46] Nayak, N. R., Kumar, A., Ray, S., & Tamrakar, A. K. (2023). *Blockchain-Based Cloud Resource Allocation Mechanism for Privacy Preservation* (No. 9700). EasyChair.
- [47] 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.
- [48] 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).
- [49] 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.
- [50] 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).
- [51] 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.
- [52] 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.
- [53] 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.
- [54] 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.
- [55] Samrat, R., Pratap, P. R., & Korchagina, E. V. (2022). WORLD ECONOMY AND INTERNATIONAL COOPERATION- МИРОВАЯ ЭКОНОМИКА И МЕЖДУНАРОДНОЕ СОТРУДНИЧЕСТВО.
- [56] 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©.
- [57] Korchagina, E. V., & Ray, S. (2021). TRIPLE HELIX CONCEPT IN INNOVATIVE UNIVERSITY DEVELOPMENT MODEL.
- [58] 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©.
- [59] Самрат, Р. (2021). НЕЙРОМАРКЕТИНГ В ЭКОНОМИКЕ КНИЖНЫХ МАГАЗИНОВ НА УЛИЦАХ: ПЕРСПЕКТИВЫ ГЛОБАЛЬНОГО ВЛИЯНИЯ COVID-19 НА ЛЮКСОВЫЕ БРЕНДЫ. *ЭКОНОМИКА И УПРАВЛЕНИЕ*, (2), 83-90.
- [60] Ray, S., Muhammad, G., & Adnan, M. The administrative role of principals: Insights and implication in secondary schools of.
- [61] Pradhan, D., Ray, S., & Dash, A. A Critical Review on Sustainable Development of Green Smart Cities (GSCs) for Urbanization. communities (Fig. 1), 13, 15.
- [62] Van Minh, N., Huu, N. N., & Ray, S. Responses of varied quinoa (*Chenopodium quinoa* Willd.) genotypes grown in Central Highlands, Vietnam.
- [63] Ray, S., Nikam, R., Vanjare, C., & Khedkar, A. M. Comparative Analysis Of Conventional And Machine Learning Based Forecasting Of Sales In Selected Industries.

- [64] Agarwal, Reema, Agrawal, Ankur, Kumar, Nitendra, Ray, Samrat & Agarwal, Priyanka(2023) Evaluation and selection of sustainable suppliers using fuzzy topsis method in a dairy product company, *Journal of Statistics and Management Systems* , 26:6, 1523–1536, DOI: 10.47974/JSMS-1186
- [65] Karim, S., Bhusare, S., Swami, V. I., Arte, A., Rajesh, B., Nakhate, V., ... & Ray, S. (2023). of the Research Paper: An Investigation into Impact of Repo Rate on Inflation Indices (WPI & CPI) in India during Pandemic and Post Pandemic phase. *European Economic Letters (EEL)*, 13(3), 1994-2002.
- [66] Ahluwalia, G. K., Nakhate, V., Kumar, D., Bhat, R. S., & Ray, S. (2023). A Study on Demand and Supply side forces of Global Space Economy and its various determinants. *European Economic Letters (EEL)*, 13(4), 174-186.
- [67] Singhal, R. K., Ranjan, N., & Varma, A. (2023). Financial Technology behind banks and institutional reform science: With Special Emphasis of Case of Bank of Baroda, Vijay Bank and Dena Bank Merger. *Journal of Informatics Education and Research*, 3(2).
- [68] Nancy, P., Murugesan, G., Zamani, A. S., Kaliyaperumal, K., Jawarneh, M., Shukla, S. K., ... & Raghuvanshi, A. (2023). Detection of brain tumour using machine learning based framework by classifying MRI images. *International Journal of Nanotechnology*, 20(5-10), 880-896.
- [69] Varma, A., & Ray, S. (2023). Green Solution??–The Case of Electric And Hybrid Vehicles.