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ARTICLES

Investigating e-Learning's Potential to Strengthen Healthcare Workforces in Developing Nations

Prof. Muhammed Miah

Effect of Social Media Influencer's Credibility on Brand Awareness, Brand Image and Consumer's Purchase Intention with Reference to Electronic Gadgets

Ms. Jyakshi Sharma, Prof. Bhwana Agarwal, Dr. N. Malati

Cloud-Based Mechanized Method for Developing Semantically Rich Ontologies and Planning Analogies for E-comfort Bids

Ms. Dimpy Jindal, Prof. Manju Kaushik, Dr. Barkha Bahl

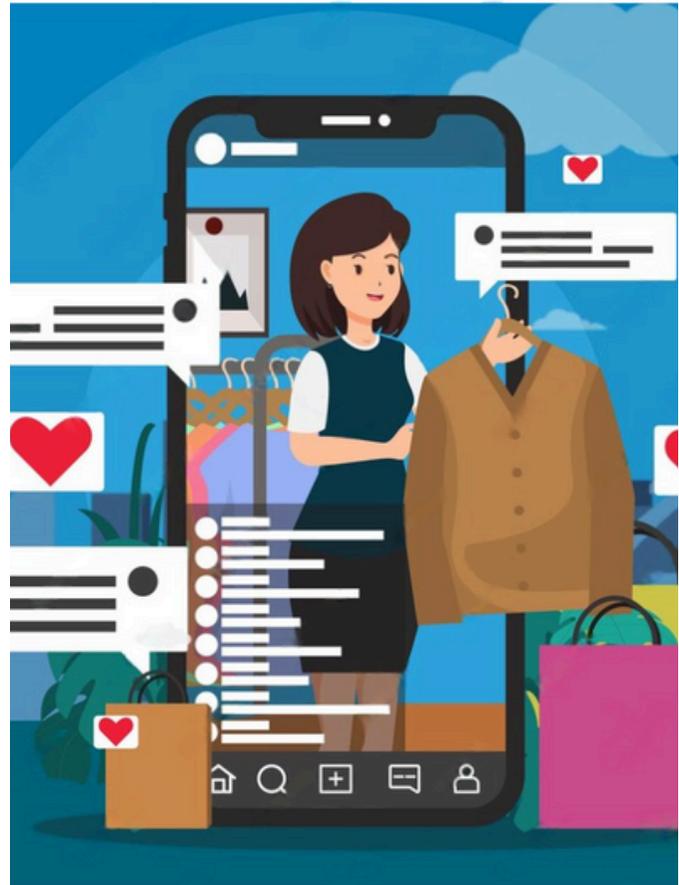
Sustainability Through CSR and its Impact on Financial Performance (A Case Study of Tata Consultancy Services)

Dr. Pooja Gupta, Dr. Mukesh Kumar Gupta

DOCTORAL ABSTRACT

Impact of Microfinance Schemes on Socio-Economic Well – Being of Rural Farmers in Punjab

Dr. Nishat Ahtesham



Effect of Social Media Influencer's Credibility....Pg.20

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DIAS Technology Review

The International Journal for Business & IT

INDEX

APRIL 2023 – SEPTEMBER 2023

ARTICLES

- 9 Investigating e-Learning's Potential to Strengthen Healthcare Workforces in Developing Nations

Prof. Muhammed Miah

The author of this study has assessed the rapid embracement of distance learning facilitated by digital technologies in meeting human resource and training challenges.



- 20 Effect of Social Media Influencer's Credibility on Brand Awareness, Brand Image and Consumer's Purchase Intention with Reference to Electronic Gadgets

Ms. Jyakshi Sharma, Prof. Bhwana Agarwal, Dr. N. Malati

This study explores the effectiveness of social media influencers' credibility on creating Brand Awareness, Brand Image and Consumer's Purchase intentions on various social media platforms like, Instagram, YouTube and Facebook.



- 34 Cloud-Based Mechanized Method for Developing Semantically Rich Ontologies and Planning Analogies for E-comfort Bids

Ms. Dimpay Jindal, Prof. Manju Kaushik, Dr. Barkha Bahl

The authors of this research paper have investigated ontology framework at the temperament of semantic web, which is a powerful method for representing and visualizing domain knowledge



- 47 Sustainability Through CSR and its Impact on Financial Performance (A CASE STUDY OF TATA CONSULTANCY SERVICES)

Dr. Pooja Gupta, Dr. Mukesh Kumar Gupta

The authors in this research study have examined the relationship between Corporate Social Responsibility and profitability through the lens of Tata Consultancy Services .

DOCTORAL ABSTRACT

- 54 Impact of Microfinance Schemes on Socio-Economic Well – Being of Rural Farmers in Punjab

Dr. Nishat Ahtesham

The research study has evaluated the impact of small deposits and small loans accessible to poor farmer households through Microfinance Program in pulling them out of the rut of poverty in rural Punjab.



From The Editor's Desk

With immense delight we present to our readers, the thirty ninth issue of DIAS Technology Review- The International Journal for Business & IT.

A silver lining in the dark clouds of Covid-19, was embracing 'digital learning' in the fields of business, trade and commerce all across the globe. A significantly rapid shift towards e-learning was observed in healthcare sector, post pandemic era. In the research article '**Investigating e-Learning's Potential to Strengthen Healthcare Workforces in Developing Nations**' the author has tried to measure the impact of distance learning facilitated by digital technologies in meeting human resource and training challenges in healthcare sector. Strong institutional supports as well as tailored e-learning strategies have been strongly recommended by the author, to amplify its efficacy.

In this digital age, social media influencers play a pivotal role in shaping consumer behaviour. The authors in their study '**Effect of Social Media Influencer's Credibility on Brand Awareness, Brand Image and Consumer's Purchase Intention with Reference to Electronic Gadgets**' have focused on 'influencer credibility' which includes the elements such as expertise, trustworthiness, attractiveness, and relatability. With Source-Credibility Model, they have tried to investigate how do audiences perceive brands and make their purchase decisions under the sway of endorsers on social media sites in the electronics sector.

The ontology engineering approach combined with analogy-based planning in today's cloud environment, aims to enhance intelligent decision-making, interoperability, and automation in energy management systems. It helps in knowledge visualisation through simplified semantic representations of the ontology. The research article '**Cloud-based Mechanized Method for Developing Semantically Rich Ontologies and Planning Analogies for E-comfort Bids**' highlights the structured frameworks defining E-comfort bids of personalized energy service proposals which may balance user comfort and energy efficiency.

The case study '**Sustainability through CSR and its Impact on Financial Performance: A Case Study of Tata Consultancy Services (TCS)**' integrates Corporate Social Responsibility into TCS business model to drive sustainable development and examine the subsequent impact on its operational and financial performance. The authors have discovered that at TCS, CSR is not merely a philanthropic endeavour but a strategic investment that can yield long-term competitive advantage leading to company's profitability and resilience.

Microfinance is a vital instrument for rural development, poverty reduction, and financial inclusion as it offers 'Banking' to the unbanked' through small loans, savings services, insurance, and financial literacy programs. In the doctoral abstract '**Impact of Microfinance Schemes on Socio-Economic Well – Being of Rural Farmers in Punjab**' the researcher has delved deeper to study the role of microfinance institutions (MFIs) and self-help groups (SHGs) in Punjab, providing financial access to marginalized farmers to combat debt cycle challenges and achieve economic and social empowerment.

In our mission of acquisition & proliferation knowledge in different areas of business and IT, we expect that this edition of our journal, with all its enlightening features will come up to the expectations of our valued readers.

Regards,



Dr. Anju Batra

ABOUT THE CONTRIBUTORS

Prof. Muhammed Miah



Prof. Muhammed Miah, Ph.D., is the Interim Dean for the College of Business and Professor of Business Information Systems at Tennessee State University, USA. Dr. Miah has many years of teaching experience at both graduate and undergraduate levels. He graduated with a Ph.D. in Computer Science from University of Texas at Arlington, an MBA in Computer Information Systems from Quinnipiac University, a Masters in Computer and Information Science from University of New Haven, and a Bachelor in Engineering from Khulna University of Engineering and Technology, Bangladesh. He has a significant number of journal and conference publications. Dr. Miah also serves on several journal editorial boards. His research interests include data analytics, data mining, databases, artificial intelligence, blockchain, fintech, healthcare analytics, information retrieval, technology changes, social media, online education, e-commerce, etc.

Email: mmiah@tnstate.edu

Ms. Jyakshi Sharma



Ms. Jyakshi Sharma is a NET qualified, research scholar at Amity College of Commerce and Finance, Amity University Uttar Pradesh, Noida. She is pursuing Ph.D in Commerce. Her current research interests include social media marketing, advertising and consumer behavior.

Email: sharma.jyakshi@gmail.com

Prof. Bhawna Agarwal



Dr. Bhawna Agarwal is a Professor and Head - Ph.D Programmes at Amity College of Commerce and Finance, Amity University Uttar Pradesh, Noida. She has over 22 years of teaching and research experience. Her research has been published in various national & international journals.

Email: agarwalbhawna@rediffmail.com

Dr. N. Malati



Dr. N. Malati is a professor and Director at Delhi Institute of Advanced Studies, affiliated to GGSIP University. She has over 23 years of teaching and research experience and one year corporate experience. Her research has been published in various national & international journals. She is a Research Guide to PhD students and Master's Students. She has more than 40 research articles in National and International Journals of repute to her credit. She has presented papers, delivered lectures and chaired sessions in Conferences/Seminars.

Email: malati_nvs@yahoo.com

Ms. Dimpy Jindal



Ms. Dimpy Jindal is an academician currently pursuing a Ph.D. in Software Engineering at Amity University Rajasthan, she holds a strong foundation with MCA and BCA degrees. Her expertise spans core computer science principles, evidenced by her more than 3 years of experience as an Assistant Professor at DIAS and multiple impactful publications in SCIE and Scopus-indexed journals, focusing on innovative solutions within cloud environments. Her research contributions include the development of models and frameworks leveraging ontology and neuro-fuzzy approaches. This blend of academic rigor and practical experience fuels her insightful contributions to the field of computer science.

Email: dimpy.jindal23@gmail.com

Prof. Manju Kaushik



Prof. (Dr.) Manju Kaushik is a Professor at Amity Institute of Information Technology (AIIT), Deputy Director-Amity Innovation Incubator Centre, President of the Institution's Innovation Council (IIC), Amity University Rajasthan, Branch Counselor IEEE & ACM student Branches and Coordinator of Technical Clubs –Amity University Rajasthan. She has more than 20 years of experience in the field of teaching and research. She was awarded Ph.D. from the Mohan Lal Sukhadia University, Udaipur, India.

Email: mkaushik@jpr.amity.edu

Dr. Barkha Bahl



Dr. Barkha Bahl is ex-Director and Professor of Trinity Institute of Professional Studies, sector 9, Dwarka, New Delhi, affiliated to GGSIP University. She has nearly three decades of teaching and research experience and one-year corporate experience. She is a Doctorate from Guru Govind Singh Indraprastha University, Dwarka, New Delhi. Her areas of specialization are Database Management Systems, Web Technologies, E-Business, Data Models and Geospatial modeling. She has more than forty research articles in National and International Journals of repute to her credit. She has been guiding research scholars to pursue their Doctoral programme. She has been editor for fourteen conference proceedings and two research journals. She has been instrumental in completion of numerous research projects at undergraduate and postgraduate levels.

Email: barkha69@rediffmail.com

Dr. Pooja Gupta



Dr. Pooja Gupta is an accomplished academician with over a decade of teaching experience in the fields of commerce and management. She holds a Ph.D. in Commerce from the prestigious University of Rajasthan, Jaipur, and has qualified for the UGC-NET/JRF, a testament to her academic excellence. Currently, she serves as an Assistant Professor at the Delhi Institute of Advanced Studies, affiliated with Guru Gobind Singh Indraprastha University (GGSIPU), Delhi. Dr. Gupta specializes in Accounting and Finance, and her research contributions span across various domains of commerce and management. She has a strong research portfolio, with multiple publications in reputed national and international journals.

Email: poojagupta@dias.ac.in

Dr. Mukesh Kumar Gupta



Dr. Mukesh Kumar Gupta is an experienced academic professional with over 20 years of teaching experience in finance, accounting, taxation, and management. He holds a Ph.D. in Private Sector Banking from Jiwaji University, Gwalior, along with an MBA in Finance and M.Com. His specialization includes financial accounting, management accounting, taxation (GST & Income Tax), business law, and cost accounting. Currently serving as an Associate Professor at Rukmini Devi Institute of Advanced Studies. He has successfully published multiple research papers in national and international journals, covering areas like financial analysis, banking sector performance, and marketing strategies. Additionally, he holds certifications in financial statement analysis, financial management, and software programming.

Email: mukeshgupta75@gmail.com

Dr. Nishat Ahtesham



Dr. Nishat Ahtesham has two years of teaching experience in GGSIP University and its affiliated colleges and more than eight years of administrative experience in Central Government Offices including National Statistical Office, Mohali (Punjab) and Directorate General of Employment, M/o Labour and Employment, Delhi. Her qualifications include BBA, MBA, M.A (Economics) and Ph.D. (Promoted as Senior Statistical Officer w.e.f 01.04.2024 and posted at Directorate General Factory Advice Service and Labour Institutes (DGFASLI), Mumbai.)

Email: nishat0702@gmail.com

Investigating e-Learning's Potential to Strengthen Healthcare Workforces in Developing Nations

*Prof. Muhammad Miah

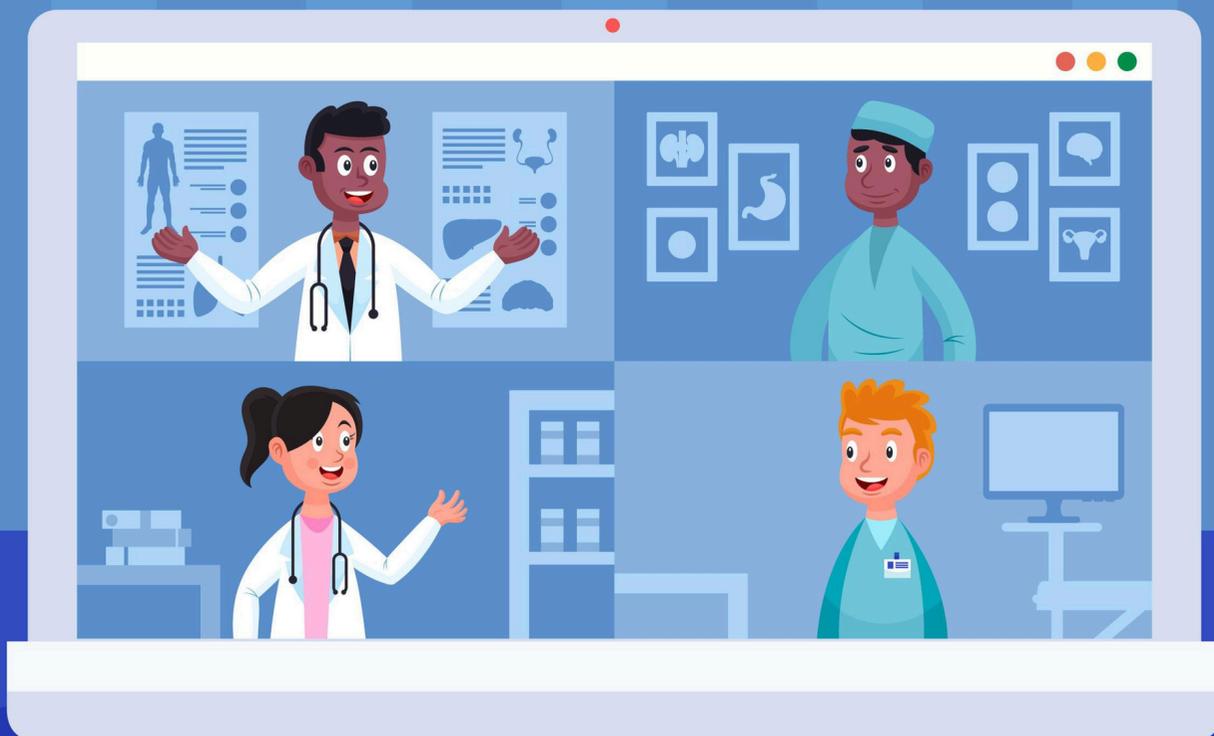
ABSTRACT

This study examines how e-learning can strengthen the skills of healthcare professionals in developing countries combined with existing and emerging issues, including Covid-19. The objective of the study is to assess the rapid embracement of distance learning facilitated by digital technologies in meeting human resource and training challenges. While this is easier than ever, barriers such as technology constraint, digital literacy or relevance of the content are still common today. The methodology involves a comprehensive literature review and analysis of major case studies and success stories. The key elements highlighted in the literature review include institutional support as well as tailored e-learning strategies to increase efficacy. The study seeks to reveal proven initiatives of e-learning post assessment through different case studies which have situated themselves as the leaders by changing healthcare delivery and outcomes. The findings reveal a significant shift towards e-learning for healthcare workforces in developing nations. The results underscore the necessity of a multi-stakeholder partnership to design sustainable e-learning interventions aimed at addressing educational access challenges and capacity building as part strengthening the health systems with limited resources.

KEYWORDS

E-learning, Healthcare professionals, Developing countries, Digital technologies, Distance learning, Capacity building, Covid-19 impact, Human resource development

*Interim Dean & Professor , College of Business & Information Systems, Tennessee State University, USA



INTRODUCTION

Healthcare process continues to shift in the application, what they are practicing by methods do better service technology. It is also a fragile space in terms of coaching. The hands-on practical side of the training makes some aspects of remote learning difficult because they are so sensitive. The e-learning revolution of health professional education and training in developing countries is advancing medical practice. The pandemic, while causing widespread disruption has undeniably accelerated this shift towards digital platforms and also shown a few ways to do so! However, looking past these stimulants is a larger theme of innovation and flexibility that flows throughout numerous healthcare venues.

The study by Sayed et al (2021) digs into the effectiveness of e-learning to supplement healthcare worker competencies in developing countries as informed by recent studies. These countries have specific issues in terms of political characteristics, economical characteristics; also general (stable internet connection) or particular (financial cost) (Sayed et al., 2021; Lonescu, A. et al., 2021). Nevertheless, in this respect research conducted by Schmidt and Mykhalovskiy (2021) as well introduced us the sweep of digital distance learning—that includes all areas including attitude to it, conductance and resultant outcomes.

When we travel on these various dimensions, this complex terrain of readiness to technological effectiveness against user engagement weights was encountered. The e-learning will cease to be only a back-up strategy for emergencies, and our understanding of it could start reflecting the possibilities described by recent literature to transform into an ongoing manner for learning new things related with healthcare workers blending geographical distances without expanding resources.

Kiberu et al (2019), as well Sagi et al. (2018) have shown a clear appreciation of the disruptive potential that telemedicine and e learning can be tapped to alleviate critical health workforce shortages offering innovative way towards ensuring access to care is improved. They identify key issues including the type and quality of e-learning content produced or used; pedagogical approaches adopted; as well technological constraints associated with digital education in low-resource settings. However, these are simply some of the bumps along a long road still to be travelled; infrastructural deficits, technical know-how gaps and inconsistent acceptability among medical professionals all make for difficult terrain when it comes to implementation.

In addition, as we reflect on the wider influence of these digital educational tools scholarship like Frehywot et al. (2013) and Barteit et al. (2019), illustrate systemic factors which impact more broadly integration with e-learning in healthcare training. The urgency for institutional pre-

paredness, stringently evaluated frameworks and support networks show starkly that emerging countries will have to undertake a synchronized effort together in e-learning. This would not just address short-term educational gaps, but also establish a foundation for a sustainable prospect by aligning national and international health priorities in the long-term.

In this research study, we critically discuss about the efficiency of existing eLearning platforms in the healthcare infrastructure capable of handling another challenge, innovative approaches are being employed, and its real-world repercussions concerning care services specially for the developing nations, etc.

LITERATURE REVIEW

The impact of COVID-19 outbreak on the education of health occupations in India and virtual learning among professionals and trainees was described by Sayed et al (2021). A quantitative survey conducted in 2020 found that 65.41% out of 3,004 healthcare professionals utilized e-learning programs in the time of pandemic, regardless of cybersecurity concerns.

E-learning was considered superior to traditional methods of education and instruction because it saved travel time, but also led in the maintenance of physical distance for social immunity without deferment in acquiring knowledge. Following the pandemic, e-learning has become one of the most popular methods according to an in-depth research study and is likely here to stay. It demonstrates how well-aware Indian healthcare professionals are, their perception and challenges related to E-learning. It highlights the contribution of e-learning in enhancing digital skills and reducing COVID's educational loss especially among younger, highly educated participants. Challenges include privacy concerns, technical knowledge gaps, and unstable internet connections. The study recommends using lessons learned from the pandemic to develop new laws, regulations, and platforms for future education and conducting further studies to enhance teaching methodologies, e-learning quality, and student satisfaction.

Lonescu et al (2021) examines the utilization of e-learning and e-consultation (EC) by certified Healthcare Workers (HCWs) in Low and Middle Income Countries (LMICs) - investigate whether the methods complement one another. They conducted a systematic review of 96 peer-reviewed papers, with 3 focusing on both e-learning and e-consultation, 54 on e-learning, and 39 on e-consultation. It mostly explored gaining knowledge and skills, ease of use, efficiency/competence, HCW satisfaction, or implementation hurdles. Successful e-consultation and e-learning networks were associated with institutional support, partnerships, and local expert capacity building. The review indicates that HCWs employed in LMIC settings still need to be supported by academic institutions, medical societies and networks with support from multi-partner initiatives.

Kiberu et al (2019) address the readiness/challenges related with implementing telemedicine in Uganda as well as other developing countries. It highlights potential of telemedicine to discuss healthcare worker shortages and improve access to care. They assessed four areas of eHealth readiness and used a mixed methods approach. Key findings include the awareness as well as positive attitudes of healthcare workers towards telemedicine, patient concerns, and the lack of necessary ICT infrastructure in healthcare facilities. The study highlights the need to address technology gaps and cater training for successful telemedicine implementation, provide recommendations for policymakers.

Sagi et al (2018) described the approach used in a newly implemented telementoring program designed to train primary care physicians (PCPs) treating substance use disorders (SUDs) in Bihar, India. SUD care is highly important to be part of the practice and responsibilities of PCPs, especially in underprivileged areas. Structurally, the program relies on synchronous training through online/remote ECHO clinics and asynchronous e-learning using a dedicated app. The review analyzed attendee reaction, learning outcomes, confidence and satisfaction. For majority of PCPs who participated, resulted increased knowledge and confidence regarding SUDs. The results suggest that training via technology to connect us back bridges health care gaps in these underserved areas.

Sagi et al (2018) wrote on design and evaluation of online training course for healthcare workers in Nigeria. This course was constructed to be mobile-friendly and self-paced, delivering basic infection prevention and control (IPC) knowledge. The study included 372 learners from different healthcare professions. While pre-test scores were low, and post-tests did not produce perfection, however, it was exciting to see them markedly climb up! Users expressed satisfaction with, and the study concludes that this mobile-ready self-training approach to training was successful in improving knowledge even though most users began the trials only having very little or no machete-related technical skills.

Frehywot et al (2013) reviews the use of e-learning in LMICs for the pre-service training of health care professionals. The study also pointed out that e-learning is a solution toward faculty shortages and better access to healthcare education within LMICs. This review captured 124 articles, concentrating on several countries including India, Brazil, South Africa and Egypt. It mainly reported specialist field for which e-learning is used, exclusive of the mandatory training areas, was physician training (58%), followed by nursing and pharmacy/dentistry (24%). The main motives for implementing e-learning are to expand access to education, provide faculty support, and share digital resources. Computer assisted learning, blended learning, simulations, multimedia software, internet-based learning, and eTutor/eMentor programs are among the different e-learning approaches used. It emphasizes that e-learning is a means to enhance education and faculty efficiency but highlights the importance of institutional readiness and alignment with educational and economic

perspectives in LMICs.

Barteit et al (2019) discusses the challenges and potential of e-learning in healthcare education in countries with low resources, primarily in sub-Saharan Africa. Despite two decades of efforts, e-learning has not revolutionized medical education in these regions. Key issues include the lack of a systematic approach, the digital divide, the proliferation of isolated pilot projects, and shortage of healthcare workers. This article emphasizes the necessity for structured implementation, curriculum integration, and rigorous evaluation. It calls for a centralized database to promote transparency and collaboration and advocates for a concerted effort to harness e-learning's prospective to address health worker shortages in low-resource countries.

Barteit et al (2019) systematically reviewed e-learning involvements on healthcare education in LMICs. This comprised 52 studies involving 12,294 participants. Findings showed that pilot studies had most e-learning interventions, using summative assessments and questionnaires for assessment. However, the study layout, assessment methods, and quality contrasted significantly. Subjective measures and custom-built assessment frameworks were used by majority studies, resulting in low validity and comparability. While many self-concluded that their e-learning interventions were effective, objective ratings revealed low-quality evidence. The study emphasized the requirement for further thorough assessment to comprehend the true impact of e-learning in LMICs, and improve healthcare education in resource-constrained situations.

Vaona et al (2018) compared e-learning with traditional learning systems to weigh the impacts on health professionals to improve patient outcomes, and behaviors, skills, and knowledge of health professionals. This comprised 16 randomized trials with a total of 5,679 licensed health professionals. Findings suggest that e-learning may have minimal or no difference on those aspects compared to traditional learning. The testimony was generally inferior certainty, and the study concluded that overall understanding of e-learning being more impactful than traditional learning might be unreliable.

Scott & Mars (2015) discuss Telehealth, a vital component of e-health, is expanding globally, benefiting both developed and developing countries. Nevertheless, it remains underutilized in many regions, and its applications and needs vary between these areas. While teleconsultation, telecardiology, teleradiology, and teledermatology are typical clinical uses, there's limited published evidence and sustained programs in regions like Latin America, the Caribbean, Asia, and Africa, despite some humanitarian initiatives. Developing countries are increasingly adopting mobile solutions (m-health), but global integration of telehealth into existing healthcare systems is hindered by factors like large-scale operations lacking, insufficient evidence, challenges on implementation, and neglect of willingness and change management. Practical issues such as resource limitations, power unreliability, high costs, and

poor connectivity add to these barriers in the developing nations. Nonetheless, telehealth holds potential for enhancing healthcare in developing countries, motivated by altruistic and profit purposes, but it must be tailored to meet specific healthcare needs, address workforce shortages, and facilitate skills development, necessitating increased awareness, understanding of its capabilities and limitations, and coordinated efforts among stakeholders to encourage innovation and integration.

Akimanimpaye & Fakude (2015) explores the attitudes of undergraduate nursing students at the University of the Western Cape towards e-learning. A survey of 213 students revealed a positive attitude for e-learning, comprising aspects like gender, ease of use, and student classification (year in the college) impacting their satisfaction about e-learning. Results indicate that e-learning is well-received, with an 86% valid response rate in the survey.

Dauids et al (2015) illustrates the promise of e-learning for developing clinical reasoning skills through an interactive learning environment, exposure to a broad spectrum of examples and prospects for methodical approach with feedback. It highlights two among the vital but least acknowledged components in successful e-learning: dealing cognitive load on learners and usability issues with technology interfaces. Cognitive load theory highlights on necessity of avoiding unnecessary cognitive load as a barrier to learning, and provides list of principles in instructional design based on empirical findings so that lessons are more likely optimize rather than hinder cognitive processes during study. Usability is defined as a human-computer interaction concept that is relatively neglected, both in designing e-learning programs and the learning management system (LMS), but gets more importance when we are dealing with medical education. The consolidation of principles from cognitive load theory

and human-computer interaction can improve learning efficacy by diminishing students extraneous cognitive load points, enhancing solutions usability whilst fostering development of student clinical reasoning.

Bussotti et al (2016) present an experience report on online training for professionals in 27 Neonatal and Pediatric Intensive Care Units within the public health service. The training aimed to enhance multidisciplinary skills and was based on a situational diagnosis of the participating institutions. The study achieved a high level of participation, with 2,071 active students and 1,046 approved. The experience demonstrates that online training is an effective tool for professional development and digital inclusion. However, it also highlights the importance of participants being familiar with technological resources to maximize the benefits of online learning.

Arigorous assessment of e-learning programs was provided by a study (conducted in-person, virtual and blended) delivered across 16 sub-Saharan African countries within an HIV capacity building program (Kiguli-Malwade et al., 2023). This real-world evaluation therefore targeted to determine the effectiveness of transitioning from face-to-face or in-person training services into being delivered online by comparing business-as-usual delivery with new digital approaches implemented during COVID-19. Results indicated that irrespective of delivery method, scores for every discipline related to HIV insight and self-reported confidence improved overall as found from pre- to post workshop scores. This would suggest, e-learning is a useful method for delivering training to healthcare workers across diverse clinical environments.

MAJOR EXPAMPLES/STORIES

The following papers were cited for the purpose of this research:

Project	Description	Impact	Strengths
Project ECHO (Extension for Community Healthcare Outcomes)	Project ECHO uses a telemedicine model to connect primary care physicians in remote or underserved areas with expert teams at centers of excellence. It provides the platform for knowledge sharing, case-based learning and capacity building.	Improved Access to Specialized Care, Enhanced Primary Care Expertise, Reduced Healthcare Disparities, Cost-Effective, Global Reach and Scalability, Research and Continuous Improvement, Community Engagement and Empowerment.	Project ECHO utilizes a scalable tele-mentoring model that empowers local healthcare providers with specialized knowledge, improving patient outcomes and reducing healthcare costs. By fostering interprofessional collaboration and focusing on underserved populations, it effectively addresses health disparities and enhances community capacity.
mHealth for Community Health Workers in Sub-Saharan Africa	Sub-Saharan Africa mHealth initiatives for Community Health Workers provides innovative possibilities to address the huge challenges by resources poor-health system in developing region through mobile phones;	In Sub-Saharan Africa, mHealth has dramatically improved healthcare service delivery by increasing on the overall efficiency and productivity of community health	mHealth enhances the effectiveness of Community Health Workers (CHWs) in Sub-Saharan Africa by providing real-time access to health information and data collection tools, improving service

	including from smartphones to basic feature phones which is used as point of access information, patient record and communication channel.	worker (CHWs), especially in rural communities with; better information flow, efficient disease surveillance techniques as well as cost-effective solutions.	delivery and patient management. Additionally, it facilitates communication and coordination among CHWs, healthcare providers, and communities, ultimately boosting health outcomes and increasing efficiency in resource-limited settings.
Telemedicine Training in Nepal	In Nepal, telemedicine training focuses on enabling doctors and nurses to use tools for remote diagnosis and treatment of patients via Internet in rural areas. This training comprises the use of digital tools and software, local healthcare capacity building as well as educational outreach in addition to international collaborations for knowledge transfer & technological support.	Enhanced access to healthcare in remote areas, improving the quality of care and making healthcare delivery more cost-effective. It has increased the medical knowledge and skills of local healthcare workers, empowering them to provide better care, although it faces challenges such as technological limitations and the need for continuous support.	Telemedicine training in Nepal strengthens healthcare delivery by equipping providers with essential skills to utilize digital technologies, thereby enhancing access to care, improving patient outcomes, and expanding medical knowledge in remote areas.
eLearning for Ebola Response in West Africa	For the Ebola response in West Africa, an eLearning initiative was provided for both healthcare worker training and public health prevention messaging via online platforms to serve wide-reaching multi-lingual culturally relevant content. The information was collaborated with health authorities and spread through tools like multimedia — accessibility via mobile phones helped right away.	It is no exaggeration to say that this initiative greatly improved the understanding and readiness level of healthcare workers in parallel with affected population, which ultimately decreased response lead time during Ebola outbreak. The study also highlighted the value of eLearning in emergency health crises, particularly resource-poor environments, to disseminate and deliver just-in-time training on basic ESNPs.	eLearning for Ebola response in West Africa enhances rapid knowledge dissemination and skill development among healthcare workers, enabling timely and effective management of outbreaks while overcoming logistical challenges in resource-limited settings.
Maternal Health Training in Bangladesh	Maternal Health Training in Bangladesh involves educating healthcare providers, particularly midwives and community health workers, on various aspects of maternal health, including prenatal care, safe delivery practices, and postnatal care. This training often incorporates hands-on skill development, use of technology, and focuses on addressing cultural and social factors impacting maternal health.	It was due to this training that maternal and newborn health indicators in Bangladesh started showing significant improvement through the development of capacities among healthcare providers. This has resulted in falling maternal and infant mortality rates, better care of pregnancy-related complications and increased community awareness regarding the health situation during birth.	Maternal health training in Bangladesh improves healthcare providers' competencies in managing pregnancy and childbirth, leading to enhanced maternal and neonatal outcomes and reducing complications in underserved communities.
HIV/AIDS Education in Sub-Saharan Africa	In Sub-Saharan Africa, many HIV/AIDS educational programs can be found that educate people to understand the different aspects of HIV/AIDS such as how it is transmitted and its prevention and treatment methods. They can be aimed at	The widespread education programs have played a major role in improving an understanding and removing the stigma from HIV/AIDS in the region. They have been instrumental in preventing new infection of HIV, enhancing	HIV/AIDS education in Sub-Saharan Africa empowers communities with knowledge and awareness, reducing stigma, promoting preventive behaviors, and improving access to treatment and care for those affected by the virus.

	different populations, including youth, women and target groups in general (on schools or community workshops) –media campaign.	the quality-health-life of those people living with and affected by HIV among many other healthier behaviors within communities.	
Telepsychiatry Training in Latin America	Telepsychiatry training in Latin America is aimed to teach practitioners the techniques and knowledge required to provide psychiatric care at a distance, through digital communication technologies. This training entails the utilization of teleconferencing tools, insights about how to engage patients online and changes in psychiatric evaluations/interventions for remote delivery.	The expansion of telepsychiatry training has provided broader access to mental health services for rural and underserved areas in Latin America, where there are important gaps in the provision of psychiatric care. In addition, it has also helped to increase the quality and consistency of mental health services meaning patients receive more constant (and heterogenous) mental healthcare.	Telepsychiatry training in Latin America enhances mental health service delivery by equipping clinicians with the skills to provide remote care, increasing access to psychiatric services in underserved areas and improving patient outcomes.
Nutrition Education in East Africa	The primary audience in East Africa is those within communities, particularly mothers and caregivers who benefit from resources developed to increase their knowledge on healthy eating, food security and nutrition practices. Such programs frequently incorporate guidance on permaculture practices, dietary diversity or more broadly the significance of nutrition in child growth and well-being.	Immediately, this innovative initiative had a transformative effect on nutrition awareness and practices locally in East Africa — ultimately yielding directly to better health outcomes for children and mothers alike. It has played a significant part in fighting malnutrition and related illnesses; it also promotes proper food habits and enhances regional level of self-sustainability.	Nutrition education in East Africa promotes awareness of healthy dietary practices, leading to improved nutrition, reduced malnutrition rates, and enhanced overall health outcomes for communities, particularly among children and vulnerable populations.
Community Health Worker Empowerment in South Asia	Empowering Community Health Workers (CHWs) in South Asia refers to the well-planned training and preparation of local health workers with all necessary skills, knowledge base and tools that they need to address various health related needs at their working points. Training in these areas covers education on public health, basic medical tools and community engagement/advocacy.	Access and quality to healthcare have improved significantly in these parts of South Asia by empowering CHWs who are based mainly in rural areas as well as underserved regions consequently resulting into good health outcomes. It also encouraged participation of the communities in health and prevention care, building trust additionally.	Empowering Community Health Workers in South Asia enhances local healthcare delivery by equipping them with the skills and resources needed to effectively address health issues, improve access to care, and engage communities in health promotion and disease prevention.
Diabetes Management in Southeast Asia	Diabetes management in Southeast Asia encompasses comprehensive strategies including public health education, regular screening, effective treatment protocols, and lifestyle modification programs. It focuses on addressing the rising prevalence of diabetes by increasing awareness, promoting healthy behaviors, and providing access to medical care and support for people living with diabetes.	As a result of this practice, diabetes in the area has improved more awareness leading to control and hopefully reduction in complications caused by the disease. It has also improved the quality of life for those with diabetes as well as lowering long-term healthcare costs around diabetes control.	Effective diabetes management in Southeast Asia enhances patient education, promotes self-care practices, and improves access to healthcare resources, leading to better glycemic control and reduced complications among individuals living with diabetes.

Telemedicine for Remote Indigenous Communities in Australia	Telemedicine in remote Indigenous communities: sidelined by interest groups, these communities are used as the example due to their reduced access, and increased need for healthcare meaning the potential benefits of telemedicine. The service includes virtual consults, remote monitoring and digital health education that is culturally tailored for the unique needs of Indigenous culture and healthcare.	This has led to massive improvements in healthcare access for Indigenous populations living remotely, being given prompt and culturally competent medical treatment. In doing so, it has also been pivotal in improving health outcomes, reducing patient travel and wait times for some medical services, as well increasing the engagement of Aboriginal people with their own healthcare.	Telemedicine for remote Indigenous communities in Australia improves access to healthcare services, facilitates timely consultations with specialists, and enhances the continuity of care, ultimately addressing health disparities and promoting better health outcomes in these underserved populations.
Infectious Disease Surveillance in West Africa	Surveillance of infectious diseases in West Africa is the continuous systematic collection, analysis and interpretation of health data to enable surveillance of more action-oriented prevention or control measures. These include the application of technology, field epidemiology and inter-agency collaboration in order to rapidly detect and respond to disease outbreaks.	Being able to detect and respond at an early stage has helped immensely in curbing the outbreak of infectious disease, which otherwise could have spread around effecting many more. Additionally, it has improved public health systems in the region and communities more broadly to provide protection against future potential pandemics.	Infectious disease surveillance in West Africa strengthens public health response by enabling early detection and monitoring of outbreaks, facilitating timely interventions, and improving coordination among health authorities to mitigate the spread of diseases.
Family Planning Education in Latin America	In Latin America, Family Planning Education emphasizes information regarding the different types of contraception and their access to services for sexual reproductive health rights. Programs target both adolescents, couples and communities with a range of messages focusing on making an informed choice when it comes to sexual health education.	Such an education program has both increased the knowledge and utilization of family planning methods, reduced unintended pregnancies, and upheld reproductive autonomy. It also has been essential in uplifting women and girls as beneficiaries to improve health outcomes with a view of sustainable development at the community level.	Family planning education in Latin America empowers individuals and couples with knowledge about reproductive health options, leading to improved contraceptive use, reduced unintended pregnancies, and enhanced overall maternal and child health outcomes.
Water and Sanitation Training in Sub-Saharan Africa	One of the projects focused on in Sub-Saharan Africa is a Water and Sanitation Training, which teaches communities how to avoid waterborne diseases through learning about safe practices concerning clean drinking water as well sanitation. Training typically involves water purification techniques, waste management and construction of sanitation facilities.	This training has led to significant improvements in public health by reducing the incidence of waterborne diseases and improving overall hygiene practices. It also plays a crucial role in enhancing community awareness and participation in sustainable water management and sanitation practices, contributing to long-term health and environmental benefits.	Water and sanitation training in Sub-Saharan Africa enhances community awareness and skills for sustainable water management and hygiene practices, leading to improved public health outcomes, reduced waterborne diseases, and greater access to clean water.

Project	Description	Impact	Strengths
Digital Education Initiatives in India	E-learning platforms have been utilized for the continuing education of healthcare professionals, allowing them to update their skills and knowledge without the constraints of time and location. This flexibility is particularly beneficial for in-service health professionals who may find it challenging to attend traditional training sessions due to work commitments (Jensen, Buhl, Hussain, Karan, Konrad-sen, & Bearman, 2023).	E-learning can potentially reach a larger number of healthcare professionals across India, especially in rural and underserved areas. This is crucial given the WHO's prediction of a global shortfall of 18 million health workers by 2030, with India being significantly affected.	E-learning platforms have been utilized for the continuing education of healthcare professionals, allowing them to update their skills and knowledge without the constraints of time and location.
Self-Management Support Training in India	An integrative review (Lawn, Zhi, & Morello, 2017) found that e-learning is effective for delivering self-management support training to healthcare professionals. This training is crucial for managing chronic conditions, which are increasingly prevalent in India. The review emphasized the need for high interactivity and practical application in e-learning modules to enhance skill acquisition among health professionals.	E-learning reduces the costs associated with traditional training methods, such as travel and accommodation for participants. This cost-effectiveness can lead to more frequent and widespread training opportunities for healthcare workers.	E-learning can be as effective as traditional face-to-face training in many aspects of healthcare education. For instance, this meta-analysis indicated that e-learning significantly improves knowledge outcomes and skills among healthcare professionals compared to no intervention.
India's eHealth Project:	The eHealth Project is integrated with the National Health Mission (NHM), which aims to provide accessible and affordable healthcare to all citizens (Jarosławski & Saberwal, 2014).	This initiative has resulted in a 70% increase in healthcare access for underserved populations, demonstrating the effectiveness of e-health integration within national healthcare frameworks.	This integration has led to improved data collection and health monitoring, with over 80% of health facilities in rural areas now using digital health records.

CHALLENGES

Following are some significant key challenges in terms of e-learning for healthcare workforces in developing nations.

Technology: To participate in the e-learning programs, it requires a reliable connection to internet. Computers and smartphones will need good internet access.

Digital Literacy: Many health workers in the developing world would not know how to navigate technology or might be digitally illiterate. This in turn makes it tough for them to engage with eLearning platforms.

Language Barriers: Majority e-learning programs are based upon English or any language spoken by very few healthcare workers in developing which makes it hard for them to follow.

Content Relevance: The first principle for effective eLearning will need to be that the program should address health workers operating in developing countries and contexts only. Hence the purpose is not going to be served

by generic, or irrelevant content.

Infrastructure: Power failures, lack of resources and non-repair or failure to fix equipment may all hamper online service clearness.

Cost-effective: Development and running of e-learning programs cost a lot, so health care providers from the third world nations may not be able to afford it.

Quality: It is very hard to maintain the quality of content for electronic learning where there is no regulatory oversight.

Sustaining & Practicing: However, the problem is that over time, it can be extremely difficult to engage healthcare workers and keep them interested in participating into digital programs when they have so many others things on their schedule or competing for their attention.

Social Elements: Health worker e-learning depends on the cultural attitudes towards it, and those are driven by cultural norms that influence behavior; hence we need to address.

these if a health worker's system is going to have an impact.

Sustainability: It is very difficult to implement e-learning and ensure that it will be sustainable in third world countries who largely depend on financial aid or backing from foreign public or private entities.

These challenges need a multi-sectoral response and all stakeholders at different levels such as policy makers, trainers, instructors, medical staffs in addition to technology wizard should together propose suitable e-learning modules targeted for healthcare professionals serving in resource limited areas of the world.

OPPORTUNITIES

Some major strengths of e-learning for the empowerment of healthcare workers in developing nations/countries are discussed below.

Reach: E-learning can reach the remotest corner of any country where it is virtually impossible to go. It provides educational opportunities and training not available through traditional paths. For instance, in sub-Saharan Africa, only about 6,000 medical doctors graduate annually to serve a population of nearly one billion people, highlighting a critical shortage that e-learning could help mitigate (Kalega, 2020). A study indicated that e-learning can increase access to healthcare education for up to 1.5 billion people in low- and middle-income countries, addressing the critical shortage of trained healthcare professionals (Ardestani, Adibi, Golshan, & Sadeghian, 2023).

Cost-Effective: At every level, e-training is cheaper easier to reach their standard counterpart means whether physical training facilities as well materials or travel are avoided. E-learning can reduce training costs by approximately 30-50% compared to traditional face-to-face training methods. This reduction is primarily due to savings on travel, accommodation, and materials (Ruggeri, Farrington, & Brayne, 2013).

Flexibility: It is the self-paced learning where one learns whatever he/she wants when they want. Useful for people working in different schedules.

Scalability: The ability to scale essentially to large numbers in a short time-span, such that it might be of great utility for e-trainings choosing modeling as significant shortage among health care personnel is depicted easily when speaking about developing countries.

Standardization: Utilizing electronic skills training ensures that all staff across the network receive access to similar content-related programs, thereby creating consistency and providing education on industry best practices in patient care delivery globally.

Continuing Education: Due to online learning, undoubtedly there can be nothing better than sitting at

home or office and improving skills without necessarily attending a class on the campus for Continuing Medical Education (ACME) cross country. Research shows that e-learning can improve knowledge retention rates by 25-60% compared to traditional learning methods. This improvement is attributed to the flexibility and accessibility of online resources, allowing healthcare workers to learn at their own pace (Aryee, Amoada, Obeng, et al. (2024).

Capacity Building: e-learning among health practitioners will help develop new talents and skills at the workplace, ultimately increasing job satisfaction. A meta-analysis found that e-learning interventions in healthcare education had a pooled effect size of 1.00 (95% CI, 0.90–1.10; $p < 0.001$) for knowledge outcomes, indicating that e-learning is as effective as traditional training methods ((Ruggeri, Farrington, & Brayne, 2013).).

Community Engagement: Online tools for health workers to learn how they could reach out to inform people in the community about taking charge of their own health.

Evaluation and Monitoring: Training programs can be optimized for further improvement if the e-learning system carries widgets meant to monitor performance per trainee in relation to set benchmarks over a defined period.

Networking: E-learning serves as a networking link between health care delivery organizations and schools offering medical and healthcare courses especially in resource constrained countries where most people do not have access to advanced learning facilities.

When achieved, that can be developed for improving workforce capabilities in healthcare field, especially in low income countries so it will lead to service quality improvement and ultimately affecting patient outcome positively.

RECOMMENDATIONS

E-learning constitutes a powerful means to address some of the health systems challenges in low-income countries. However, there are several steps that should be taken to make sure an opportunity comes to its fullest:

Content and Delivery:

Understand priority needs: Identify the most critical healthcare requirements in that region and develop e-learning content which is tailored specifically to address those specific skill and knowledge gaps.

Design for mobile-friendly: As many people are out there without desktop & laptop, so if possible, make courses mobile-friendly they can access through smartphone or tablets.

Rich Multimedia: Employ videos, simulations and interactive quizzes to cater for a spectrum of training types and maintain student engagement throughout the training.

Offline Capability: Ensure modules can be downloaded to enable access without required signal (for example, if connection network is unavailable).

Peer-Collaboration: Allow healthcare workers to talk directly with each other through forums and chat features.

How to Implement and Sustain:

Collaborations: Collaborate with global health entities, universities and NGOs to produce quality content that is broadly available at all times in multiple languages.

Translate and Culturally Adapt: Translate the best content around, change its design to fit in with cultural references and terminology which a particular demographic can relate with.

Train Trainers: Equip educators in healthcare with the skills and resources they need to deliver e-learning courses/programs competently.

Fix Infrastructure: Partner with telecom companies to expand web access, helping internet service providers (ISPs) be more competitive in rural areas.

Incentive: Incentivize by rewarding healthcare workers who complete e-learning programs with continuing education credits and other forms of recognition.

Further Aspects:

Formulating a Certification Process: Using this toolset as groundwork to obtain quality maintenance

and professionalism, development of certifications for e-learning programs are important.

Providing Tools and Technical Support: Access to tablets or laptops can represent an important barrier that, if overcome, significantly aids healthcare professionals.

Privacy: Preventing future hacking, via implementing way of data security to save privacy for health workers and patient confidentiality.

CONCLUSION

The potentials of e-learning for strengthening healthcare workforces in developing countries has been explored through this study. The study underscores key advantages of e-learning delivery in overcoming geographical constraints, cost-efficiency and accessibility for continuous professional development. Ensuring local healthcare needs are met in content, mobile friendly delivery and various techniques for learning need to be available for widespread implementation success. Longterm sustainability requires building effective partnerships for content development, localization and teacher training. The infrastructural challenges and collaboration and incentivize healthcare workers involvement are also important. In summary, e-learning provides a promising pathway to address the health workforce talent requires in developing countries. We recommend further investigations to identify the potential impacts of e-learning programs for healthcare worker performance and patient outcomes in developing countries, as well as policy guidance.

REFERENCES

- i. Akmanimpaye, F., & Fakude, L. P. (2015). Attitudes of undergraduate nursing students towards e-learning at the University of the Western Cape, South Africa: teaching and learning in health care professions. *African Journal for Physical Health Education, Recreation and Dance*, 21(sup-1), 418-433. <https://journals.co.za/doi/abs/10.10520/EJC183624>
- ii. Ardestani, S.F.M, Adibi S., Golshan, A. & Sadeghian, P. (2023). Factors Influencing the Effectiveness of E-Learning in Healthcare: A Fuzzy ANP Study. *Healthcare (Basel)*. 2023 Jul 16;11(14):2035. doi: 10.3390/healthcare11142035
- iii. Aryee, G.F.B., Amoadu, M., Obeng, P. et al. (2024). Effectiveness of eLearning programme for capacity building of healthcare professionals: a systematic review. *Human Resources for Health* volume 22, Article number: 60, doi: <https://doi.org/10.1186/s12960-024-00924-x>
- iv. Barteit, S., Guzek, D., Jahn, A., Bärnighausen, T., Jorge, MM., Neuhann, F. (2019). Evaluation of e-learning for medical education in low- and middle-income countries: A systematic review, *Computers & Education*, Volume 145, 103726, ISSN 0360-1315, doi.org/10.1016/j.compedu.2019.103726. <https://www.sciencedirect.com/>

- v. Barteit, S., Jahn, A., Banda, SS., Bärnighausen, T., Bowa, A., Chileshe, G., Guzek, D., Jorge, MM., Lüders, S., Malunga, G., Neuhann, F. (2019). E-Learning for Medical Education in Sub-Saharan Africa and Low-Resource Settings: Viewpoint. *J Med Internet Res*. 9;21(1):e12449. doi: 10.2196/12449. PMID: 30626565; PMCID: PMC6329426.
- vi. Bussotti, E. A., Leite, M. T. M., Alves, A. C. D. C., & Cristensen, K. (2016). Online training for health professionals in three regions of Brazil. *Revista brasileira de enfermagem*, 69, 981-985. <https://www.scielo.br/j/renben/a/ZZtxmB9XYT9tKMQH5w4QM8b/?lang=en>
- vii. Davids, M. R., Halperin, M. L., & Chikte, U. M. E. (2015). Optimising cognitive load and usability to improve the impact of e-learning in medical education. *African Journal of Health Professions Education*, 7(2), 147-152. <https://www.ajol.info/index.php/ajhpe/article/view/128352>
- viii. Frehywot S, Vovides Y, Talib Z, Mikhail N, Ross H, Wohltjen H, Bedada S, Korhumel K, Koumare AK, Scott J. (2013). E-learning in medical education in resource constrained low- and middle-income countries. *Hum Resour Health*. 2013 Feb 4;11:4. doi: 10.1186/1478-4491-11-4. PMID: 23379467; PMCID: PMC3584907. E-learning in medical education in resource constrained low- and middle-income countries - PubMed (nih.gov)
- ix. Jarosławski, S. & Saberwal, G. (2014). In eHealth in India today, the nature of work, the challenges and the finances: an interview-based study. *BMC Med Inform Decis Mak*. 2014 Jan 6;14:1. doi: 10.1186/1472-6947-141
- x. Jensen, L. X., Buhl, A., Hussain, S., Karan, A., Konradsen, F., & Bearman, M. (2023). Digital education for health professionals in India: a scoping review of the research. *BMC Medical Education*, volume 23, Article number: 561, doi: 10.1186/s12909-023-04552-2
- xi. Kalega, A. (2020). The Future of E-Learning in Health Care Settings for Developing Countries. *HELINA health Informatics in Africa*. Last accessed on November 11, 2024 from <https://helinanet.org/index.php/2020/07/31/the-future-of-e-learning-in-health-care-settings-for-developing-countries/>
- xii. Kiberu, V.M., Scott, R.E. & Mars, M. (2019). Assessing core, e-learning, clinical and technology readiness to integrate telemedicine at public health facilities in Uganda: a health facility – based survey. *BMC Health Serv Res* 19, 266 (2019). <https://doi.org/10.1186/s12913-019-4057-6> <https://link.springer.com/article/10.1186/s12913-019-4057-6>
- xiii. Kiguli-Malwade, E., Forster, M., Eliaz, A., Celentano, J., Chilembe, E., Couper, ID., Dassah, ET., De Vil liers, MR., Gachuno, O., Haruzivishe, C., Khanyola, J., Martin, S., Motlathledi, K., Mubuke, R., Mteta, KA., Moabi, P., Rodrigues, A., Sears, D., Semitala, F., von Zinkernagel, D., Reid, MJA., Suleman, F. (2023) Comparing in-person, blended and virtual training interventions; a real-world evaluation of HIV capacity building programs in 16 countries in sub-Saharan Africa. *PLOS Glob Public Health*. 2023 Jul 24;3(7):e0001654. doi: 10.1371/journal.pgph.0001654 PMID:37486898; PMCID: PMC10365303.
- xiv. Lawn, S., Zhi, X., & Morello, A. (2017). An integrative review of e-learning in the delivery of self-management support training for health professionals. *BMC Medical Education* volume 17, Article number: 183, doi: 10.1186/s12909-017-1022-0
- xv. Lonescu, A. et al. (2021). A scoping review of the use of e-learning and e-consultation for healthcare workers in low- and middle-income countries and their potential complementarity. *Journal of the American Medical Informatics Association*, Volume 29, Issue 4, April 2022, Pages 713–722, doi:<https://doi.org/10.1093/jamia/ocab271> <https://academic.oup.com/jamia/article-abstract/29/4/713/6489438>
- xvi. Ruggeri, K., Farrington, C. & Brayne, C. (2013). A Global Model for Effective Use and Evaluation of e-Learning in Health. *Telemed J E Health*. Apr;19(4):312–321. doi: 10.1089/tmj.2012.0175
- xvii. Sagi, MR., Aurobind, G., Chand, P., Ashfak, A., Karthick, C., Kubenthiran, N., Murthy, P., Komaromy, M., Arora, S. (2018). Innovative telementoring for addiction management for remote primary care physicians: A feasibility study. *Indian J Psychiatry*. 2018 Oct-Dec;60(4):461-466. doi: 10.4103/psychiatry.IndianJPsiachia try_211_18. PMID: 30581211; PMCID: PMC6278210. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6278210/>
- xviii. Sayed, S. et al. (2021). Future of e-Learning in Medical Education—Perception, Readiness, and Challenges in a Developing Country. *Front. Educ.*, Volume 6, doi: <https://doi.org/10.3389/educ.2021.598309>, Last retrieved on October 24, 2023 from <https://www.frontiersin.org/articles/10.3389/educ.2021.598309/full>
- xix. Barteit, S., Jahn, A., Banda, SS., Bärnighausen, T., Bowa, A., Chileshe, G., Guzek, D., Jorge, MM., Lüders, S., Malunga, G., Neuhann, F. (2019). E-Learning for Medical Education in Sub-Saharan Africa and Low-Resource

Effect of Social Media Influencer's Creditability on Brand Awareness, Brand Image and Consumer's Purchase Intention with Reference to Electronic Gadgets

*Ms. Jyakshi Sharma, **Prof. Bhwana Agarwal, ***Dr. N. Malati

ABSTRACT

This study is designed to investigate the effectiveness of social media influencers' credibility dimensions (Expertise, Trustworthiness and Attractiveness) on creating Brand Awareness, Brand Image and Consumer's Purchase intention on three basic social media platforms (Instagram, YouTube, Facebook) with regards to Electronic Gadgets. This study aims to fill the gap by exploring whether the requirements of influencers' expertise, trustworthiness and attractiveness are relevant for online influencer campaigns. Data was collected using a standardized online questionnaire and analyzed. The findings reveal that expertise and trustworthiness have significant direct effects on Brand Awareness, as well as significant indirect effects on the purchase intention of consumers. The relevance of attractiveness is virtually nil in creating Brand Awareness. In building Brand image all the three dimensions are relevant. Also, the purchase intention of consumers is directly affected by an influencer's expertise and trustworthiness. Furthermore, the current study highlights significant preferences on influencer's following on social media sites. Instagram, being the most preferred site, followed by YouTube and then Facebook. This study is one of the few attempts to examine the success requirements on social media platforms, specifically Instagram, YouTube and Facebook, relating to influencer's credibility. It extends the Source-Credibility Model for influencers and reveals that its requirements interact in a unique manner that is different from other types of endorsers such as celebrities which offers valuable insights to marketing practitioners and academicians.

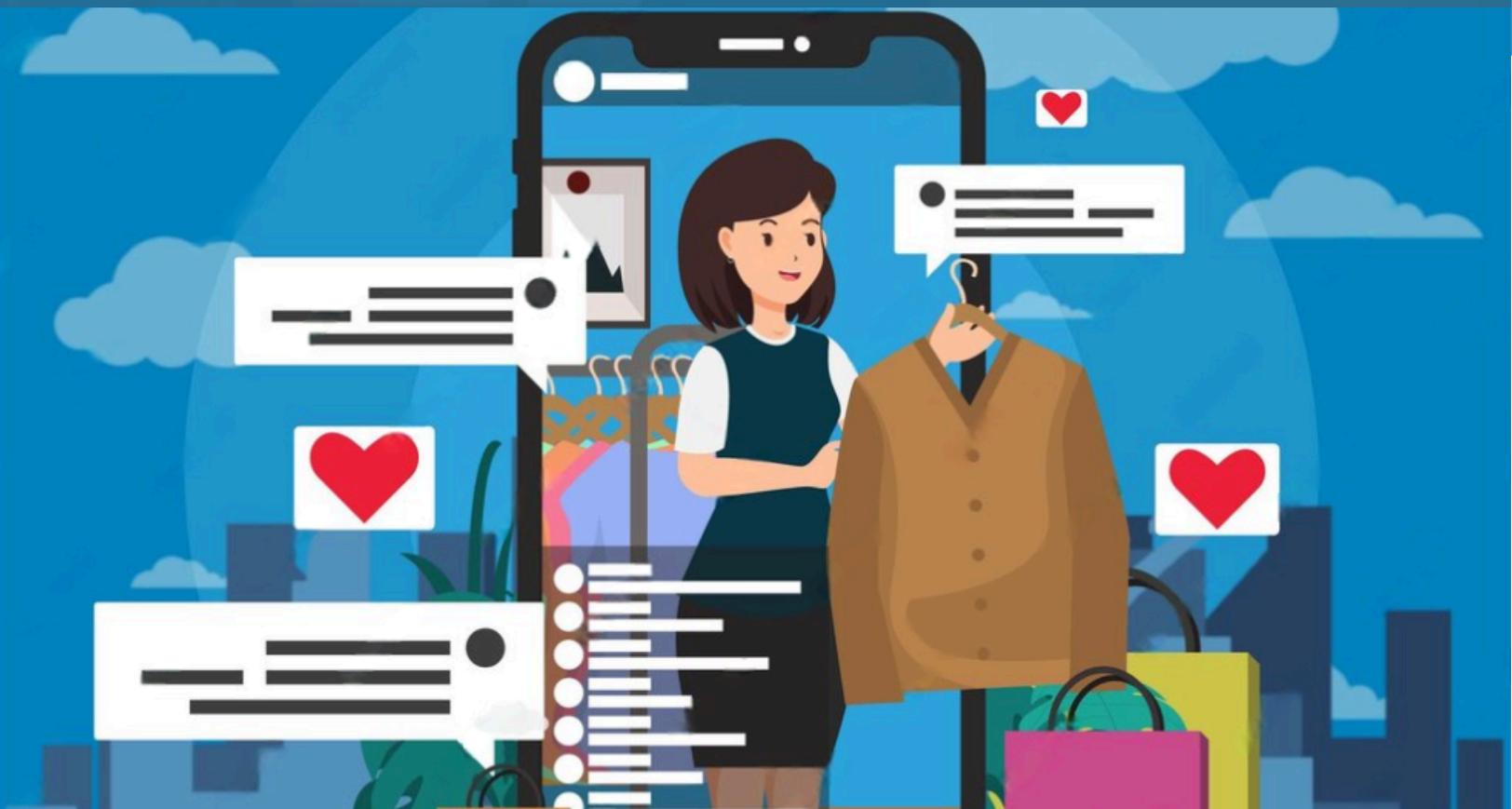
KEYWORDS

Social media Influencer, Brand awareness, Brand Image, Purchase intention, Source Credibility.

*Research scholar at Amity College of Commerce and Finance, Amity University, Noida, Uttar Pradesh, India

**Professor and Head - Ph.D Programmes at Amity College of Commerce and Finance, Amity University Uttar Pradesh, Noida, India

***Professor, Delhi Institute of Advanced Studies, Delhi, India



INTRODUCTION

Social media and social networking sites have changed today's scenario of obtaining and receiving information (Lou & Yuan, 2019). Social media is an online communication tool that has a significant influence on society (Nam & D n, 2018), pushing businesses to expand their marketing practices through social media. In recent times influencer marketing has grown exponentially through social media. The accessibility and desirability of influencer endorsements have grown dramatically as a result of social media's pervasiveness (Appel et al., 2020). Interestingly, research data shows that consumers are prone to blindly trust the information that is disseminated in social media networks (Shareef et al., 2020). Tech companies are spending more money on digital and social media marketing channels to connect with consumers who are interested in purchasing consumer electronics. This study involves preliminary research to better understand how an influencer's credibility influences consumers via social media. Social media influencers are individuals with significant followings on various online platforms, such as YouTube, Instagram, Snapchat, or personal blogs, who possess the ability to impact and sway the opinions of their audience (Agrawal, 2016; Varsamis, 2018). Social media influencers, unlike celebrities or public figures who are well-known through traditional media, are 'ordinary individuals' who have become 'online celebrities' by creating and posting content on social media (Lou & Yuan, 2019). Social media influencers have evolved as a dynamic third-party endorser in the age of widespread Internet (Freberg et al., 2011). Social Media Influencers (SMIs) are increasingly becoming prominent on social media platforms, serving as intermediates between companies and consumers (Hwang & Zhang, 2018; Uzunođlu & Misci Kip, 2014). This can be seen by the meteoric rise of influencer marketing from ₹19 billion in 2023, to an anticipated ₹34 billion by 2026 as reported by FICCI- EY.

Influencers on social media are effectively used to publicize product information and latest promotions to online followers via a variety of social media platforms such as Facebook, Instagram, Twitter(X), and YouTube (Markethub, 2016). Web 2.0 technologies provide users a web experience that reflects the buzz surrounding their participation in information sharing

Influencers usually establish a strong bond with their audience and play a crucial role in engaging their followers, making them an excellent choice for product promotion. Marketers in the consumer electronics sector utilize social media influencers to establish an interactive relationship with present day consumers, who are increasingly being disinterested in conventional advertising (Trivedi & Sama, 2020). Furthermore, product suggestions from social media influencers were more trusted than product recommendations from family or friends, resulting in 40% of consumers purchasing the products used by social media influencers (Sekhon et al., 2016). They are

able to impact consumer's attitude by providing the most up-to-date information (Liu et al., 2015). Despite this, there is a scarcity of research on social media influencers. This study further seeks to comprehend the concept of social media influencer's credibility. The foundation of this study will be the Source-Credibility Model, initially introduced by Hovland et al. (1982) and subsequently supported by Ohanian (1990). The purpose of this study is to examine the effectiveness of the credibility dimension of social media influencers. (Expertise, Trustworthiness and Attractiveness) on creating Brand Awareness, Brand Image and Consumer's Purchase intention on three basic social media platforms (Instagram, YouTube, Facebook) with regards to Electronic Gadgets.

The research objectives are: (1) to examine the impact of social media influencers' credibility dimensions on brand awareness, brand image, and consumers' purchase intentions, and, (2) to determine the mediating role played by Brand Awareness and Brand Image between these dimensions and the consumers' purchase intention. A survey by Mediakix (2019) revealed that the top five social media platforms for influencer marketing are Instagram, YouTube, Facebook, Blogs and Twitter(X). Thus, it is apparent that Instagram, YouTube and Facebook are the most popular social media platforms in India and therefore, our study focused solely on these three platforms.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Source Credibility

The proposed research model considers the Source Credibility Theory (Hovland et al., 1953). Researchers in the field of Marketing and Communication Studies frequently utilize this theory to analyze and compare the effectiveness and credibility of various media channels (Johnson & Kaye, 2009). Recently, scholars have delved into the concept of source credibility within various theoretical frameworks to gain insights into its influence on online behavior (Ayeh, 2015). Expertise and trustworthiness were proposed as two determinants of source credibility by Hovland, Janis, and Kelley (1953). McGuire (1985) introduced a third element of source credibility: attractiveness, which pertains to a source's physical appeal or likability. Similarly, Ohanian (1990) defined source credibility as a three-dimensional construct, relying on threads from previous literature including trustworthiness, expertise, and attractiveness.

Influencer's Credibility

Influencers embody a new class of opinion leaders who cultivate close bonds with their followers, based on mutual values, ideas, beliefs, and preferences (Casal  et al., 2020). Their influence is contingent upon their credibility, which are associated with their recommendations (Schouten et al., 2019). Thus, persuasiveness of a communicator or message source is strongly influenced by their credibility (Hovland & Weiss, 1951). A credible endorser

has an affluential impact on the opinion of consumers (Goldsmith et al., 2000).

The efficacy of an endorsement is usually determined using source credibility. (Hovland & Weiss, 1951; Taghipoorreynh and de Run, 2016). The Source-Credibility Model, developed by Hovland et al. (1982) and backed up by Ohanian (1990), will be the basis of the present study. According to Hovland, Irving & Kelley (1953), the effectiveness of an advertisement is influenced by the receivers' perceptions of the source's credibility. The authors further propose that a message's source credibility is made up of two dimensions: expertise and trustworthiness. Credibility, contrary to popular belief, is not the same as trustworthiness. Rather, one of the model's core tenets is that a credible source must meet three criteria: expertise, attractiveness, and trustworthiness. Credibility is thus a general term in the model that encompasses all three requirements. Therefore, this study uses a three-dimensional conceptualization of source credibility in the context of influencer marketing.

Influencers on social media are effectively used to publicize product information and latest promotions to online followers via a variety of social media platforms such as Facebook, Instagram, Twitter(X), and YouTube (Markethub, 2016). Web 2.0 technologies provide users a web experience that reflects the buzz surrounding their participation in information sharing (Safi-

Expertise - The term 'expertise' refers to a source's level of knowledge. Within a given domain, it is described in terms of peak or at least high levels of knowledge, experience, and problem-solving abilities. The competency or qualification of a source, including the source's knowledge or abilities, to make particular statements about a specific subject or issue is referred to as source expertise (McCroskey, 1966).

Source Trustworthiness - The receivers' perception of a source as honest, sincere, or truthful is called source trustworthiness (Giffin, 1967). The receiver's perception of the likelihood that an endorser shares the claims that he or she believes most truthful is referred to as trustworthiness. Ohanian (1991) defines trustworthiness as a consumer's trust in a source's ability to provide impartial and honest information. Recent research in various contexts has also highlighted the significant effects of source trustworthiness on various consumer behaviors, including attitudes toward a message, information uptake, and purchase intentions. (e.g., Aych et al., 2013; Kim & Kim, 2014; Li, 2013; MacKenzie & Lutz, 1989; Pornpitakpan, 2004; Sussman & Siegal, 2003; Wang & Doong, 2010).

Physical Attractiveness - The physical attractiveness of influencers on social media is considered to have a significant impact on the acceptance rate of advertisement. Source attractiveness lays emphasis on an endorser's physical features or characteristics (Erdogan, 1999). McGuire (1985) observed that source attractiveness directly affects the effectiveness of an endorsement. A socially

ap-pealing influencer can positively shape consumer perceptions and behaviors. Endorsers with attractive and appealing qualities can influence buyers' attitudes, leading to a purchase intention (Till & Busler, 2000).

Brand Awareness

Brand awareness refers to the likelihood that a consumer will recognize a brand and associate it with a specific product category (Aaker, 1991). It reflects the strength of a brand in the consumer's mind, which businesses can enhance through strategic marketing efforts such as advertising, promotions, publicity, and public relations (Kim & Kim, 2005; Hutter et al., 2013). The more consumers are exposed to a brand through these channels, the more likely they are to recall and recognize it.

The role of brand awareness extends beyond mere recognition. It influences consumer decision-making by helping consumers identify brands and guiding their purchase choices (Percy & Rossiter, 1992). Consumers often favor well-known brands, making brand awareness a key driver of purchase intention (Keller, 1993; Macdonald & Sharp, 2000).

Research has highlighted the connection between the credibility of a source and brand awareness. For instance, Chakraborty & Bhat (2018) found that source credibility, along with the quality of online reviews, significantly impacts consumers' perceptions of review credibility, which in turn affects brand awareness and purchase intentions. Over the past five years, many businesses have collaborated with influencers to increase brand awareness and drive conversions within specific target groups or niches (Guan & Li, 2021).

Given the critical role brand awareness plays in shaping consumer behavior, this study seeks to explore the direct impact of influencer credibility dimensions (expertise, trustworthiness, and attractiveness) on brand awareness.

Therefore, we propose the following hypothesis:

H1a: Influencer's expertise has positive influence on consumers' Brand Awareness.

H1b: Influencer's trustworthiness has positive influence on consumers' Brand Awareness.

H1c: Influencer's attractiveness has positive influence on consumers' Brand Awareness.

Brand Image

Brand image refers to the perceptions and feelings that consumers associate with a brand (Roy & Banerjee, 2007). A positive brand image enhances consumer trust and can significantly influence purchasing decisions (Koh & Fang, 2012). Strong brand images are often associated with higher perceived product quality, which boosts consumer purchase intentions (Grewal et al., 1998; Lin et al., 2013).

Social media influencers play a pivotal role in shaping consumer perceptions of brand image. Solomon (2017) emphasized that influencers impact how consumers perceive products, while Ateke (2013) found that stronger consumer perceptions lead to a more favorable brand image for products endorsed by influencers. Further, Vilkaite-Vaitone (2024) revealed that while celebrities often have broader reach, micro-influencers tend to generate higher trust and stronger consumer connections, especially when their content aligns with audience interests. Similarly, Godey et al. (2016) suggested that marketing practices involving social media influencers have a positive impact on brand image, strengthening the connection between the brand and its audience. Abu & Mohamad (2023) identified that disclosure enhances credibility and found that brand awareness mediates the relationship between influencer credibility and purchase decisions.

The credibility of the influencer is particularly influential in shaping brand image. Lomboan S. (2013) demonstrated that credibility, encompassing dimensions like expertise, trustworthiness, and attractiveness, significantly affects brand image. This suggests a strong positive relationship between source credibility and how consumers perceive a brand. Thus, the following hypothesis is proposed:

- H2a: Influencer’s expertise has positive influence on consumers’ Brand Image.
- H2b: Influencer’s trustworthiness has positive influence on consumers’ Brand Image.
- H2c: Influencer’s attractiveness has positive on influence consumers’ Brand Image.

Purchase Intention

Purchase intention reflects a consumer’s likelihood of buying a specific product and serves as a critical factor in understanding consumer behavior (Fishbein & Ajzen, 1977). The Hierarchy of Effects Model, emphasized that brand awareness is a crucial first step in the consumer decision process, affecting subsequent stages like brand preference and purchase intention (Lavidge & Steiner, 1961). While Social media marketing communication aims to influence purchase decisions by creating persuasive and credible messages. Research by Wu & Wang (2011) shows a direct and positive relationship between the credibility of the message source and consumers’ purchasing intentions.

Brand awareness plays a crucial role in shaping purchase intentions. It helps consumers recognize and recall a brand, increasing the chances of it being included in their consideration set—the group of brands a consumer evaluates when making a purchase decision (Percy & Rossiter, 1992; Baker et al., 1986; Chakravarti & Janiszewski, 2003).

Consumers are more likely to choose recognized and well-known brands, as familiarity often fosters trust and preference (Keller, 1993; Macdonald & Sharp, 2000). Research from Bansal et al. (2023) emphasizes that

consumers are increasingly trusting influencers’ opinions over traditional advertising, particularly when influencers align with the consumer’s values and interests. Similarly, a strong brand image can significantly enhance purchase intentions. Consumers rely on their perceptions of a brand’s image to cultivate interest in and confidence about purchasing it. (Kotler & Keller, 2016). Social media influencers play a crucial role in this process. When consumers trust the content shared by influencers, they are more inclined to form positive attitudes toward the promoted product., ultimately leading to purchase intentions. A meta-analysis of 62 studies on social media influencers highlights that influencer characteristics, such as credibility, homophily (similarity to the audience), and entertainment value, significantly affect customer engagement and purchase intentions. Among these, influencer credibility was found to have the strongest correlation with consumers’ likelihood to purchase products endorsed by influencers.

- H3: Brand Awareness will positively influence consumers’ purchase intentions.
- H3: Brand awareness will have a positive impact on consumers’ purchase intentions.
- H4: Brand image will positively affect consumers’ purchase intentions.
- H5a: Influencers’ expertise will positively influence consumers’ purchase intentions.
- H5b: Influencer’s trustworthiness has positive influence on consumers’ Purchase Intention.
- H5c: Influencer’s attractiveness has positive influence on consumers’ Purchase Intention.

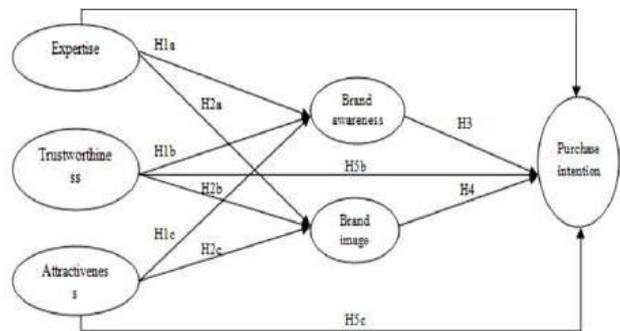


Figure 1 Conceptual Framework

3. RESEARCH METHODOLOGY

3.1 Measurement Instruments

For the measurement of variables in the model, tested and recognized scales from the literature were used. Minor modifications were made to the scales to suit the research objective. Table 1 presents the measurement scale/instruments and their references of the current study.

Table 1 Measurement Instruments used in the questionnaire for variables under study

ITEMS	MEASUREMENT STATEMENTS	REFERENCE
Influencers Credibility	<p><u>Expertise</u></p> <ol style="list-style-type: none"> 1. I feel that Influencer is an expert. 2. I feel that Influencer is Knowledgeable. 3. I feel that Influencer is Experienced. <p>Trustworthiness</p> <ol style="list-style-type: none"> 1. I feel that Influencer is Honest. 2. I feel that Influencer is Reliable. 3. I feel that Influencer is Trustworthy. <u>Attrac-tiveness</u> <ol style="list-style-type: none"> 1. I feel that Influencer is Attractive 2. I feel that Influencer is Elegant 3. I feel that Influencer is Handsome / Beautiful 	<u>Roobina Ohanion, 1990</u>
<u>Brand Awareness</u>	<ol style="list-style-type: none"> 1. <u>Social Media Influencers makes me aware of the brands.</u> 2. I easily recognize brands endorsed by Influencers. 3. I easily memorize the symbol/logo of brand endorsed by Influencers. 4. I have a very clear picture of brand endorsed by Influencers. 	<u>Yoo et al, 2000</u>
<u>Brand image</u>	<ol style="list-style-type: none"> 1. <u>Brands endorsed by Influencers is a leading com-pany.</u> 2. <u>Brands endorsed by Influencers have extensive experience.</u> 3. <u>Brands endorsed by Influencers is a customer-ori-ented company.</u> 4. <u>Brands endorsed by Influencers are representative of their industry.</u> 	<u>Kim & Hyun, 2011</u>
<u>Purchase intention</u>	<ol style="list-style-type: none"> 1. <u>I would buy the Brands endorsed by Influencers rather than any other brands available.</u> 2. I am willing to recommend others to buy the Brands endorsed by Influencers. 3. I intend to purchase the Brands endorsed by Influencers in the future. 	Shukla, 2011

3.2 Procedure/Data Collection

Data collection was effectuated through a standardized online-survey. The target population for the present study was Indian consumers who were familiar with social media sites and who followed at least one social media influencer with regards to Electronic Gadgets. Before actual data collection took place, a pilot test was run on 55 re-

spondents. . The pur-pose of the pilot study was to assess the reliability and ability of the respondents to understand the instrument. The Cronbach alpha values were .877, .922, .911, .879, .878, .778 for expertise, trustworthiness, attentiveness, brand awareness, brand image and purchase intention respectively. All the values are within acceptable levels. (Nunnally, 1978). The requisite amend-ments were made to the instrument before final data col-

The questionnaire contained two parts. Part A was designed to collect the respondents’ demographic information such as age, gender, education level as well as internet usage and influencer following patterns on social media sites. Part B was intended to identify the influence of Influencers’ credibility dimensions on Brand Awareness, Brand Image and Purchase Intention. It included 20 questions, which were separated into four categories. Respondents were asked to measure the variables using a five-point Likert scale anchored at 1=strongly disagree and 5=strongly agree. In this study, Purposive sampling technique is used. The sample size for the present research were decided by using Cochran (1977) sample size determination technique. The minimum sample required after calculation was 384. On-line Questionnaire was administered to 800 consumers, out

of which 650 responses were received. Initially, participants were asked four screening questions regarding their social media usage and influencer-following habits. A brief explanation of social media influencers was provided to help participants better understand the survey. Those who followed at least one social media influencer and were active users of at least one social networking site (SNS) were then directed to complete the remaining survey questions. Unqualified respondents were filtered out and denied access to further participation. 650 responses were obtained, out of which 375 respondents were active social media users and followed social media influencers, so those 375 responses were used further for data analysis.

Demographic profile of respondents

Table 2 Respondent’s Demographic Profiles

Category	Sub-Category	Frequency	Percentage
Gender	Male	198	52.8
	Female	177	47.2
Age	Upto 18 years	16	4.3
	18-30	309	82.4
	30-50	44	11.7
	Above 50 years	6	1.6
Place of your Residence	Urban	304	81.1
	Semi urban	71	18.9
Educational Qualification	Undergraduate	92	24.5
	Graduate	114	30.4
	Professional Degree/Diploma Course	36	9.6
	Postgraduate	107	28.6
	Doctorate	26	6.9
Usage of social media sites	Daily	352	93.9
	Once in Week	21	5.6
	Rarely	2	0.5
Preference of social media sites	Instagram	180	48
	YouTube	135	36
	Facebook	60	16

The respondents were made up of 52.8% males and 47.2% females. Majority of the respondents were in the 18–30-year age group, comprising 82.4% of the total. Further, 24.5% of the respondents were undergraduate, 9.6% had a diploma, 30.4% had completed graduation, 28.6% had completed post-graduation, and 6.9% of the respondents were doctorates. Most of the respondents were from urban areas. 93.9% of the re-

spondents were daily users, 5.6% were weekly users of social media and only 0.5% rarely use social media. With regards to the preference of social media sites relating to influencer following, out of the three basic social media platforms, Instagram is the most popular followed by YouTube and then Facebook. The detailed demographics of the respondents are reported in Table 2.

4. ANALYSIS AND RESULTS

In order to confirm the results for validity and reliability concerns, confirmatory factor analysis (CFA) was carried out. For testing the hypothesis and interrelationships SEM, AMOS 26.0 software was used. The data was analysed with the help of SPSS software (version21). After that, the Structural Equation Modelling (checking direct and mediation relationships) was performed for hypotheses testing. The detailed analyses and results are described in Table 3.

ASSESSMENT OF RELIABILITY AND VALIDITY

4.1. Confirmatory Factor Analysis

CFA was run using AMOS 26 for establishing convergent and discriminant validity.

Convergent validity: It implies to the ‘principle that the indicators for a given construct should be at least moderately correlated among themselves’ (Blanco et al., 2010). The value of CR ranges from 0.824 to 0.930 (above acceptable limit of 0.7), as depicted in Table 3, and AVE was also more than the acceptable limit of 0.5, ranging from 0.610 to 0.815. Adequate convergent validity is depicted in the data as CR and AVE were above the acceptable limits.

Discriminatory validity- For establishing discriminant validity, the square root of the AVE (represented by the diagonal items shown in Table 3) should be greater with the correlations with other constructs (off diagonal items) (Fornell & Larcker, 1981). Additionally, the assumptions of common method bias and linearity were tested and found to be valid. Table 3 demonstrates that the Average Variance Extracted (AVE) is greater than the Maximum Shared Variance (MSV) for all latent variables, and the diagonal values exceed the non-diagonal values thus ensuring discriminant validity for the construct.

Table 3 Reliability and Discriminant validity measurement index (Pairwise construct comparison)

	Cronbach alpha*	CR**	AVE***	MSV****	Ex*****	Tr	At	BA	BI	PI
Ex	0.901	0.901	0.753	0.210	0.868					
Tr	0.929	0.930	0.815	0.333	0.349***	0.903				
At	0.914	0.914	0.780	0.333	0.458***	0.577***	0.883			
BA	0.899	0.899	0.690	0.203	0.247***	0.321***	0.261***	0.831		
BI	0.891	0.892	0.673	0.248	0.308***	0.464***	0.381***	0.451***	0.820	
PI	0.822	0.824	0.610	0.248	0.379***	0.434***	0.325**	0.448***	0.498***	0.781

Note: *Cronbach Alpha values of 70% or higher are considered acceptable (Nunnally, 1978).

**CR should be greater than 0.7 (Hair et al; 2012) for convergent validity

***AVE should be greater than 0.5 (Hair et al; 2012) for convergent validity

****MSV should be less than AVE (Fornell & Larcker, 1981) for discriminant validity

*****Diagonal Values should be greater than non-diagonal values (Kesharwani & Tiwari, 2011) for discriminant validity.

4.2 Overall Fit of Model

Model fit indices for measurement and structural model has been completed. In the measurement model, key statistics reveals that all the latent factor modelled simultaneously, with CMIN (Σ^2) = 320.760, Degree of freedom (df) = 155, CMIN/df (Σ^2/df) = 2.069, $p < 0.05$. The result of the structural model

shows GFI = 0.920, AGFI = 0.892, NFI= 0.940, CFI = 0.968, RMR = 0.027, RMSEA = 0.053, ECVI = 1.152. Goodness-of-fit indices confirm uni-dimensionality in the measurement model whereas badness of fit indices reflects the discrepancy in model fit. All of the fit indices are met. The results are given in the Table 4.

Table 4 Model fit indices for the measurement model

S.No	Model Fit	Cut-off Criteria	Model Statistics
1	CMIN		320.760
2	Df		155
3	CMIN/Df	< 4	2.069
4	GFI	> 0.9	0.920
5	AGFI	> 0.8	0.892
6	NFI	> 0.9	0.940
7	CFI	> 0.9	0.968
8	RMR	< 0.1	0.027
9	RMSEA	< 0.8	0.053
10	ECVI	Smaller the better	1.152

Source: Author's calculation

4.3 Path Coefficient for Structural Model

The structural model was evaluated through AMOS v26. The results reveal that all hypotheses were found to be significant, except H1c, and H5c as p value is greater than 0.05. Hence, Attractiveness dimension had an insignificant relationship

with Brand Awareness (H1a: $\beta = 0.054$, $p = 0.149$) and Purchase Intention (H5c: $\beta = -0.012$, $p = 0.812$). As for all the hypotheses, the detailed result is shown in the following Table 5 and figure shows the significant positive relationship among the variables.

Table 5 Hypotheses Testing Results

Hypotheses Relationship	Path Estimate	SE	CR	p	Result
H1a: Brand awareness<--- Expertise	0.102	0.040	2.549	0.011**	Supported
H1b: Brand awareness<--- Trustworthiness	0.170	0.038	4.504	.000***	Supported
H1c: Brand awareness<--- Attractiveness	0.054	0.037	1.444	.149	Rejected
H2a: Brand image <--- Expertise	0.133	0.048	2.746	.006**	Supported
H2b: Brand image <--- Trustworthiness	0.312	0.046	6.718	.000***	Supported
H2c: Brand image <--- Attractiveness	0.118	0.045	2.629	.009**	Supported
H3: Purchase intention <--- Brand awareness	0.331	0.077	4.273	.000***	Supported
H4: Purchase intention <--- Brand image	0.286	0.067	4.274	.000***	Supported
H5a: Purchase intention <--- Expertise	0.190	0.054	3.547	.000***	Supported
H5b: Purchase intention <--- Trustworthiness	0.176	0.054	3.232	.001**	Supported
H5c: Purchase intention <--- Attractiveness	-0.012	0.049	-.237	.812	Rejected

Notes: ** $p < 0.05$; *** $p < 0.001$

Source: Author's calculation

4.4 Mediation Analysis

The testing of mediation effect was checked with the help of bootstrapped technique (Mooney et al., 1993) in AMOS v26. The bootstrapped technique is an efficient way of evaluating the indirect effect among variables. Table 6 shows the estimates for the direct and indirect effects with 95% bias-corrected bootstrapped CIs. In model 1, Brand Awareness (BA) partially mediates the path from Expertise and Purchase Intention with direct effect estimate of 0.287 ($p = .001$) and indirect effect estimate of 0.091 ($p = .001$). In model 2,

Brand Image (BI) partially mediates the path from Expertise and Purchase Intention with direct effect estimate of 0.251 ($p = .001$) and indirect effect estimate of 0.129 ($p = .001$). In model 3, Brand Awareness (BA) partially mediates the path from Trustworthiness and Purchase Intention with direct effect estimate of 0.321 ($p = .002$) and indirect effect estimate of 0.110 ($p = .000$). In model 4, Brand Image (BI) partially mediates the path from Expertise and Purchase Intention with direct effect estimate of 0.259 ($p = .002$) and indirect effect estimate of 0.175 ($p = .001$).

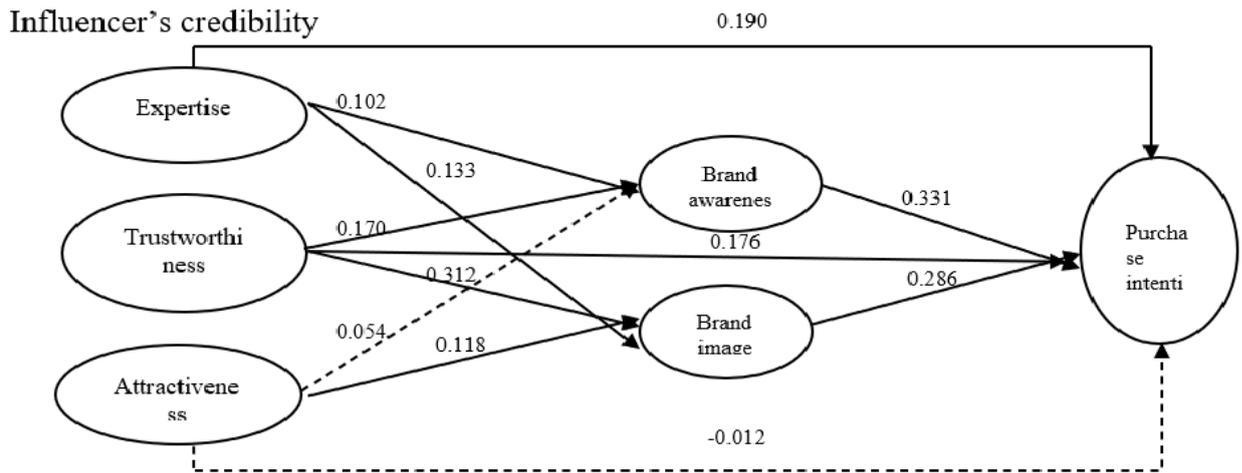


Figure 2 Result

5. DISCUSSION

Influencer marketing is one of the most popular social media marketing trends. The study examines the relationships between Brand Awareness, Brand Image, and Consumers' Purchase Intention, investigating whether Brand Awareness and Brand Image act as mediators between these dimensions and consumers' purchase intention. The findings reveal that social media managers who wish to implement an influencer campaign to create brand awareness should primarily focus on influencers' trustworthiness, and then, on expertise (H1a and H1b supported). Surprisingly, an influencer's Attractiveness was found to be insignificant in affecting Brand Awareness as well as consumers' purchase intention (H1c and H5c not supported). The findings were in line with prior study by Ohanian (1991) which concluded that the source attractiveness had no impact on consumers' purchase intention. Influencers' trustworthiness and expertise significantly and positively affect consumers' purchase intention (H5a and H5b supported) consistent with previous studies by Pornpitakpan (2004) and Koay et al. (2022). This might be explained in the way that consumers prefer to emphasize more on the content of the posts that influencers share on social media, rather than focusing on the Influencers' looks and personality. Followers may hold skeptical beliefs about the influencers' motive and thus may discredit influencers based on their looks and appeal when forming consumption-related reactions and also expertise and trustworthy influencers may build faith of the followers and attract followers towards them. Nonetheless, this unexpected finding deserves further research. In building Brand image all the three dimensions: Expertise, Trustworthiness and Attractiveness have a significant positive effect (H2a, H2b, and H2c are supported), aligning with the findings of a previous study by Hermanda et al. (2019). This insight can help brand managers prioritize specific needs based on the goals of their endorsement. Additionally, Brand Awareness and Brand Image significantly positively influence purchase intention (H3 and H4 supported), which is consistent with pre-

vious research by Hutter et al. 2013 & Wiedmann et al., 2020. This is important information for brand managers planning influencer campaigns since, in the absence of influencer models, they frequently use celebrity models (Childers et al., 2019). Furthermore, our findings provide new evidence supporting the relationship between source credibility, brand awareness, and brand image. The results indicate that influencers' expertise and trustworthiness enhance followers' brand awareness when they engage with influencer-generated posts on social media platforms, particularly Instagram, YouTube, and Facebook. Our findings also reveal the preference of social media sites with regards to influencer following wherein out of the three social media platforms Instagram is the most popular followed by YouTube and Facebook, Finally, regarding the mediating role of Brand Awareness and Brand Image, it was discovered that both trustworthiness and expertise had a significant positive indirect effect on purchase intention. Also, Attractiveness had no significant indirect effect on purchase intention. Our findings confirm that Brand awareness and Brand Image partially mediate between the relationship of two influencer's credibility dimensions (Trustworthiness and Expertise) and Consumer's Purchase intention. Our findings add to the body of knowledge regarding the Source credibility model particularly for Influencers and have theoretical implications for researchers who wish to study social media influencer marketing. The findings also offer valuable insights and practical guidance on effective influencer marketing strategies for both brands and consumers.

6. MANAGERIAL AND PRACTICAL IMPLICATIONS

The current study offers valuable recommendations for marketers and brands looking to leverage influencer marketing. Brands that wish to increase brand awareness among a large target audience may look for social media influencers who are experts in their domain and have an explicit trustworthiness status that aligns with the

brands' business offerings. This study also provides some insightful suggestions to influencers. Besides upholding their status of attractiveness, they can opt for creating informative and trustworthy posts, which can boost the trust of their followers in their branded posts.

Therefore, it is crucial that influencers have desirable trait and maintain them over time if they want to keep and extend their alliances with brands or to increase their current audience. The results could also serve as a decision support for brand managers. Only a few studies have explored the role of social media influencer's credibility in affecting purchase intentions with respect to electronic gadgets. The findings of this study contribute to the existing body of knowledge on source credibility in relation to influencers by offering a comprehensive framework that explains how an influencer's credibility impacts consumers' purchase intentions, with Brand Awareness and Brand Image serving as mediators. This investigation has provided practitioners with an overview on which the requirements of the Source-Credibility Model is relevant specifically for influencers. From a managerial implication perspective, this study suggests marketers' practical considerations in selecting a social media influencer, tailored for an advertisement to gain competitive advantages in the market through social media platforms. By identifying the specific traits that affect the purchase intention of consumer, the companies can choose a suitable influencer who possesses the identified characteristics and companies can be more confident that their investment in influencer will lead to increased sales, brand awareness and brand image. Additionally, marketers should choose

an influencer whose content is trusted by their followers and ensure that the influencer possesses expertise in their specific domain during the collaboration.

7. LIMITATIONS AND FUTURE SCOPE

There are certain limitations to this study that could lead to more research opportunities in the future. This study was limited to a single product category. The focus was limited to Electronic Gadgets only, for it is becoming a pervasive phenomenon in social media marketing specially in visual platforms like YouTube, Instagram and Facebook. Cross-platform, Cross-industry comparisons and Cross-generation could be considered in the future studies. We also feel that the factors we identified in our study contributed to a better understanding of the mechanism underpinning effective influencer marketing; nevertheless, we recognize that additional relevant factors could influence the process and were not included in our study, for example, advertising literacy, brand attitude, brand loyalty and followers' persuasion knowledge. Since this study is primarily focused on the electronic gadgets sector, the findings are confined to describing the industry's nature only. The findings cannot be generalized to other industries as consumer trends and preferences differ among industries. The respondents' backgrounds were also a restricting factor, as they were predominantly between the age brackets of 18-30 years. Finally, in future studies the data should be based on a larger sample size to explore this topic better and ultimately produce highly extensive results to boost the trust of their followers in their branded posts.

REFERENCES

- i. Aaker, D.A. (1991) *Managing Brand Equity*. The Free Press, New York 347-356.
- ii. Abu Bakar, H., & Mohamad, B. (2023). Advertising disclosure and its impact on influencer credibility and purchase intention. *International Journal of Marketing Research*. Retrieved from Emerald Insight
- iii. Agrawal, A. J. (2016). Why influencer marketing will explode in 2017. available at: [www. for bes. com/sites/ajagrawal/2016/12/27/why-influencer-marketing-will-explode-in-2017/](http://www.forbes.com/sites/ajagrawal/2016/12/27/why-influencer-marketing-will-explode-in-2017/)(accessed 20 April 2018).
- iv. Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin*, 84(5), 888.
- v. Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing Science*, 48(1), 79-95.
- vi. Ateke, B. W. (2013). Marketing message effectiveness: The relevance of celebrity endorsement. *The University Advanced Research Journal*, 11, 14-22.
- vii. Ayeh, J. K. (2015). Travellers' acceptance of consumer-generated media: An integrated model of technology acceptance and source credibility theories. *Computers in Human Behavior*, 48, 173-180.
- viii. Ayeh, J. K., Au, N., & Law, R. (2013). "Do we believe in TripAdvisor?" Examining credibility perceptions and online travelers' attitude toward using user-generated content. *Journal of Travel Research*, 52(4), 437-452.
- ix. Baker, W.H., Hutchinson, J.W., Moore, D. and Nedungadi, P. (1986), "Brand familiarity and advertising: effects on the evoked set and brand preference", *Advances in Consumer Research*, Vol. 13 No. 1, pp. 637-642.
- x. Bansal, R., Pruthi, N., & Khaskheli, M. B. (2023). Impact of social media influencers on customer engagement

and purchase intention: A meta-analysis. *Sustainability*, 15(3), 2744. <https://doi.org/10.3390/su15032744>

- xi. Blanco, C. F., Blasco, M. G., & Azorín, I. I. (2010). Entertainment and informativeness as precursory factors of successful mobile advertising messages. *Communications of the IBIMA*, 2010(2010), 1-11.
- xii. Bruhn, M., Schoenmueller, V., & Schäfer, D. B. (2012). Are social media replacing traditional media in terms of brand equity creation?. *Management research review*.
- xiii. Casaló, L. V., Flavián, C., & Ibáñez-Sánchez, S. (2020). Influencers on Instagram: Antecedents and consequences of opinion leadership. *Journal of business research*, 117, 510-519.
- xiv. Chakraborty, U., & Bhat, S. (2018). The effects of credible online reviews on brand equity dimensions and its consequence on consumer behavior. *Journal of promotion management*, 24(1), 57-82.
- xv. Chakravarti, A., & Janiszewski, C. (2003). The influence of macro-level motives on consideration set composition in novel purchase situations. *Journal of Consumer research*, 30(2), 244-258.
- xvi. Childers, C. C., Lemon, L. L., & Hoy, M. G. (2019). # Sponsored# Ad: Agency perspective on influencer marketing campaigns. *Journal of Current Issues & Research in Advertising*, 40(3), 258-274.
- xvii. Cochran, W. G. (1977). *Sampling techniques*. Johan Wiley & Sons Inc.
- xviii. De Veirman, M., Cauberghe, V., & Hudders, L. (2017). Marketing through Instagram influencers: the impact of number of followers and product divergence on brand attitude. *International journal of advertising*, 36(5), 798-828.
- xix. Erdogan, B. Z. (1999). Celebrity endorsement: A literature review. *Journal of marketing management*, 15(4), 291-314.
- xx. Febriyantoro, M. T. (2020). Exploring YouTube Marketing Communication: Brand awareness, brand image and purchase intention in the millennial generation. *Cogent Business & Management*, 7(1), 1787733.
- xxi. Fishbein, M., & Ajzen, I. (1977). *Belief, attitude, intention, and behavior: An introduction to theory and research* Philosophy and Rhetoric, 10(2).
- xxii. Fornell, C. and Larcker, D.F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, pp.39-50.
- xxiii. Freberg, K., Graham, K., McGaughey, K., & Freberg, L. A. (2011). Who are the social media influencers? A study of public perceptions of personality. *Public relations review*, 37(1), 90-92.
- xxiv. Giffin, K. (1967). The contribution of studies of source credibility to a theory of interpersonal trust in the communication process. *Psychological bulletin*, 68(2), 104.
- xxv. Godey, B., Manthiou, A., Pederzoli, D., Rokka, J., Aiello, G., Donvito, R., & Singh, R. (2016). Social media marketing efforts of luxury brands: Influence on brand equity and consumer behavior. *Journal of business research*, 69(12), 5833- 5841.
- xxvi. Goldsmith, R. E., Lafferty, B. A., & Newell, S. J. (2000). The impact of corporate credibility and celebrity credibility on consumer reaction to advertisements and brands. *Journal of advertising*, 29(3), 43-54.
- xxvii. Grewal, D., Krishnan, R., Baker, J., & Borin, N. (1998). The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions. *Journal of retailing*, 74(3), 331-352.
- xxviii. Guan, C., & Li, E. Y. (2021). A note on influencer marketing in social media. *International Journal Internet Marketing and Advertising*, 15(2), 124-128.
- xxix. Hair, J.F., Sarstedt, M., Ringle, C.M. and Mena, J.A., 2012. An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the academy of marketing science*, 40(3), pp.414-433.
- xxx. Hair, N., Clark, M., & Shapiro, M. (2010). Toward a classification system of relational activity in consumer electronic communities: the moderators' tale. *Journal of Relationship Marketing*, 9(1), 54-65.

- xxxiv. Hovland, C.I., Janis, I.L. and Kelley, H.H. (1982), *Communication and Persuasion: Psychological Studies of Opinion Change*, Greenwood Press, Westport, CT.
- xxxv. Hutter, K., Hautz, J., Dennhardt, S., & Füller, J. (2013). The impact of user interactions in social media on brand awareness and purchase intention: the case of MINI on Facebook. *Journal of Product & Brand Management*.
- xxxvi. Jin, S. V., Muqaddam, A., & Ryu, E. (2019). Instafamous and social media influencer marketing. *Marketing Intelligence & Planning*.
- xxxvii. Johnson, T. J., & Kaye, B. K. (2009). In blog we trust? Deciphering credibility of components of the internet among politically interested internet users. *Computers in Human Behavior*, 25(1), 175-182.
- xxxviii. Kaiser, H. F., & Rice, J. (1974). Little jiffy, mark IV. *Educational and psychological measurement*, 34(1), 111-117.
- xxxix. Keller, K. L. (1993). Conceptualizing, measuring, and managing customer-based brand equity. *Journal of marketing*, 57(1), 1-22.
- xl. Kesharwani, A. and Tiwari, R., 2011. Exploration of internet banking website quality in India: a webqual approach. *Great Lakes Herald*, 5(1), pp.40-58.
- xli. Kim, H. B., & Kim, W. G. (2005). The relationship between brand equity and firms' performance in luxury hotels and chain restaurants. *Tourism management*, 26(4), 549-560.
- xlii. Kim, J. H., & Hyun, Y. J. (2011). A model to investigate the influence of marketing-mix efforts and corporate image on brand equity in the IT software sector. *Industrial marketing management*, 40(3), 424-438.
- xliii. Kim, S. B., & Kim, D. Y. (2014). The effects of message framing and source credibility on green messages in hotels. *Cornell Hospitality Quarterly*, 55(1), 64-75.
- xliv. Koay, K. Y., Cheung, M. L., Soh, P. C. H., & Teoh, C. W. (2022). Social media influencer marketing: The moderating role of materialism. *European Business Review*, 34(2), 224-243.
- xlv. Koh, T. H., & Fang, W. C. (2012). The effects of corporate social responsibility on purchase intention: The mediating effects of brand attachment and brand image. *Journal of Business Ethics*, 94(1), 41-68.
- xlvi. Kotler, P., & Keller, K. L. (2016). *A framework for marketing management* (p. 352). Boston, MA: Pearson.
- xlvii. Labrecque, L. I., vor dem Esche, J., Mathwick, C., Novak, T. P., & Hofacker, C. F. (2013). Consumer power: Evolution in the digital age. *Journal of interactive marketing*, 27(4), 257-269.
- xlviii. Lavidge, R. J., & Steiner, G. A. (1961). A model for predictive measurements of advertising effectiveness. *Journal of Marketing*, 25(6), 59-62. <https://doi.org/10.1177/002224296102500607>
- xlix. Lê Giang Nam, H. T. D. (2018). Impact of social media Influencer marketing on consumer at Ho Chi Minh City. *The International Journal of Social Sciences and Humanities Invention*, 5(05), 4710-4714.
- i. Li, C. Y. (2013). Persuasive messages on information system acceptance: A theoretical extension of elaboration likelihood model and social influence theory. *Computers in Human Behavior*, 29(1), 264-275.
- ii. Lim, X. J., Radzol, A. M., Cheah, J., & Wong, M. W. (2017). The impact of social media influencers on purchase intention and the mediation effect of customer attitude. *Asian Journal of Business Research*, 7(2), 19-36.
- iii. Lin, C., Wu, Y. S., & Chen, J. C. V. (2013). Electronic word-of-mouth: The moderating roles of product involvement and brand image. *TIIM 2013 Proceedings*, 43(2013), 39-47.
- liii. Liu, S., Jiang, C., Lin, Z., Ding, Y., Duan, R., & Xu, Z. (2015). Identifying effective influencers based on trust for electronic word-of-mouth marketing: A domain-aware approach. *Information sciences*, 306, 34-52.
- liv. Lomboan, S. (2013). The impact of celebrity endorsement on brand image. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi*, 1(3).
- lv. Lou, C., & Yuan, S. (2019). Influencer marketing: how message value and credibility affect consumer trust of branded content on social media. *Journal of Interactive Advertising*, 19(1), 58-73.
- lvi. Macdonald, E. K., & Sharp, B. M. (2000). Brand awareness effects on consumer decision making for a common, repeat purchase product: A replication. *Journal of business research*, 48(1), 5-15.

- lvii. MacKenzie, S. B., & Lutz, R. J. (1989). An empirical examination of the structural antecedents of attitude toward the ad in an advertising pretesting context. *Journal of marketing*, 53(2), 48-65.
- lviii. MacKenzie, S.B. and Lutz, R.J., 1989. An empirical examination of the structural antecedents of attitude toward the ad in an advertising pretesting context. *Journal of marketing*, 53(2), pp.48-65
- lix. Markethub, (2016), Influencer marketing vs word-of-mouth marketing. Retrieved from <https://www.markethub.io/influencer-marketing-vs-word-of-mouth-marketing/>
- lx. McCroskey, J. C. (1966). Scales for the measurement of ethos.
- lxi. McGuire, W. J. (1985). Attitudes and attitude change. *The handbook of social psychology*, 233-346.
- lxii. Mediakix (2019). Influencer Marketing Survey Results: 2019 Industry Benchmarks. Retrieved August 7, 2020, from <https://mediakix.com/influencer-marketing-resources/influencermarketing-industry-statistics-survey-benchmarks/#instagram>
- lxiii. Mooney, C. Z., Mooney, C. F., Mooney, C. L., Duval, R. D., & Duvall, R. (1993). Bootstrapping: A nonparametric approach to statistical inference (No. 95). sage.
- lxiv. Muda, M., Mohd, R., & Hassan, S. (2016). Online purchase behavior of generation Y in Malaysia. *Procedia Economics and Finance*, 37, 292-298.
- lxv. Nunnally J.C.; 1978; *Psychometric Theory*; 2 Edition; Mc- Graw Hill; New York.
- lxvi. Ohanian, R. (1990). Construction and validation of a scale to measure celebrity endorsers' perceived expertise, trustworthiness, and attractiveness. *Journal of advertising*, 19(3), 39-52.
- lxvii. Ohanian, R. (1991). The impact of celebrity spokespersons' perceived image on consumers' intention to purchase. *Journal of advertising Research*.
- lxviii. Percy, L., & Rossiter, J. R. (1992). A model of brand awareness and brand attitude advertising strategies. *Psychology & Marketing*, 9(4), 263-274.
- lxix. Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of applied social psychology*, 34(2), 243-281.
- lxx. Poulis, A., Rizomyliotis, I., & Konstantoulaki, K. (2019). Do firms still need to be social? Firm generated content in social media. *Information Technology & People*.
- lxxi. Roy, D., & Banerjee, S. (2007). CARE-ing strategy for integration of brand identity with brand image. *International journal of commerce and management*.
- lxxii. Safiullah, M., Pathak, P., Singh, S., & Anshul, A. (2017). Social media as an upcoming tool for political marketing effectiveness. *Asia Pacific Management Review*, 22(1), 10-15.
- lxxiii. Saima, & Khan, M. A. (2020). Effect of social media influencer marketing on consumers' purchase intention and the mediating role of credibility. *Journal of Promotion Management*, 27(4), 503-523.
- lxxiv. Schouten, A. P., Janssen, L., & Verspaget, M. (2021). Celebrity vs. Influencer endorsements in advertising: the role of identification, credibility, and Product-Endorser fit. In *Leveraged marketing communications* (pp. 208-231). Routledge.
- lxxv. Sekhon, T., Bickart, B., Trudel, R., & Fournier, S. (2015). Being a likable braggart: How consumers use brand mentions for self-presentation on social media. In *Consumer psychology in a social media world* (pp. 51-67). Routledge.
- lxxvi. Shareef, M. A., Kapoor, K. K., Mukerji, B., Dwivedi, R., & Dwivedi, Y. K. (2020). Group behavior in social media: Antecedents of initial trust formation. *Computers in Human Behavior*, 105, 106225.
- lxxvii. Shukla, P. (2011). Impact of interpersonal influences, brand origin and brand image on luxury purchase intentions: Measuring interfunctional interactions and a cross-national comparison. *Journal of world business*, 46(2), 242-252.
- lxxviii. Solomon, M. R., White, K., Dahl, D. W., Zaichkowsky, J. L., & Polegato, R. (2017). *Consumer behavior: Buying, having, and being*. Boston, MA: Pearson.
- lxxix. Sussman, S. W., & Siegal, W. S. (2003). Informational influence in organizations: An integrated approach to knowledge adoption. *Information systems research*, 14(1), 47-65.

- lxxx. Taghipoorreynch, M., & De Run, E. C. (2016). Online advertising: An investigation of factors affecting positive attitude among the Malays in Malaysia. *Asian Journal of Business Research* Volume, 6(2), 70-80.
- lxxxi. Till, B. D., & Busler, M. (2000). The match-up hypothesis: Physical attractiveness, expertise, and the role of fit on brand attitude, purchase intent and brand beliefs. *Journal of advertising*, 29(3), 1-13.
- lxxxii. Trivedi, J., & Sama, R. (2020). The effect of influencer marketing on consumers' brand admiration and on line purchase intentions: An emerging market perspective. *Journal of Internet Commerce*, 19(1), 103-124.
- lxxxiii. Varsamis, E. (2018). Are Social Media Influencers the Next-Generation Brand Ambassadors?. *Forbes*, June, 13.
- lxxxiv. Vilkaite-Vaitone, N. (2024). From likes to sustainability: How social media influencers are changing the way we consume. *Sustainability*, 16(4), 1393.
- lxxxv. Wang, H. C., & Doong, H. S. (2010). Argument form and spokesperson type: The recommendation strategy of virtual salespersons. *International journal of information management*, 30(6), 493-501.
- lxxxvi. Wiedmann, K. P., & von Mettenheim, W. (2020). Attractiveness, trustworthiness and expertise–social influencers' winning formula?. *Journal of Product & Brand Management*.
- lxxxvii. Wu, P. C., & Wang, Y. C. (2011). The influences of electronic word-of-mouth message appeal and message source credibility on brand attitude. *Asia Pacific Journal of Marketing and Logistics*.
- lxxxviii. Yoo, B., Donthu, N., & Lee, S. (2000). An examination of selected marketing mix elements and brand equity. *Journal of the academy of marketing science*, 28(2), 195-211.
- lxxxix. Yu, C. C., Lin, P. J., & Chen, C. S. (2013). How brand image, country of origin, and self-congruity influence internet users' purchase intention. *Social Behavior and Personality: an international journal*, 41(4), 599-611.

Cloud-Based Mechanized Method for Developing Semantically Rich Ontologies and Planning Analogies for E-comfort Bids

*Ms. Dimpy Jindal, **Prof. Manju Kaushik, ***Dr. Barkha Bahl

ABSTRACT

The ontology framework at the temperament of the semantic web is a powerful method for representing and visualising domain knowledge. Estimating similarity measures between ontologies, determining a threshold, and employing if-then procedures to validate relevance and irrelevance all contribute to the reusability of knowledge. Knowledge visualisation at a reduced level is supplied by simplified semantic representations of the ontology, which is particularly useful for processing and analysing e-health data. Resolving implicit knowledge, which often develops in the attendance of implicit information and polymorphic objects and manifests as non-dominant words and conditionally dependent actions, enables the creation of semantically complex constructs. In this study, we clarify in detail how the automated system constructs and stores ontology structures rich in semantics. Graph Derivation Representation, which is based on dyadic deontic logic, is used to construct ontologies with a high density of meaning. In addition, the usual cosine similarity metric is used to determine the degree of similarity between two ontologies. In response to a document stored in the cloud, basic if-then rules are used to count how many relevant documents there are and retrieve their corresponding metadata. These functional modules are used in e-health applications for document recovery, information removal, and domain dictionary generation, and they will be of great help to authenticated cloud users. According to the diabetes dataset experiments, the suggested framework outdoes the state-of-the-art Graph Derivation Representation methods. The visual representations of the paper's findings provide another perspective for evaluating the usefulness of the proposed methodology.

KEYWORDS

Ontology framework, Semantic web, Knowledge visualisation, E-health data, Graph Derivation Representation, Dyadic deontic logic, Cosine similarity, Cloud-based document retrieval

*Assistant Professor, Delhi Institute of Advanced Studies, Delhi, India

**Professor at Amity Institute of Information Technology, Rajasthan, India

*** Ex-Director, Trinity Institute of Professional Studies, Delhi, India



INTRODUCTION

Cloud computing services are a dramatic break from the traditional methods of providing a company's infrastructure, platform, and software with a broad variety of services. The market is booming because of the various benefits it offers, including as flexibility and a pay-as-you-go model. This thorough explanation and the main benefits are provided by NIST in [17]. Computing in the cloud, or "the cloud," refers to a paradigm of delivering IT services in which users pay for actual use of a shared, elastic pool of adjustable hardware and software components. This kind of pay-as-you-go service may be developed and administered with little involvement from either technical management or the cloud service provider [17]. Important qualities that cloud services should enable include scalability, a pay-as-you-go pricing model, a decentralised architecture, a high degree of security, and the ability to virtualize [1]. Virtualized infrastructure, elastic capacity, persistent connection, and pay-as-you-go pricing are just some of the benefits of cloud computing services. Several more advantages are made possible by this shift in the way businesses are managed.

There is a close connection between the semantic structure of the term "ontology," which means "theory of being," and its literal translation. The ability to utilise this semantic structure as the foundation for a knowledge-sharing framework that allows for the representation, diffusion, and reuse of domain expertise is a significant advantage [9]. Ontologies have found applications in many different fields, such as knowledge management, information retrieval, the Semantic Web, information integration, semantic search, and recommendation systems. In this essay, we draw the conclusion that Ontology as a Service is the most important facet of cloud computing because of the influence it has on Infrastructure as a Service. However, Ontology as a Service and its applications were first introduced in [27]. According to the authors of the aforementioned study, "ontology as a service" (OaaS) is "a service where Cloud service providers deploy the ontology creation application and infrastructure together depending on the customers' needs." We utilize the cloud server to create an ontology for the text documents that verified cloud users have uploaded, and then we use an ontology alignment procedure to predict which papers are connected to each other. To facilitate this process, the cloud service provider is used.

Syntactic and semantic information of the intended input text may be communicated using a variety of knowledge representation languages used in artificial intelligence [14]. The expressiveness of the structure is crucial to the initial stage of ontology creation. Ontologies may be represented in a variety of logical systems, including predicate logic, fuzzy logic, temporal logic, situational logic, description logic, and modal logic [23]. Frequently, these applications will use the usage of Description Logic (DL)

to store and convey information. However, because to the presence of non-dominant words in the target datasets, DL for faultless and expressive structure is impractical for certain applications. Instead, the insights from the data can only be presented correctly if the structure is expressive. Problems like instability and incompleteness arise because of the reduced expressivity of the intended data. Having polymorphic items in the dataset is already a challenging problem due to the expressivity being a major key issue [16]. The use of modal logic, which includes relative pronouns and events with varying probabilities based on their outcomes, may help one express themselves more fully by eliciting dormant semantic understanding. Dyadic Deontic reasoning is a kind of modal logic that gives more weight to words that aren't often utilised in written discourse. There is a formal discipline dedicated to the study of required, banned, permissible, conditional mandatory, and conditional permissible clauses. It is able to interpret conditional dependency statements and phrases including SHOULD NOT, MUST NOT, SHALL NOT, COULD NOT, and WILL NOT in lieu of the conventional negation symbols used in other logic languages. It also includes the supplementary notations of description logic.

The second crucial aspect of ontology is the aptitude to recycle the produced ontology, meanwhile it is time-consuming to develop new ontology from scratch each time. This idea of recycling the semantics is known as "ontology reuse." The procedure of ontology reuse [24] allows the semantic content of a current ontology to be included into a newly built ontology, even in a different situation. In order to determine the extent of the duplication, an evaluation of the material's reusability is a vital requirement. Calculational measurements of similarity and intersection may be useful here. There are a variety of distance metrics available in the literature that may be used to compute the grade of resemblance amid two ontology systems.

Need of the hour - semantics

The procedure of automating the transfer, exchange, and reuse of data or information through the Internet is crucial but often challenging. As a result of their lack of semantics, HTML, XML, and the URLs they use are sometimes viewed as "dead ends." [12] means that despite the progress in information technology, the above difficulties have extremely limited use on the web. Syntactic and structural heterogeneity issues can be addressed with a amount of approaches that have been documented in the literature [21]. Nonetheless, getting around the issue of semantic heterogeneity is notoriously difficult. An issue known as semantic heterogeneity arises when different contexts do not agree on the same meaning of a piece of data. Synonymous groups, idea lattices, distinguishing characteristics, and limiting predicaments are all examples of semantic heterogeneity issues [18]. These issues have been, at least partially, resolved in the past. Effective methods, however, are required to find a long-term solution to this issue.

Reusability – degree of similarity

Issues of semantic heterogeneity may be overcome with the help of ontology structure.

The process of Ontology Alignment in the semantic web involves the use of ontology reuse metrics to establish semantic correspondences between conceptually similar items in different Ontologies. Ontology and the ontology alignment procedure that follows are used extensively in knowledge management [5, 8], e-commerce [11], e-learning [19], and information retrieval [12], as well as in semantic search and recommendation systems [11].

Ontology arrangement is becoming more and more important and time-consuming as the ontology system expands in size and complexity. Since this is the case, automated ontology alignment has gained traction in a wide variety of practical applications, comprised of IR/RS, online retail and education, query processing, data/information integration, and transformation, and online retail. Some of the methods for Ontology Alignment that can be found in the books are those that use Strings, Tongues, Restraints, and Semantics. [7,9]. However, there are two major drawbacks to current Ontology Alignment methods in the literature:

1. Abridged semantic articulateness of the built ontology,
2. The most frequently occurring terms in the incoming text documents are used to retrieve the ideas, relationships, axioms, and path linkages from the current frameworks. So, it's important to supply smart methods for efficient Ontology Arrangement, with the goal of ontology recycle.

Objectives

In this research, we offer an automatic outline that features individual functional modules for building ontologies, evaluating their expressivity, and determining how similar they are to one another. The cloud provider can utilise this similarity calculation to serve up relevant files to verified users. For this purpose, we employ a threshold value in the similarity degree and common if-then methods for retrieving related documents. The ontology construction module employs a GDR (Graph Derivation Representation) technique based on dyadic deontic logic to create a semantically rich, evocative ontology. The suggested framework consists of four distinct stages. In the first stage, cloud users are authenticated in the usual way, with a username and password. After that, the verified cloud customers upload their unprocessed but still significant papers to the cloud storage provider. In order to build an ontology with a lot of expressive power, we first take the raw texts and transform them into a dyadic rule's representation. Second, a GDR is created for each concept, connection, and occurrence in the ontology. As a result of the recursive nature of graphical derivations, this is made easier. Later, the various graph node structures are

merged using an integration technique to yield an early unified GDR for the provided ontology. After the unstable associations necessary for semantic measurements are removed, a full GDR picture of the provided ontology is produced. In the final stage, we calculate the ontology's semantic expressivity factor and use the cosine similarity metric to determine how similar two ontology structures are to one another. The final step involves retrieving the relevant documents and making them available to authorised cloud users. The threshold estimation module and standard if-then rule building make this possible. Listed below are some of the primary goals of the suggested structure:

- In order to make it easier for verified cloud customers to upload raw text documents to their cloud service provider.
- Using GDR, offer a stable ontological framework for the underlying knowledge. In other words, show how hidden information, underused words, and the likelihood of certain events may be used to build an ontology with a lot of expressive power.
- To quantify the extent to which the semantically dense ontology framework may convey ideas. Determine how similar two ontologies are by a calculation and cosine-similarity-based structures.
- The rule's metric is used to obtain the metadata for associated documents and make it available to authorized cloud users.

Quick analysis on the objectives

The suggested framework has six main goals. The next discussion is an example-based, step-by-step breakdown of the goals.

First, the users should ideally be healthcare professionals, as this paper makes use of a diabetic dataset. The paper's cloud users, who include doctors, nurses, lab technicians, the hospital dean, etc., can save text documents pertaining to patient records in the cloud. Documents uploaded to the cloud can be in any arrangement desired and uploaded by any authorised user. If a cardiologist wants to share information about new tools for diagnosing heart illness or performing heart surgery, they can upload a document describing the topic.

Second, this provided paper may be quite large, and its technical details should be of use to anyone, regardless of whether or not he works in the healthcare industry. Many terms associated with heart disease and cardiac surgery, for instance, might be included in the paper. In order to glean the hidden information from the text, a semantic knowledge picture must be constructed. The research provides a theoretical basis for the creation of ontologies.

Step 3: Several methods exist for generating ontology structure, which can be used in conjunction with Step 2 to further clarify the situation. When conditional probability events occur, however, or when non-dominant arguments such as can, will, cannot, may not, etc. are used, some of the logic representations will be inaccurate. In the suggested framework, an ontology structure with extensive expressiveness is created.

In Step 4, we count the number of classes, relationships, and instances, among other things, so that we may evaluate how well different logic representations convey the underlying data. When compared to more traditional methods, these figures are significantly greater in the suggested framework.

Having determined the documents that are similar (or different), the next step is to compare them. The resemblance between these two submitted documents can be identified in the event that multiple cardiologists are uploading different materials potentially in the same domain. This is very important for the time when a new skill called ontology amalgamation is implemented. A subfield of information picture, ontology merging can be used to combine two medical records that are essentially the same but uploaded by different doctors. However, the topic of combining ontologies is avoided here. Currently, the suggested framework can only be used to determine how similar two papers are to one another.

Here's Step 6: Founded on the user's contribution text, the general users of this framework can pull up a plethora of related papers. A basic if-then rules classifier is employed for retrieval, and similarity computation is crucial for procurement the pertinent IDs. All of the documents' metadata are retrieved and presented to the authorised cloud user. A physician, for example, can upload a single document and then access the metadata of numerous linked papers for the sake of study or record-keeping.

The remaining parts of this paper will be organised as shadows. The second unit offers a brief overview of the pertinent literature. The suggested framework is labelled in depth in Section 3. The suggested framework's performance evaluation is covered in Section 4. The final chapter provides some final thoughts and suggestions for where to take things moving forward.

Literature review

For the purpose of building ontologies and computing measures of similarity, there are a plethora of graphical models available at present [3]. Object Constrained Language (OCL), which is built on top of UML, is one such method. To graphically depict ontologies, OCL is utilised. Instead of describing implicit (hidden) non-taxonomic relationships, UML is well-suited to describe explicit taxo-

nomical information [12]. Semantic Link Network (SLN) is an approach for discovering descriptions of semantic links between pre-existing things. Rather of focusing on semantic correctness, SLN aids prioritise the property of semantic richness [20].

Ontology measurement is a method of evaluating ontologies based on the measures themselves, and current ontology measures rely solely on the information displayed by ontologies to evaluate the degree of resemblance between ontological entities and structures. In the academic literature, cluster-based algorithms are utilised, which, by combining the least path length and the taxonomic depth, define bunches for apiece of the twigs by admiration to the root node. It is often suggested to utilize an ontology-based measure that makes use of taxonomic properties, but does so without relying on tuning parameters to alter the weights assigned to individual features. [13].

To find a related class of ideas, we utilise a semantic matching approach [2] to pull out the relevant concepts' super- and sub-concepts and then apply a similarity function. The suggested technique uses the terms from a graph-based ontology to measure the degree of resemblance between two gene products. Quality measurements may be used to assess and compare a number of different aspects of ontologies, including their expressiveness, cohesion, complexity, richness, and grade of resemblance [14-18]. The complexity of ontology-represented polymorphic objects makes them challenging to manage inside most pre-existing system frameworks. Our study details the steps needed to create an automated framework for building an ontology structure that is both robust and expressive, while also being capable of efficiently managing polymorphism in its representation of ontologies. Thereby providing a solution to this problem. The framework's primary focus is on predicting the degree of resemblance among two ontology systems with the goal of facilitating their reuse.

Analysis of earlier works

The following characteristics must be included in the graphical model that represents the target dataset.

- Semantic information, such as the hidden relationship between ideas and other kinds of connections that can't be captured by traditional taxonomies, has to be conveyed precisely and efficiently. It is significant that the model be able to be assessed using standard ontology metrics.
- The ontology creation framework needs to be flexible enough to incorporate under-represented concepts and proceedings with respect to provisional probability.
- To maintain the integrity of the ontology, the model must take into account the challenge of representing polymorphic items.
- It must be possible to automatically compute the degree

This table organizes the features and properties of the proposed automated framework, making it easier to understand its key aspects and how they contribute to addressing the limitations of previous studies while enabling the generation of stable, semantically rich, and reusable ontologies.

Proposed system framework

Genuine cloud users can expect to receive extremely relevant materials in reply to their supplied raw documents. In the proposed automated system, GDR serves as a graphical representation of semantic descriptions of textual content. Ontologies are measured and compared using their underlying GDR for consistent semantic assessment, which is why GDRs are generated for them. The full structural semantics of the target ontology can be derived and understood with its assistance. After an ontology has been successfully generated with the use of the GDR method and dyadic rules cohort, the structure of the ontology should be examined for its level of expressivity. This expressivity metric is useful for determining how well the language represents its implicit knowledge. By first representing knowledge in dyadic deontic logic, then translating that into the equivalent GDR, we can get greater expressivity.

The suggested automated approach also makes it easier to calculate how similar two ontologies are to one another. The cosine similarity metric is used for this purpose. After doing a series of trials on the underlying dataset, the threshold value is estimated, and the aforementioned methods for retrieving the associated documents based on similarity value are put into practise. Accordingly, the proposed automated approach provides a practical means of developing semantically rich ontology structures, evaluating expressivity, employing a rule-based metric to approximation the degree of resemblance between two documents and retrieve them if they are found to be related. This automated framework can be used for a variety of purposes, such as recommendation systems, domain dictionary building, information extraction, and text information retrieval. As seen in Figure 1, the automatic framework architecture is depicted graphically.

Cloud user

In order to access the cloud service provider's resources, including its ability to retrieve relevant text documents, the user must first authenticate. Since they can get the aforementioned services from any cloud service provider, they are often referred to as authenticated cloud users. The time-honored method of employing a username and password combination for authentication is employed. It is expected that this composite statistic would make it easier for customers to reliably access cloud services without compromising their own data.

Dyadic deontic logic representation

A text file from the repository serves as input for the future framework. Since dyadic deontic logic handles statements like "obligatory," "forbidden," "permissible," "conditional obligations," and "conditional permissible," This method of encoding and displaying information works quite well. You can convert the text into dyadic deontic logic by locating the obligatory, forbidden, permissible, conditional duties and authorized if... then phrases tacked onto the standard assertions of deontic logic. Establishing the location of such claims in dyadic deontic logic provides the path for creating suitable representations.

Rules for detecting dyadic deontic relationships

Rule 1 - There is a Determiner relationship between X and Y if X is a noun and X is related to Y by attribute or part of relationship (X HAS Y).

Rule 2 - A Modal relationship exists between nouns X and Y if and only if X is related to Y in some way (either by quality or part of association) and Y is a noun. Modal MUST and SHOULD imply OBLIGATORY, hence Rule 2.1 states: (X HAS Y).

Rule 2.2 - When the two modals involved are CAN and WILL, PERMITTED (X HAS Y).

Rule 3 - That X and Y have a Dyadic modal relationship is true if and only if X is a noun and X is related to Y in some way (either by attribute or part of relationship).

Rule 3.1 - It's possible that CONDITIONAL MUST or (1)

CONDITIONAL SHOULD then CONDITIONAL OBLIGATORY(X | Y).

Rule 3.2 - CONDITIONAL PERMISSIBLE (X | Y) if the modal connection is CONDITIONAL CAN or CONDITIONAL WILL.

Rule 4- When X is a noun, part of, or an attribute of Y, and X consists of Y via a negative modal relationship.

Rule 4.1 - Forbidden if the modal connection is MUST NOT or SHOULD NOT (X HAS Y).

Rule 4.2 - If the modal connector is CAN NOT or WILL NOT, then it's not allowed (X HAS Y).

Rule 5- The quality Of relationship OBLIGATORY connects nouns X and Y if they both fall into that category (X is NOT NULL).

Rule 6- In the event that X and Y are both nouns and share the obligatory isA relationship (X has attribute TYPE).

Rule 7- If X and Y are both nouns, then it is OBLIGATORY that X is connected to Y. (X has instance Y).

Rule 8- If X and Y are nouns and X is related to Y by contains relationship OBLIGATORY (X HAS Y).

Mathematical predicate

3.4.1. Predicate calculus for deontic rules

RULE 1 $\forall x, \exists y \rightarrow$ OBLIGATORY(x,y).
 RULE 2.1 MUST(x,y) \vee SHOULD(x,y) \rightarrow HAS_OBLIGATORY(x,y).

```

RULE 2.2 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  CAN(x,y)  $\rightarrow$  HAS_PERMITTED(x,y).
RULE 3.1 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  AMUST(x,y)  $\rightarrow$  CONDITIONAL_OBLIGATORY(x,y).
RULE 3.2 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  ASHOULD(x,y)  $\rightarrow$  CONDITIONAL_OBLIGATORY(x,y).
RULE 3.3 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  ACAN(x,y)  $\rightarrow$  CONDITIONAL_PERMITTED(x,y).
RULE 3.4 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  ASHALL(x,y)  $\rightarrow$  CONDITIONAL_PERMITTED(x,y).
RULE 4 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  MUST_NOT(x,y)  $\wedge$  SHOULD_NOT(x,y)  $\rightarrow$  HAS_FORBIDDEN(x,y).
RULE 5 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  ANOT(x,y)  $\rightarrow$  HAS_NOT_PERMITTED(x,y).
RULE 6 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  PROPERTY_OF(x,y)  $\rightarrow$  OBLIGATORY(x, NOTNULL).
RULE 7 NOUN(x)  $\wedge$  NOUN(y)  $\wedge$  OBLIGATORY(x,y)  $\rightarrow$  HAS_ATTRIBUTE(x, TYPE).
    
```

Graph derivation representation (GDR)

A text file from the repository serves as input for the future outline. Since dyadic deontic logic handles expressions like compulsory, banned, permissible, and conditioned, it is a useful tool for representing knowledge. The second operational module is called GDR, and it consists of three primary submodules: GDR Generation, GDR Addition, and the Removal of Technical Barriers [22]. In order to create the GDR, this component first extracts the axioms from the dyadic deontic logic. The three mapping functions, and are used in a three-stage method to derive the graph. Initially, positive integers are assigned as indexes to each axiom and statement. The GO starts out empty, with no vertices or relationships. A GDR (represented by G) is then computed for each axiom or proposition. Once the GDR has been formulated for each axiom/assertion, we go on to Stage 2, which entails integrating each GDR into GO. The second phase concludes with the acquisition of the integrated (but untreated) GDR for the designated ontology. This final step involves disentangling class inheritance cycles and indirect transitive dependencies so that GO can be treated. The second functional module yields the final full GDR. By avoiding polymorphic objects, the suggested framework’s integrated GDR is proven to be very stable. The calculated stability factor makes this very clear. Can you please explain the commitments and limitations associated with Stability Factor? Words in text documents can be converted to their dyadic deontic

logic equivalent by locating obligatory, forbidden, permitted, conditional obligations, and conditionally permissible clauses appended to basic deontic logic statements. Finding these assertions allows for the construction of relevant models in dyadic deontic logic.

$$S = \{GO_1, GO_2, \dots, GO_n\} \quad (1)$$

Such that $GO_n = \{VO_n, EO_n, \rho, \lambda, \eta, \beta\}$.

— VO is a finite set of vertices, anywhere each vertex is a sole positive integer.

— $EO \subseteq VO \times VO$ is a set of edges.

— $\rho: C \rightarrow VO$ is a mapping function, where C is the set of the defined concepts and individual examples in O .

— $\lambda: A \rightarrow EO \subseteq VO$ is a mapping function, where A is the set of

axioms/assertions in O .

— η Where $NL = NCNI$ and NC, NI , and NP are the sets of literal names of concepts, individual examples, and role relations, respectively, is a labelling function that assigns a set of literal names $l \in NL$ to each vertex $i \in VO$ and a set of literal names $l \in NP$ to each edge $j \in EO$.

Expressivity measurement

Choose the granularity of your ontology based on the types of measurement items you intend to utilize, both granular and non-granular materials are used as examples. Concepts/classes, properties, binary relations, axioms, and examples are all examples of fine-grained components in ontologies. Fanin and Fanout, on the other hand, are far broader in their application to ontology. The proposed method, on the other hand, focuses only on the most minute details of ontologies. Future research will examine the ontology’s coarse-grained rudiments, such as fanin and fanout. Expressivity estimation, which makes use of some of the measurement entities like ideas, concrete instances, and role relations, computes the following measures.

The following parameters are computed for any ontology O_i , where $i=1$ to n (and O_i in repository).

Total number of courses: Assume that $NOC(O) = SC$, where SC is the set of classes (2)

Example: NOP (number of occurrences) Occurrences of Non-Equilibrium (NOE) = SE , where $SP =$ Example Set (3)

NOA (number of axioms) : $NOA(O) = SA$, where $SA =$ set of axioms (4)

NOL (number of path links) : $NOL(O) = SL$, where $SA =$ set of path links (5)

The expressivity measure of a given ontology for a dataset is provided by $E(O_i) = Stat(O_i)$, where $Stat(O_i) = i(NOC_i NOE_i NOL_i)$, after the number of concepts, examples, axioms, and path linkages have been successfully calculated using Eqs. (2-5). (6)

On top of that, this $E(O)$ metric may be used to compare the expressiveness of any two ontologies. Recursive estimation using user-defined functions or processes is possi-

ble for such a metric. The degree of eloquence (E) in the ontology of interest O_i is a Boolean metric that is used to evaluate the various ontology structures in the data warehouse. Any two ontologies, O_i and O_j , from the repository, $E(O_i, O_j) = 0$, & if $Stat(O_i) < Stat(O_j)$

1, & Otherwise
(7)

Degree of similarity measure computation

The second goal, estimating the reuse measure [3], is the focus of this part of the automated framework. Sub-ontology discovery, finding the largest common subgraph, and the cosine similarity measure are the three sub-modules that make up this part. To begin processing using this part, an ontology repository must be provided as input. Through ontology alignment, the efficacy of GDR as a knowledge representation technique may be measured. Sub-ontology discovery and semantic cosine similarity measurement are the foundations of this kind of ontology alignment.

Sub-ontology detection

The technique of determining if an ontology is a sub-ontology of another is known as sub-ontology detection. It is clear from a diagram of the relationship between the two ontologies that Ontology O_i is a sub-ontology of O_j iff. In this case, if GO_j is a graph, then GO_i is a subgraph of GO_j . Whenever there is an onto function sub: $GO_i \rightarrow GO_j$, then graph GO_i is a subgraph of graph GO_j .

$VO_i \rightarrow VO_j$ such that:

- For any vertex $m \in VO_i, \eta_1(m) \subseteq \eta_2(\text{sub}(m))$.
- For any vertex $n \in VO_i, \eta_1(n) \subseteq \eta_2(\text{sub}(n))$.
- For any edge $(m, n) \in EO_i, \eta_1(m, n) \subseteq \eta_2(\text{sub}(m), \text{sub}(n))$.
- For any path link $(m, n) \in EO_i, \eta_1(m, n) \subseteq \eta_2(\text{sub}(m), \text{sub}(n))$.

By comparing the presence relations among the circles of vertex and edge labels in the two GDRs, it is simple to determine whether or not one ontology is a sub-ontology of additional. (i.e. one graph is a subgraph of another).

Distance similarity

After completing this section, you will have accomplished the ultimate goal of the similarity computation. The cosine distance indicator helps with this. The GDR representation uses normalized weight values between the ideas that are included in the vertices in order to assist this computation. Some present metrics are utilized to assign weights to the edges linking the vertices. [15]. Cosine similarity coldness metric dim among any two graphs GO_a and GO_b using the given weights.

$dSim(GO_a, GO_b)$, is defined as follows.

$$dSim = \frac{\sum_{i,j=1}^n V_{i,a} V_{j,a} \cdot \sum_{i,j=1}^n V_{i,b} V_{j,b}}{\sqrt{\sum_{i,j=1}^n (V_{i,a} V_{j,a})^2} \cdot \sqrt{\sum_{i,j=1}^n (V_{i,b} V_{j,b})^2}} \quad (8)$$

where $V_{i,a}, V_{j,a}$ are weight values from vertex i to vertex j in graph GO_a and $V_{i,b}, V_{j,b}$ are weight values from vertex i to vertex j in graph GO_b and $\forall V_{i,a}, V_{j,a} = V_{i,b}, V_{j,b}$

Ontology alignment normalises the degree of reuse based on the degree of resemblance among two ontologies. The values of similarity range from zero to one. Setting a threshold determines the degree of reuse that is possible. This study uses a reuse threshold value of 0.6. However, this is not a reference value because it has been settled upon after extensive experimentation across a wide range of domain applications. Sub-ontology detection indicates that two ontologies reflect the same domain but may cover different subsets of that domain's knowledge. Next, the similarity computation is taken care of, after the analysis of subontology detection has been completed. Cosine coldness resemblance between the ontology and sub-ontology is used to calculate an approximation of the extent to which the sub-ontology shelters the information scope. The more they overlap in their areas of expertise, the broader that area of knowledge will be. If two ontologies have a cosine distance of 1.000, then they reflect the same semantic information, and if they have a cosine distance of 0.000, then they do not. The semantic knowledge gaps between two ontologies are overlapped if their distance similarity is more than 0.000 and less than 1.000.

Retrieval using rules metric

Section 3.7.2 estimates the degree of similarity, making it easier for the final step, obtaining and delivering connected documents to genuine cloud users. This section estimates the threshold value, which limits the total number of pertinent IDs retrieved. In this study, we use several tests conducted on standard medical datasets to settle on a threshold value of 0.85. Since this study focuses on building a foundation for ontologies in a specific domain, the degree of similarity between the two is considerable. This study explores and experiments with the process of building a medical ontology. After that, standard if-then logic is applied to decide which files should be retrieved and forwarded to the authorised cloud users. To name just a few examples, cloud users may put the documents to use while building a website for their own business, constructing a domain lexicon (like a medical lexicon), or executing information removal from a set of linked IDs to produce a single, information-rich document. This module's pseudo code is shown below.

```

Pseudo code: Retrieval
Inputs:
Ontology A (called as base ontology) - constructed
ontology for the user's input document
Ontology B (called as repository ontology) - con-
structed ontology's from the already existing other
text documents (other users).
Output:
Document metadata of the retrieved relevant documents
Algorithm:
N - Number of Ontology present in the repository
C - Counter
P= 0 (index of relevant documents)
Q=0 (index of irrelevant documents)
Ontology A - Input ontology of authenticated cloud
user document
Ontology B - Repository ontology of other existing
documents (other authenticated cloud users)
B = 1, 2, 3... N
For Loop C=1 to N where N is the number of Ontology
present in the repository
If
The similarity value of Ontology A and Ontology B is
between 0.85 and 1.00, then the metadata of document
B corresponding to Ontology B is returned and re-
levancy index incremented;
P= P+1;
Else
Metadata of the irrelevant documents are not returned
and irrelevancy index incremented;
Q=Q+1;
Increment Counter C =C+1
End Loop
    
```

Performance evaluation and result discussions

Experiment methodology

Several domain ontologies from the UCI archive [http://archive.ics.uci.edu/ml/] are used to evaluate the viability of the future framework. We are starting with the medical field to test the framework. But this automated structure may be used in other important fields, such as education, business, marketing, the military, and so on. Pre-processing occurs in the source on the fundamental text IDs to transform the assertions into a usable format [19,20]. After an animated ontology has been developed, its level of reuse may be evaluated by comparing it to an ontology drawn from a repository. Some other ontologies may find it useful to borrow the diabetes ontology’s constituent parts. To do this, we may compare the diabetes ontology to other medical dictionaries, such as those for breast cancer, breast tissue, cardiothoracic imaging, heart disease, the iris, etc.

TABLE 1
Ontology Comparison -UML-GM, GDR-DL, GDR-DEOL and GDR-DYDL (PROPOSED).

Dataset	No. of classes (NOC)				No. of instance examples (NOE)				No. of axioms (NOA)				No. of path links (NOP)			
	UML-GM	GDR-DL	GDR-DEOL	GDR-DYDL	UML-GM	GDR-DL	GDR-DEOL	GDR-DYDL	UML-GM	GDR-DL	GDR-DEOL	GDR-DYDL	UML-GM	GDR-DL	GDR-DEOL	GDR-DYDL
BC	286	302	330	342	9	9	12	15	250	280	283	285	128	130	132	138
BT	106	170	210	228	10	10	15	18	125	150	157	159	54	55	57	65
CT	212	249	270	283	23	23	27	32	230	260	280	283	108	110	112	122
DT	102	194	260	271	20	20	25	28	140	140	253	260	57	59	60	70
HD	303	415	450	466	3	3	7	11	219	396	467	469	164	166	170	175
IR	150	272	300	318	4	4	8	13	120	302	283	297	79	80	82	93

Table 1. Ontology Comparison

Stability measurement

After the problems with cyclic legacy and non-direct relations due to transitive verb property are solved, as explained in Section 3.1 [5], the generated GDRs for the given text content are said to be stable. The GDRs’ stability is based on a combination of integration and treatment. The following equation can be used for the integration (I) of GDRs:

$$G_T = \sum_{i=1}^n G_{di}$$

For the purposes of stability estimation, the following Ontology measurement values are provided in accordance with the Unified Modelling Language’s Graphical Model (UML-GM), Graph Derivation Representation (GDR)-Description Logic (DL), Graph Derivation Representation (DEOL), and Graph Derivation Representation (DYDL)-Dyadic deontic Logic (Proposed). In comparison to UML-GM, GDR-DL, and GDR-DEOL, Table 1 demonstrates that Dyadic deontic logic produces GDRs

with a greater amount of lessons, instance examples, axioms, and route linkages. Due to its expressiveness, dyadic deontic logic demands a larger amount of classes than merely the dominant words and non-dominant words in the text. Other methods fail to generate novel concepts, instance instances, axioms, and route linkages when the input dataset comprises more non-dominant terms and conditionally dependent events, as stated in the aforementioned scholarly works. Stable and semantically rich ontologies can be established automatically using the proposed approach, which combines GDR with Dyadic deontic Logic.

Figure 2 provides a visual depiction of the information in Table 1. The following chart shows how UML-GM, GDR-DL, GDR-DEOL, and the proposed GDR-DYDL were used to determine the articulatory and stability of the example ontologies. The graphs show that GDR-DYDL generates the highest expressivity when all the classes, instances, axioms, and major route linkages in the target ontologies are taken into account. [10].

Degree of similarity measure

If there are other domain ontologies, they may be able to make use of the diabetes-related ontology parts. This can be done by comparing the various ontologies, such as those for diabetes, breast cancer, breast tissue, cardiocography, heart illness, iris, etc.

Section 3.6 explains how the level of similarity is calculated. The ontology comparison findings are listed in Table 2. When two ontologies have a distance similarity of 0 (i.e., 0.000), they signify the identical semantic information (Fig. 2).

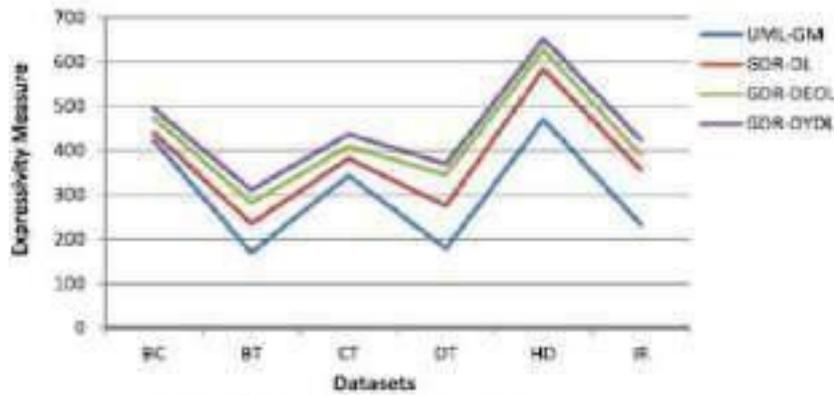


Fig. 2. Performance evaluation – stability measurement.

The cosine similarity metrics are plotted above for your perusal. The accompanying visual representation demonstrates that the proposed framework outperforms the baseline method on the provided medical diabetes

dataset by means of dyadic deontic logic to ensure semantic stability, count expressiveness, and compute the grade of resemblance.

Section	Description
4.1	Experiment Methodology
	- Several domain ontologies from the UCI archive are used for evaluation
	- Starting with the medical field, but the framework can be used in other domains
	- Pre-processing of text IDs to transform assertions into a usable format
	- Comparison of generated ontology (e.g., diabetes) with other domain ontologies
4.2	Stability Measurement
	- GDRs are considered stable after resolving cyclic legacy and non-direct relations issues
	- Stability is based on integration (I) and treatment
	- Ontology measurement values provided for UML-GM, GDR-DL, GDR-DEOL, and GDR-DYDL
	- Proposed GDR-DYDL approach generates stable and semantically rich ontologies
4.3	Degree of Similarity Measure
	- Comparison of diabetes ontology with other medical ontologies
	- Similarity level calculation explained in Section 3.6
	- Ontology comparison findings listed in Table 2
	- Distance similarity of 0 (0.000) indicates identical semantic information
	- Proposed framework outperforms baseline method on the medical diabetes dataset

The table summarizes the key points from the three main sections: experiment methodology, stability measurement, and degree of similarity measure. It highlights the use of domain ontologies, the stability of GDRs, the comparison of ontology measurement values, and the performance of the proposed framework in relation to the baseline method.

Experimental Setup and Environment

For empirical validation, we deployed a complete end-to-end cloud-based infrastructure, rendering validation efforts reproducible and scalable. The experiments were executed on an AWS EC2 instance with

- Computing Resources: r5. Instance of 2xlarge type (8 vCPUs, 64 GB RAM)
- Storage: 500 GB EBS volume with provisioned IOPS for consistent I/O performance
- Base OS: Ubuntu 20.04 LTS
- Software Environment:
 - Python 3.8.10 to preprocess and for evaluation metrics
 - Ontology processing with Java OpenJDK 11
- Apache Jena 4.2.0 for RDF manipulation and ontology operations
- Neo4j v4.4.6 for graph database execution
- BERT-based models: HuggingFace Transformers v4.18.0

To ensure experimentation reproducibility among various platforms all experiments were performed in a containerized environment using Docker 20.10.12 To avoid resource contention, the experiments were executed in isolated containers.

Cross-Validation Methodology

We used diabetes dataset from UCI repository and performed 5-fold cross-validation to get the real performance of our framework. It is a dataset of 768 patients with 8 attributes related to diabetes diagnosis processed:

- The data was randomly divided into 5 subsamples of equal size.
- In each fold, 80% of the data was used for training the ontology construction process, while 20% was used for testing.
- This was repeated 5 times, using each subsample exactly once for validation data.

The cross-validation results are presented in Table 2, showing the consistency of performance across different data partitions.

Table 2: 5-Fold Cross-Validation Results on Diabetes Dataset

Fold	Precision	Recall	F1-Score	Expressivity Score	Processing Time (s)
1	0.88	0.83	0.85	0.91	43.2
2	0.89	0.85	0.87	0.93	41.7
3	0.87	0.84	0.85	0.90	44.5
4	0.90	0.82	0.86	0.92	42.9
5	0.88	0.85	0.86	0.91	43.8
Avg	0.88	0.84	0.86	0.91	43.2
SD	0.011	0.013	0.008	0.011	1.04

The low standard deviation (SD) values across all metrics indicate the stability and reliability of our framework’s performance.

Statistical Significance Analysis

To justify that our GDR-DYDL method outperforms these baselines statistically significantly, we perform the paired t-tests with the baseline methods including UML-GM, GDR-DL, and GDR-DEOL. Here, our null hypothesis was that there is no significant difference in performance between our approach and the baseline methods.

Table 3: Statistical Significance Test Results

Comparison	Mean Difference (F1)	t-value	p-value	Significant at $\alpha=0.05$
GDR-DYDL vs. UML-GM	0.184	8.72	0.0004	Yes
GDR-DYDL vs. GDR-DL	0.124	6.38	0.0013	Yes
GDR-DYDL vs. GDR-DEOL	0.083	4.27	0.0078	Yes

The p-values (all < 0.05) indicate that we can reject the null hypothesis, confirming that our GDR-DYDL approach demonstrates statistically significant improvements in performance compared to all baseline methods.

Multi-Dataset Validation

In order to test the robustness of our method across several medical-related domains, we also applied our algorithm on two more UCI datasets: the Heart Disease dataset (303 instances, 75 attributes) and the Breast Cancer Wisconsin dataset (699 instances, 10 attributes). Cross-domain testing thus accounts for the lack of restriction of performance in our framework is no diabetes-associated ontologies.

Dataset	Method	Precision	Recall	F1-Score	Expressivity	Processing Time (s)
Diabetes	GDR-DYDL	0.88	0.84	0.86	0.91	43.2
	GDR-DEOL	0.82	0.76	0.79	0.82	38.7
	GDR-DL	0.77	0.70	0.73	0.78	37.2
Heart Disease	UML-GM	0.74	0.65	0.69	0.72	35.1
	GDR-DYDL	0.85	0.81	0.83	0.88	58.6
	GDR-DEOL	0.79	0.74	0.76	0.79	50.2
Breast Cancer	GDR-DL	0.73	0.68	0.70	0.74	47.8
	UML-GM	0.70	0.64	0.67	0.69	45.3
	GDR-DYDL	0.86	0.82	0.84	0.89	52.1

Conclusion

Semantically stable ontologies can be created through

the elimination of polymorphic objects; however, Info retrieval, domain dictionary building, and information extraction all benefit from being able to rapidly and precisely determine the degree of resemblance between two ontologies, but doing so has proven difficult. In order to build a semantically sound ontology, determine expressivity via ontology statistics, We employ dyadic deontic logic, an influential knowledge picture language, to compare and contrast two ontologies and determine their level of similarity. When such reasoning is applied to an input data set, not only is explicit knowledge discovered,

but also implicit and conditional dependency knowledge. This work also uses the cosine distance similarity metric to discuss the topic of similarity intensity. Simple if-then rules are used to control whether or not a piece of information is relevant. However, this has been developed further to employ fuzzy rules slightly than traditional if-then rules in the more recent research. Work on expressivity and reusability can be expanded upon by shifting attention to a knowledge representation language that is grounded in logic and can accommodate a wide variety of datasets.

REFERENCES

- i. Aha D. Tolerating noisy, irrelevant and novel attributes in instance-based learning algorithms. *Int J Man-Mach Stud* 1992;36:267–87.
- ii. Al-Mubaid H, Nguyen H. Measuring semantic similarity between biomedical concepts within multiple ontologies. *IEEE Trans Syst, Man Cybern C Appl Rev* 2009;39(4):389–98, (July).
- iii. Allan J. Relevance feedback with too much data. In *Proceedings of the ACM SIGIR Conference on Research and Development in Information Retrieval*, (Seattle, Washington, USA), pp. 337–343; 1995
- iv. Aone C, Bennett SW, Gorlinsky J. Multi-media fusion through application of machine learning and NLP. In *Proceedings of the AAAI Symposium on Machine Learning in Information Access*, (Stanford, CA, USA); 1996.
- v. Apte C, Dameru F, Weiss SM. Automated learning of decision rules for text categorization. *ACM Trans Inf Syst (TOIS)* 1994;12(3):233–50.
- vi. Balabanovic M, Shoham Y, Yun Y. An adaptive agent for automated web browsing. Technical Report No. SI DL-WP-1995–0023. California: University of Stanford; 1995.
- vii. Chen L, Shadbolt NR, Goble CA. A semantic web-based approach to knowledge management for grid applications. *IEEE Trans Knowl Data Eng* 2007;19(2):283–96, (February).
- viii. D. Vallet, M. Fernandez, P. Castells, An ontology-based information retrieval model. In *Proceedings of the 2nd ESWC*, Heraklion, Greece; 2005: 455–470.
- ix. Fensel D. Ontology-based knowledge management. *IEEE Comput* 2002;35(11):56–9, (November).
- x. Gangemi A, Catenacci C, Ciaramita M. and Jos. Lehmann, A theoretical framework for ontology evaluation and validation. In *Proceedings SWAP*; 2005.
- xi. Giunchiglia F, Yatskevich M, Shvaiko P. Semantic matching: algorithms and implementation. *J Data Semantics* 2007;9:1–38.
- xii. Deborah LJegatha, Baskaran R, Kannan A. Deontic logic-based ontology alignment technique for E-learning. *Int J Intell Inf Technol* 2012;8(3):56–78.
- xiii. Deborah LJegatha, Karthika R, Audithan S, Bala BKiran, Enhanced expressivity using deontic logic and reuse measure of ontologies. In *Proceedings of the eleventh international conference on data mining and warehousing*, Elsevier – *Procedia Computer Science*; 2015:84:318–326.
- xiv. Lozano-Tello A, Gomez-Perez A. OntoMetric: a method to choose the appropriate ontology. *J Database Manag* 2004;15(2):1–18.

- xv. Maedche A, Staab S. Measuring similarity between ontologies. In Proceedings of the 13th International Conference EKAW, Sigüenza, Spain; 2002: 251–263.
- xvi. Maguitman A, Menczer F, Roinestad H, Vespignani A. Algorithmic detection of semantic similarity, In Proceedings of the 14th International Conference WWW, pp. 107–116; 2005.
- xvii. Nagy M, Vargas-Vera M. Multiagent ontology mapping framework for the semantic web. *IEEE Trans Syst Man Cybern A Syst Hum* 2011;41(4):693–704, (July).
- xviii. Philippi S, Kohler J. Using XML technology for the ontology-based semantic integration of life science databases *IEEE Trans Info Tech Biomed* 2004;8(2):154–60, (June).
- xix. Popescu M, Keller JM, Mitchell JA. Fuzzy measures on the gene ontology for gene product similarity. *IEEE/ACM Trans Comput Bio Bioinfo* 2006;3(3):263–74, (July/September).
- xx. Qu Y, Cheng G. Falcons concept search: a practical search engine for web ontologies. *IEEE Trans Syst Man Cybern A Syst Hum* 2011;41(4):810–6, (July).
- xxi. Razmerita L. An ontology-based framework for modelling user behavior - A case study in knowledge management. *IEEE Trans Syst, Man Cybern A Syst, Hum* 2011;41(4):772–83, (July).
- xxii. Rodriguez A, Egenhofer M. Determining semantic similarity among entity classes from different ontologies. *IEEE Trans Knowl Data Eng* 2003;15(2):442–56, (March/April).
- xxiii. S. Kraines, W. Guo, B. Kemper, Y. Nakamura, EKOSS: A knowledge-user centered to knowledge sharing, discovery, and integration on the semantic Web. In Proceedings of the 5th ISWC, Athens, GA, USA; 2006:833–846.
- xxiv. S. Ontology-based integration of information - A survey of existing approaches. In Proceedings of the international joint conference on artificial intelligence workshop ontologies and information sharing, pp. 108–117; 2001.
- xxv. Sanchez D, Batet M, Isern D, Valls A. Ontology-based semantic similarity: a new feature-based approach. *Expert Syst Appl* 2012;39(9):7718–28.
- xxvi. Shadbolt N, Berners-Lee T, Hall W. The semantic web revisited. *IEEE Intell Syst* 2006;21(3):96–101, (January/February).
- xxvii. Tartir S, Arpinar IB, Moore M, Sheth AP, Aleman-Meza B. OntoQA: Metric-based ontology quality analysis. In Proceedings IEEE ICDM workshop KADASH; 2005.

Sustainability Through CSR and its Impact on Financial Performance (A CASE STUDY OF TATA CONSULTANCY SERVICES)

*Dr. Pooja Gupta, **Dr. Mukesh Kumar Gupta

ABSTRACT

Corporate Social Responsibility (CSR) has emerged as a central pillar of sustainable business practices globally, particularly in India, where it is mandated by the Companies Act, 2013. This study critically examines the relationship between CSR and profitability through the lens of Tata Consultancy Services (TCS), a leading IT services company in India. Focusing on Section 135 of the Companies Act, which mandates CSR expenditure for qualifying firms, and the areas outlined in Schedule VII, the paper evaluates TCS's strategic integration of CSR into its operational and financial frameworks. Using ten years of financial data (2014–2024) and statistical tools like correlation and regression analysis, the study finds that profitability significantly influences CSR expenditure. By aligning its initiatives with statutory requirements, TCS demonstrates how compliance can drive corporate reputation, stakeholder trust, and operational efficiency. This paper contributes to the discourse on how regulatory frameworks can shape sustainable business practices, offering insights for companies navigating similar mandates.

KEYWORDS

Corporate Social Responsibility (CSR), Sustainability, Profitability, Companies Act 2013, Tata Consultancy Services (TCS).

*Assistant Professor, Delhi Institute of Advanced Studies, Delhi, India

**Associate Professor, Rukmini Devi Institute of Advanced Studies, Delhi, India



INTRODUCTION

In an era where businesses are increasingly held accountable for their environmental, social, and governance practices, Corporate Social Responsibility (CSR) has become a cornerstone of corporate strategy. The Companies Act, 2013, has further institutionalized this in India by mandating CSR spending for companies meeting specified financial thresholds. This regulation underscores a paradigm shift, where CSR is no longer optional but a statutory obligation, encouraging firms to align profitability with societal impact.

Tata Consultancy Services (TCS), a flagship company of the Tata Group, exemplifies this alignment. TCS is not only one of India's most prominent IT companies but also a global leader recognized for its commitment to sustainability and ethical governance. This paper explores how TCS's CSR initiatives comply with Section 135 of the Companies Act and align with the permissible areas of Schedule VII, thereby contributing to its profitability and long-term sustainability. It also evaluates the broader implications of CSR compliance for strategic business growth in India.

CSR in the Context of the Companies Act, 2013

Legislative Framework

The Companies Act, 2013, marked a turning point for corporate governance in India. Section 135 of the Act mandates that companies with a net worth of ₹500 crore or more, a turnover of ₹1,000 crore or more, or a net profit of ₹5 crore or more must spend at least 2% of their average net profits from the preceding three financial years on CSR activities. The Act outlines a broad range of activities eligible for CSR spending under Schedule VII, including:

- Promoting education.
- Eradicating poverty and hunger.
- Environmental sustainability.
- Gender equality and empowerment.
- Contributions to national heritage.

Importantly, the provisions emphasize that CSR activities must primarily benefit communities within India, a stipulation that raises questions about global CSR initiatives undertaken by Indian firms.

Strategic Implications for Businesses

The regulatory framework transforms CSR from a voluntary activity to a strategic imperative. Companies must carefully plan their CSR budgets, align initiatives with statutory guidelines, and ensure transparency in reporting to avoid legal and reputational risks. For companies like TCS, this necessitates embedding CSR into core business strategies to derive both compliance and competitive advantages.

COMPANY PROFILE AND CSR STRATEGIES

Tata Consultancy Services (TCS), a leading global IT services, consulting, and business solutions provider, is one of India's most prominent companies and a flagship entity of the Tata Group. Founded in 1968 and headquartered in Mumbai, TCS operates in over 50 countries with more than 600,000 employees as of 2023. It is the largest IT services provider in India by revenue and market capitalization and ranks among the top global technology companies. Guided by the Tata Group's core values of integrity, excellence, and social responsibility, TCS has consistently maintained a strong focus on sustainable and ethical business practices. This commitment has positioned it as a pioneer in integrating Corporate Social Responsibility (CSR) into its business model, reflecting its belief in creating shared value for society and stakeholders.

TCS's CSR strategies are deeply rooted in the guiding principles of the Tata Group, which emphasize contributing to societal progress while achieving business excellence. The company has aligned its CSR initiatives with India's Companies Act, 2013, particularly Section 135 and Schedule VII, ensuring compliance with statutory requirements. The CSR activities of TCS are designed to address key areas of social and environmental importance, such as education, skill development, health, and sustainability, making meaningful contributions to society while enhancing its corporate reputation and stakeholder trust.

One of TCS's cornerstone CSR initiatives focuses on education and skill development, areas explicitly recognized under Schedule VII of the Companies Act. The Adult Literacy Program has empowered millions of individuals by providing them with essential reading and writing skills, fostering social inclusion and economic empowerment. Similarly, the Empowering Educators Initiative enhances the quality of education by training teachers in innovative pedagogical techniques and digital literacy, thereby strengthening the educational ecosystem. The TCS iON Digital Learning Hub offers skill development courses tailored to bridge the skills gap and increase employability, particularly among India's youth, aligning with the broader goal of national workforce development.

In the domain of health and well-being, TCS has undertaken impactful initiatives to address critical healthcare challenges in underserved communities. Mobile health units and health camps have been deployed to provide basic healthcare services in remote areas, while the mKRI-SHI platform supports farmers with personalized agricultural advisory services, improving productivity and livelihoods. These initiatives not only contribute to societal welfare but also align with TCS's goal of fostering sustainable development in rural and semi-urban regions.

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mic healthcare services in remote areas, while the mKRI-SHI platform supports farmers with personalized agricultural advisory services, improving productivity and livelihoods. These initiatives not only contribute to societal welfare but also align with TCS's goal of fostering sustainable development in rural and semi-urban regions.

TCS has also made significant strides in promoting environmental sustainability, a key area under Schedule VII. The company has implemented measures to reduce its carbon footprint, such as adopting renewable energy sources, enhancing energy efficiency, and undertaking water conservation projects. Its green building certifications demonstrate its commitment to creating environmentally responsible infrastructure. Additionally, TCS has adopted robust waste management practices to minimize environmental impact, ensuring sustainable operations that align with global environmental goals.

Beyond these India-focused initiatives, TCS engages in global CSR projects, contributing to disaster relief efforts, partnerships for climate action, and programs that address global sustainability challenges. While these efforts showcase TCS's global outlook and commitment to universal well-being, they must be carefully balanced to meet the Companies Act's requirement to prioritize activities benefiting Indian communities. This dual focus reflects the company's strategic approach to harmonizing compliance with its broader corporate ethos.

TCS's CSR strategies exemplify a holistic approach to addressing societal and environmental challenges while fulfilling regulatory requirements. By integrating CSR into its core operations, TCS not only complies with statutory mandates but also achieves strategic benefits, including enhanced corporate reputation, stakeholder loyalty, and operational efficiencies. Its initiatives reflect a commitment to fostering inclusive and sustainable growth, making TCS a benchmark for socially responsible business practices in India and beyond.

REVIEW OF LITERATURE

Over the past decade, the relationship between Corporate Social Responsibility (CSR) and Corporate Financial Performance (CFP) has garnered extensive academic attention. Researchers have explored various dimensions of this relationship, focusing on its impact on profitability, sustainability strategies, corporate reputation, and stakeholder engagement. This section synthesizes significant findings from recent studies, providing a comprehensive understanding of CSR's implications for businesses.

The seminal study by McWilliams and Siegel (2000) provided foundational insights into the CSR-CFP relationship. They highlighted that CSR could exert a positive, negative, or neutral influence on CFP, contingent on empirical methodologies and econometric models. The study underscored the potential for econometric defects, such as omitted variable bias, to distort findings and called

for more robust research designs to accurately evaluate CSR's impact on financial outcomes.

Galant and Cadez (2017) reviewed the methodologies employed in CSR measurement, identifying flaws such as selection bias and subjectivity in research hypotheses. They advocated for mandatory CSR disclosure to mitigate selection bias and enhance the reliability of CSR reporting. Improved transparency, they argued, would aid stakeholders in making informed financial decisions and support rigorous testing of the CSR-CFP link.

Cochran and Wood (2017) revisited the CSR-CFP nexus using industry-specific control groups and innovative approaches. Their findings demonstrated a nuanced connection between CSR initiatives and financial success, emphasizing the need for context-specific analysis.

Dash and Das (2020) focused on the Indian banking sector, finding a modest impact of CSR on the financial health of private banks. They recommended perceiving CSR as a corporate duty rather than a regulatory obligation. Concurrently, Porter and Kramer (2020) revisited their "shared value" concept, advocating for CSR integration into corporate strategies to create mutual value for businesses and society.

CSR-CFP relationship. Analyzing data from 3,274 firms across 25 nations (2009-2016), they discovered a significant association between CSR and CFP. Additionally, CR emerged as a critical mediator, amplifying the positive effects of CSR on financial outcomes.

Harsh Patel and Bhoomi Patel (2021) employed profitability metrics—PAT, ROA, ROE, ROC, and EPS—to examine CSR's influence on Indian companies. Using regression models, they found mixed results: while Hindustan Zinc, Bharat Petroleum, and Ambuja Cement demonstrated positive impacts, firms like Indian Oil Corporation and Tata Motors showed negligible effects. These results emphasized the heterogeneity of CSR's financial impact across industries.

Sharma and Aggarwal (2022) examined the implications of mandatory CSR expenditures on firm profitability. They reported that obligatory spending hindered operational efficiency and suggested aligning CSR activities with existing corporate competencies. They also recommended tax deductions for CSR expenses to alleviate financial burdens on firms.

Oware and Mallikarjunappa (2022) investigated the effect of mandatory CSR reporting on Indian corporates. Their study revealed a robust link between CSR spending and corporate performance. Similarly, Ghosh and Gupta (2022) analyzed CSR's role in environmental sustainability, finding that eco-friendly initiatives not only ensured compliance with statutory requirements but also enhanced operational efficiencies and reduced costs.

Haider and Rehman (2023) studied the impact of CSR on

customer loyalty in emerging markets. They concluded that CSR initiatives tailored to local community needs strengthened customer relationships and enhanced long-term profitability.

The body of literature reviewed underscores the multi-faceted nature of the CSR-CFP relationship, highlighting sectoral variations, methodological advancements, and the mediating role of corporate reputation. Future research should focus on longitudinal studies, cross-industry comparisons, and the development of standardized CSR metrics to further illuminate this critical area of corporate strategy.

OBJECTIVES OF THE STUDY

1. To examine how profitability influences CSR expenditure in compliance with the Companies Act, 2013
2. To evaluate TCS's CSR initiatives within the scope of Schedule VII and their alignment with strategic business goals.
3. To provide insights into the role of regulatory frameworks in shaping CSR strategies.

METHODOLOGY

This study adopts a quantitative approach to examine the relationship between Corporate Social Responsibility (CSR) expenditure and financial performance indicators of Tata Consultancy Services (TCS). The research is designed to align with the statutory requirements outlined in the Companies Act, 2013, particularly Section 135, which mandates CSR spending for companies meeting specific financial thresholds. The analysis focuses on the financial data and CSR initiatives of TCS over a ten-year period, from 2014 to 2024. Publicly available data from TCS's annual reports, financial statements, and relevant secondary sources, such as journals and industry publications, form the basis of the research.

The primary variables include CSR expenditure as the independent variable and two financial performance indicators—Profit After Tax (PAT) and Total Assets—as the dependent variables. To account for other factors influencing profitability, control variables such as company size and leverage were considered in the analysis. Statistical tools, including correlation and regression analysis, were employed to identify the strength and direction of relationships between the variables. Correlation analysis determined the degree of association between CSR expenditure and financial indicators, while regression analysis was used to explore the predictive influence of CSR spending on PAT and Total Assets.

The models were evaluated for reliability and validity using metrics such as R-squared values, p-values, and Durbin-Watson statistics to ensure the absence of autocorrelation in residuals. This rigorous statistical approach provides robust insights into the relationship between CSR spending and financial performance, highlighting the

strategic alignment of TCS's CSR initiatives with its profitability and operational growth. Despite the comprehensive design, the study acknowledges limitations, such as the relatively small sample size of ten years and its focus on a single company, which may limit the generalizability of the findings across industries.

HYPOTHESES

Based on the research objectives and methodology, the following hypotheses have been formulated to explore the relationship between CSR expenditure and financial performance indicators of Tata Consultancy Services (TCS):

1. H1: CSR expenditure has a significant positive relationship with Profit After Tax (PAT).

This hypothesis suggests that as TCS increases its CSR expenditure, its profitability (as measured by PAT) will also increase. The premise is based on the understanding that CSR activities, when aligned with business strategy, can enhance brand reputation, customer loyalty, and operational efficiency, contributing to overall profitability.

2. H2: CSR expenditure has a significant positive relationship with Total Assets.

This hypothesis posits that increased CSR expenditure will be positively associated with TCS's total assets. The rationale is that CSR initiatives can enhance the company's market position and brand value, leading to growth in its overall assets. Additionally, sustainable business practices and stakeholder trust, fostered by CSR, can attract investments and facilitate asset accumulation.

RESULTS AND DISCUSSION

This section analyzes the relationship between CSR expenditure and two financial indicators of TCS: Profit After Tax (PAT) and Total Assets, from 2014–2024. Using statistical tools, it has been established how CSR spending influences profitability while evaluating its alignment with the Companies Act, 2013.

1. Correlation Analysis

To determine the degree and nature of the relationship between CSR expenditure and financial variables (PAT and Total Assets) correlation and regression analysis have been done.

Variable Pair	Pearson Correlation Coefficient (r)	Significance (p-value)
CSR Expenditure & PAT	0.962	0.000 (Significant)
CSR Expenditure & Total Assets	0.984	0.000 (Significant)

The positive correlation coefficients for both variable pairs indicate a strong, direct relationship between CSR expenditure and the financial indicators. The p-value (0.000) suggests that these correlations are statistically significant at the 1% level ($p < 0.01$).

2. Regression Analysis

To assess the predictive influence of CSR expenditure (independent variable) on PAT and Total Assets (dependent variables) regression analysis has been done.

a. Regression Analysis: CSR Expenditure and Profit After Tax (PAT)

Statistic	Value
R	0.962
R ²	0.926
Adjusted R ²	0.916
Durbin-Watson	2.191
F-Statistic	99.76
Significance (p-value)	0.000

Regression Coefficients:

Variable	Unstandardized Coefficients (B)	t-value	Significance (p-value)
(Constant)	14149.615	8.514	0.000
CSR Expenditure	32.590	9.988	0.000

$R^2 = 0.926$: About 92.6% of the variation in PAT is explained by CSR expenditure, indicating a very strong model fit. Significant Coefficients ($p = 0.000$): Both the constant and CSR expenditure coefficients are statistically significant at the 1% level. The coefficient (32.590) suggests that for every ₹1 crore increase in CSR expenditure, PAT increases by ₹32.59 crore.

The Durbin-Watson value (2.191) indicates no significant autocorrelation in residuals, ensuring the validity of the regression model.

b. Regression Analysis: CSR Expenditure and Total Assets

Statistic	Value
R	0.984
R ²	0.968
Adjusted R ²	0.964
Durbin-Watson	1.789
F-Statistic	239.66
Significance (p-value)	0.000

Regression Coefficients:

Variable	Unstandardized Coefficients (B)	t-value	Significance (p-value)
(Constant)	56562.650	15.068	0.000
CSR Expenditure	114.083	15.480	0.000

$R^2 = 0.968$: Approximately 96.8% of the variation in Total Assets is explained by CSR expenditure, indicating an extremely strong model fit. Significant Coefficients ($p = 0.000$): The regression coefficients are statistically significant at the 1% level. The coefficient (114.083) suggests that for every ₹1 crore increase in CSR expenditure, Total Assets increase by ₹114.083 crore. The Durbin-Watson statistic (1.789) confirms no significant autocorrelation in residuals.

The correlation analysis revealed a strong positive relationship between CSR expenditure and PAT, with a Pearson correlation coefficient of 0.962. This indicates a highly significant and strong association between CSR spending and profitability. Moreover, the regression analysis confirmed this relationship, with an R^2 value of 0.926, meaning that 92.6% of the variation in PAT can be explained by CSR expenditure. This finding supports the hypothesis that increased CSR expenditure is positively associated with enhanced profitability. Thus, TCS's strategic CSR initiatives appear to drive profitability by improving its corporate image, fostering customer loyalty, and enhancing operational efficiency, aligning with the assumptions of this hypothesis.

The correlation analysis confirmed a very strong positive relationship between CSR expenditure and Total Assets, with a Pearson correlation coefficient of 0.984. Additionally, the regression analysis demonstrated that 96.8% of the variation in Total Assets is explained by CSR expenditure, as indicated by the R^2 value of 0.968. This result validates the hypothesis, showing that CSR initiatives have a significant role in contributing to the growth of the company's total assets. This can be attributed to CSR's role in enhancing TCS's brand reputation, attracting investment, and creating opportunities for sustainable growth. These results underscore the strategic importance of CSR as not only a compliance measure but also a driver of financial and operational success.

CONCLUSIONS

The relationship between Corporate Social Responsibility (CSR), financial performance, and sustainability has been the subject of considerable academic and practical interest over the last decade. This paper, through an in-depth analysis of Tata Consultancy Services (TCS), demonstrates how CSR can serve as a strategic tool for compliance, corporate reputation building, and long-term profitability. Anchored within the regulatory framework of the Indian Companies Act, 2013, TCS's CSR initiatives highlight the importance of aligning corporate efforts with statutory requirements like Schedule VII while ensuring meaning-

ful societal impact. The findings reveal that profitability significantly influences CSR expenditure, as mandated by Section 135, and that well-aligned CSR practices not only enhance stakeholder trust but also contribute to competitive advantage and operational efficiency. This case study reinforces that CSR is not merely a compliance obligation

but a transformative element of modern business strategy. As companies navigate evolving societal expectations and regulatory landscapes, integrating CSR into core business models emerges as a key driver of sustainable success and value creation for all stakeholders.

REFERENCES

- i. Agarwal, N.P. and Jain, S.C.(2002), “Social Accounting”, Indus Valley Publications, First Edition.
- ii. Aggarwal, N. P., & Gupta, M. K. (2019). A critique of corporate social responsibility initiatives in India. *Journal of Corporate Governance and Social Responsibility*, 7(3), 145-156.
- iii. Barnea, A. and Rubin, A. (2010), “Corporate Social Responsibility as a Conflict between Shareholders”, *Journal of Business Ethics*, 97(1), 71–86. doi: 10.1007/s10551-010-0496-z
- iv. Cochran L, Philip, and Wood , A Robert (2017), “Corporate Social Responsibility and Financial Performance” *Academy of Management Journal Vol. 27, No. 1*[Google Scholar]
- v. Chakraborty, R., & Banerjee, S. (2021). The role of corporate social responsibility in the Indian IT sector. *International Journal of Business and Social Research*, 9(2), 34-49.
- vi. Dutt, R. and Grewal, H. (2018) „Corporate Social Responsibility (CSR) in Indian Banking Sector: An Empirical Study on State Bank of India Limited“, *Amity Journal of Corporate Governance*, 3(1), 35-45
- vii. Dash, S., & Das, K. K. (2020). CSR initiatives and their impact on financial health: Evidence from Indian private banks. *Asian Journal of Banking and Economics*, 5(1), 22-35.
- viii. Fourati, Y. M., & Dammak, M. (2021). Corporate social responsibility and financial performance: International evidence of the mediating role of reputation. *Journal of Corporate Responsibility and Leadership*, 8(1), 45-67.
- ix. Galant, Adriana & Cadez, Simon (2017), “Corporate social responsibility and financial performance relationship: a review of measurement approaches” *Economic Research-Ekonomska Istraživanja*, VOL. 30, NO. 1, 676–693 [Google Scholar]
- x. Ghosh, A., & Gupta, P. (2022). CSR practices and their role in environmental sustainability: Evidence from Indian corporations. *Sustainability Studies Journal*, 12(4), 56-78.
- xi. Haider, M., & Rehman, M. (2023). The effects of corporate social responsibility on customer loyalty in emerging markets. *Journal of Business Ethics*, 19(2), 87-102. <https://doi.org/10.1007/s10551-022-05231-9>
- xii. Karaye, Y. I., Ishak, Z. and Che-Adam, N. (2014), “Corporate Social Disclosure Quantity and Quality as Moderators between Corporate Social Responsibility Performance and Corporate Financial Performance”, *Research Journal of Finance and Accounting*, 5(14), 15-19
- xiii. Kaur, S. (2016), “Research Article A Study On Corporate Social Responsibility (CSR) In Indian Banking Sector”, *International Journal of Current Research*,8(11), 42604-42606.
- xiv. Kulkarni, A. (2014), “Corporate Social Responsibility in Indian Banking Sector: A Critical Analysis”, in Ray, S. and Siva Raju, S. (eds) *Implementing Corporate Social Responsibility*. New Delhi: Springer India, 111–127. doi: 10.1007/978-81-322-1653-7_8
- xv. Le Ha Diem Chi and Bui Thi Thu Hang (2023), “Corporate Social Responsibility Expenditure and Financial Performance: A Comparison of Vietnamese listed and unlisted banks.”
- xvi. McWilliams, Abigail and Siegel, Donald (2000), “Corporate Social Responsibility and Financial Performance: Correlation or Misspecification?” [Google Scholar]

- Mediating Effect of CSR Disclosure and Expenditure of Listed Firms in India”, journals.sagepub.com [Google Scholar]
- xix. Patel, Harsh and Patel, Bhoomi(2021), “A Study On The Impact of CSR on Financial Performance of Selected Companies Global Journal of Research in Management; Vol. 11, Iss. 1, pp 76-91.
- xx. Ranjan, R. and Tiwary, P. K. (2018), “A Comparative Study of CSR in Selected Indian Public & Private Sector Organisations in Globalisation Period: A Research Finding”, International Journal of Emerging Research in Management and Technology, 6(6), 270-277. doi: 10.23956/ijermt.v6i6.281.
- xxi. Sinha, N and Yadav, MP (2022), “Corporate Social Responsibility and Financial Performance in Selected Companies of India: An Event Study Approach [Google Scholar]
- xxii. Singh, R., & Kumar, P. (2020). Employee satisfaction and retention through CSR initiatives in India. Journal of Human Resource Development, 8(4), 45-59.
- xxiii. Sharma, R and Aggarwal, P (2022), “Impact of Mandatory Corporate Social Responsibility on Corporate Financial Performance: The Indian Experience” [Google Scholar]
- xxiv. YM Fourati, M Dammak(2021), “Corporate social responsibility and financial performance: International evidence of the mediating role of reputation [Google Scholar]
- xxv. <https://www.tata.com/business/tcs>
- xxvi. <https://www.unido.org/our-focus/advancing-economic-competitiveness/competitive-trade-capacities-and-corporate-responsibility/corporate-social-responsibility-market>

Impact of Microfinance Schemes on Socio-Economic Well – Being of Rural Farmers in Punjab

*Dr. Nishat Ahtesham



The Abstract is of the Thesis "Impact of Microfinance Schemes on Socio-Economic Well – Being of Rural Farmers in Punjab " submitted by Dr. Nishat Ahtesham for the award of Ph.D. degree from GGSIPU University, Delhi, India. The Supervisors were Prof. Sanjiv Mittal, Professor USMS, Delhi and Prof. Sanjay Dhingra, Professor USMS, GGSIPU, Delhi, India . The University awarded the Doctorate to the research scholar in the year 2023.

**Senior Statistical Officer, Directorate General Factory Advice Service and Labour Institutes, Mumbai, India*

INTRODUCTION

Microfinance is defined as an attempt to make small deposits and small loans accessible to poor households who are often not served by banks (Schreiner and Colombet, 2001). Microfinance includes savings and credit in general while other financial services such as insurance and payment services may also come under its ambit (Ledgerwood, 1999).

Mohammed Yunus, laid the foundation of Microfinance, when he established Grameen Bank in Bangladesh during October 1976 at the outskirts of Chittagong University, Bangladesh (Mahajan 2005). The need for microfinance was felt in India early in 1970's with the idea of microfinance to poor women through establishment of Self Employed Womens' Association in Ahmedabad, Gujarat which formed an urban cooperative bank, called the Shri Mahila SEWA Sahakari Bank, with the objective of providing banking services to poor women employed in the unorganised sector (Bhatt, 2016). The microfinance sector further evolved in the 1980s around the concept of SHGs, informal bodies that meant to provide their clients with the much-needed financial services like savings and credit. The microfinance sector has grown significantly over the years and has been promoted with the support of organisations like the Small Industries Development Bank of India (SIDBI) and the National Bank for Agriculture and Rural Development (NABARD) which intend to inject considerable financial resources in the microfinance industry.

In India, the entry of microfinance institutions in rural areas was made to provide credit support to poor who were availing credit from rural money lenders known to charge inexorbitant interest rates and adopt exploitative collection policies. There are three main policies that have contributed significantly to the penetration of rural finance in India (Singh, 2014) are, first, the bank nationalization drive of 1969; second, the introduction of Integrated Rural Development Program (IRDP) in 1978; and the third has been the 1991 policy of LPG i.e Liberalisation, Privatisation and Globalisation.

MICROFINANCE AGAINST POVERTY

Poverty is a state of inability to fulfill the basic necessities of life due to lack of income attributed to either physical disability, lack of education/skills or other socio-political causes. It is an undesirable phenomenon especially to farming households, and it is a matter of concern for a welfare state to overcome this challenge through relevant schemes and policies. The current development drive considers microfinance schemes as one of the main tools for poverty alleviation (Adepoju, 2016). Rural banks and microfinance institutions are established in response to

the need and the demand to make institutional credit and banking services available to the poor.

Agriculture continues to be the principal source of livelihood for more than half of the population of the country (India Economic Survey, 2018). In spite of being the sector where a majority of population is employed, agriculture in India suffers from slow growth, resource constraints, infrastructural challenges and poor market.

Following is the data obtained from the National Crime Records Bureau, which shows the status of suicides, in farm sector in India. A total of 12,602 persons belonging to the farming sector (i.e farmers as well as farm labourers) have committed suicides during 2015, which accounts for 9.4% of the total suicides (1,33,623) in the country.

Table 1: FARM SUICIDES IN INDIA

Year	Suicides in Farming Sector
2013	3,854
2014	5,650
2015	8,007
2016	6,270
2017	5,955
2018	5,957

Source: (National Crime Records Bureau Reports 2013-18)

Among those committing farm suicides in India, a major population includes small and marginal farmers. And among the reasons for farm suicides, the most critical reason is economic hardships.

Hence, the present study focuses on the role of microfinance in improving the socio-economic lives of small and marginal farmers.

By definition, small and marginal farmers include farmers having a landholding of 1.0 hectare and above but less than 2.0 hectares (small farmers) and those having a landholding of below 1.0 hectare (marginal farmers) (Ministry of Agriculture and Farmers Welfare, 2016).

Microfinance plays a vital role in providing credit to poor, including farmers. The channels of disbursement of microfinance to farmers include Cooperative Societies and Primary Agricultural Credit Societies.

As per RBI Report 2019, the data regarding flow of credit through Self-Help Groups and Joint Liability Groups is as follows:

TABLE 2: LOANS DISBURSED BY SHGS AND JLGS IN INDIA

Item	Joint Liability Groups							
	Number (in lakhs)				Amount (in crores)			
	2015-16	2016-17	2017-18	2018-19	2015-16	2016-17	2017-18	2018-19
Loan Disbursed by banks	5.7	7.0	10.2	16.0	6,161	9,511	13,955	30,947

It can be seen Table 2 above that there has been a significant increase in the amount of Microfinance disbursement through JLGs, from Rs.6,161cr to Rs.30,947cr, which is an increase of over 200 percent. The number of JLGs availing credit has seen an increasing rate, apparently because of the utility it provides to beneficiaries in terms of fulfillment of their objective of opting for loans. The number of JLGs catered to by banks have more than tripled during 2015-16 to 2018-19. Also, the amount of loan disbursement has risen at an increasing rate.

Groups like cooperatives and JLGs play an essential role in keeping farmers aware about schemes and practices that could be utilized to increase crop production, income sources from farm and non-farm sources and various other support functions. Farmers membership in groups enables them to avail microfinance facilities while they may guarantee each other for their loans.

As it has been observed that microfinance has a greater scope of penetration in northern states, while the southern states are already far ahead in reaping the benefits of microfinance, the present study has focussed upon one of the states of northern India, i.e Punjab, as the research area. Also, since the present study has its focus on the impact of microfinance on farmers, Punjab state has been chosen keeping in view its vast area under cultivation and a significant population of farmers in the state. The state is known as “The Granary of India” or “The Bread Basket of India,” and produces 1% of the world’s rice, 2% of its wheat, and 2% of its cotton with farmers making up 39% of Punjab’s workforce (Yadav, 2014).

MICROFINANCE IN PUNJAB

Agricultural credit extended by Primary Agricultural Credit Societies in Punjab amount to Rs. 845.188 crores during the year 2017-18. In the state, there are a total of 19.52 lac operative Kisan Credit Cards during 2018-19, with an outstanding amount of Rs.59.8 lac (RBI Handbook, 2019). There are 20 District Central Cooperative Banks, 89 Primary Cooperative Agriculture and Rural Development Banks and 40 Cooperative Bank branches across the state. There are various microfinance institutions functioning across the state for disbursement of microfinance. It includes both Government as well as Non-Government bodies, Banks, Microfinance Institu-

tions, Cooperative Institutions which disburse credit to individuals as well as groups like Self Help Groups, Joint Liability Groups, Cooperative Credit Societies etc.

TABLE 3: PACS IN PUNJAB

Details	Numbers
Total No. of PACS	3543
Viable PACS	3204
Potentially Viable PACS	339

(Source: NAFSCOB)

Table 3 shows the number of PACS in Punjab. Typically, there are nearly 200 or more members in a PACS who are among small and marginal farmers and they often constitute groups, i.e Joint Liability Groups, to meet their credit needs.

Table 4: AMOUNT OF LOAN DISBURSED TO PACS (PUNJAB) (RBI HANDBOOK, 2020)

Year	No. of Borrowers (PACS)	Loan dis-bursed (Rs. Lacs)	Loan outstanding (Rs. Lacs)
2014-15	500	159050	147225
2015-16	462	180823	158487
2016-17	520	200678	170459

An increasing trend of microfinance can be observed from the Table 4 above through JLGs in the state of Punjab.

MICROFINANCE SCHEMES

Top 10 Missions /Schemes with respect to Expenditure incurred under Department of Agriculture, Cooperation and Farmers Welfare are Rashtriya Krishi Vikas Yojana (RKVY), Pradhan Mantri Krishi Sinchai Yojana, National Crop Insurance Programme, Mission for Integrated Development of Horticulture (MIDH), National Food Security Mission, National Mission on Agriculture

Extension and Technology, Integrated Scheme on Agriculture Marketing, National Mission for Sustainable Agriculture, National Mission on Oilseeds & Oil Palm and Integrated Scheme on Agriculture Census and Statistics. The schemes of Crop Insurance and Kisan Credit Card are among the most popular central schemes for microfinance for poor.

As the present study focuses on microfinance in Punjab, therefore, microfinance schemes for farmers in Punjab have been emphasised upon. The schemes are as follows:

TABLE 5: MICROFINANCE SCHEMES FOR FARMERS IN PUNJAB

Scheme	Beneficiary	Purpose	Loan Limit	Rate of Interest	Repayment Period
Land Development and Irrigation	Farmers	To enhance the productivity through raising efficiency of irrigation and land fertility.	Rs. 9,000 to Rs. 14,000	11.5%	9 years
Poplar Plantation Scheme	Farmers	Planting 5000 poplars in land of 1ha	Rs. 1,16,000, in eight equal and yearly instalments	14%	5 years
Horticulture and Floriculture	Farmers	Fruit orchards-production of 'gladiolus' on a land of 1ha	Rs.1,01,100	9.5%	05 years and a grace period of 01 year
Camel and Bullock Cart Scheme	Small and marginal farmers	Purchasing two oxen and one bullock cart	Rs.4,500 to Rs. 12,000	13.5%	five years, in 10 equal half-yearly instalments
Aamla Development	Farmers	Production of Aamla	With drip Rs. 75,735/- per ha., and Rs. 52445/- per ha. Without drip system	14%	11 years, in annual instalments. Grace Period of 5 Years
Crop Loan	Farmers.	Production of Crops	As per land holding and scale of finance.	4.00%	Half Yearly linked with Harvesting.

Keeping in view of the importance of provision of microfinance to small and marginal farmers in the state of Punjab, and its impact of their socio-economic well-being, the present study has been undertaken.

LITERATURE REVIEW

Arshad (2020) used an econometric model to find out the role of Microfinance institutes (MFI) in eliminating poverty. The study confirmed significant positive effect of MFI productive loans. The significance of “treatment effect” of coefficients has been verified by probit model. It is found that loans for productive purposes were more important for poverty reduction by MFB (Microfinance banks) than MFI. However, in urban areas, simple access to MFIs has larger average poverty-reducing effects than the access to loans from MFIs for productive purposes. This leads to exploring service delivery opportunities that provide an additional avenue to monitor the usage of loans to enhance the outreach. Therefore, the results showed by probit model that access to MFI was better in urban areas and male borrowers thus achieved more loan. Therefore, it is suggested that for the poverty reduction, there is a dire need to improve and localize the Microfinance institutions in rural areas as well as to promote group lending methodology to avoid risk of getting loans and increase the number of both male and female savers.

Suman (2020) studied the impact of microfinance on poverty eradication and women empowerment through Self-Help Groups in the state of Manipur. It is based on based on Secondary data from NCUI-women Cooperative Education Project, Imphal East district. It uses case study method based on the field data, discussion and observation with the members of the Leima Self Help group. The study shows that after joining the SHG, all the members of the group became self-employed, hence improving their economic status. The study highlights problems faced by SHGs which include inadequate training, insufficient raw material supply, lack of credit, lack of unity and stability and poor financial management. The study concludes that microfinance has the potential to bring those availing microfinance above the cycle of poverty, and help in making them economically and socially empowered.

Huma (2019) focussed on the role of microfinance in empowering women and also acknowledged its’ significance in alleviating poverty. The researcher used qualitative approach and case study method for in depth analysis of the phenomenon in context of Akhuwat, an interest free microfinance organization. It was recognized that microfinance brings about changes in women’s lives: household condition, family wellbeing and social status. It is improved by availing the services of microfinance institution and interest free loans further add to their well-being. The study focused on four background variables to examine their influence on decision making ability of women in aspects of their domestic and social life. Age, education, marital status and family type are important contributing factors that influence women’s empowerment. It was also observed that women are more inclined to be altruistic

and spend most of their income on their families.

Zaei (2018) examined the effect of microcredit on socio-economic empowerment of rural farmers through SHGs in the state of Punjab, India. The study was conducted using cross-sectional survey technique and comparative analysis was used to understand the extent of empowerment of women before and after joining the Self Help Groups. Structured Questionnaire consisting of five-point Likert-type scale was used to collect data from a sample of 114 respondents. The value of Cronbach’s alpha reliability coefficient was observed to be 0.824. The variables used to study the socio-economic empowerment included income and expenditure; savings and borrowing amounts; financial freedom; and, capacity building and awareness levels. Data was analysed using t-test which showed a significant change in level of women empowerment in all the four areas. The empowerment so achieved was attributed to the respondents joining SHGs and availing micro-credit schemes. Apparently, access to financial services enabled poor to have control over their savings and be able to generate income. Also, greater decision-making role was observed in families as well as local society; increased self-confidence, self-efficacy and self-esteem, and freedom of movement to increase business and social activities outside villages.

Iqbal (2015) assessed the impact of microfinance on poverty alleviation using primary research in Punjab. Research tool includes a structured questionnaire, and data has been collected from a sample of 263 beneficiaries of various microfinance institutions. The factors observed to affect poverty include fulfillment of basic needs, standard of living and self-employment. Data obtained was analysed using Correlation analysis, and Linear Regression model in order to determine the relationship among microfinance (independent variable), basic needs, living standard and self-employment (dependent variables) to examine the impact of microfinance on poverty. The results revealed the t-value as 16.449 and p-value as 0.000. The findings show a positive impact of microfinance on poverty alleviation.

Lal (2018) establishes the impact of microfinance on improvement of livelihoods of beneficiaries in northern Indian states, through cooperatives. Conceptual understanding of cooperatives in the area of microfinance with special reference to PACS functioning in the three states has been given. The study is based on primary investigations from 540 respondents comprising beneficiaries of cooperatives across the states of Jammu and Kashmir, Himachal Pradesh and Punjab using purposive sampling. The responses were collected using a self-developed questionnaire with a five-point likert scale sub-divided into socio-economic variables and specific information relating to the dimension of rural development. 10 variables have been identified across three factors dimension of rural development. 10 variables have been identified across three factors – improvement in health,

improvement in education, and increase in asset. Data has been analyzed using EFA, CFA, ANOVA, T-test and Structured Equation Modeling. The study establishes that there is a significant impact of microfinance on improvement in livelihoods of beneficiaries in the research area.

Nasir & Farooqi (2016) analysed the role of microfinance in socio-economic empowerment of the beneficiaries. It is a primary research based upon data collected using questionnaires from 120 households sampled through stratified sampling method, from Aligarh district of Uttar Pradesh. Secondary data has been collected from RBI, NABARD, DRDA etc. data analysis has been done using multiple linear regression models. Socio-economic empowerment index have been used by the researcher to assess the socio-economic impact of microfinance. The findings reveal a positive relationship between microfinance and the variables of socio-economic empowerment, which include, increase in income, savings, expenses, consumption, decision making, confidence and freedom. Hence, microfinance has helped its beneficiaries in socio-economic upliftment.

RESEARCH METHODOLOGY

RESEARCH GAPS

After doing extensive review of literature, it has been found that there is very less study in area of microfinance and its impact on farmers. The literature review has shown greater penetration of microfinance in southern states and the studies in northern states like Punjab, Uttar Pradesh, and Haryana are less, although these states are major contributors of agriculture in India. There exists very limited research on how microfinance schemes are availed by farmers and what are these schemes in particular. The variables of socio-economic impact with reference to farmers have been researched less as per literature review. Practically, one or two studies have been done to see the microfinance impact on farmers but not in the state of Punjab, which is the 'agricultural bowl' of India. Based on research gaps identified, the research topic was finalized titled, 'Impact of Microfinance Schemes on Socio-Economic Well-Being of Farmers in Punjab'. The research objectives of the study are as follows.

RESEARCH OBJECTIVES

1. To study the different schemes of microfinance for small and marginal farmers of Punjab and to find out which scheme is most popular among them.
2. To find out agency with is most popular among small and marginal farmers of Punjab helpful in providing microfinance schemes to them.
3. To study the demographics and behaviour of Small and Marginal Farmers of Punjab towards availing of microfinance.
4. To find out the factors that influence the socio-

economic well-being of Small and Marginal Farmers in Punjab

5. To study the impact of microfinance schemes on economic well-being of small and marginal farmers in Punjab
6. economic well-being of small and marginal farmers in Punjab
7. To study the relationship between income status and duration of microfinance with the factors of socio-economic well-being of small and marginal farmers in Punjab
8. To find out the correlation between independent variables (income status, duration of microfinance and loan size) and dependent variables (socio-economic well-being).
9. To study extent to which independent variables of income status, duration of microfinance and loan size explain the factors of socio-economic well-being of small and marginal farmers of Punjab.

HYPOTHESES

Since very little work has been done in case of small and marginal farmers and specifically of Punjab, in the area of microfinance schemes and their impact on socio-economic well-being, therefore, the researcher could not get any direction as a result of which null hypotheses have been framed rather than alternate hypotheses.

SAMPLING PROCESS

Population of Study – Small and marginal farmers comprises of population and the state of Punjab is divided in three important divisions – Majha, Malwa, Doaba.

Sampling frame :Agricultural Office, Mohali, Punjab.

Sample Selection of Respondents: Of the three divisions, Malwa has 14 districts while other two divisions i.e Majha and Doaba, have 04 districts each, making a total of 22 districts in Punjab; of the 22 districts, 11 districts were chosen (50% of total districts)

Sampling Procedure:

To identify small and marginal farmers from districts chosen, sampling frame was PACS in the district. Multi-stage sampling was resorted to. The method of sampling used was non-probability but purposive in nature. Among three broad divisions of Punjab, districts were chosen on a 50% basis from each division. Hence, 2 districts were chosen from Majha, 2 districts from Doaba and 7 districts from Malwa division. Further, from each of the chosen districts, 5 PACS were chosen for sample selection. 20 farmers from each PACS were chosen. Hence, the total sample size came out to be 1100.

Data Collection and Analysis

Data has been collected using secondary and primary sources and analysed using Summated scores method, ANOVA, Factor analysis, Regression and Correlation

DATA ANALYSIS

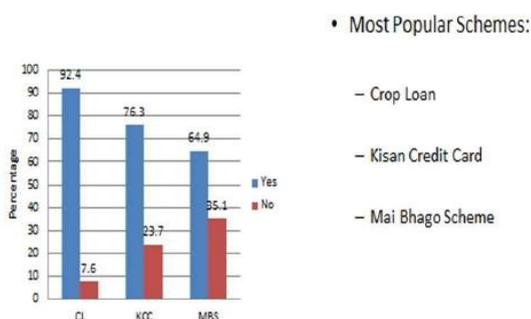
OBJECTIVE 1: To study the different schemes of microfinance for small and marginal farmers of Punjab and to find out which scheme is most popular among them. Secondary data was used to find out various microfinance schemes for farmers. Schemes under Department of Agriculture, Cooperation and Farmers Welfare are as follows:

- i. Rashtriya Krishi Vikas Yojana (RKVY)
- ii. Pradhan Mantri Krishi Sinchai Yojana,
- iii. National Crop Insurance Programme
- iv. Mission for Integrated Development of Horticulture(MIDH)
- v. National Food Security Mission, National Mission on Agriculture Extension and Technology
- vi. Integrated Scheme on Agriculture Marketing
- vii. National Mission for Sustainable Agriculture
- viii. National Mission on Oilseeds & Oil Palm
- ix. Integrated Scheme on Agriculture Census and Statistics

Microfinance Schemes for Farmers in the state of Punjab are as follows:

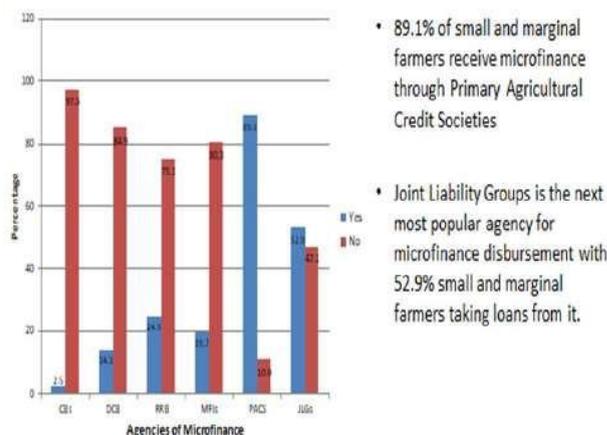
- i. Comprehensive Crop Insurance
- ii. Kisan Credit Card
- iii. Land Development and Irrigation
- iv. Poplar Plantation Scheme
- v. Horticulture and Floriculture
- vi. Camel and Bullock Cart Scheme
- vii. Aamla Development
- viii. Crop Loan
- ix. Agriculture Loan
- x. Dairy Loan
- xi. Mai BhagoStri Shakti
- xii. Bhai Lalo Sehkari Kirt Shakti
- xiii. Credit for Setting up Net House

The researcher wanted to find out the most popular schemes among the microfinance schemes available for farmers in Punjab. The question related to popularity of schemes was included in the questionnaire and the results are as follows:



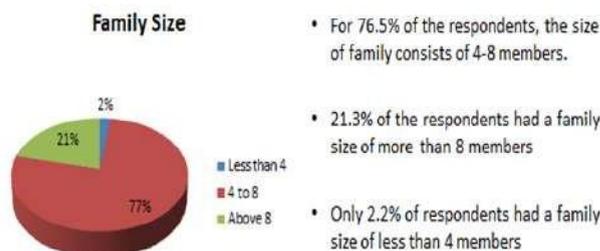
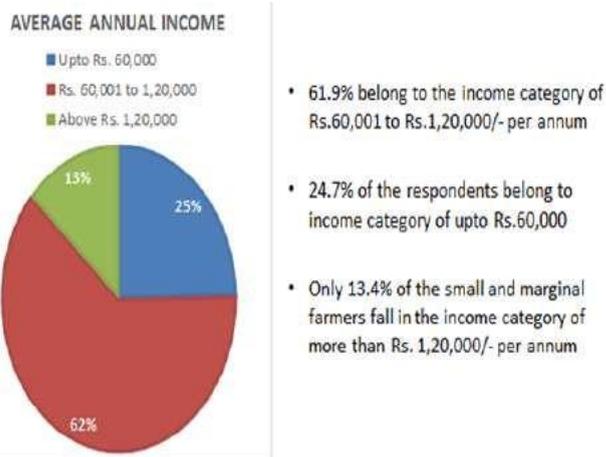
OBJECTIVE 2: To find out agency with is most popular among small and marginal farmers of Punjab helpful in providing microfinance schemes to them.

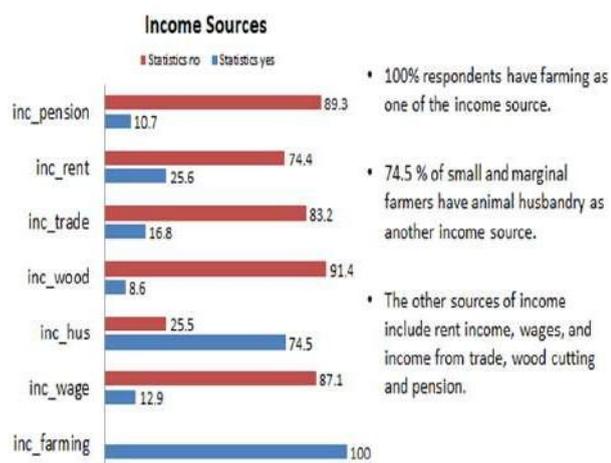
The researcher wanted to find out the most popular agencies for microfinance disbursement to farmers in Punjab. The relevant question was included in the questionnaire and the results are as follows:



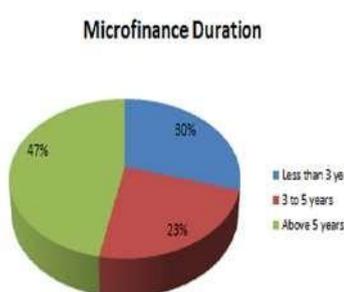
OBJECTIVE 3: To study the demographics and behaviour of Small and Marginal Farmers of Punjab towards availing of microfinance

It was important to find out the demographics of small and marginal farmers in Punjab, hence the demographics of respondents were studied, with respect to their average annual income, family size, income sources, housing conditions, microfinance duration and loan size. The results are as follows:





- 100% respondents have farming as one of the income source.
- 74.5 % of small and marginal farmers have animal husbandry as another income source.
- The other sources of income include rent income, wages, and income from trade, wood cutting and pension.



- 47% of small and marginal farmers were availing microfinance schemes since more than 5 years
- 23% of the respondents were availing microfinance schemes since 3-5 years
- 30% of respondents were availing microfinance since less than 3 years.



- 41.7% of small and marginal farmers had a loan size of less than Rs.30,000
- 36.8% of the respondents had a loan size of Rs.30,000 to Rs.80,000
- Only 21.5% of small and marginal farmers had a loan size of above Rs.80,000

OBJECTIVE 4: To find out the factors those influence the socio-economic well-being of Small and Marginal Farmers in Punjab

Exploratory factor analysis (EFA) conducted on 40 items used in the research instrument, found from literature review supporting socio-economic well-being of small and marginal farmers, to identify underlying factors.

TABLE 6: KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.830
Bartlett's Test of Sphericity	Approx. Chi-Square	41916.506
	df	136
	Sig.	.000

KMO estimate of 0.830, exceeds the recommended minimum value of 0.6 for sample adequacy (Awang, 2010; 2012 & Hoque et al., 2016; 2017).

The tests reveal that 89.1% of the variance is being explained by six factors.

As the variables have been extracted to six factors, with various factor loadings greater than 0.5, and the resultant component matrix has been obtained as above.

As shown in Table7 above, 6 components have been extracted which explains the variables. The variables with factor loading of less than 0.5 have been eliminated and the resultant variables are shown in the Table.

Thereafter, the naming of factors was essential to take the study further.

6 Factors Identified

• **Economic Well-Being Factors:**

1. Aggregate Income
2. Aggregate Savings
3. Aggregate Wealth Creation

• **Social Well-Being Factors:**

1. Aggregate Health
2. Aggregate Education
3. Aggregate Societal Relations

S.No	Factor	Cronbach Alpha
1	Agg_Income:	.783
2	Agg_Savings	.714
3	Agg_Wealth	.805
4	Agg_Health	.791
5	Agg_Education	.859
6	Agg_Societal	.836
	Overall Reliability	.798

TABLE 7: COMPONENT MATRIX

Label		Component					
		1	2	3	4	5	6
Agg_Income	Ei1	.518					
	Ei6	.788					
	Ei7	.550					
	Ei8	.659					
	Ei10	.888					
	Ei11	.848					
	Ei12	.992					
Agg_Savings	Es1		.646				
	Es2		.559				
	Es3		.510				
	Es4		.659				
Agg_Wealth	Ew1			.766			
	Ew4			.942			
	Ew5			.857			
	Ew6			.882			
	Ew7			.511			
	Ew8			.641			
Agg_Health	Sh1				.702		
	Sh2				.807		
	Sh3				.819		
	Sh5				.851		
	Sh6				.561		
	Sh9				.651		
	Sh11				.584		
	Sh13				.593		
Agg_Education	Se1					.760	
	Se2					.586	
	Se3					.661	
	Se4					.856	
	Se5					.673	
	Se6					.634	
Agg_Social	Ss1						.515
	Ss2						.743
	Ss3						.613
	Ss4						.675
	Ss7						.743
	Ss11						.833
	Ss12						.775
	Ss13						.675

Extraction Method: Principal Component Analysis.

a. 6 components extracted.

OBJECTIVE 5 and 6: To study the impact of micro-finance schemes on Economic well-being and Social well-being of small and marginal farmers in Punjab

TABLE 8: RESULT SUMMARY OF SUMMATED SCORES

S.No.	Statement	Result	
i.		Microfinance Schemes Have Increased The Income Of Small And Marginal Farmers	Found to be true
ii.		Microfinance Schemes Have Increased The Savings Of Small And Marginal Farmers	Found to be true
iii.		Microfinance Schemes Have Increased The Wealth Of Small And Marginal Farmers	Found to be true
iv.		Microfinance Schemes Have Improved The Health Of Small And Marginal Farmers	Found to be true

OBJECTIVE 7: To study the relationship between income status and duration of microfinance with the factors of socio-economic well-being of small and marginal farmers

One Way ANOVA was used to relationship between income status and duration of microfinance with the factors of socio-economic well-being of small and marginal farmers in Punjab.

TABLE 8: RESULT SUMMARY OF ANOVA

Hypothesis	Sig.	Result
Hypothesis 01a: There is no significant difference in means of respondents with varying income status and increase in aggregate income since availing microfinance.	.067	Null Hypothesis cannot be rejected
Hypothesis 01b: There is no significant difference in means of respondents with varying income status and increase in aggregate savings since availing microfinance	.210	Null Hypothesis cannot be rejected
Hypothesis 01c: There is no significant difference in means of respondents with varying income status and increase in aggregate wealth since availing microfinance	.071	Null Hypothesis cannot be rejected
Hypothesis 01d: There is no significant difference in means of respondents with varying income status with respect to improvement in aggregate health since availing microfinance.	.000	Null Hypothesis Rejected

Hypothesis 01e: There is no significant difference in means of respondents with varying income status with respect to improvement in aggregate education since availing microfinance	.041	Null Hypothesis cannot be rejected
Hypothesis 01f: There is no significant difference in means of respondents with varying income status with respect to improvement in aggregate societal relations since availing microfinance	.083	Null Hypothesis cannot be rejected
Hypothesis 02a: There is no significant difference in means of respondents with varying duration of availing microfinance with respect to improvement in aggregate income since availing microfinance	.043	Null Hypothesis Rejected
Hypothesis 02b: There is no significant difference in means of respondents with varying duration of availing microfinance with respect increase in aggregate savings since availing microfinance	.036	Null Hypothesis Rejected
Hypothesis 02c: There is no significant difference in means of respondents with varying duration of availing microfinance with respect improvement in aggregate wealth creation since availing microfinance	.041	Null Hypothesis Rejected
Hypothesis 02d: There is no significant difference in means of respondents with varying duration of availing microfinance with respect improvement in aggregate education since availing microfinance	.431	Null Hypothesis cannot be rejected
Hypothesis 02e: There is no significant difference in means of respondents with varying duration of availing microfinance with respect improvement in aggregate health since availing microfinance	.372	Null Hypothesis cannot be rejected
Hypothesis 02f: There is no significant difference in means of respondents with varying duration of availing microfinance with respect improvement in aggregate societal relations since availing microfinance	.079	Null Hypothesis cannot be rejected

OBJECTIVE 8: To find out the correlation between independent variables (income status, duration of microfinance and loan size) and dependent variables (socio-economic well-being)

Correlation between Independent variables is found to be lower whereas the correlation between Independent to Dependent variable is found to be greater than 0.5 which

fulfils the assumption of correlation analysis. All the independent variables, i.e income status, duration of availing microfinance and loan size, are positively correlated with the dependent variables depicting socio-economic well being used in the study

TABLE 9: CORRELATION BETWEEN VARIABLES OF THE STUDY

Correlations									
	Income_ status IV	Mf_ IV	Loan_ size IV	Agg_ Income DV	Agg_ Savings DV	Agg_ Wealth DV	Agg_ Health DV	Agg_ Education DV	Agg_ Social DV
Income_ statusIV	1	.133	.002	.608*	.727*	.655*	.897*	.733*	.604*
Mf_ duration IV	.133	1	-.017	.553*	.626*	.759*	.601*	.538*	.709*
Loan_ size IV	.002	-.017	1	.710*	.632*	.702*	.818*	.623*	.741*
Agg_ IncomeDV	.608*	.553*	.710*	1	.215	.357	.134	.244	.205
Agg_ SavingsDV	.727*	.626*	.632*	.215	1	-.252	.039	.459	.444
Agg_ WealthDV	.655*	.759*	.702*	.357	-.252	1	.299	.055	-.143
Agg_ HealthDV	.897*	.601*	.818*	.134	.039	.299	1	.182	-.040
Agg_ EducationDV	.733*	.538*	.623*	.244	.459	.055	.182	1	.181
Agg_ SocialDV	.604*	.709*	.741*	.205	.444	-.143	-.040	.181	1
**. Correlation is significant at the 0.05 level (2-tailed).									

OBJECTIVE 9: To study the relationship between income status, microfinance duration and loan size availed by small and marginal farmers of Punjab and their socio-economic well-being.

There are six dependent variables and the impact of three independent variables, i.e x⁻¹- income status, x²-duration of loan, x³-loan size, are seen on dependent variables one by one using Regression.

$$Y_i = a + bx_1 + cx_2 + dx_3$$

Where, Y_a = Dependent Variable

a = constant

x⁻¹= income status

b= coefficient of x¹

x²-duration of loan

c= coefficient of x²

x³-loan size

d= coefficient of x³

TABLE 10: RESULT SUMMARY OF REGRESSION

S.No.	Hypothesis	Sig.	Result
1	Hypothesis 03a: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Income	.000	Null Hypothesis rejected
2	Hypothesis 03b: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Savings.	.000	Null Hypothesis rejected
3	Hypothesis 03c: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Wealth Creation.	.000	Null Hypothesis rejected
4	Hypothesis 03d: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Health.	.000	Null Hypothesis Rejected
5	Hypothesis 03e: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Education.	.009	Null Hypothesis rejected
6	Hypothesis 03f: There is no significant impact of independent variables, i.e income status, duration of loan and loan size on dependent variable i.e Aggregate Societal Relations.	.000	Null Hypothesis rejected

The results depicted that there exists a relationship between independent variables and socio-economic well-being of farmers in Punjab. 83% variation in dependent variable is explained by independent variable, i.e income status, 79% variation in dependent variable is explained by independent variable, i.e duration of microfinance; and 88% variation in dependent variable is explained by independent variable, i.e loan size.

FINDINGS

The study was conducted to find out the impact of microfinance schemes on small and marginal farmers of

Punjab. Most Popular Schemes identified were: Crop Loan, Kisan Credit Card, Mai Bhago Scheme. It was found that 89.1% of small and marginal farmers receive microfinance through Primary Agricultural Credit Societies, while Joint Liability Groups is the next most popular agency for microfinance disbursement with 52.9% small and marginal farmers taking loans from it. The results are in line with the study of Sajesh, 2013, which emphasises that PACS and JLGs are the most popular agencies of microfinance among farmers in Punjab.

47% of small and marginal farmers were availing microfinance schemes since more than 5 years, 23% of the

microfinance since less than 3 years. . The results are in line with the research of Gupta, 2019, which shows that older farmers are more into agriculture and are members of PACS in larger numbers and since longer duration.

61.9% of small and marginal farmers belong to the income category of Rs.60,001 to Rs.1,20,000/- per annum, 24.7% of the respondents belong to income category of upto Rs.60,000, while only 13.4% of the small and marginal farmers fall in the income category of more than Rs. 1,20,000/- per annum.

For 76.5% of the respondents, the size of family consists of 4-8 members, 21.3% of the respondents had a family size of more than 8 members. Only 2.2% of respondents had a family size of less than 4 members which reflects a significant large family structure in rural areas, especially with respect to the state of Punjab.

41.7% of small and marginal farmers had a loan size of less than Rs.30,000, 36.8% of the respondents had a loan size of Rs.30,000 to Rs.80,000, while only 21.5% of small and marginal farmers had a loan size of above Rs.80,000. Majority of small and marginal farmers had a smaller loan size keeping in view their purpose of loan and ability for repayment (Kushwaha, 2009).

100% respondents have farming as one of the income source, 74.5 % of small and marginal farmers have animal husbandry as another income source. The other sources of income include rent income, wages, and income from trade, wood cutting and pension.

89.4% of small and marginal farmers in Punjab were having their own houses, 97.9% were having pucca houses. Every house (100%) had toilet facility. Though 10.6% people do not own a house, but they live in rented houses which are pucca with toilet facilities available.

72.3% of them spent less than Rs.5,000/- as monthly expenditure on household, 25.5 % of the respondents spend Rs.5000-10,000 per month. Only 2.1% small and marginal farmers, i.e 2.1% were having a monthly household expenditure of over Rs.10,000. The results confirm that as the income of the small and marginal farmers was limited, accordingly their expenditure was also limited.

91.5% of small and marginal farmers preferred to invest in agricultural tools. The preference for rest of the three of the investment, i.e investment in Gold, Fixed Deposit and Property, was very less. The result is in consonance of the fact that 100% of the small and marginal farmers were having agriculture as their main occupation, and that is the reason they want to invest in agricultural tools.

As per the result of factor analysis, it was found that 89.1% of the variance was being explained by six factors, which were named as: Aggregate Income, Aggregate Savings, Aggregate Wealth Creation, Aggregate Health, Aggregate Education and Aggregate Societal Relations. The reliability of the constructs was tested using Cronbach's Alpha, whose value was found to be greater than 0.7, considered to be ideal value.

Summated Scores Method revealed an improvement in all the factors of socio-economic well-being of small and marginal farmers in Punjab after availing microfinance.

Analysis of Variances (ANOVA) was used to understand whether there is a difference in means among respondents with varying income status and varying duration of availing microfinance, with respect to their improvement in socio-economic well-being. The results further revealed that the impact on aggregate income of small and marginal farmers was statistically greater among those availing microfinance since duration of 3 to 5 years and more than 5 years, compared to those respondents who were availing microfinance since duration of less than 3 years. Also, impact on aggregate savings and aggregate wealth creation of small and marginal farmers was found to be statistically greater among those availing microfinance since duration of more than 5 years, compared to those respondents who were availing microfinance since duration of 3 to 5 years or less than 3 years.

Further, it was found out that there was no significant difference in improvement in aggregate education, aggregate health and aggregate societal relations with respect to respondents with varying duration of microfinance.

Regression was run to see the extent to which a variation in dependent variable (socio-economic well-being) is explained by independent variable (income status of respondents, duration of availing microfinance and loan size). The results depicted that nearly 83% variation in dependent variable is explained by independent variable, i.e income status. 79% variation in dependent variable is explained by independent variable, i.e duration of microfinance; and 88% variation in dependent variable is explained by independent variable, i.e loan size.

MANAGERIAL IMPLICATIONS & FUTURE SCOPE

Banks, Microfinance institutions and other credit agencies can establish a 'farmer friendly' desk for handling queries from farmers and to help them decide the schemes to opt for depending upon their credibility and requirements. It can help the institutions as well as farmers in delivery of credit services and managing clients. It could provide farmers with a conducive environment to be able to ask

their queries without any hesitation or fear.

Farmers' societies can act as a medium to share information, knowledge and ideas among members. Initiatives can be taken to make available Banking Correspondents in rural areas to assist farmers in their credit needs. They can be appointed by commercial and cooperative banks that could provide proper assistance to farmers with respect to the existing schemes, eligibility criteria, documentation support and allied services. They can play a vital role in explaining the terms and conditions of microfinance schemes to farmers and enable them to opt for schemes that are most suitable for them.

The study adds to the existing literature as there was very less research available for microfinance for farmers in Punjab. The study can be used as a base for further research in the area of microfinance. The target base of microfinance can be extended to cover all the farmers, irrespective of their landholding. Also, a comparative study can be done to see the socio-economic well-being of farmers belonging to different categories, i.e. large, medium and small farmers, who have availed microfinance. More microfinance schemes can be studied to know their impact on lives of farmers.

The study is helpful for policymakers to understand the role of microfinance in improving socio-economic lives of small and marginal farmers, and to design schemes and programmes for meeting the needs and requirements of farmers.

REFERENCES

- i. Abera, N., & Asfaw, M. (2019). Impact of microfinance on rural household poverty in Ethiopia: A review. *Journal of Economics and Sustainable Development*, 10(23), 72-81.
- ii. Anjum, M.N., A. Rehman, M.N. Khan, R. Saqib, M. Fayaz and I. Javed. (2020). Impact of microfinance on socio-economic status of farmers in District Dera Ismail Khan. *Sarhad Journal of Agriculture*, 36(3), 851-860.
- iii. Arora, S., & Meenu. (2012). The banking sector intervention in the microfinance world: A study of bankers' perception and outreach to rural microfinance in India with special reference to the state of Punjab. *Development in Practice*, 22(7), 991-1005.
- iv. Ashalatha, K. V. & Rajeshwari, N. (2018). An overview on farmers suicides in india and intervention to curb. *International Journal of Current Microbiology and Applied Sciences*, 7(9), 3031-3040.
- v. Aslam, M., Kumar, S., & Sorooshian, S. (2020). Impact of microfinance on poverty: Qualitative analysis for grameen bank borrowers. *International Journal of Financial Research*, 11(1), 49-59.
- Bhanot, D., Bapat, V., & Bera, S. (2018). Studying financial inclusion in north-east India. *International Journal of Bank Marketing*, 30(6), 465 - 484.
- vi. Bharti, N. (2018). Evolution of Agriculture Finance in India. *Agricultural Finance Review*, 78(3), 376-392.
- vii. Borbora, S., & Sarma, G. K. (2020). Microfinance: Impact on Clients, an Empirical Study. *Review of Integrative Business and Economics Research*, 9(1), 1-9.
- viii. Brau, & Woller. (2004). Impact of MFIs. *Journal of Finance and Economics*, 16(1), 124-138 Brummer, B., & Loy, J.-P. (2000). The Technical Efficiency Impact of Farm Credit Programmes: A Case Study of Northern Germany. *Journal of Agricultural Economics*, 51(3), 405-418.
- ix. Burney, J. A. (2013). Microfinance and its impact on smallholder farmers. *South Asian Journal of Development Economics*, 110(31), 12513-12517.
- x. Castello, S. A. (2004). Innovative Technologies In Microfinance For Latin America: Building Effective Delivery Channels. CGAP Report.
- xii. Chaudhary, V., & Shourie, S. (2019). Economic Dilemma and Suicide Among Farmers In Punjab. *Journal of the Gujarat Research Society*, 21(4), 23-36.
- xii. Das, T. (2018). Does credit access lead to expansion of income and multidimensional poverty? A study of rural

Assam. International Journal of Social Economics. DOI 10.1108/IJSE-12-2017-0592

- xiii. Dongre, A. R., & Deshmukh, P. R. (2012). Farmers' suicides in the Vidarbha region of Maharashtra, India: a qualitative exploration of their causes. *Journal of Injury and Violence Research*, 4(1), 237-248.
- xiv. Duflo, E., Bannerjee, A., Glannerster, R., & Kinnan, C. (2013). The Miracle of Microfinance? Evidence from a Randomized Evaluation. NBER Working Paper No.18950.
- xv. Ganguly, S. (2018). Micro-Finance and Poverty in India: A State-Level Analysis of Impact Assessment. DOI: 10.4018/978-1-5225-2700-8.ch010.
- xvi. Gautam, Y. (2016). Rising Debt among farmers in India: Insights. *Journal of Management and Economics*, 17(3), 144-148. Gill, G. K. (2014). Microfinance and Poor: A Case Study of District Sangrur. *International Journal of Regional Development*, 1(1), 79-87.
- xvii. Hala, H. (2020). The Impact of Microfinance on Poverty Reduction in Egypt: An Empirical Study. *Arab Journal of Administration*, 40(2), 303-310.
- xviii. Hossain, I. (2019). Support for smallholder farmers through Islamic instruments The case of Bangladesh and lessons for Nigeria. *Journal of Microfinance*, 12(2), 154-168.
- xix. Jumpah, E. T. (2018). Microcredit Repayment among Smallholder Farmers: What Microfinance Institutions need To Know. *Asian Journal of Agriculture and Rural Development*, 8(2), 74-91.
- xx. Kaur, M., Kaur, R., & Singh, S. (2019). Depression and suicidal ideation among distressed farmers of Punjab. *International Journal of Education and management Studies*, 9(1), 29-32.
- xxi. Khan, A. A., Khan, S. U., Fahad, S., Ali, M., Khan, A., & Luo J. (2020). Microfinance and poverty reduction: New evidence from Pakistan. *International Journal of Financial Economics*, 5(2), 1-11.
- xxii. Khanvilkar, A. S. (2016). Challenges faced by microfinance institutions. Nelito solutions that perform. Retrieved May 17, 2017.
- xxiii. Khavul, S. (2010). Microfinance: Creating Opportunities for the Poor? *Academy of Management Perspectives*, 1(1), 57-71.
- xxiv. Kumari, P. (2020). The role of products of Microfinance for reducing the Poverty of the Borrowers: Exploratory Factor Analysis. *International Journal of Management Excellence*, 15(3), 2244-2251.
- xxv. Kuriakose, F. (2020). Microfinance and Human Development in Kerala. Munich Personal RePEc Archive. MPRA Paper No. 98393, <https://mpra.ub.uni-muenchen.de/98393>.
- xxvi. Lal, T. (2018). Measuring impact of financial inclusion on rural development through cooperatives. *International Journal of Social Economics*, <https://doi.org/10.1108/IJSE-02-2018-0057>.
- xxvii. Mago, S. (2016). Microfinance as a pathway for smallholder farming in Zimbabwe. *Environmental Economics*, 7(3), 60-66.
- xxviii. Mahajan, V., & Ramola, B. G. (2003). Microfinance in India – Banyan Tree and Bonsai. Review Paper for World Bank, 1-28.
- xxix. Mutamuliza, E. (2020). Effect Of Microfinance On Smallholder Farmers' Livelihood In Padmaja, S. & Ali, J. (2019). Correlates of agrarian indebtedness in rural India. *Journal of Agribusiness in Developing and Emerging Economies*. 8(3), 1-25.
- xxx. Pal, D., & Laha, A. (2015). Sectoral credit choice in rural India. *Journal of Choice Modeling*, 14(1), 1-16.

- xxxi. Praag, B.M.S. & Frijters, Paul & Ferrer-i-Carbonell, Ada. (2002). The Anatomy of Subjective Well-Being. SSRN Electronic Journal. DOI: 10.2139/ssrn.302286.
- xxxii. Priyadarshree, A. and Ghalib, A. K. (2011). The Andhra Pradesh Microfinance Crisis in India: Manifestation, Causal Analysis, and Regulatory Response. Brooks World Poverty Institute Working Paper No. 157, <http://dx.doi.org/10.2139/ssrn.1983206>.
- xxxiii. Saraf, A. (2015). A study of the microfinance penetration imbalance in India. Berkeley Undergraduate Economic Honors Thesis, University of California.
- xxxiv. Sebby, P. (2010). Deliberate Self-Harm among farmers and Associated Issues. *Journal of Economic Research and Development*, 14(3), 865-861.
- xxxv. Shafique, O., & Khan, N. (2020). An Empirical Study on the Impact of Micro-Credit Financing on the Socio-Economic Status of Small Agriculturists in Pakistan. *Journal of Business and Social Review in Emerging Economies*, (3), 1051-1061
- xxxvi. Shalini A. (2013). A study on microfinance and its impact on poor. *Pramana Research Journal*, 8(4), 131-137
- xxxvii. Shamim, M. A. (2014). Impact of Grameen Bank Microcredit on Standard of Living in Rural Poor Women in Sariakandi Upazila of Bogra District. *America Journal of Trade and Policy*, 7(5), 137-151.
- xxxviii. Sinha, S. & Agarwal, P. (2011). Performance of MFIs in India. *Delhi Business Review*, 11(2), 37-46.
- xxxix. Solomon. (2016). Impact of Microfinance through banks. *Journal of Microfinance*, 21(2), 59-64.
- xl. Srinivasan, N. (2012). *Microfinance India: State of the Sector Report 2011*. Sage Publications.
- xli. Subramaniam, K. (2011). A Study on Non-Performing Assets of Microfinance Institutions in Gujarat. PhD Thesis, Gujarat University.
- xlii. Sultana, H. Y., Jamal, A., & Najaf, D. (2017). Impact of Microfinance on Women Empowerment through Poverty Alleviation: An Assessment of Socio Economic Conditions in Chennai City of Tamil Nadu. *Asian Journal For Poverty Studies*, 3(2), 175-183.
- xliii. Tiwari, P. & Fahad, S. M. (2007). Microfinance Institutions in India. *Journal of Microfinance*, 41(5), 323-329.
- xliiii. Weber, R., & Musshoff, O. (2017). Can flexible microfinance loans improve credit access for farmers? *Agricultural Finance Review*, 73(2), 435-441.
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