



المصنعة  
Al-Mussanah

جامعة التقنية  
والعلوم التطبيقية  
University of Technology  
and Applied Sciences



# Strategies for Business Transformation - Accelerators for Sustainable Growth

## EDITORS

HE Dr. Said Hamed Al Rubaie  
Dr. Ahmed Ali Al Shahri  
Dr. Aziza Abdallah Al Qamashoui

Strategies for Business Transformation - Accelerators for Sustainable Growth



2023





# **Strategies for Business Transformation- Accelerators for Sustainable Growth**

Editors

HE Dr. Said Hamed Al Rubaie  
Dr. Ahmed Ali Al Shahri  
Dr. Aziza Abdallah Al Qamashoui

**Book Title**

Strategies for Business Transformation - Accelerators for Sustainable Growth

**Editors**

HE Dr. Said Hamed Al Rubaie -

Vice Chancellor, University of Technology and Applied Sciences (UTAS)

Dr. Ahmed Ali Al Shahri -

Dean - University of Technology and Applied Sciences - Al Mussanah (UTAS-A)

Dr. Aziza Abdallah AlQamashoui -

HoD - College of Economics and Business Administration (CEBA)

University of Technology and Applied Sciences- Al Mussanah (UTAS-A)

**Language & Volume**

English

First Volume: November 2023

Copyright © 2023 by University of Technology and Applied Sciences- Al Mussanah,  
Sultanate of Oman

ISBN: 978-99969-98-73-7

The chapters of the book are double-blind peer reviewed and it is available for open access from University website. UTAS-Al Mussanah ([www.act.edu.om](http://www.act.edu.om))

All rights are reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical or photocopying, recording, or otherwise without the prior permission of the publisher.

**Publisher**

University of Technology and Applied Sciences- Al Mussanah

Printed in the Sultanate of Oman

**Disclaimer**

Whatever has been expressed in chapters of this edited book has been contributed by the authors. The editors and the publisher are not responsible for the authenticity and originality of the contents expressed by the authors in their articles.



**His Majesty  
Sultan Haitham Bin Tarik**





# FOREWARD

The notable priority of Oman Vision 2040 related to a sustainable national economy focuses on effective, balanced, and robust systems to ensure priorities across all sectors in Sultanate of Oman. In today's rapidly evolving business landscape, the need for organizations to adapt and transform has become more crucial than ever before. This transformation should ensure an equilibrium between the economic, environmental and social requirements according to the sustainable development guidelines of Oman 2040. According to this contemporary scenario, editors decided to select a related theme and titled the Book Chapters as, "Strategies for Business Transformation: Accelerators for Sustainable Growth."

This book is a comprehensive guide that explores various strategies and accelerators that can drive sustainable growth and success in a dynamic and competitive market. Themes from the chapters of this book are further classified into categories as Accounting, Human Resource Management and Marketing, which are highly relevant to the current stream scenario. The research insights shared in this book will empower our readers to embark on their transformative journey, towards new opportunities and sustainable growth, and position their organization at the forefront of the ever-evolving business endeavors.

I would like to extend my heartfelt gratitude and appreciation for choosing this book as a companion to bestow your insights. I hope the acumens and strategies presented here in this book will inspire our readers and find every chapter remarkable, combatting and endowing them to achieve sustainable growth.

**His Excellency Dr. Said Hamed Al Rubaie**

**Vice Chancellor**

**University of Technology and Applied Sciences**



# PREFACE

We are going through many rapid transformations which test human adaptability and resiliency to their extensive. Businesses are being radically altered by digitalization, innovation, and technological advancement. This obliges the companies to reckon about a renewed perspective on management and corporate strategies to survive and succeed. These twilight developments in the various fields often reflect a common concern about the creation of sustainable growth. However, considering the fast changes in political, economic, competitive and consumer trends, achieving this goal is an arduous task. Companies must adapt, innovate, and embrace strategies that foster sustainable growth which will act as the blueprint providing direction throughout this transformational journey of businesses. The redefining of business values will improve the ability to build a framework to sustain income generation for a better economy and distribution of wealth. The book "Strategies for Business Transformation: Accelerators for Sustainable Growth," aims to provide a platform to unveil various transformational strategies that would drive towards sustainable growth.

This book has received a wonderful response from a vast community of academicians and business professionals from various realms, which has been tremendously encouraging and fulfilling. Their varied viewpoints will give bibliophiles a comprehensive understanding of the difficulties and opportunities for achieving a sustainable corporate environment. This book chapter encompasses a diverse collection of theoretical and empirical research integration across the core areas of Accounting, Human Resource Management and Marketing. It explores the decisive role of technology in finance, neuro-marketing, Human Resource Development strategies and systems, the importance of social media and behavioral engagement for organizational development. This book offers actionable insights to all organizations from various industries from different domains of digital transformation to blockchain technology, from behavioral engagement to generational sustainability concerns for a successful business survival and transformation.



This book launched by the University of Technology and Applied Sciences strives to provide information to business leaders and aspiring entrepreneurs and equip them with the tools needed to drive sustainable growth.

UTAS is a public university in the Sultanate of Oman which has thirteen branches across various Governorates. UTAS- Al Mussanah is one of the branches which focuses to be at the forefront of Higher Education Institutions by providing high quality learning, teaching and a conducive research environment. Oman's Vision 2040 backed by the culture at College of Economics and Business Administration encouraged the college to launch this debut publication to create a link between industry and academia which would nurture research as a key component of sustaining and enhancing standards at the University.

We express our sincere gratitude to the contributors, experts, and practitioners who shared their knowledge and expertise to launch this book. We also extend our heartfelt appreciation to the readers who undertake this transformative journey with us.

## **The Editors**

# CONTENTS

1.	FINANCIAL FORENSIC EVIDENCE AND ACCEPTABILITY IN THE COURT OF LAW	1
	<b><i>Hisham Said AlGhunaimi &amp; Saleh Said AlMamari</i></b>	
2.	THE ROLE OF SMART CONTRACTS IN DISTRIBUTED LEDGER TECHNOLOGY	37
	<b><i>Kumaresan Chandrasekaran</i></b>	
3.	LEVERAGING BLOCKCHAIN TECHNOLOGY IN ACCOUNTING FOR TRANSPARENCY, ACCURACY AND SPEED FOR RECORD KEEPING	55
	<b><i>Lina George &amp; Hari Krishna Karri</i></b>	
4.	IMPACT OF TECHNICAL INDICATORS ON THE OPENING VALUE OF STOCK MARKET INDEX - PREDICTION MODEL USING ARTIFICIAL NEURAL NETWORK	73
	<b><i>Gopu Jayaraman, Mahalakshmi Venkatachalam, Hanaa Mahmoud Sid Ahmed &amp; Viju Mathew</i></b>	
5.	HOW FORENSIC ACCOUNTANTS ADD VALUE WHILE INVESTIGATING CLAIMS & FRAUD	95
	<b><i>Hisham Said AlGhunaimi &amp; Saleh Said AlMamari</i></b>	
6.	FINANCIAL TECHNOLOGY AND THE CURRENCY TRANSFORMATION	125
	<b><i>Maria Teresa Matriano, Mariya Ahmed Abdullah Al Jabri &amp; Maha Salim Rashid Al Jahwari</i></b>	
7.	THE EFFECT OF VALUE CO-CREATION ON THE TRANSFORMATION OF ACADEMIC EXPERIENCE: CASE OF HIGHER EDUCATION IN THE SULTANATE OF OMAN	141
	<b><i>Sunita Panicker, Shivakami Rajan, Veena Tewari &amp; Saoussen Othmani</i></b>	
8.	THE AUTOMATION REVOLUTION: A TRANSFORMATIONAL CHANGE IN RECRUITMENT AND SELECTION THROUGH ARTIFICIAL INTELLIGENCE	159
	<b><i>Nasser Al Harrasi, Salim Al Daraai &amp; Maryam Al Rashdi</i></b>	

9.	GENERATIONS AND SUSTAINABILITY: A STUDY OF THE THREE GENERATIONS – X, Y AND Z WITH SPECIAL FOCUS ON ROLE OF EDUCATION AND COMMUNICATION TO PROMOTE SUSTAINABLE BEHAVIOR AMONG ZERS <b>Mohammad Taslim</b>	173
10.	BEHAVIOURAL ENGAGEMENT, CURRENT PRACTICES, AND FUTURE PROSPECTS OF INDUSTRIAL SECTORS TOWARDS ENVIRONMENTAL SUSTAINABILITY IN OMAN <b>Samskrati Gulvady &amp; Vandana Jyotirmayee</b>	189
11.	DIGITAL TRANSFORMATION OF MARKETING CHANNELS : A STUDY ON THE ROLE OF SOCIAL MEDIA AND PHYSICAL STORES <b>Moez Bellaaj</b>	209
12.	BUSINESS TRANSFORMATION THROUGH NEUROMARKETING: A CONTEMPORARY STRATEGY OF UNDERSTAND CONSUMER PERCEPTIONS, PREFERENCES, AND BEHAVIOUR <b>Reason Masengu, Chenjerai Muchenje &amp; Benson Ruzive</b>	227
13.	REDUCTION OF THIRD-PARTY COOKIES – ITS EFFECTS IN DIGITAL MARKETING TRANSFORMATION <b>Benson Ruzive, Reason Masengu &amp; Chenjerai Muchenje</b>	245
14.	POST PANDEMIC IMPACT OF DIGITAL TRANSFORMATION IN MARKETING <b>Jasmine Mariappan &amp; Padmalosani Dayalan</b>	261
15	THE ADOPTION OF CONTEMPORARY APPROACHES IN HUMAN RESOURCE MANAGEMENT FOR BUSINESS TRANSFORMATION AND SUSTAINABILITY <b>Rahma Mohammed Talib Al Bahri</b>	277

# ABOUT EDITORS

**His Excellency Dr. Said Hamed Al Rubaie**  
**Vice Chancellor,**  
**University of Technology and Applied Sciences**

Dr. Said Bin Hamed Al-Rubaie holds the prestigious distinction of being appointed as the inaugural President of the esteemed University of Technology and Applied Sciences (UTAS) by the Royal Decree. Throughout his illustrious career, Dr. Said has carved an exceptional path as a renowned academician, educator, and administrator, leaving an indelible mark on the educational sector.

His exceptional educational background began with a Diploma in English Language from the Teachers Institute, followed by a Bachelor's degree in "English Language," a Master's degree in "Methods of Teaching English," and a PhD in "Educational Technologies," from the esteemed University of Manchester, UK.

Dr. Said demonstrated his versatility and competence by serving many notable positions such as the Dean of the College of Education in Rustaq, General Court of the Ministry of Higher Education, and College of Education in Sohar, Director General of Private Universities and Colleges, Director General of Colleges of Applied Sciences, Advisor to the Minister for Academic Affairs, and Secretary General of the Education Council.

He has authored and translated many books, both within and beyond the Sultanate such as "Oman: Glorious Civilization and A World of Beauty" (2019), "Fundamentals of English Language Grammar" (2018), and "Higher Education in the Knowledge Era: Changes, Challenges, Future & Trends" (2008). In addition, he penned significant works such as "Teachers' Education in Oman: Achievements and Ambitions" (2004). Collaborating with other experts, he co-authored notable works like "Tourism in the Sultanate of Oman" (2009) and "Self-Directed Learning: Meaning, Importance, Techniques & Implementations" (2006). He was instrumental in translating two vital books from English to Arabic, namely "Education and Globalization" (2006) and "Quality Assurance in Higher Education: A Study of Developing Countries" (2005).

The University of Technology and Applied Sciences is privileged to have such an accomplished and visionary leader at its helm, driving the institution to greater heights of success and innovation.





**Dr. Ahmed Ali Al Shahri****Dean - University of Technology and Applied Sciences -  
Al Mussanah (UTAS-A)**

Dr. Ahmed Ali Al Shahri, an enthusiastic and dedicated Engineer and Academician with vast experience across all areas of Technology and Educational Management is the Dean of University of Technology and Applied Sciences- Al Mussanah (UTAS-A), Sultanate of Oman. He was awarded PhD in Manufacturing Systems Engineering in the year 2008 by University Putra Malaysia, where he completed his Master's in Manufacturing Engineering as well. Dr. Ahmed completed his bachelor's in Industrial Engineering at California State University, USA. He governed the University of Technology and Applied Sciences –Nizwa (UTAS-N) as the University Dean since January 2019 prior to which he was associated with UTAS-A as the Assistant Dean for Academic Affairs (2016 to 2019). He is an exceptional leader and since he was appointed as the Acting Assistant Dean for Academic Affairs, UTAS-Salalah in the year 2009.

Dr. Ahmed managed several administrative positions in various Universities of Technology and Applied Sciences. He was the Acting College Dean of UTAS-Salalah for the year 2010, Assistant Dean for Student Affairs UTAS-A and UTAS - Salalah during the years 2011 and 2011 to 2016 respectively. Dr. Ahmed was appointed as a Municipality Council Member of the Mirbat Municipality Council to represent the public and to consider the well- being and interests of citizens and residents of Mirbat. Apart from his crucial administrative positions, Dr. Ahmed is equally dedicated to academia and published several papers in National and International Journals, Conferences and Symposiums. At the international level, his papers get published and admired in several acclaimed journals of Malaysia, Egypt, Turkey and Indonesia. Dr. Ahmed main area of interest in research includes supply chain management and manufacturing engineering. He also plays an important role as an editor of this book.



**Dr. Aziza Abdallah AlQamashoui**

**HoD-College of Economics and Business Administration (CEBA)  
University of Technology and Applied Sciences- Al Mussanah**



Dr. Aziza Abdallah AlQamashoui is the Head of the Department of Business Studies at the University of Technology and Applied Sciences-Al Mussanah (UTASA) in Oman. She holds a PhD in Management from the University of Plymouth, UK, and has completed her Masters in International Accounting and Financial Management from Glasgow University, UK, after graduating from Sultan Qaboos University (SQU) in Muscat. Dr. Aziza is a Fellow of the Academy of Higher Education in the United Kingdom and a Research Fellow in the Humanities Research Center at SQU. She is also leading the Research Committee at UTASA and has also been involved in research on various projects funded by The Research Council, Oman Chamber of Commerce and Industry, and Oman LNG. Her research interests include entrepreneurship, education, innovation, and economic development. She has presented papers at numerous national and international conferences and symposiums organized by prestigious universities in the UK, Ireland, Morocco, Saudi Arabia, and Oman. Her areas of research and practice relate to the areas of accounting, finance, entrepreneurship, IP, and more. With a strong focus on research and technology transfer, Dr. Aziza is making significant contributions to the field of business studies in Oman and beyond.




# ABOUT CONTRIBUTORS




Sl. No.	Authors' Profile	
1	<p><b>Mr. Hisham Said Saif Al Ghunaimi</b> was born in Muscat, Oman, in 1981. He received the NVQ certificate from NCR UK in 2000 after high school diploma.</p> <p>He continued his education in Leicester University and graduated with the diploma in management in 2007. He continued in Wolverhampton University UK, the diploma of Higher Education in Business &amp; Information Systems in Human Resource and graduated in 2017 in merit. Then the MBA from the University of Bedfordshire UK and he's currently pursuing the PhD in Management from the University of Technology from Malaysia.</p> <p>Started his career in the banking sector in Oman, worked in various multinational commercial and diplomatic organisations in finance, accounting, and HR sections. He worked as a faculty member for different higher education institutions where he taught financial and management courses and now in A'sharqiyah University in the college of business administrations as accounting and finance lecturer.</p>	
2	<p><b>Dr. Saleh Said Khalfan Al Mamari</b> was born in Burundi in 1975. He received his High school certificate from the Institution of Jurisprudence- Muscat Oman in 1994/1993. He continued his education in the same Institution and graduated with a Bachelor's in Judiciary in 1998/1997. He then did his M.A. from the University of Birmingham UK in 2003 and got his PhD in Islamic Judiciary from the University of Birmingham UK in 2009.</p> <p>He started his career as a Judge in the Ministry of Justice in 1999, then shifted his attitude to academia to be Assistant Professor in Law from 2010 till date. He worked in the law field, demonstrated the legal skills required to perform the duties, could develop and evaluate facts and apply knowledge to others, analysed and applied legal rules and principles to develop case strategies, conducted legal research and applied information to form logical and legal conclusions.</p> <p>High Court lawyer and Legal Advisor. Dean of the College of Law at A'Sharqiyah University since Feb. 2018.</p> <p>The topic of research: Judiciary, Family Law, Civil Law</p>	



3	<p><b>Mr. Kumaresan Chandrasekaran</b> obtained his Master of Computer Applications degree in Urumu Dhanalakshmi College, affiliated with Bharathidasan University, Trichy, India, 1999. He completed his Diploma in Export Management course at IEM, Bangalore. He received his Master of Philosophy degree in Computer Science from Jamal Mohammed College, affiliated with Bharathidasan University, Trichy, India 2007. He is currently pursuing doctoral research in big data analytics at Bharathidasan University. He is a lecturer in the Department of Business Studies, University of Technology and Applied Sciences, Al Mussanah, Sultanate of Oman.</p> <p>He has published six papers in various international and national journals. He has delivered lectures to multiple colleges in Tamil Nadu. He has 24 years of teaching experience in many universities and colleges in India and abroad. He attended many workshops, conferences and symposiums in data mining, Student Advising, Supervising and Counseling Skills Development. His research area of interest includes Big data analytics, e-commerce, mobile commerce, IoT, data analytics and Blockchain technology. He completed the Blockchain foundation program offered by Kerala Blockchain Academy, and his certificate Id is IIITMK-KBA-BFP-OL-18900. His LinkedIn profile id is <a href="https://www.linkedin.com/in/kumaresan-chandrasekaran-a90218183/">https://www.linkedin.com/in/kumaresan-chandrasekaran-a90218183/</a>.</p>	
4	<p><b>Dr. Lina George</b>, <a href="mailto:lina.george@hct.edu.om">lina.george@hct.edu.om</a></p> <p>An Academician and researcher, currently working as a faculty at the College of Economics and Business Administration, University of Technology and Applied Sciences, Muscat, Sultanate of Oman. She earned her doctorate from Periyar University, a Masters's degree in Finance from Annamalai University and a Masters's degree in Commerce from Bangalore University.</p> <p>Dr. Lina has over 21 years of expertise in teaching accounting and finance courses. She has an excellent flair for Social Science Research. In 2018, and received the National Award for Scientific Research from The Public Authority for Social Insurance, Government of Oman, for her research titled "Extending Social Protection Coverage for Self-Employed for their Economic Development- A Study on the Social Protection Coverage of Orange Taxi Drivers in Oman". She has to her credit a copyright registered with the Government of India for the model developed by her for the empowerment of women through Microfinance. She is a member of the Editorial Committee of the International Journal of Accounting, Finance and Education, Philippines and also a member of the Global Forum for Sustainable Rural Development. She has published papers in International Journals and has attended a number of workshops and conferences.</p>	



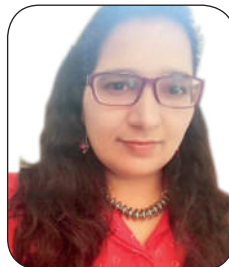
5	<p><b>Dr. Hari Krishna Karri</b>, karri.krishna@hct.edu.om</p> <p>He is a PhD in Management Studies from Shri Venkateshwara University. He also obtained his Master's in Business Administration from Andhra University. At present, he is a Faculty of Accounting &amp; Finance, College of Economics and Business Administration, University of Technology and Applied Sciences, Muscat, Sultanate of Oman. Dr Hari Karri has also been an academic consultant to many educational institutions. His research interests include Portfolio Management, Investment Banking, Financial Risk Management and interdisciplinary applications. He has more than two decades of teaching, research and industry experience. He has also authored books/monographs and contributed over 25 articles in refereed national and international journals, besides attending/chairing several national and international conferences.</p>	
6	<p><b>Dr. Gopu Jayaraman</b> is an Assistant Professor in the Department of Business Administration at the University of Technology and Applied Sciences (CEBA), Sultanate of Oman. With over 25 years of teaching and research experience in Accounting and Finance, he holds a PhD, M.Phil. and M.Com degrees from Annamalai University, India.</p> <p>Dr. Gopu Jayaraman's expertise lies in equity research, fundamental analysis, technical analysis, and stock market prediction using Artificial Neural Networks. He has published many research articles in esteemed journals and conferences, including SCOPUS-indexed publications. Additionally, he has served as an examiner for various universities, evaluating PhD reports. As an expert in the field of Accounting and Finance, Dr. Gopu Jayaraman is highly regarded for his research contributions. His proficiency in equity research and Artificial Neural Networks further enhance his knowledge of the subject matter.</p> <p>To connect with Dr Gopu Jayaraman, you can reach him via email at gopu.sal@cas.edu.om or gopujayaraman@gmail.com.</p>	



7	<p><b>Dr. Mahalakshmi Venkatachalam</b> is working as an Assistant Professor in the Department of Computer Science &amp; Engineering (FEAT) at Annamalai University, India. She has done a Master of Engineering in Computer Science and Engineering, and PhD in Data Mining and Artificial Engineering from Annamalai University, and a Master of Business Administration from the University of Madras, India. To her credit, she has presented many research papers at international conferences and published research papers relating to Datamining, Artificial Intelligence and Stock market predictions in refereed journals (SCOPUS). Email: mahaa80@gmail.com</p>	
8	<p><b>Dr. Hanaa Mahmoud Sid Ahmed</b> Hanaa Mahmoud Sid Ahmed received a PhD degree in Economics (2006). She is an assistant professor of Economics in the Department of Business Administration (CEBA), University of Technology and Applied Sciences, Oman. Her research interests include economic development and environmental economics. Said Ahmed published many papers in many reputable journals that are indexed in Scopus. She has also served as a reviewer for many well-reputed conferences and as a reviewer for several reputed journals. She was Head of the Research Department in the College until 2018. Email: hanna.sal@cas.edu.om</p>	
9	<p><b>Dr. Viju Mathew</b> is working at the University of Technology and Applied Sciences, Salalah, Oman, with vast experience in industry and academics. He was the former HoD of Scientific Research at the Salalah Branch. Dr Mathew has more than 50 research papers published in reputed national and international journals, authored books, university texts and monographs. He was also the chief coordinator for implementing DIF projects funded by International Development Agency (World Bank) and MoHE, FDRE. Since 2006, he has been involved in Quality Assurance in Higher education programs, projects, and processes. Dr Viju is actively conducting development programs, quality assurance initiatives in academics, community services, executive education, and research programs. Dr Mathew is also on the advisory board for several educational projects and programs. His teaching interests include Marketing, Strategic Management and Entrepreneurship. Email: viju.sal@cas.edu.om</p>	



10	<p><b>Dr. Maria Teresa Matriano</b>, has a doctorate in Business Administration, MBA, and Master of Arts in Learning and Teaching, and completed the two-year P.G. course from Coventry University, U.K. Being an academican for twenty years, she has been involved in university/ collegiate teaching, research writing and publication.</p> <p>She has served as Training Institute Administrator for twenty years drafting academic policies while collaborating with higher education members. Dr. Maria has expertise in teaching Entrepreneurship, Business Research Methodology, Organization and Strategic Management, MBA dissertation writing, and U.G. Projects. She has acquired certification from Oman SME-MOHE as a Certified Entrepreneur Educator. She has been with Middle East College as Assistant Professor since spring 2014.</p> <p>Email: maria@mec.edu.om.</p>	
11	<p><b>Ms. Mariya Ahmed Abdullah Al Jabri</b> Mariya Al Jabri has a Master's degree in International Banking and Finance from Edinburgh Napier University, United Kingdom and a Bachelor's in International Business Administration-Accounting from the University of Higher Technology and Applied Sciences – Rustaq, Sultanate of Oman. In addition, she has five years of experience in the academic field as a Lecturer at the College of Economics and Business Administration at the University of Technology and Applied Science – Muscat, Middle East College and Oman Tourism College. She has been involved in writing and publication in academic research and is interested in analytical thinking and financial management.</p> <p>Email: mariya.aljabri@utas.edu.om</p>	
12	<p><b>Ms. Maha Salim Rashid Al Jahwari</b> has a master's degree in accounting and financial Management from Essex University/ United Kingdom and a Batchelor's degree in Finance from Sultan Qaboos University. She has three years of experience in the academic field as a senior lecturer at the management studies department at Middle East College.</p> <p>Email: maljahwari@mec.edu.om</p>	



13	<p><b>Dr. Sunita Panicker</b>, Assistant Professor, Department of Business Administration, UTAS-CAS-Ibri. She had a PhD in Management Studies from Mahatma Gandhi University, Kottayam, Kerala. She has more than two and a half decades of experience in Academics, Consultancy, Research and industry, both in India and Oman. In India, she has served as Principal &amp; Professor at MVM College of Arts, Science, and Management, Associate Professor at Christ University, and Lecturer at MS Ramaiah Institute of Technology. She was also associated with Wipro Technologies. Dr Sunita has published over 70 publications in national and international journals of repute and received the best paper awards in India, Malaysia, Oman and Bahrain. Additionally, she has undertaken significant research and consultancy projects for the industry and academia in India and abroad. Her areas of interest include Entrepreneurship, Strategic Management, Higher Education, Banking, Finance, and Innovation. She has a copyright in her name from Case Center, U.K. She is also a member of the Institute of Directors, India.</p> <p>Currently, she is a Professor at UTAS. Asst. Professor, Department of Business Administration College of Economics and Business The Administration University of Technology and Applied Sciences-Ibri (CAS)</p> <p>Email: <a href="mailto:sunita.ibri@cas.edu.om">sunita.ibri@cas.edu.om</a></p>	
14	<p><b>Dr. Shivakami Rajan</b> is an Indian educator and author currently positioned as a Professor in the Department of Management, Faculty of Management and Commerce, Ramaiah University of Applied Sciences, Bengaluru, Karnataka State, India. She was proficient in SPSS, AMOS, Visual Plus &amp; G*power software for research, so she took a professional certification in supply chain management and analytics from the Indian Institute of Technology Roorkee. Along with a global online certification in Data-driven supply chain transformation from I-DAPT Hub Foundation-IIT (BHU) and CoE Logistics &amp; Supply Chain Management-NITIE-Mumbai, certification in design thinking and innovation from IISC, Centre for Continuing Education, Bengaluru, keen on research, and has three books publications and more than 20 journal publications. She has presented many research papers at International Conferences and also written case studies, one of which is at The Case Centre, U.K.</p>	






	<p>During her career in the corporate world, she donned various roles of Accounts Assistant, Senior Technical Associate, Key Account Management, and Logistics Head (PAN-India, predominantly in the supply chain domain, certified in SAP-MM. When academics drew her attention, she completed her M.Phil, in Management from Christ University, Bengaluru and PhD in Management from Bharathiar University, Coimbatore, Tamilnadu State, India. She can be reached at shivakamirajan.mc.ms@msruas.ac.in.</p> <p>Professor, Department of Management Studies, Faculty of Management and Commerce, Ramaiah University of Applied Sciences, Bangalore, Karnataka, India.</p> <p>Email: shivakamirajan.ms.mc@msruas.ac.in,</p>	
15	<p><b>Dr. Veena Tewari</b> is an Assistant Professor at the University of Technology and Applied Sciences in the College of Business and Economics, Ibri campus. She is a Senior Fellow of the Higher Education Academy U.K. and a Fellow of the Chartered Institute of Marketing, with a (PhD) in Management. She has been on the teaching assignment in East Europe, the Middle East, Southeast Asia and Northeast Africa. She has been an extensive traveller and has been to various countries by virtue of consultancy and research projects. She has almost 40 publications both at the international and national levels in various conferences, journals, book chapters and seminars. Presently she serves as the editor in chief, board and advisory member for multiple journals, Marketing organisations and conferences. Areas of expertise are consumer behaviour in services, corporate social responsibility, entrepreneurship and using I.T. in Management. She has given keynote speeches and presented papers at various tourism, marketing, corporate governance, and innovation conferences in India (various national and private institutions) and abroad like Portugal, South Korea, Germany, Portugal, Japan, Greece, United States of America, U.K., Pakistan and the Middle East.</p> <p>Asst. Professor, Department of Business Administration College of Economics and Business Administration University of Technology and Applied Sciences-Ibri (CAS)</p> <p>Email: veena.ibr@cas.edu.om</p>	

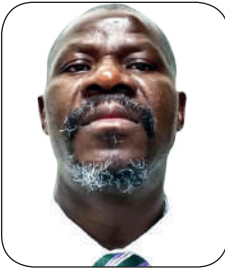


16	<p><b>Dr. Saoussen Othmani</b> is an Assistant Professor of Finance and Accounting at the University of Technology and Applied Sciences, Oman, Ibri. She holds a PhD in Finance from HEC Carthage University, Tunisia (2016). Her research interests include behavioural finance, Financial markets, Corporate Finance and Entrepreneurship. She has more than 13 years of teaching experience in different universities in Tunisia, Saudi Arabia, and the Sultanate of Oman. She has attended many national and international conferences and has written many research papers on Corporate and Behavioral finance.</p> <p>Asst. Professor, Department of Business Administration College of Economics and Business Administration University of Technology and Applied Sciences-Ibri (CAS)</p> <p>Email:saoussen.ibr@cas.edu.om</p>	
17	<p><b>Dr. Nasser Al Harrasi</b> is a senior lecturer of Business studies at University of Technology and Applied Science-Muscat. He is a Fellow of UK HEA and obtained his PhD in Human Resources Management from Binary University, College of Management &amp; Entrepreneurship, Malaysia in 2020. He has worked with many multinational companies with more than 10 years of diverse experience involving teaching, consultancy, and corporate management in Oman. He has research interests in HRM Practices, Organization Behaviour, and Higher Education. He has attracted many external funding and grant research opportunities. He leads and supervises several research teams. His research papers appear in the Journal of social science and business management areas.</p> <p>Email: Nasser.alharrasi@utas.edu.om</p>	

18	<p><b>Mr. Salim Bakhit Al Daraai</b> is a PhD candidate in Business with Management at Plymouth Business School, University of Plymouth. He Joined Muscat college as a lecturer of Business and Accounting in 2021. Teaching a variety of management units such as fundamental management, organizational behaviour, Strategic management, change management, human resources management, operations management, and different modules in project management.</p> <p>Mr. Al Daraai is a member of the British Academy of Management since 2022, a member of Brilliant Club since 2021, and a member of the Institute for Engineering Research and Publication: IFERP since 2022. Currently, Mr. Al Daraai is a member of the exam committee and a member of the training and development committee at Muscat College. Also, he is a coordinator for the student learning platform (Moodle) and data entry of the student information system.</p> <p>Email: <a href="mailto:salim.aldaraai@muscatcollege.edu.om">salim.aldaraai@muscatcollege.edu.om</a></p>	
19	<p><b>Ms. Maryam Al Rashdi</b> is a lecturer at Middle East College. She holds a master's degree in Business Administration from Sultan Qaboos University and has obtained her bachelor's degree in Human Resource Management from University of Technology and Applied Science-Muscat. She has worked in companies in different fields since 2014.</p> <p>Maryam is interested in Human resource development and Entrepreneurship studies. She has conducted workshops about self-development and Successful Entrepreneurs in different organizations. Currently she is working in research about strategies for entrepreneurship recovery after Covid-19 pandemic.</p> <p>Email: <a href="mailto:alrashdim@mec.edu.om">alrashdim@mec.edu.om</a></p>	

20	<p><b>Mr. Mohammad Taslim</b>, a former member of GSCC (UK), is currently working as a lecturer in University of Technology and Applied Sciences – Al-Musannah, Oman. He has Master's degree in HRM &amp; OB from Aligarh Muslim University (AMU), India. Being an academician for more than a decade, he has been serving university level teaching, research writing and publications. He has authored more than twenty national and international publications and also developed &amp; presented a case on "Bottom-up Approach in Behavioral Change of 'XR' Population which was awarded as the best paper in BVIMR.</p> <p>He has also been awarded as 'EXEMPLARY SERVICE AWARD' for academic year 2015-2016 by the UTAS-Al-Musannah. His areas of interest include AI Applications into HRM, Counselling and Mentoring, Socio-economic, corporate and sustainability perspectives of Generations – X, Y, and Z. He has privileged to be associated with several international bodies like International Labour Organization (ILO) on the project of Indus Child Labour Survey, and with UNICEF (United Nations International Children's Emergency Fund) on Social &amp; Behavioral Mobilization in Polio Eradication Program. The author can be approached at <a href="mailto:mtaslim@act.edu.om">mtaslim@act.edu.om</a> Or <a href="mailto:taslim.nawaz@gmail.com">taslim.nawaz@gmail.com</a>.</p>	
21	<p><b>Dr. Samskrati Gulvady</b> is an Assistant Professor in the Department of Mass Communication, College of Creative Industries, at the University of Technology and Applied Sciences, Salalah, Oman. She holds a PhD in Mass Communication from the Manipal Academy of Higher Education (MAHE), Manipal, India. She completed her Master's in Science (Communication) from MAHE, India, after graduating from Bangalore University, India. Dr. Samskrati is involved in research on a project funded by the Ministry of Higher Education, Research and Innovation, Oman. She has presented papers at numerous national and international conferences and symposiums organised by prestigious universities in India, Japan, Bahrain, Oman, UAE, etc. She has also published research papers in national and international journals. Her research interests include diasporic studies, sustainability, tourism, and cultural studies. With a focus on research and technology transfer, Dr Samskrati is making significant contributions to the field of Mass Communication studies in Oman and beyond.</p>	

22	<p><b>Dr. Vandana Jyotirmayee</b> is a Lecturer in the Department of Mass Communication at the University of Technology and Applied Sciences at Salalah in Oman. She worked as the Program Director of the Mass Communication program earlier. Being a master's degree holder in two subjects, she holds a PhD in Journalism and Mass Communication. Dr Vandana has authored five books, three of which are in the field of Mass Communication. Apart from teaching, she has worked for both the national channel of T.V. and Radio in India. Being a regular contributor to Oman Daily Observer, the National Daily Newspaper of Oman, she also writes on world literature, music, and contemporary topics for some international websites. Dr Vandana has been part of the National trainers' team of UNICEF (India) and has imparted training programs in many states of India in Education, Community development, Leadership, and women empowerment. She has presented research papers at many international conferences organised by prestigious universities, and her area of interest lies in education, journalism, and environment conservation.</p>	
23	<p><b>Mr. Moez Bellaaj</b> is an Associate Professor of Marketing, holding a doctorate from Montpellier University in France. Currently, he is affiliated with the Higher Institute of Business Administration at the University of Sfax in Tunisia, where he undertakes various academic responsibilities. Before his current position, he gained valuable experience working at several universities in the Kingdom of Saudi Arabia (KSA). Dr Bellaaj's research contributions have been featured in prestigious academic journals, including the International Journal of Emerging Markets, the International Journal of Electronic Marketing and Retailing, and renowned French publications such as Revue Française de Gestion and Revue Internationale PME. Moreover, he has actively participated in numerous conferences and colloquia, presenting several papers. His ongoing research primarily focuses on digital marketing strategies, social media performance, e-entrepreneurship, and digital transformation.</p>	

24	<p><b>Dr. Reason Masengu (PhD, FCIM, CPM)</b></p> <p>Dr. Reason Masengu is a highly experienced Senior Lecturer of Business Management at Middle East College in Muscat, Oman, with over seven years of experience in higher education. He specialises in Global Marketing, Marketing Management, Digital Marketing, and related courses. Dr. Masengu holds a PhD in Business Management (Marketing)-, a Master of Commerce in Marketing Strategy, and a B-Tech Hons in International Marketing. He has obtained marketing, brand strategy, and data analytics certifications from prestigious institutions such as the Chartered Institute of Marketing and Google. Dr. Masengu is a Fellow of the Chartered Institute of Marketing, a Certified Practising Marketer at- the Australia Marketing Institute and a Senior Manager Member -Marketers Association of Zimbabwe. He holds various positions, including International Faculty Advisor and reviewer for the IEOM Society and other internationally accredited journals. His research interests include digital marketing, financial inclusion, marketing research, business management, sustainable marketing, and technology adoption. With international exposure in administering research grants, he contributes significantly to marketing, logistics, and supply management through his dedicated research endeavours.</p>	
25	<p><b>Dr. Chenjerai Muchenje</b> is an Associate Lecturer at the South East Technological University Carlow Campus in Ireland. He holds a PhD in Business Administration from the Northwest University in South Africa and completed his Master of Science in Strategic Management degree with the Chinhoyi University of Technology in 2013. Chenjerai also obtained a Bachelor of Business Administration in Marketing from Solusi University, Zimbabwe, in 2004. Dr. Muchenje is a member of the Marketers Association of Zimbabwe and the Digital Marketing Institute, Ireland. He is also a part-time lecturer at the Marketers Association of Zimbabwe Business Institute. With several publications, conference presentations, and book chapters, his research interests are in digital marketing, digital entrepreneurship, and sustainable marketing.</p>	

26	<p><b>Mr. Benson Ruzive</b> is a lecturer at the Modern College of Business Science in Oman. He holds a Master's Degree in Procurement, Logistics and Supply Chain Management from the University of Lusaka, Zambia. Benson is a member of The Chartered Institute of Procurement and Supply, a U.K. professional board for Supply Chain professionals. Currently, Benson is involved in two projects funded by The Research Council of Oman and The Ministry of Higher Education, Research and Innovation. These studies are to advance the Vision 2040 of the country in the Logistics sector. Benson's research interests include supply chain management, logistics and transport, education, marketing and distribution and innovation. He has presented many papers at international conferences in Mauritius, Oman, and South Africa. Benson has co-authored several articles and book chapters, collaborating with others across the globe. This level of interaction and international collaboration has helped build some strength in research in Benson.</p>	
27	<p><b>Ms. Jasmine Mariappan</b> is working as a lecturer in the Department of Business Studies at the University of Technology and Applied Sciences, Ibra. She had completed her M.Phil in General Management, M.Com, and B.Com. She has an experience of more than 17 years in the field of teaching. She is specialised in the field of Marketing. Her research interests are in Marketing, E-marketing, and blending learning. She has published her work in leading journals and in international conferences. She is known for her hard work and commitment.</p>	
28	<p><b>Ms. Padmalosani Dayalan</b> is working as a lecturer in the Department of business studies at the University of Technology and Applied Sciences, Ibra. She had completed MBA in Finance, M.Com and M.Phil. She is currently pursuing a doctoral program. She has an experience of more than 18 years in the field of teaching. She is specialised in the field of accounting and finance. Her research interests are in the areas of corporate finance, international investment and blended learning. She has published her work in leading journals and in international conferences. She is known for her hard work and dedication.</p>	

29

**Ms. Rahma Al Bahri** is a dedicated and enthusiastic quality analyst. She is currently working at the Central Bank of Oman as Senior Quality Analyst. Her working experience is almost 16 years, as she has worked at the Ministry of Health for 3 years and the Ministry of Regional Municipalities and Water Resources in nearly six years. She joined the CBO in 2015. Currently, she is a registered PhD. Student in the field of Management at the University Technology of Malaysia (UTM). She graduated in 2012 from Portsmouth University in the U.K. with MSc. Strategic Quality Management. Her dissertation was awarded the Atomic Weapon Establishment Award (AWE Award) related to the British Ministry of Defense as the best dissertation among the batches that graduated that year. She has worked in different fields and submitted several development proposals for the three working entities she has worked for. Being a member of several task forces within her functional entities has enabled her to gain different knowledge, refine her talents, use her competencies, and share her knowledge and ideas. Her areas of interest are Process Enhancement, Business Process Re-Engineering, Innovation, Digital Transformation, KPIs, Strategic Planning, Quality Management Systems and more.

Email: rahma1281@yahoo.com, rahma.albahri@cbo.gov.om







# **FINANCIAL FORENSIC EVIDENCE AND ACCEPTABILITY IN THE COURT OF LAW**

*Hisham Said AlGhunaimi*  
*Saleh Said AlMamari*

---

## **INTRODUCTION**

Financial forensic evidence is more like an annual financial audit report that consists of financial records, proofs of annual transactions, hard or soft copy data regarding yearly income or outcomes. Financial forensics is often considered a prevention plan or initiative that focuses on the vulnerable aspects of a company or an organization. Through investigation financial forensic reduces the financial risk factors and also detects any harmful activities in the sector. This particular research paper is based on the financial forensic evidence and acceptability in the court of law, as in the judicial procedures proving the authenticity of a financial forensic report often gets a complex task. Also, forensic accounting is a conceptual practice that generally focuses on the investigation to find the misconduct activities in the organizational corporate system. The current study discussion also sheds light on the importance and implication of forensic accounting practices in the corporate financial world. The financial forensic evidence and current world example also would be discussed in the paper. Because, the benefits, impact, and importance of financial forensic evidence and accounting can decorate the structure of the financial aspect of an organizational sector. Also, through this implication, the study will also address the challenges that would come up with audits and implementation of accounting investigation procedures.

## **FORENSIC ACCOUNTING**

In simple words, forensic accounting is a strategic investigation procedure that analyses any criminal activity that has happened in an organizational sector. This particular technique of investigation implements specific protocols in the financial record department to verify every recorded data thoroughly. Generally, in financial accounting procedures, the specialty integrates the skills of criminal investigation with auditing skills to verify criminal activity. An organizational criminal activity can happen from the internal and external side of the organization, for that reason auditing with investigation implication is necessary (Nikkel, 2020).

Some important forensic accounting types are financial theft analysis, where the accountant surveys the existing system of financial departments and audits accordingly. The second example is Security fraud or bankruptcy, where a financial scam or any other type of fraudulent activity happens, and accountants investigate the whole crime scene and they

try to make an investigation report. Also, taxation evasion, economic lawsuits, corporate valuation disputes, organizational economic damages are common criminal events that need financial accounting and investigation. The current study has been formed under this particular financial procedure, as the process indicates the financial fraud in the system by practicing some techniques (Nikkel, 2020). A popular model named Beneish Models for financial accounting is often used for this type of work and audit. The model is important and acts as a tool to uncover financial fraud.

## **HOW IT HELPS IN BUSINESS**

Forensic accounting is more like a strategic technique that is generally used for investigating any criminal activity in the financial department of an organization. Some common criminal activities are financial record mismatching, economic damage through fraudulent activity, and taxation embroidery. These financial criminal activities are common in organizational business operations, general accounting, and investigating means verifying these activities.

A financial forensic accounting procedure includes investigating the crime scene, the overall impact of identification of financial harm, and auditing the whole scenario (Sorunke, 2018). The auditing process has two significant parts; one is reporting the whole scenario based on the crime type, rate, and impacts so that the organization can estimate the harm. Moreover, the second part is implementing or suggesting strategic methods or models so that the system would not face similar activity in the future. This recommendation process needs to be overviewed, as an implication that can influence the business function would not be a proper solution. By implementing the viewed audit recommendation, the business function would be freed from any internal embroidery element and through this implication the growth of the business also would be increased. Also, through forensic accounting, the efficiency level of the accounts department would increase, or at least the department can identify the vulnerable section of the department. This particular advancement will develop the business operation progress and avoid further criminal activity.

## **DIFFERENCE BETWEEN AUDITING AND FORENSIC ACCOUNTING**

Both auditing and forensic accounting are essential procedures for maintaining the financial safety of an organizational department. Business operation is a complex task, and for large organizational businesses facing financial fraudulent activities in the internal departments is common adversity (Hitchcock, 2018). Audit as a yearly process is very common and needed for every organizational business operation so that the authorities can identify the overall business condition and revenue. But forensic accounting is very complex and needs only any fraudulent suspicious activity seen in the department. Although both of these processes have similarities, some differences exist, which are -

**Objectives** - The very significant difference between auditing and forensic accounting is its underlying objective. The process for audit includes the identification of any fraudulent or unauthorized transaction in the financial statement. The most common work of auditing is finding any mistake in the financial data, acquiring financial statements and material that has something unauthorized, and auditing based on the situation of the department. While forensic accounting work with minor changes in the system should not be changed. It is more of a preliminary stage of auditing where identification of issues in the early stage is important.

**Requirement** - The audit system for identification of the current state of the financial department of a company is a recurring process. This means every company that is connected publicly needs an audit system yearly to publish the annual report of revenue and other economic statements. Because, without publishing this report, the company cannot identify its current position in the market. On the other hand, forensic accounting is an uncertain process that needs only any fraudulent activity noticed in the management or finance department of a company. If a company faces a similar situation when the company officials suspect some unauthorized activities, then it would be time to call forensic accountants.

**Skills and Techniques** - For general auditing, some basic skills for this task are required, and also, for this process the department only needs to produce financial statements and recorded data. While forensic accounting is a critical process, that includes past transaction lists and every financial data, including statements, records, and even employee details. Because forensic accounting is an investigation process that needs a large amount of time and data.

Besides the above-mentioned differentiation, forensic accounting and audit have some other variations, like audit is a short process for identification of financial state, while the forensic is much more complex and longer. Through forensic accounting, the organization can identify the vulnerable spot of the organization, while the audit does not provide any information about this.

## **IMPORTANCE AND IMPLICATIONS OF FORENSIC ACCOUNTING IN THE FINANCIAL WORLD**

The basic importance of this implication of forensic accounting in the financial world is protecting organizational business processes from uncertain financial threats and scams. Forensic accounting, including auditing and measuring a company's financial department condition, is more like an investigation program that analyses every aspect and activity in the section. There is no doubt that every multinational or public organization business has a potential threat from financial scams and financial fraudulent activities. To overcome these activities organisations require proper implementation of forensic audit plans and investigation if any suspicious activities are noticed.

**Figure 1 : Importance and Implications of Forensic Accounting in the financial world**

(Source: Hitchcock, 2018)

From this process, some factors have been found that would be considered as the importance of forensic accounting in the financial world, which are ;

- **Reducing risk factors** -A most important factor of implementing forensic accounting in the financial world is through this implementation an organization can reduce the risk factors. As it has been seen that many criminal activities and threats attacks in the financial department occurred and affected the financial stability of the organization, importing forensic accounting is necessary. By doing such activity, the organization can reduce the impact and eleven prevent it.
- **Financial control** - Through forensic accounting and audit implication controlling financial flow or stability is possible. Since it has been seen that many companies with uncertain business plans often face difficulties in financial control and manipulation. Those companies could face a high chance of financial outflow. But through forensic accounting, those companies can address proper plans for financial control and even audit the current financial plan.
- **Avoiding past mistakes** - Through forensic accounting, a company analyses past mistakes and fraudulent activities in the management system, by doing that, the company makes new plans and modifies the current system. From another perspective, this process also provides help with addressing past mistakes to the company so that in future operations, they would never occur.
- **Prevent scams** - According to Hitchcock (2018), one of the most common and significant importance of forensic accounting in the financial world is preventing scams. Several financial scams Brienne Madoff scheme, the Worldcom scandals, and The Enron crisis are common and popular examples. Here the forensic accountant

studies these past scams and analyses the overall situation to identify the possible reason and condition of the scams. This analysis would be useful if the accountant implicates those in the upcoming activities.

From the above discussion, it has been seen that financial sectors have financial threats, and forensic accounting implication is an effective activity that can resolve this issue. Since through this implication, an organization can know the current situation of the company in terms of financial state, auditing and making a new plan for future preference is also a factor that could be stated as important.

### **ADVANTAGES OF A FORENSIC ACCOUNTANTS WITHIN AN ORGANISATION**

A forensic accountant is specialty personnel, who make internal audits, and forensic investigation cites if any fraudulent or criminal event happens in the management system (Hitchcock, 2018). Generally, the audit is a common activity that has to be conducted by the organization every year, for which many organizations have their audit personnel.

**Figure 2 : Importance of Forensic Accountants within an Organization**



*(Source: Hitchcock, 2018)*

But as in the current situation, financial crimes are happening in the business industries and for this case, investigation and audit officers are not enough. Requiring forensic accountants within an organization is important. Even having a forensic accountant within an organization has some advantages, which are -

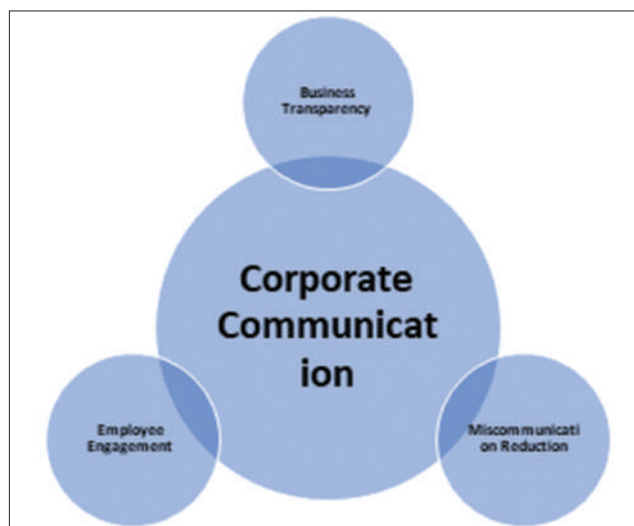
- **Consistent monitoring** - Forensic accountant within an organization has several advantages. One of the most common would be monitoring. An organization with a personal forensic accountant would monitor the system of the financial department in a consistent way. Regular monitoring would increase the safety in the financial segment, as the accountant will look into it.

- **Verifying data repeatedly** - Having a forensic accountant in an organizational workplace is also useful for verifying the final data like statements, audit reports, and internal and external transactions (Duncan & Whittington, 2018). With proper verification, the organization can ensure a better and more effective financial department maintenance process which would initially increase the business performance of the organization.
- **Reducing the impact** - A forensic accountant is also useful for reducing the impact of any financial harm in the department. Since facing a financial crisis in business operations are a common activity, even scams and criminal events can occur at any moment. Having a forensic accountant would reduce the initial impact of the event. Because the accountant can handle the situation with the most effective procedures that any other person cannot, even what should be done after any critical financial situation, an accountant would know better. For that reason, having forensic accountant personnel in an organization is important.

### IMPORTANCE OF CORPORATE COMMUNICATION

Corporate communication is a way that is used in business operations, where internal communication can happen to internal and external stakeholders of the company. Corporate communication is often circled between company employees and the management system, which is the internal portion of the whole communication system. Also, external stakeholders like targeted customers and market audiences are connected through this particular communication system. There are several advantages to corporate communication, and the following examples are significant.

**Figure 3 : Importance of Corporate Communication**



(Source: Özcan, 2018)

- **Business Transparency** - Through corporate communication, increasing business transparency is possible because this communication connects external stakeholders of the company to its internal stakeholders or system. For this connectivity, there would be no gap between stakeholders so that everyone would be aware of the current business situation of the company.
- **Reduces miscommunication** - As previously mentioned increasing transparency in the business also increases the connectivity of departments and stakeholders to the main business system. Through corporate communication, every stakeholder can know the business income or outcomes, so there would be no miscommunication between them.
- **Employee management and engagement** - By implementing a good corporate communication system in the workplace, increasing employee engagement is also possible (Ocansey, 2017).

Although corporate communication is generally implemented for communication development, for financial accounting and audit, making this particular communicational, the system would be useful.

## IMPACT OF FAILURE OF CORPORATE COMMUNICATION

Corporate communication is a significant implication that brings connectivity between the internal and external stakeholders of an organization, but sometimes this implication fails to be established properly. Even for organizational development, corporate communication is a key element because, through this implication, employees and internal and external stakeholders can communicate with each other. And through this communication, the entire process of business operation and development could happen. Still, some factors impact the process if the corporate communication process would not be evaluated properly.

**Figure 4 : Impact of Failure of Corporate Communication**



(Source: Ozcan, 2018)



As a consistent process, any failure in the implementation would have some impacts, which are -

### ***Flawed internal controls***

A failed corporate communication could impact the internal control segment of an organization severely. The very impact in the control segment could also affect the operating system of the business. Financial stability is the least element for a functional business operation system. But if this particular system does not work properly, then the impact on the internal segments like management system and workforce management would affect too. Also, internal controlling systems like the financial storage and revenue processor, which is an essential part of the business, would be stopped. For which the entire process of investing and producing new financial plans would be more difficult (Ozcan, 2018).

### ***Poor corporate governance***

Without corporate communication, providing corporate governance is impossible because corporate communication not only makes communicational connections between departments but also provides transparency in the operation. Through business transparency and reduction of miscommunication, the governance of the entire program gets easy and sufficient.

### ***Fraudulent financial statements***

Without corporate communication facing fraudulent activities in the organizational business operation is common because, without better communication, employee management and engagement are impossible. A poorly organized workforce system in an organization would not be enough to fulfil a company or organization's expectations with performance. And without target achievement, the company will not provide enough financial or any other types of support to employees. In this context, financial statements like business transactions and conditions of the company will not be genuine (Duncan & Whittington, 2018). For that reason, facing fraudulent activities in the system would be a common factor. A proper corporate communication system will increase business transparency so that criminal activities will be decreased.

From the above-mentioned discussion, it has been seen that corporate communication is a significant aspect that is needed for maintaining business stability and company performance.

## **REASONS FOR THE DEVELOPMENT OF FORENSIC ACCOUNTING TECHNIQUES**

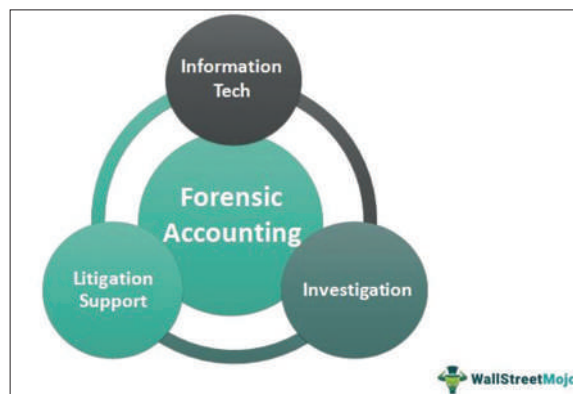
### ***Reduce external auditor deficiencies in fraud detection, and its implications***

Forensic accounting techniques are common and effective procedures within an organization

that have different stages of identifying the financial harm and the reason for it (Ozcan, 2018). A proper investigation of forensic accounting procedure has four parts, which are as follows:

- **Direct and Indirect method** - In the process of forensic accounting techniques, direct and indirect methods are a common example, where the accountant analyses the whole system separately based on the situation. In the direct method, the accountant verifies every recorded data in the system, including bank statements, financial records, charts, audit reports, and transactional bills (Duncan & Whittington, 2018). All of this recorded data is a common element that every organization should provide to an accountant. Otherwise, the method would not be applicable. On the other hand, the indirect method also verifies data but not hard copies; in this method, the account verifies soft copies and computer data that can be modified. For this reason, some IT professionals are also needed.

**Figure 5 : Forensic Accounting**



(Source: Ozcan, 2018)

- **Cash T method** - Every organization's financial department has details of cash transactions and incoming and outgoing receipts. In this particular method, forensic accounting verifies those case receipts for analysing the cause of cash flows and the reason for the criminal activity. If any abnormal transaction has been located in the system, the accountant proceeds with the procedure based on the protocol. The basic tactics of this method are analysing the incoming and outgoing cash transactions and verifying the origin and the destination of the transaction (Duncan & Whittington, 2018).
- **Net Worth Method** - Net Worth method has one job, which is analysing the overall value of the assets and liabilities of an organization to verify the source of the criminal activity. Since several activities happened due to the over-transparency of the organization, identification of worth can resolve this issue.
- **Bank Deposit Method** - This particular procedure generally consumes more time in comparison to other procedures because, here, the forensic accountant verifies

the yearly deposit amount and transactions. Specifically, knowing the deposit proves a specific pattern of transactions of an organization, this pattern identifies the organization's overall business growth (Duncan & Whittington, 2018). Here the accountant finds an abnormal transaction in the system that does not match the pattern. And by doing this survey, the account finds a particular department where the problem lies.

The above-mentioned methods are important because without implementing such activities, an organization cannot ensure the safety of the financial aspect of the organization. Also, through these implications, the organization can reduce the impact of criminal activities by ensuring a pre-planned activity that can recover the harm with less time.

### **THE BENEFIT OF CLOUD FORENSIC AUDIT TO ENHANCE CORPORATE EFFICIENCY IN FRAUD DETECTION**

Cloud forensic audit is a method of implementing forensic science and technology to recognize and reorganize the financial records of any firm or organization for presenting them as legal evidence. The application comes along with many benefits that help to enhance the efficiency and effectiveness of the corporate industries in fraud detection. Cloud forensic audit represents the realistic approach that helps to deepen the understanding of financial capacity. The benefits of cloud forensic audits are mentioned below (Duncan & Whittington, 2018).

- **Minimized Losses** - Different fraudulent activities and general discrepancies result in the loss of a large amount of money in corporate sectors. The association between auditing and modern technology and scientific tools helps corporate industries to minimize apparent losses by regulating and monitoring monetary transactions and keeping digital records safe and intact. Several tools of forensic science help the management to identify fraudulent activities if there are any and thus preventing further incidents. Moreover, forensic accounting regulates daily expenses. So, the chances of financial breaching are also lower as well as frauds are also identified.
- **Improved Efficiency** - the introduction of modern technology and its implementation have increased the efficiency of the auditing department to many folds (Yoon, 2020). Virtual forensic accountants play a significant role in investigating, examining, and assessing financial processes and standards. This leads to quicker identification of any kind of fraudulent activity and helps in fixing the incident much sooner. The systems also suggest improvement of sectors where it is needed, thus making the whole procedure more effective and efficient. This entire process of fraud detection and improvisation leads to a lesser frequency of fraudulent activities.

- **Reduced Exploitation Risk** - as the cloud forensic auditing system improves the system and regulates the entire process on a regular basis, the chances of exploitation get reduced. The time-to-time investigation of financial standards and transaction records covers all the gaps that can be generated in manual auditing (Duncan & Whittington, 2018). Therefore, the frequency of chance of future exploitation is effectively reduced as no one can surpass the investigation easily, thus making the system leak-proof. This prevents the losses of money and breaches of finance in the long term by securing the system with efficacy.
- **Avoidance of Legal Problems** - Generally, organizations lose a significant amount of money and time in identifying frauds and then dealing with them in legal aspects. But with the implementation of cloud forensic audits in businesses, the organization can effectively prevent fraud from breaching the finance through regular periodic investigation, examination, and regulation. Hence, the firms can avoid post-identification legal problems as the implication of forensic tools identify the criminal or potential criminal beforehand and solve the problem at the initial stage if any such incident takes place.
- **Improved Brand Reputation and Authority** - numerous fraudulent activities and the incapability of the organizations to identify and fix the problems often lower the reputation of the organization and the brand related to it (Nsor-Ambala, 2021). It affects the business harshly as the clients lose their interest and trust in the company. So, the implementation of forensic accounting not only improves the auditing process but also uplifts the reputation of the organization by providing the best and most secured audit systems.

## **SIGNIFICANCE OF FORENSIC ACCOUNTING TECHNIQUES IN CORPORATE GOVERNANCE**

Accounting frauds and financial crimes in corporate sectors are increasing daily and becoming a serious problem. Incorrect and altered financial records mislead the entire picture of the financial situation of an organization. Investors and other significant users make important decisions based on those financial statements that are incorrect and manipulated. This causes huge damage to information users. The increased rate of fraud cases and delayed identification and fixation of the damages not only inflict the loss of money and time for the companies but also jeopardize the trust of a large number of clients. The problem has been faced by industries and organizations all over the world. So, countries around the world are struggling and are forced to find a solution to the mentioned affair, based on which the government can strengthen the regulatory framework to encourage companies to strengthen their controls against financial crimes and breaching (Duncan & Whittington, 2018). The concept of corporate governance emphasizes the function of each key factor that is essential to make a financial report. The application of forensic accounting in maintaining

the financial statements of the organizations increases the effectiveness and reliability of the accounting information and thus enables more efficient corporate governance for every stakeholder, such as the managers, owners, users, and potential investors. The development of forensic accounting techniques has created an entirely new pathway for combating fraudulent activities and their identification. It has set new disciplines in accounting that involve examination and interpretation of shreds of evidence and facts. This is a special branch of accounting which deals with the evaluation and assessment of legal and official recordings and statements. The significant jobs of forensic accounting are -

- Examining and evaluating the business risks to prevent fraudulently.
- Giving independent opinions explaining the reasons for the crimes based on the financial evidence.
- Analysing the cause of fraudulent activities and the impact of such incidents on the financial status of a particular organization.
- Identification and analysis of disputes or the statements that may be manipulated.
- Identification and analysis of the real financial situation of the particular organization.
- Detection of false reports.
- The providing suggestion about required improvement in financial sectors including auditing.
- Identification of proper legal solutions to mitigate the problems.

These above-mentioned jobs of forensic accounting make corporate governance impactful and effective, thus leading the entire system to be more efficient and less prone to fraud and criminal activities (Mitrović & Knežević, 2020). This way, a corporate business can achieve maximum effectiveness by enabling the use of forensic accounting.

## **FORENSIC ACCOUNTING AUDITS FOR THE NEW GENERATION**

Forensic accounting audits are the tools for the regulation of financial sectors and auditing in the corporate sectors. The implementation of forensic accounting in audit has enlightened a completely new and technically evolved method of regulating and operating accountancy. The application of forensic audit is so appropriate that it is considered to be the future of accountancy and would be the inevitable option to achieve maximum effectiveness in auditing (Ocansey, 2017). The implementation of forensic accounting has not only improvised the entire system of financial operation but also has attracted new generations by raising interest in them as the procedure consists of the application of several modern technologies and tools. The youth are interested in choosing their career in forensic accounting by becoming forensic accountants (Chapman, 2018). Forensic accountants are not ordinary chartered accountants but professional experts who are trained to examine and identify

frauds and scams. Therefore, the new generation is eagerly choosing forensic accountancy as their career.

The below-mentioned aspects of forensic accounting are responsible for drawing the attention of the new generations.

- **Technology** - the base of forensic accounting is the implementation of several scientific tools and modern technologies. As the world is becoming digital, especially youth are more attracted towards the new inventions of technologies and their implementation. They are used to the adaptation of new and innovative ideas and always look for newness. That is the reason why they are attracted to the implementation of forensic accounting in the corporate business and why they opt for the position of the forensic accountant (Oyedokun, 2015).
- **Interpersonal skills** - a forensic accountant is required to have the ability to concentrate and listen carefully to analyse the situation and narrow down the issues specifically. An eligible and potential forensic accountant always focuses on understanding the cultural background of the organization he is working by vigorous observation. These qualities make a forensic accountant different from an ordinary chartered accountant. These features of the forensic accountant set a challenge for the applicants and the new generation tends to go for the challenges.
- **Skeptical mind** - development of a sceptical mind is a very important asset for any person who wants to build a career in forensic accounting. Sceptical minds are able to receive the facts and information instantly and proceed to verify the facts with perseverance. So, the skills and their implementation, along with required training and guidance, make a person efficient as a forensic accountant. The new generation is the best when it comes to training them with the knowledge of the skills as the youth minds always create places for new information and knowledge (Eliezer & Emmanuel, 2015).
- **International effects** - as the financial alteration and misplacement of a large amount of money in corporate sectors are global problems now, each country is adopting some governance policies to mitigate the issues of financial crimes and fraud. Under this circumstance, the ability to collect international resources and implement them to solve local problems makes a person effective as a forensic accountant. Comparatively, the new generation is more appropriate for this kind of task.
- **Pressure on valuation services** - the main responsibility of a forensic accountant is to focus on the value and importance of the services it can provide to the finance sector of a corporate business. The undivided concentration of an expert to identify and resolve the scopes of frauds makes him potential and perfect for the role.

All the requirements of a forensic accountant can be observed as the specific abilities of the youth generations. Therefore, all they need is specific training and guidance to flourish in this role of the job.

## **FORENSIC ACCOUNTING TECHNIQUES**

Forensic accounting technique is more similar to an essential strategy that is by and large utilized for exploring any crime in the monetary branch of an association. Some normal crimes are monetary record crisscrossing, financial harm through fake action, and tax assessment weaving. These kinds of monetary crimes are normal in authoritative business tasks, and general bookkeeping and examining implies confirming these exercises. A monetary measurable bookkeeping method incorporates researching the crime location, the general effect of recognizable proof of monetary damage, and inspecting the entire situation (Rehman & Hashim, 2018). The examination system has two huge parts. One is revealing the entire situation dependent on the wrongdoing type, rate, and effects with the goal that the association can assess the damage. Furthermore, the subsequent part is executing or recommending key techniques or models with the goal that the framework would not confront comparative action later. (Depauw, 2016). This suggestion interaction should be outlined, as a ramification that can impact the business capacity would not be an appropriate arrangement. By executing the saw review proposal, the business capacity would be liberated from any inside weaving component and through these ramifications, the development of the business additionally would be expanded (Sayidah, 2017). Likewise, through scientific bookkeeping, the proficiency level of the records division would increase, or possibly the office can distinguish the weak part of the office. This specific headway will foster the business activity progress, and keep away from any further crime. For example, registered insurance coverage is required in every insurance company in the US . The coverage is minimal but referred to as Collison coverage to provide necessary damage to the accident or total loss of the vehicle. Furthermore, when the price of the gas soared toward \$5.00 per gallon in late 2008, many vehicle owners in the US destroyed their cars or caused the vehicle to be stolen due to the decline in values of low mileage vehicles. The same incident was repeated when gas prices rose above \$4.00 in 2011. The forensic investigators were proactive in determining the loss and identifying whether the claim was legitimate or practical.

## **IMPACT OF FORENSIC ACCOUNTING TECHNIQUES TO MINIMIZE CORPORATE DAMAGE**

As per the discussion, the implementation of forensic accounting techniques in the finance department of corporate businesses to reduce the chances of financial fraudulent activities and monetary misplacements has a strong and significant impact on the recovery of corporate damages and the prevention of further incidents. If the impacts are analysed, it can be observed that the impacts of the application of forensic accounting have been positive so far and will serve so for the long-term period in the future too. The functional activities

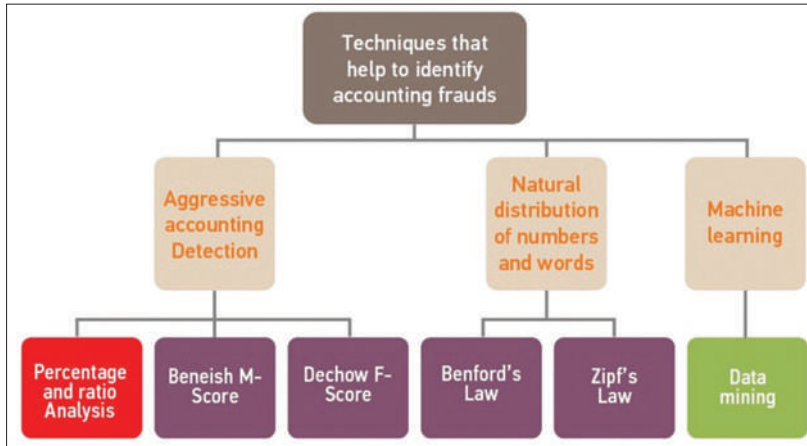
of forensic accounting create the difference, making it stand as the only available option for improvising the auditing system by incorporating the implementation of scientific innovation and developments of technologies (Simeon, 2018). The features of forensic accounting that create positive impacts on recovering corporate damages and prevention of fraudulent activities are described below.

- Assuring that Internal Controls are built into Every Process - the tendency of frauds and criminal minds is to take the opportunity mostly when there is a load of pressure. In such a situation, the authority generally lacks efficiency and cannot regulate every sector properly. But forensic accounting powered by the application of modern technologies enhances the efficacy of the regulation of all the sectors at its optimum level (Aigienohuwa et al., 2017). The implementation of the computational system, along with the implication of modern technologies, assures the overall control over every process.
- Reviewing on a regular interval - to control the accountancy and audits, the forensic accountant must have the perseverance to regulate the overall system on a daily basis or short interval of period. It is also important to check the records and reports suddenly to catch the frauds red-handed. Such diligence in the work field and regular and irregular checking prevent criminal minds from such activities.
- Implementing Company-Wide Anti-Fraud Education - Providing protection from fraud is not only keeping the employees in check but also making them aware of the situations and their consequences. Hence, it is essential to educate everyone involved in the business about fraud tendencies and their prevention, including owners and senior leadership of the organizations. This ensures that everyone is aware and has minimum knowledge of how to identify fraud and report it instantly (Rehman & Hashim, 2018). Moreover, the education serves the idea of making everyone understand what the implication of forensic accounting is and what the benefits are.
- Keeping the whistle-blowers anonymous - as per research, it has been reported that a major percentage of frauds have been identified by e anonymous whistle-blowers, who generally work undercover. Thus, for a corporate business, it is important to keep the whistle-blower anonymous, which makes the person unidentified from the criminals. This enhances the detection of fraud more effectively.
- Keeping regular contact with the forensic accounting team to catch fraud at the initial stage- identification of fraud is very important as well as critical for maintaining the financial and reputational status of the organization. Forensic accounting creates a user-friendly environment for all the employees, thus enabling their efficiency to keep regular contact with the forensic team (Rehman & Hashim, 2018). This leads to more effective detection and prevention of fraudulent activities.



## FORENSIC ACCOUNTING IN DETECTION AND PREVENTION OF FRAUD

**Figure 6 : techniques of detection and prevention of fraud by the implementation of forensic accounting**



(Source: Rehman & Hashim, 2018)

The above-mentioned picture represents the tools and techniques that the forensic accounting method used in detecting fraudulent activities and preventing further incidents. The implication of these techniques and laws makes forensic accounting appropriate and more effective in the detection of fraud and prevention of it.

**Percentage and ratio analysis** - the regular observation, monitoring and analysis of records of transactions and billing reports make the system effective in identifying the displacement if any occurs. The computational method quickens the review procedure and enables the overall checking of every sector. The machinery and technological advancement of forensic accounting make it possible for the auditor to cover the whole area without leaving a single sector unexamined (Imam et al., 2015). This increases the rate of detection, that gradually leads to a decrease in the rate of criminal activity.

**Beneish M score -****Figure 7 : Example showing how M score analysis can suggest the area of possible financial manipulation**

**Comparing key metrics of an M-score analysis can suggest areas of possible financial manipulation**

Characteristic	Mean of manipulators	Valeant (2013)	SuperGroup (2011)
DSRI	1.412	1.198	1.276
GMI	1.159	1.077	0.942
AQI	1.228	0.997	0.880
SGI	1.581	<b>1.658</b>	<b>1.707</b>
DEPI	1.072	<b>1.254</b>	0.930
SGAI	1.107	1.041	0.984
LVGI	1.124	1.022	1.103
TATA	0.049	-0.068	0.028
<b>M-score</b>		<b>-1.976</b>	<b>-1.586</b>

(Source: Chapman, 2018)

This method uses the computational statistical data to analyse the records and reports and after vigorous observation and assessment, it suggests the probably vulnerable area that can be manipulated or is already manipulated (Ozili, 2015). Based on the prediction of the M score, further investigation occurs, leading to the detection of the fraud. On the other hand, Beneish scores are correctly identified by 76% of manipulators, while 17.5% of manipulators incorrectly identify it. If the M-score is less than -1.78, the company is likely to be a manipulator, and the M-score value of -2.50 implies that the company has a low likelihood of manipulation.

Dechow's F scores -

Figure 8 : An example showing how F scores produce value for functions that are believed to be vulnerable

The F-score produces values for seven functions it believes may be vulnerable to misstatements		
	Valeant (2013)	SuperGroup (2011)
rsst_acc	0.07977	0.15529
ch_rec	0.03924	0.10335
ch_inv	0.01532	0.16707
soft_assets	0.93441	0.69535
ch_cs	0.55274	0.65252
ch_roa	-0.03015	-0.62487
issue	1	1
F-score	2.41	3.95

(Source: Sayidah, 2017)

Dechow's F score can be stated as the recent and updated version of the Beneish M score. The module collects data and compares the metrics of the misstating companies to the metrics of the companies without any misstatement. This helps to draw an outline of the standards for the correction of misstatements.

**Benford's law** - Benford's law functions by analysis of the deviation of manipulated digits from the anticipated frequencies (Xenya & Quist-Aphetsi, 2019). The more the deviation, the more the rate of fraud activity. This way, fraud can be detected by using Benford's law and after detection; further actions can be taken to prevent the vulnerability of data to criminals.

**Zipf's Law** - To identify the fraudulent accounting activity within an organization's department using Zipf's Law would be an effective move. This particular mathematical law of empirical statistics is often used for frequency distribution so that one can understand the value of the existing system and detect any conventional value that has not been processed previously.

**Data Mining** - Another important accounting fraud identification tool is data mining; this machine learning tool can analyse, extract and discover a specific pattern in financial transactions. Since organizational transactions have a large amount of data, using this particular tool that has a large data processing unit is useful (Bhasin, 2015).

The model is highly beneficial in the present-day calculation of financial ratios and eight variables which helps in the proper identification and justification of the earnings of the company. The M-scores in the Beneish model also help to determine how much manipulation is done on the company's earnings in order to reduce its growth and success in the global market. The main role of the model is to determine the financial frauds which affect the business's performance. The model is highly beneficial to the business because it helps to uncover financial fraud significantly. The model also helped to analyze and detect fraud with Enron Corporation. It helped the business to identify the fraud which manipulated their earnings. The application of the Beneish model was highly prevalent in the detection of fraud at Enron Corporation. The model also helps businesses to plan their investment, thereby gaining profitability in the future (Sorunke, 2018).

### CHALLENGES FACED BY AUDITORS IN IMPLEMENTING FORENSIC ACCOUNTING TECHNIQUES APPLICATION

The implementation of forensic accounting in audit and other financial regulations of a corporate business organization enhances the rate of effectiveness of the accountancy department of that organization many folds. It simplifies the identification and fixation of frauds and monetary displacement and prevents losses for the company (Mircheska *et al.*, 2020). But simultaneously, the implementation of forensic accounting techniques is not that easy and smooth as there are many challenges that emerge along the way. The most common and frequent challenges that are faced by auditors in implementing forensic accounting techniques are -

- **Acceptability** - the first challenge that appears in the way of implementation of forensic accounting is the reluctance of a major percentage of the employees to accept the method, especially from the aged generation of employees as they are not much familiar with the use of technologies and prefer the conserved traditional methods.
- **Adaptability** - if the legal infrastructure of countries all over the world is considered, not all countries have an infrastructure to support the acceptability and faster adaptability of innovative ideas and methods. Rather, they are rigid and conservative. On the other hand, not all the people of a country's population are equally adapting in nature, thus cannot receive the optimum utilization of any updated or new method (Mircheska *et al.*, 2020).
- **Technological advancement** - the inability of a particular country or organization, or person to adopt the technology and its implementation makes the implication of forensic accounting a challenge for the auditing authority as the major employees lack the knowledge about the technology and cannot handle the tools in the proper way. This makes the task quite difficult to implement.
- **Expensive** - for developed countries or big companies, the implementation of forensic accounting powered by the support of computational and technological

innovation results in the growth of the organization by reducing financial fraud. However, for small companies located in developing or underdeveloped countries, the expense of installing the system into the infrastructure is often an emerging issue (Mircheska et al., 2020).

- **Time-consuming** usually, the incorporation of forensic accounting saves time for the companies by removing the manual checking procedures, but in some cases, due to the lack of knowledge about the handling and proper application of the system, it becomes more time-consuming and complicated.
- **Cultural aspects** - the diverse cultural and social structure of different countries and different organizations impacts the implementation of forensic accounting to some extent. The difference in culture and mind-set of people amplify the challenges in the way of implementing forensic accounting for the auditor in a particular office environment.

## IMPORTANCE TO ACCEPT FINANCIAL FORENSIC EVIDENCE IN THE COURT OF LAW

Financial statements are considered crucial factors that affect the financial performance of the business in conducting effective investment decisions. Besides this, conducting external audits also focuses on determining the objectivity and accuracy the financial statements, such as: evaluating business performances, disclosure of resources and funds and forming an opinion that is based on the available information. Besides this, auditing is significantly regulated by obligatory standards that are required to be observed, whereas a similar form of standards prevents conducting external audits from gaining full potential (Mircheska et al., 2020). This is true and effective in case of detecting fraud. Significant expansion of significant financial misconduct depicted an increasing number of scams and frauds that took place in the previous decades, causing damages such as frauds. This gave rise to conducting forensic audits along with specialized forms of audit services. Besides this, forensic audit requires more knowledge and information from practice than from theory, and the substantial differences between them are theoretical, practical and conceptual (Paul & Yunusa, 2018). The nature of forensic audit also stipulates the differences associated with procedures followed for conducting external audits. Such differences take place when external audits cannot respond effectively and are associated with the detection and prevention of fraud with offensive forms of elements, along with preparing relevant evidence from the proceedings of the court. However, there are numerous restrictions that stand in the medium of this category of audit. The vital form of limitation is that the forensic audit is not obligatory in the case of conducting an external audit (Mircheska et al., 2020). Application of standard form of charges resulted from long-term practices. The demand for the provision of such a category of services appeared irregularly from case to case where the occurrence of fraud is evident as it appeared in the form of the subject of judicial proceedings. In the past decades, after the occurrence of various financial scandals, the requirements of conducting audit services are becoming more important effectively. It is also important to stress the ever-growing demand for this audit category.



are required to give due consideration. The vision statement of the organization also provides the future direction that it is striving to reach. This implies that every business sector requires a good leader that creates vision and synergy to ensure the achievement of strong corporate objectives. One such factor threatening the actualization of the corporate objective of the organization internationally is fraud (Adesina et al., 2020). Besides this, the incidental activities of fraud cases are increasing rapidly in the public and private sectors internationally. The developing nations and the states to which Nigeria belongs suffer from immense pain where fraudulent activities in the banking sectors are increasing, consequently leading towards the failure and distress of various banking organizations. This poses severe threats to the actualization of corporate objectives of business organizations (Mircheska et al., 2020).

**Figure 10 : Financial forensic evidence in the court of law**



(Source: Adesina et al., 2020)

As illustrated in the Black Law Dictionary, the occurrence of fraudulent activities is referred to as intentional action where an individual takes advantage of another person through suppression of truth or wilful deception. Such activities are considered a criminal offence that is misleading with the intention of cheating another party. Also, fraud takes place when individuals in the organization falsify financial information in the form of altering it or distorting it wilfully. The activity of fraud encompasses the effective engagement of illegal functional operations towards accessing unjust or inappropriate benefits (Adesina et al., 2020). As evaluated earlier, fraud is considered as a deliberate intention that is motivated to attract or receive undue benefit. Such understanding differentiates between error and fraud, where the business practices are referred to as the disclosures, unintentional misstatements or omissions. The intention or purpose of the error is not to enhance the misappropriation of assets of the organization. The purpose or intention of error is not to misappropriate the assets of an organization. Besides this, the concept of forensic audit is increasing rapidly in the field of financial accounting, which describes the successful engagement of actual results from the anticipated results. Moreover, forensic accounting or auditing is regarded as an investigative medium of accounting that is used for evaluating the successful engagement

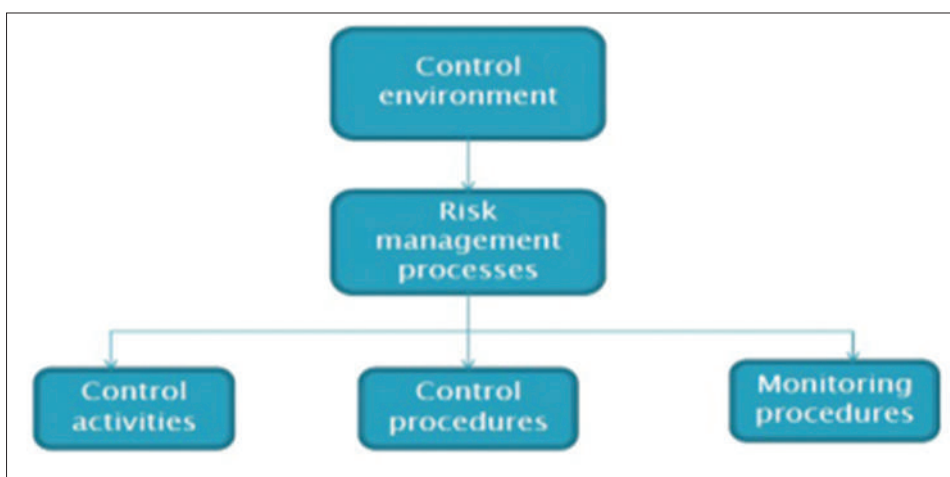


of organizations or individuals in conducting illegal financial activities. Also, the professional forensic accountant is required to work in both private and public practices. As critically analysed by Adesina *et al.* (2020), forensic auditing through accounting procedure is considered one of the old professions where its development has spanned over the years in various other forms of available financial information. In addition, forensic accountants are provided with high quality training and have become trained experts in interpreting and detecting the evidence of abnormal and normal phenomena towards successful interdiction of accounting records along with its resultant impact on financial reporting. Besides this, the increase in the case of fraudulent activities has forced organizations and corporations to quote and look for possible ways of tackling the fraudulent menace. Presently, fraud has become normal in most organization and due to its widespread investigation and auditing process has become unproductive in detecting and preventing fraudulent activities (Abou- Zeid *et al.*, 2020).

### EVIDENCE OF ACCEPTABILITY OF FORENSIC ACCOUNTING IN THE COURT OF LAW

With rapid changes in the world of business, increased globalization and increased investment in information technology with rising costs of research and development took place (Akinbowale *et al.*, 2020). Besides this, accounting crimes are regarded as the subset of economic crime that has consumed deep into the fabric of economies of the world, impacting its socio-economic environment. Besides this, forensic accounting is also regarded as investigating accountings that are considered a merger of both forensic accounting and science. It is also considered an integration of conducting auditing, accounting and undertaking investigative skills for dealing with fraudulent and illegal financial transactions (Mircheska *et al.*, 2020). Moreover, forensic accounting also emerged effectively with increasing response to fraudulent incidence.

**Figure 11 : Approaches for internal fraud control in accounting**



(Source: Akinbowale *et al.*, 2020)



Forensic accountancy is the special area of conducting accounting practices describing its engagement from the anticipated or actual disputes. In the USA, investigating corporate fraud is one of the basic purposes of the FBI (Federal Bureau of Investigation). It has been observed that, at the end of 2010, 653 cases were reported under the investigation process. (Akinbowale et al., 2020). However, an increase in the cases by 10% and 37% in the case of corporate frauds resulted in accounting for losses faced by potential investors. For instance: in the UK, the magnitude of loss that took place due to fraudulent actions was: 13 billion pounds in 2006, 30 billion pounds in 2010, 38 billion pounds in 2011 and 73 billion pounds in 2012, respectively (Akinbowale et al., 2020). As reported by National fraud security, there was an increase in the perpetration of fraud by 48%, which was accounted for in the year 2012. For the purpose of tackling financial crimes, the financial organizations are now expanding 5 billion pounds annually. However, there is no doubt regarding the increase in the cases of financial crime for assuming dangerous and international dimensions every year with its influence on the financial, economic and public organizations (Akinbowale et al., 2020).

**FORENSIC ACCOUNTING IN THE UK, US, AND MIDDLE EAST COUNTRIES**

Evolution of forensic accounting is associated with various historical events that highlight the differences in the status of conducting accounting assessments and adopting different approaches in different nations having different legal systems. There are various foreign studies that are mainly devoted to the experience of conducting forensic accounting and fraud examinations. This depicts the importance and necessity of conducting research in this area. There are 63 scientific research articles available regarding forensic accountants and forensic accounting, and all those articles are significantly registered in a database system named “Scopus” from 1992 to 2017 (Liodorova & Fursova, 2018).

**Figure 12 : Forensic accounting in the USA**



(Source: Liodorova & Fursova, 2018)

The national leaders of the publication of articles are: the USA, UK, Nigeria, Canada, Australia, and Middle Eastern regions, along with Germany, China, South Korea, Malaysia and India. Besides this, the publication of the number of articles increased in 2008, (Liodorova & Fursova, 2018) resulting in an improvement in its growth yearly. There are several foreign scientific studies regarding accounting assessments and forensic accounting that were significantly published by forensic organizations. Also, there are various publications concerning fraud assessments and forensic accounts that were presented by international professional associations such as ACFE (Association of Certified Fraud Examiners), AICPA (Institute of Certified Public Accountants) and NACVA (National Association of Certified Valuators and Analysts) respectively (Liodorova & Fursova, 2018). Based on these conditions of conducting advanced audits and fulfilling the conditions of the market economy, the services of forensic experts and auditors were used for conducting accounting assessments. Besides this, forensic accounting and auditing operate in an individual area that continues to operate individually. Also, an auditor check is related to the successful adoption of compliance of books of organization that follow generally accepted accounting policies and principles in conducting operational functions based on auditing standards (Mishra et al., 2021).

**Figure 13 : Forensic accounting in the UK**



(Source: Liodorova & Fursova, 2018)

Forensic accounting is also considered a financial assessment procedure that is followed within the judicial system. The main subject of forensic accounting is regarded as the action of recording, extracting, settling, verifying, reporting and classifying past accounting data or activities in solving potential and current legal disputes (Liodorova & Fursova, 2018). Besides this, past economic data is used for projecting future economic data for solving financial issues. The main aim of the financial auditor is to conduct annual report auditing that might face fraudulent reports. In addition to this, the practices followed by forensic accountants comprise both disputes and fraudulent investigations for not involving fraud. Thus, there is a strong correlation between forensic auditing and accounting procedures in combating and preventing the occurrence of fraudulent activities (Inyang & Goodwil, 2020).

## **REAL LIFE EXAMPLES OF FRAUD AND FINANCIAL STABILITY**

The case of Well Fargo is different. The employees were given higher targets and sales goals. This led the employees of the bank to create fake names and profiles in the name of the customers. Furthermore, if the customers opened a savings account, the employees issued credit cards in the name of the customers. Hence it led to an increase in short- term profits because the employees created fake accounts, and the profit rose 2 million. The short- term profit did not add much value, and the company had to pay \$3 billion in fines to the U.S. Securities and Exchange Commission and Department of Justice. It led the company to suffer from huge financial risk, thereby hampering the growth and development of the company.

On the other hand, in the case of Volkswagen, the government around the world directs the car manufacturing companies to test the car before the final launch. The test is related to fuel cost and pollution control by the car. So the company put in a special type of software, and about 11 million diesel-powered cars were tested for pollution and provided positive results. In 2015 the company suffered from diesel dupe, and the company had to pay \$25 billion in fines. Hence the company is constantly facing financial burdens and ongoing litigation risk (Hirtle et al., 2016).

However, the financial instability and management of corporate fraud were reduced by setting up an executive committee where they are responsible for implementing fraud prevention measures (Al-Absy, 2020). Implementation of risk assessment paves the path for prevention strategies. Consistent monitoring and communication of fraud prevention is highly effective and needs constant valuation with time. Financial stability after fraud can be achieved by using the Merton model. The model measures the firm's ability to meet the financial constraints and measure the overall profitability of the firm. The model is also irresponsive when the value of the firm's liabilities exceeds the total assets of the firm (Cihak et.al., 2016). The model is used to capture the financial activity significantly. Hence these methods and assessment help the firms to get rid of financial fraud and establish robust financial stability.

## **RECENT EXAMPLE OF THE ROLE OF FORENSIC ACCOUNTING IN DETECTING FRAUD AND FINANCIAL STABILITY**

The Enron scandal is one of the biggest cases in American history. The scandal was formed from the 1980s to 2001 when the accountants with the executives of the company had hidden millions of dollars of debt and failed projects. The company's stock declined from \$90 to \$1 which was an alarming concern for the company. With the decline in profitability rates, the company employed an SEC investigation team to find out the cause of the decline in the profit of the company. However, after a thorough investigation, it was found that the accounting techniques were completely wrong, which portrayed false results for the growth and development of the company. The thorough investigation also led to the reveal of the accounting techniques. The investigation team found that misrepresentation of the financial

data was a significant issue in the company. Moreover, the company also had hidden debt in partnerships, inflating the stock price and debt rating. Hence the CEO of the company was put to prison for 14 years. It also led to the death of the CEO of the company during imprisonment (Li, 2010).

The case of WorldCom Fraud was also a major scandal in the United States. The growth and success of the company was significantly high throughout the 1990s. The company was forced to shut down after the collaboration with Sprint by the U. S. Justice Department in 2000. The reason for the shutdown of the company was due to fraudulent practices in the accounting techniques throughout the company, which led to the closure of the company. The fraudulent accounting practices were done by the accounting executives of the company, where a reduction of earnings was portrayed by the accounts to maintain a significant ratio in the current stock prices. The scandal was caught by the internal operations team, where the auditors began to cross-check the fraudulent activities of the company. The auditors of the company deciphered about \$3.8 billion in fraudulent entries in capital expenditures and inflating revenue through fake and unallocated revenue accounts. The company was also penalized for the misdeeds, and the outcome of the fraudulent activities led to bankruptcy. Presently company collaborated with MCI Inc., a subsidiary of Verizon (Li, 2010).

Hence from the above cases, it is quite justifiable that the role of a forensic accountant is vital to minimize fraudulent activities. Dedicated professionals are a vital part of finding out fraudulent activities all around the world. The proactiveness, skill and knowledge of forensic accountants help in the reduction of corporate frauds, thereby enabling businesses to gain more profitability in the future. Moreover, Aji and Urumsah (2017) states that forensic accountants have the proactiveness to investigate crime and work hand in hand with the legal system to reduce corporate fraud and help businesses to reach growth and success with time.

## **FUTURE OF FORENSIC ACCOUNTING FOR THE NEW GENERATION**

The pandemic, which was initiated at the end of 2019 situation all over the world, led to innovation in business operations. Remote working condition is highly prevalent in all business sectors. With the evolution of technology, businesses are integrating new technology into their business processes which has helped to enhance their profitability, but at the same time, it is also a risk. Fraudulent activities are very common in the present business structure, and in some cases, it often leads to a decrease in business profitability. The auditors and the business accountants are incapable of detecting fraud through traditional ways thereby, forensic accountants are mandatory to detect fraud and restrict fraudulent activities, which affects business growth (Ocansey, 2017). The roles and responsibilities of forensic accounts are diverse. Presently forensic, accounts are highly capable of diminishing fraud by moving from traditional roles to more contemporary ways for the growth and development of the business and thereby reducing fraud significantly (Godwin et al., 2018). However, the roles

and responsibilities include providing expert evidence in fraud, bribery and corruption trials, interviewing witnesses, imaging devices, data mining, data interrogation, data hosting, adequate knowledge of the various sectors and industries, asset tracing, asset recovery and corporate intelligence. Forensic accountants implement technology in their practice, which helps in the identification of fraud in a very short time. The impact of globalization is making the future of forensic accountants very tough due to the international nature of business, regulatory scrutiny and investigations (Nigrini, 2020). Hence the roles of forensic accounts are vital because they focus on business strategy and litigation and ensure transparency in the overall business process. In the era of digitalisation of business, there is exponential growth of data and chances of fraudulent activities are higher. So the forensic accountants' role is to mitigate fraudulent activities in the business market with skill and expertise. The role is continuously evolving with the growth in technology. Abdulrahman (2019) states that forensic accountants possess in depth skills and knowledge, thereby analyzing the issues and drawbacks in the companies' financial records through the detailed analysis of financial records and interviews. The accountants are also responsible for the management and tracing of funds and checking any irregularities in the funds. Moreover, thorough review and disclosure processes are also checked by forensic accountants (Oyedokun, 2016). However, there is a great difference between modern forensic accountants and traditional accountants. Modern tools and techniques are currently used by forensic accountants to identify fraud in the financial transactions of contemporary business activities. Therefore, according to the Market Research Future (MRFR), in the future, forensic accounting market is expected to hit USD 8.85 Billion at a CAGR of 8.2% by 2025.

## **FUTURE RESEARCH DIRECTIONS**

The focus is fundamentally on accounting concerns, but the role of forensic accountants exceeds the traditional role towards a more generic one. It includes a collection of evidence and dealing strategically to make the best out of it. Globally each and every accounting firms have forensic evidence sections maybe, without divisions. So in future directions, if sub-divisions and differentiations are adequately identified in various aspects like insurance applications, personal injury declarations, fraudulence, construction and royalty audits, it will provide more insightful information on the study area. In the future, the study can analyse in-depth the increasing risk of online criminal offence so that it will portray more critical information about the accounting concern developed due to the issue. In the future the study can also delve deeply into the services in retrieving profits from the crime and move forward with the appropriate proceedings to analyse the various intricacies related to the crime. Furthermore, in the future scope, the study can also focus on the breakdown of regulators so that tracing and detection of cyber security frauds are identified in detail. The study can also focus on the long chain of government and cooperative banks so that their functioning is strong. Moreover, the study can also focus on the insolvency cases of forensic accounting to get a vivid idea about the critical action taken against the borrowers for not repaying

loans on time. The use of technology in investigating financial forensic evidence is incredibly essential to gather insights about fraud related to insurance and other financial matters. The role of technology in forensic accountants requires continuous analysis to get hold of the actual scenario. The study can also delve deeply into the use of new technologies like artificial intelligence and machine learning to detect fraud and support forensic accountants for better analysis and interpretation.

## **SUMMARY OF THE FINDINGS**

From the above analysis of financial forensic evidence and acceptability in the court of law, it can be inferred that, through forensic accounting, financial theft analysis can be conducted in which the accountant surveys the existing system of financial departments and audits accordingly. Besides this, for assessing security fraud or bankruptcy in the organization, forensic accountants investigate the entire crime scene and attempt to make an investigation report. For assisting the business organization, a financial forensic accounting procedure is conducted in which, auditing, impact of financial harm and investigating the crime scene is conducted. The forensic auditor also suggests various forms of strategic methods or models so that the system would not face similar activity in the future. Application of cloud forensic audit enhances successful implementation of forensic technology and science for reorganization of financial records and presenting them as evidence. Such application enhances increasing effectiveness and efficiency of the corporate organizations in detecting fraud. In addition to this, forensic accounting techniques also appear similar to the application of essential strategy in utilizing and exploring the occurrence of crime in the organization. Moreover, forensic audits were also conducted for evaluating substantial differences for conducting external audits. Such forensic financial audit enhanced reduction in occurrence of fraudulent activities in the organization.

**KEY TERMS:**

**Financial audit report:** Financial audit report refers to the set of financial statements of the company and its compliance with accounting standard practices. The audit report does not showcase the earnings of the company but the performance of the whole period.

**Annual transaction:** Annual transactions refer to the transactions made annually and written in a report to analyse the financial condition of the company.

**Financial Risk Factors:** Financial risk factors are highly associated with price fluctuations and volatility. Some of the financial risk factors include interest rates, foreign currency exchange rates, and commodity and stock prices. It produces a change in the price of the financial instruments.

**Corporate governance:** Corporate governance is a set of rules and regulations by which businesses are operated, regulated and controlled.

**Financial crimes:** Financial crimes refers to the act of committing any kind of crime relating to money or to any other financial services.

**Accounting techniques:** Accounting techniques implies to the rules followed by the company to analyse revenues and expenses.

**Audit report:** An audit report refers to the written opinion of the auditor about the financial statements of a company.

**Financial frauds:** Financial fraud refers to the situation where the stakeholders deprive the business by not paying money, which significantly harms the financial health of the businesses.



**Additional Readings**

- Abbas, G. (2020). Role of Forensic Auditing in Enhancing the Efficiency of Public Sector Organization: Role of Forensic Auditing. *Reviews of Management Sciences*, 2(2), 40-59.
- Abou-Zeid, N., El-Mousawi, H., & Younis, J. (2020). Impact of Forensic Accounting Domains on Financial Corruption in Lebanon –An Empirical Study. *International Journal of Economics and Finance*, 12(8), 121-121.
- Bassey, E. B. (2018). Effect of forensic accounting on the management of fraud in microfinance institutions in Cross River State. *Journal of Economics and Finance*, 9(4), 79-8.
- Bhasin, M.L. (2016) Contribution of Forensic Accounting to Corporate Governance: An Exploratory Study of an Asian Country. *International Business Management*, 10, 479 - 492.
- Imam, A., Kumshe, A. M., & Jajere, M. S. (2015). Applicability of forensic accounting services for financial fraud detection and prevention in the public sector of Nigeria. *International Journal of Information Technology and Business Management*, 4(1), 136.
- Osho, A. E. (2017). Impact of forensic accounting on university financial system in Nigeria. *European Scientific Journal*, 13(31), 571-590.
- Ozili, P.K. (2015). Forensic Accounting and Fraud: A Review of Literature and Policy Implications. *International Journal of Accounting and Economics Studies*, 3(1), 63-68.
- Simeon, E. D. (2018). Fighting economic and financial crimes in Nigeria using forensic accounting: The moderating effect of technology. *International journal of economics and financial research*, 4(7), 235-241.



## REFERENCE

- Abbas, G. (2020). Role of Forensic Auditing in Enhancing the Efficiency of Public Sector Organization: Role of Forensic Auditing. *Reviews of Management Sciences*, 2(2), 40-59.
- Abdulrahman, S. (2019). Forensic accounting & fraud prevention in Nigerian public sector: A conceptual paper. *International Journal of Accounting & Finance Review*, 4(2), 13-21.
- Abou-Zeid, N., El-Mousawi, H., & Younis, J. (2020). Impact of Forensic Accounting Domains on Financial Corruption in Lebanon –An Empirical Study. *International Journal of Economics & Finance*, 12(8), 121-121.
- Adesina, K., Erin, O., Ajetunmobi, O., Ilogho, S. & Asiriwa, O., (2020). Does forensic audit influence fraud control? Evidence from Nigerian deposit money banks. *Banks & Bank Systems*, 15(2), p.214. <https://pdfs.semanticscholar.org/424b/c16778a083b00d323e58c9dec6ee1195ae2f.pdf>
- Aigienohuwa, O., Okoye, E.I. & Uniamikogbo, E.O., (2017). Forensic accounting & fraud mitigation in the Nigerian banking industry. *Accounting & Taxation Review*, 1(1), pp.177-195. <https://zbw.eu/econis-archiv/bitstream/11159/4366/1/1695023315.pdf>
- Aji, S. S. B., & Urumsah, D. (2017). Factors affecting the use of forensic accounting services an empirical study on Indonesian banks. *Asia Pacific Fraud Journal*, 1(1), 147-163.
- Akinbowale, O.E., Klingelhöfer, H.E. & Zerihun, M.F., (2020). An innovative approach in combating economic crime using forensic accounting techniques. *Journal of Financial Crime*. <https://www.emerald.com/insight/content/doi/10.1108/JFC-04-2020-0053/full/html>
- Al-Absy, M. S. M. (2020). The board chairman's characteristics & financial stability of Malaysian-listed firms. *Cogent Business & Management*, 7(1), 1823586.
- Antwi-Boasiako, A., & Venter, H. (2017, January). A model for digital evidence admissibility assessment. In *IFIP International Conference on Digital Forensics* (pp. 23-38). Springer, Cham.
- Bhasin, M.L. (2016) Contribution of Forensic Accounting to Corporate Governance: An Exploratory Study of an Asian Country. *International Business Management*, 10, 479-492.
- Chapman, A., 2018, February. Intruder detection through pattern matching & provenance driven data recovery. In *Proc. Cloud Comput.* (pp. 58-64). [https://www.researchgate.net/profile/Bob-Duncan/publication/324521739\\_CLOUD\\_COMPUTING\\_2018\\_Proceedings\\_of\\_the\\_Ninth\\_International\\_Conference\\_on\\_Cloud\\_Computing\\_GRIDs\\_&\\_Virtualization/links/5ad24f1d0f7e9b2859343862/CLOUD-COMPUTING-2018-Proceedings-of-the-Ninth-International-Conference-on-Cloud-Computing-GRIDs-&Virtualization.pdf#page=70](https://www.researchgate.net/profile/Bob-Duncan/publication/324521739_CLOUD_COMPUTING_2018_Proceedings_of_the_Ninth_International_Conference_on_Cloud_Computing_GRIDs_&_Virtualization/links/5ad24f1d0f7e9b2859343862/CLOUD-COMPUTING-2018-Proceedings-of-the-Ninth-International-Conference-on-Cloud-Computing-GRIDs-&Virtualization.pdf#page=70)

- Čihák, M., Mare, D. S., & Melecký, M. (2016). The nexus of financial inclusion & financial stability: A study of trade-offs & synergies. *World Bank Policy Research Working Paper*, (7722).
- Depauw, S. (2016). A European evidence (air) space? Taking cross-border legal admissibility of forensic evidence to a higher level. *EuCLR European Criminal Law Review*, 6(1), 82-98.
- Duncan, B. & Whittington, M., 2018. Can Forensic Audit Help Address the Cloud Forensic Problem in Light of the Requirements of the Forthcoming European Union General Data Protection Regulation?. *Cloud Comput*, pp.84-89. [https://www.researchgate.net/profile/Bob-Duncan/publication/324521739\\_CLOUD\\_COMPUTING\\_2018\\_Proceedings\\_of\\_the\\_Ninth\\_International\\_Conference\\_on\\_Cloud\\_Computing\\_GRIDs\\_&\\_Virtualization/links/5ad24f1d0f7e9b2859343862/CLOUD-COMPUTING-2018-Proceedings-of-the-Ninth-International-Conference-on-Cloud-Computing-GRIDs-&Virtualization.pdf#page=95](https://www.researchgate.net/profile/Bob-Duncan/publication/324521739_CLOUD_COMPUTING_2018_Proceedings_of_the_Ninth_International_Conference_on_Cloud_Computing_GRIDs_&_Virtualization/links/5ad24f1d0f7e9b2859343862/CLOUD-COMPUTING-2018-Proceedings-of-the-Ninth-International-Conference-on-Cloud-Computing-GRIDs-&Virtualization.pdf#page=95)
- Eliezer, O., & Emmanuel, B. (2015). Relevance of forensic accounting in the detection & prevention of fraud in Nigeria.
- Godwin, O. E., Enyi, E. P., & Dada, S. O. (2018). Forensic accounting techniques & integrity of financial statements: an investigative approach. *Journal of African Interdisciplinary Studies (JAIS)*, 2, 3.
- Hirtle, B., Kovner, A., Vickery, J., & Bhanot, M. (2016). Assessing financial stability: The capital & loss assessment under stress scenarios (CLASS) model. *Journal of Banking & Finance*, 69, S35-S55.
- Hitchcock, M., 2018. The Importance & Implications of Forensic Accounting in the Financial World. [https://digitalcommons.liu.edu/post\\_honors\\_theses/35/](https://digitalcommons.liu.edu/post_honors_theses/35/)
- Imam, A., Kumshe, A. M., & Jajere, M. S. (2015). Applicability of forensic accounting services for financial fraud detection & prevention in the public sector of Nigeria. *International Journal of Information Technology & Business Management*, 4(1), 136.
- Inyang, W. S., & Goodwil, G. F. (2020). FORENSIC EVIDENCE: HOW DOES ADMISSIBILITY INFLUENCE WEIGHT IN THE LAW OF EVIDENCE?. *International Journal of Business, Economics & Law*, 21(5), 53-65.
- Liodorova, J.U.L.I.A. & Fursova, V.A.L.E.R.I.Y.A., 2018. Forensic Accounting in the World: Past & Present. *Journal of Economics & Management Research*, 7, pp.84-99. [http://dspace.lu.lv/dspace/bitstream/handle/7/49047/Book\\_Journal\\_Econ\\_Management-7\\_2018.pdf?sequence=1#page=84](http://dspace.lu.lv/dspace/bitstream/handle/7/49047/Book_Journal_Econ_Management-7_2018.pdf?sequence=1#page=84).
- Li, Y. (2010). The case analysis of the scandal of Enron. *International Journal of Business and Management*, 5 (10), 37-41.

- Mircheska, K., Karadjova, V., Blazheva, S., Malakovska, M. & Nikolovski, P., (2020). The Importance of Forensic Audit & Differences in Relation to Financial Audit. *International Journal of Sciences: Basic & Applied Research (IJSBAR)*, 54(2), pp.190-200.<https://core.ac.uk/download/pdf/337387666.pdf>
- Mishra, K., Azam, M. K., & Junare, S. O. (2021). Role of Forensic Audit in Controlling Financial Statement Fraud: A case study of Satyam Computers. *Psychology & Education Journal*, 58(2), 4016-4025.
- Mitrović, A. & Knežević, S., 2020, September. FRAUD & FORENSIC ACCOUNTING IN THE DIGITAL ENVIRONMENT OF ACCOUNTING INFORMATION SYSTEMS: FOCUS ON THE HOTEL INDUSTRY. In *Tourism International Scientific Conference Vrnjačka Banja-TISC* (Vol. 5, No. 1, pp. 281-295).<http://www.tisc.rs/proceedings/index.php/hitmc/article/download/342/337>
- Nigrini, M. J. (2020). *Forensic analytics: Methods & techniques for forensic accounting investigations*. John Wiley & Sons.
- Nikkel, B., (2020). Fintech forensics: Criminal investigation & digital evidence in financial technologies. *Forensic Science International: Digital Investigation*, 33, p.200908.<https://www.sciencedirect.com/science/article/pii/S2666281720300287>
- Nsor-Ambala, R., (2021). Auditors' Perception of the Effectiveness of Fraud Detection Techniques in Stock & Warehousing Cycles: Comparison between Ghana, US, & New Zealand. *Journal of Forensic & Investigative Accounting*, 13(1).<http://web.nacva.com.s3.amazonaws.com/JFIA/Issues/JFIA-2021-No1-10.pdf>
- Ocansey, E. O. N. D. (2017). Forensic accounting & the combating of economic & financial crimes in Ghana. *European Scientific Journal*, 13(31), 379-393.
- Ocansey, E.O.N.D., (2017). Forensic accounting & the combating of economic & financial crimes in Ghana. *European Scientific Journal*, 13(31), pp.379-393.[https://www.researchgate.net/profile/Evans-Ocansey-2/publication/321134338\\_Forensic\\_Accounting\\_&\\_the\\_Combating\\_of\\_Economic\\_&\\_Financial\\_Crimes\\_in\\_Ghana/links/5a269a1b4585155dd423e693/Forensic-Accounting-&-the-Combating-of-Economic-&-Financial-Crimes-in-Ghana.pdf](https://www.researchgate.net/profile/Evans-Ocansey-2/publication/321134338_Forensic_Accounting_&_the_Combating_of_Economic_&_Financial_Crimes_in_Ghana/links/5a269a1b4585155dd423e693/Forensic-Accounting-&-the-Combating-of-Economic-&-Financial-Crimes-in-Ghana.pdf)
- Ocansey, E.O.N.D., (2017). Forensic accounting & the combating of economic & financial crimes in Ghana. *European Scientific Journal*, 13(31), pp.379-393.[https://www.researchgate.net/profile/Evans-Ocansey-2/publication/321134338\\_Forensic\\_Accounting\\_&\\_the\\_Combating\\_of\\_Economic\\_&\\_Financial\\_Crimes\\_in\\_Ghana/links/5a269a1b4585155dd423e693/Forensic-Accounting-&-the-Combating-of-Economic-&-Financial-Crimes-in-Ghana.pdf](https://www.researchgate.net/profile/Evans-Ocansey-2/publication/321134338_Forensic_Accounting_&_the_Combating_of_Economic_&_Financial_Crimes_in_Ghana/links/5a269a1b4585155dd423e693/Forensic-Accounting-&-the-Combating-of-Economic-&-Financial-Crimes-in-Ghana.pdf)

- Oyedokun, G. (2015). Approach to forensic accounting & forensic audit. *Available at SSRN 2575168*.
- Oyedokun, G. (2016). Forensic Accounting Investigation Techniques: Any Rationalization?. *Available at SSRN 2910318*.
- Özcan, A., (2018). The Use of Beneish Model in Forensic Accounting: Evidence from Turkey. *Journal of Applied Economics & Business Research*, 8(1).<http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=1927033X&AN=128868562&h=CgJ1mHw3p9Je%2F75LV8yUhnLfOELgV0%2BuHQOYtpURGgMeiTHAKy228oRVET%2FPdQDvHWLGUrUqAx1tl%2B0FL9WmPA%3D%3D&crl=c>
- Ozili, P. K. (2015). Forensic Accounting & Fraud: A Review of Literature & Policy Implications. *International Journal of Accounting & Economics Studies*, 3(1), 63-68.
- Paul, A. A., & Yunusa, A. (2018). Forensic accounting & economic stability in the Nigerian public sector: The role of economic & financial crime commission. *International Journal of Peace & Conflict Studies*, 4(3), 76-85.
- Rehman, A. & Hashim, F. (2018). Forensic Accounting on Corporate Governance Maturity mediated by Internal Audit: A Conceptual Overview. *Advances in Economics, Business & Management Research*, 46, pp.161-168.<http://fss.xxyy.info/journal/2018/2157118X.8.1.R3.pdf>
- Sayidah, N., (2017). Internalization of the Values of Mental Revolution in Forensic Accounting & Investigative Audit Learning Models. *Asia Pacific Fraud Journal*, 3(2), pp.297-305. <https://www.apfjournal.or.id/index.php/apf/article/download/85/98>
- Simeon, E. D. (2018). Fighting economic & financial crimes in Nigeria using forensic accounting: The moderating effect of technology. *International journal of economics & financial research*, 4(7), 235-241.
- Sorunke, O. A. (2018). Forensic accounting investigation techniques & successful prosecution of corruption cases in Nigeria. *International Journal of Academic Research in Accounting, Finance & Management Sciences*, 8(3), 37-44.
- Sorunke, O.A., (2018). Forensic accounting investigation techniques & successful prosecution of corruption cases in Nigeria. *International Journal of Academic Research in Accounting, Finance & Management Sciences*, 8(3), pp.37-44.[https://www.researchgate.net/profile/Olukayode-Sorunke/publication/327821527\\_FORENSIC\\_ACCOUNTING\\_INVESTIGATION\\_TECHNIQUES\\_&\\_SUCCESSFUL\\_PROSECUTION\\_OF\\_CORRUPTION\\_CASES\\_IN\\_NIGERIA/links/5ba638cba6fdccd3cb6a4ac0/FORENSIC-ACCOUNTING-INVESTIGATION-TECHNIQUES-&-SUCCESSFUL-PROSECUTION-OF-CORRUPTION-CASES-IN-NIGERIA.pdf](https://www.researchgate.net/profile/Olukayode-Sorunke/publication/327821527_FORENSIC_ACCOUNTING_INVESTIGATION_TECHNIQUES_&_SUCCESSFUL_PROSECUTION_OF_CORRUPTION_CASES_IN_NIGERIA/links/5ba638cba6fdccd3cb6a4ac0/FORENSIC-ACCOUNTING-INVESTIGATION-TECHNIQUES-&-SUCCESSFUL-PROSECUTION-OF-CORRUPTION-CASES-IN-NIGERIA.pdf)

- Xenya, M.C. & Quist-Aphetsi, K., (2019, May). A Cryptographic Technique for Authentication & Validation of Forensic Account Audit Using SHA256. In *2019 International Conference on Cyber Security & Internet of Things (ICSIoT)* (pp. 11-14). IEEE. [https://www.researchgate.net/profile/Michael-Xenya/publication/340553412\\_A\\_Cryptographic\\_Technique\\_for\\_Authentication\\_and\\_Validation\\_of\\_Forensic\\_Account\\_Audit\\_Using\\_SHA256/links/5f45425792851cd3022bb14e/A-Cryptographic-Technique-for-Authentication-&-Validation-of-Forensic-Account-Audit-Using-SHA256.pdf](https://www.researchgate.net/profile/Michael-Xenya/publication/340553412_A_Cryptographic_Technique_for_Authentication_and_Validation_of_Forensic_Account_Audit_Using_SHA256/links/5f45425792851cd3022bb14e/A-Cryptographic-Technique-for-Authentication-&-Validation-of-Forensic-Account-Audit-Using-SHA256.pdf)
- Yoon, S., (2020). A study on the transformation of accounting based on new technologies: Evidence from korea. *Sustainability*, 12(20), p.8669. <https://www.mdpi.com/2071-1050/12/20/8669/pdf>

# THE ROLE OF SMART CONTRACTS IN DISTRIBUTED LEDGER TECHNOLOGY

*Kumaresan Chandrasekaran*

---

## **Abstract**

The distributed ledger technology (DLT) is revolutionizing the way businesses are being conducted. Smart contracts, a key component of DLT, have the ability to automate processes, reduce intermediaries, and increase transparency. This study explores the role of smart contracts in DLT and its potential to disrupt traditional business models. Further, the applications, challenges, and future trends of DLT and smart contracts in various fields such as construction, accounting, management, cybersecurity, and supply chain management by analyzing several studies and articles are also explored. One of the key advantages of smart contracts is the ability to automate processes and reduce intermediaries, thus resulting in cost savings and increased efficiency. Additionally, the use of cryptographic signatures and code to enforce the terms of an agreement provides a higher level of trust, enabling new business models based on trust and transparency. However, there are also challenges to overcome: such as legal recognition, regulation, standardization, and contract logic complexity. The Qualitative research method can be used to collect data through a comprehensive literature review of studies and articles on DLT and smart contracts. This will provide an in-depth understanding of the applications, challenges, and future trends of DLT and smart contracts in different fields. Additionally, the lack of formal verification techniques, privacy, and regulatory compliance are also matters of serious concern. Despite these challenges, research and development in this field continue to evolve and progress. From formal verification to ensure the correctness of smart contracts to the integration of oracles to provide external data, the advancements in smart contract technology are increasing. The role of smart contracts in DLT is poised to revolutionize various industries, with the potential to disrupt traditional business models and create new opportunities for automation, efficiency, and trust.

**Keywords:** *Smart contract, Distributed ledger Technology, Tokenization, Blockchain*

## 1. INTRODUCTION

Distributed ledger technology (DLT) is a system that allows multiple parties to share a digital record of transactions across a network of computers rather than relying on a central authority (Duncan Cotterill, 2017). This technology emerged as a way to keep a secure and tamper-proof record of transactions where all the parties involved can have access to the same information. Blockchain is one specific type of DLT that creates a chain of blocks, each containing a group of transactions. Once a block is added to the chain, it cannot be altered, ensuring the integrity of the data. Blockchain technology uses cryptography to secure records and has the potential to be used in a wide range of industries such as finance, healthcare, supply chain, and more (Ihle & Sanchez, 2019).

The most well-known application of blockchain technology is Bitcoin, the first decentralized digital currency that uses a blockchain to record all transactions (Tan & Low, 2017). This application has led to the development of other cryptocurrencies and the creation of decentralized platforms such as Ethereum, which allows for the creation of smart contracts (Punathumkandi et al., 2021). Blockchain technology has the potential to revolutionize the way transactions, storage of data, and sharing of information are conducted (Demirkan et al., 2020). However, it is still a relatively new technology, and there are still many challenges to overcome, such as scalability, interoperability, and regulations.

### 1.1 Objectives of this study

- To analyze the role of smart contracts in DLT and their potential to disrupt traditional business models.
- To explore the potential limitations of smart contracts in DLT and recommend strategies for addressing these limitations to maximize their benefits.
- To analyze the potential impact of smart contracts on different industries and identify the challenges and opportunities that need to be addressed for successful adoption.

### 1.2 Scope of this study:

The study focuses on the role of smart contracts in DLT and their potential to disrupt traditional business models. The research explores the applications, challenges, and future trends of DLT and smart contracts in different fields, such as construction, accounting, management, cybersecurity, and supply chain management. The study also examines the key advantages of smart contracts, such as their ability to automate processes and reduce intermediaries, which results in cost savings and increased efficiency. Additionally, the research identifies the challenges to overcome, such as legal recognition, regulation, standardization, and contract logic complexity. Further, the advancements in smart contract technology, such as formal verification, integration of oracles and privacy concerns, are explored. The research also evaluates the potential of smart contracts in revolutionizing various industries and creating new opportunities for automation, efficiency, and trust. Finally, the study provides recommendations for addressing the challenges and maximizing the potential benefits of smart contracts in DLT.

## **2. RELEVANT PAST STUDIES**

### **2.1 Overview of distributed ledger technology (DLT) and its role in smart contracts:**

A distributed ledger is a common record of activity shared among computers in many locations. The concept is not brand-new. Organizations (like grocery chains, for example) that have branches or offices throughout a specific country or across countries employ such ledgers. In contrast, a system administrator often handles the crucial tasks required to preserve consistency across the various copies of the ledger in a traditional distributed database. One straightforward method to achieve this objective is for the administrator of the system to maintain a regularly updated primary version of the ledger.

According to the article “Applications of distributed ledger technology (DLT) and Blockchain-enabled smart contracts in construction” by Li et.al., 2021, smart contracts can play a significant role in improving the efficiency and transparency of construction projects by automating the process of contract execution and reducing the need for intermediaries.

In the article “Distributed Ledger Technologies and Their Applications: A Review” by (Soltani et al., 2022), it is mentioned that Smart Contracts are one of the most important and widely used applications of DLT. The authors of this study discussed various industries, such as finance, healthcare, and supply chain management. Additionally, the article “Regulating Blockchain, DLT and Smart Contracts: a technology regulator’s perspective” by (Ellul et al., 2020) states that smart contracts have the potential to revolutionize the way transactions are conducted by automating the process and reducing the need for intermediaries; but it also highlights the need for proper regulation to ensure legal certainty and consumer protection. Smart contracts are an important application of DLT and blockchain as they automate the process of contract execution and have the potential to improve efficiency, transparency and reduce intermediaries in various industries.

### **2.2 Centralized vs Distributed ledger technology**

Distributed ledger technology (DLT) is a set of protocols and infrastructure that allow computers in different locations to propose and validate transactions and update records in a synchronized way across a network. Traditional distributed ledgers rely on a central authority, while DLT systems like Bitcoin and Ethereum operate in a decentralized environment without a trusted intermediary. These systems use consensus-based validation and cryptographic signatures to facilitate peer-to-peer transactions, with blockchain technology being the most common type of DLT. However, blockchain has limitations such as high operating costs, probabilistic settlement finality, and transaction transparency. As a result, wholesale DLT payment applications have shifted to modified consensus protocols like Corda and Hyperledger Fabric, which offer enhanced confidentiality and scalability.



Fig 1 : Centralized ledger Vs Decentralized ledger

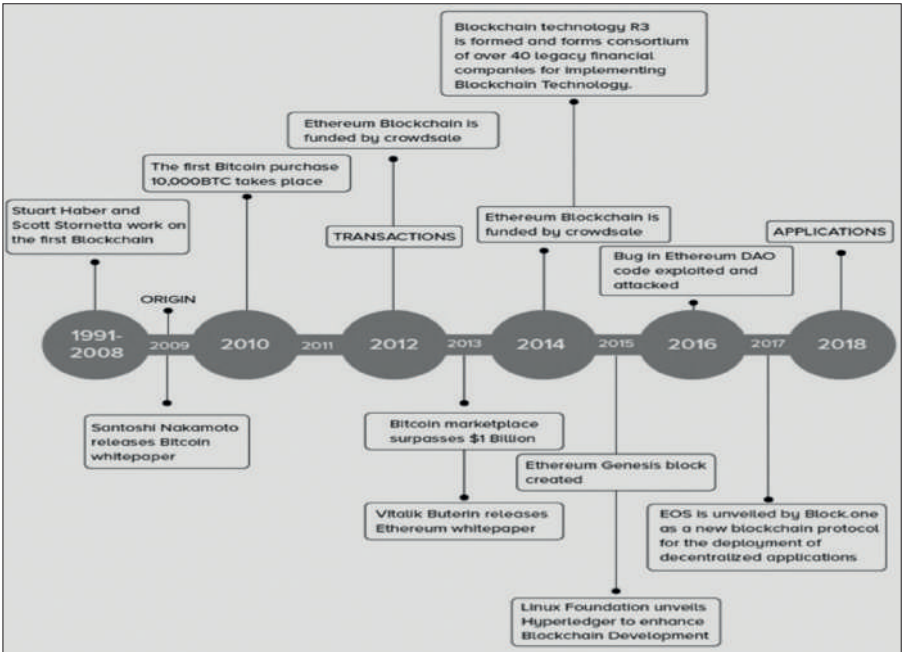


(Source: [https://www.bis.org/publ/qtrpdf/r\\_qt1709y.htm/](https://www.bis.org/publ/qtrpdf/r_qt1709y.htm/))

2.3 Distributed ledger technology development:

Smart contracts are self-executing contracts with the terms of the agreement written into code. They are built on DLT, such as blockchain, and are designed to automatically execute the terms of a contract without the need for intermediaries. Fig. 2 clearly explains the distributed ledger technology development.

Fig 2: Distributed Ledger Technology Development History



(Source: <https://merehead.com/blog/dlt-blockchain/>)

2.4 The Evolution of Smart Contracts

2.4.1 History of smart contract development

The concept of smart contracts was first proposed by Nick Szabo, a computer scientist, and legal scholar, in 1994. He defined a smart contract as “a computerized transaction protocol that executes the terms of a contract.” Szabo’s idea was to use digital technology to create self-executing contracts that could automatically enforce the terms of an agreement without the need of intermediaries.

In the years that followed the initial concept of smart contracts, numerous researchers and developers delved into its potential applications (Al Khalil et al.,2017). However, it was only with the emergence of blockchain technology, particularly Bitcoin, that smart contracts began to receive significant attention and interest. In 2009, Satoshi Nakamoto, the anonymous creator of Bitcoin, introduced the idea of using blockchain technology to create a decentralized digital currency. The Bitcoin blockchain allows for the creation of a decentralized and tamper-proof record of transactions, which served as the foundation for the development of smart contracts. In 2013 the Ethereum project was launched, which introduced the concept of “smart contract” as a new type of contract that could be executed automatically on the Ethereum blockchain (Tönnissen & Teuteberg, 2018). This was a significant development as it allowed developers to create decentralized applications that could run on the blockchain and be controlled by smart contracts.

Since then, various other blockchain platforms, such as EOS and Cardano, have been developed, each with their versions of smart contract functionality. The development of smart contract platforms, such as Ethereum, has led to the creation of decentralized applications (dApps) and the emergence of new business models, such as Initial Coin Offerings (ICOs) and Decentralized Autonomous Organizations (DAOs). Smart contract development is still ongoing, and researchers and developers continue to explore new, used cases and possibilities for this technology. Advancements in areas such as formal verification and privacy-preserving technologies are expected to further increase the potential of smart contracts.

2.4.2 Key milestones in the evolution of smart contracts

Table 1: Smart Contract Evolution Milestones

Year	Milestone	Description	Source
2014	Ethereum Launch	Ethereum, a blockchain platform, was launched, and it introduced the ability to create and execute smart contracts on a decentralized network.	Ethereum: A Next-Generation Smart Contract and Decentralized Application Platform by Vitalik Buterin (2014).

2015	Decentralized Autonomous Organizations (DAOs)	The first decentralized autonomous organization (DAO) was created on the Ethereum blockchain, allowing for decentralized decision-making and governance through smart contracts.	The DAO on the Ethereum blockchain (2015)
2016	Initial Coin Offerings (ICOs)	The first initial coin offerings (ICOs) were conducted on the Ethereum blockchain, utilizing smart contracts to automate the distribution and management of tokens.	Ethereum's ERC-20 token standard (2016) <a href="https://ethereum.org/en/developers/docs/standards/">https://ethereum.org/en/developers/docs/standards/</a>
2017	Enterprise Adoption	Major companies and industries began exploring the use of smart contracts in areas such as supply chain management and financial services.	Various industry reports and announcements <a href="https://www.ibm.com/topics/smart-contracts">https://www.ibm.com/topics/smart-contracts</a>
2020	Decentralized Finance (DeFi)	The emergence of decentralized finance (DeFi) platforms on Ethereum and other blockchain networks, using smart contracts to enable decentralized lending, borrowing, and other financial services.	Various DeFi platforms and projects <a href="https://www.investopedia.com/decentralized-finance-defi-5113835">https://www.investopedia.com/decentralized-finance-defi-5113835</a>
2021	Ethereum 2.0 phase 1	Focused on laying the foundation for a more scalable, secure, and sustainable Ethereum network through the introduction of the Beacon Chain, Proof-of-Stake, and shared chains.	Ethereum 2.0 Phase 0 Specification (2021) <a href="https://ethereum.org/en/upgrades/">https://ethereum.org/en/upgrades/</a>
2015	Hyperledger Project	The Linux Foundation launched the Hyperledger Project, an open-source collaborative effort to advance cross-industry blockchain technologies, including the development of smart contract platforms.	Hyperledger Project website <a href="https://www.hyperledger.org/">https://www.hyperledger.org/</a>

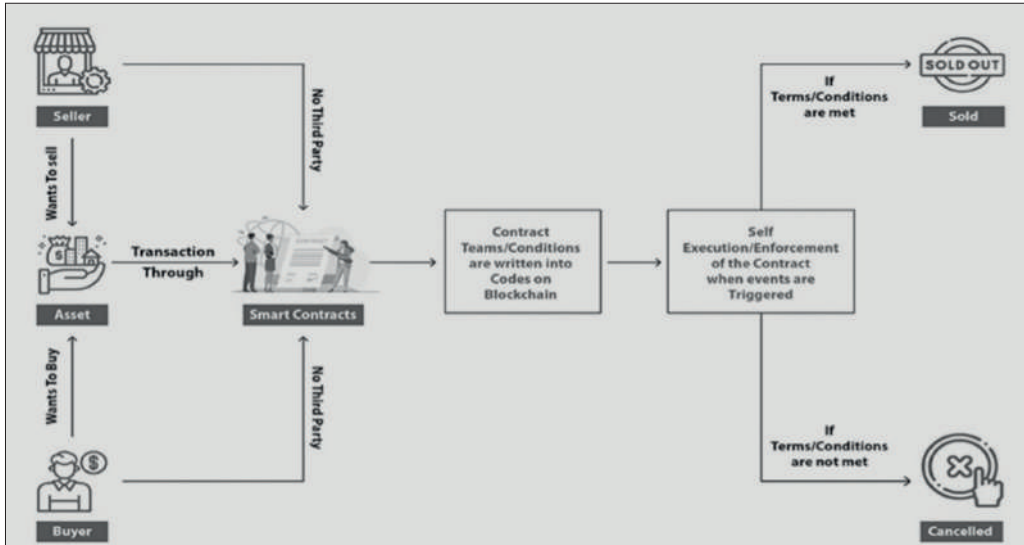
2018	EOSIO Launch	EOSIO, a blockchain platform, was launched, and it introduced a new type of smart contract called WebAssembly (WASM) smart contract which allows for more efficient and faster execution of smart contracts.	EOSIO Whitepaper by Daniel Larimer (2018) <a href="https://developers.eos.io/welcome/v2.0/introduction-to-eosio/technical_features">https://developers.eos.io/welcome/v2.0/introduction-to-eosio/technical_features</a>
2016	Corda Launch	Corda, a blockchain platform, was launched, and it introduced the concept of “smart legal contracts” that use smart contract-like protocols to control and verify legal agreements and transactions.	Corda Whitepaper by R3 (2016) <a href="https://docs.r3.com/en/pdf/corda-introductory-whitepaper.pdf">https://docs.r3.com/en/pdf/corda-introductory-whitepaper.pdf</a>
2016	Chaincode	Hyperledger Fabric, a member of the Hyperledger Project, was introduced, and it brought in the concept of Chaincode, a type of smart contract written in Go language that allows for more flexible and modular smart contract development.	Architecture of the Hyperledger Blockchain Fabric. Workshop on Distributed Cryptocurrencies and Consensus Ledgers, 310, 4. (Cachin, 2016)
2017	Smart Contract Security	The Ethereum community introduced the concept of smart contract security and the need for formal verification and testing of smart contracts to prevent security vulnerabilities.	Ethereum Smart Contract Security Best Practices. <a href="https://www.pcmag.com/news/blockchain-in-2017-the-year-of-smart-contracts">https://www.pcmag.com/news/blockchain-in-2017-the-year-of-smart-contracts</a>

### 2.4.3 How Smart Contracts Work

These contracts are agreements in which the terms are encoded in lines of code and self-executed on a blockchain network. This ensures the secure and transparent execution of the contract (Secinaro et al., 2021). The concept explores the meaning and how smart contracts can be used within distributed ledger technology (DLT). It further explains that smart contracts are computer programs that can be inserted into a blockchain to automate transactions and execute certain actions in response to specific events. Also, smart contracts can integrate contractual services, and they can be irrevocable once implemented (Almakhour et al., 2020). However, it should also be noted that the opposite can be done too if it is encoded. Additionally, the events that can condition the smart contract can be on-chain, such as transactions on the blockchain or can be off-chain and depend on external data, which is supplied by an oracle.

This dependency on external data poses risks of fraud and manipulation. And it requires special caution in the choice of oracle and measures to reduce errors in data or compensate for the consequences of improper execution of the smart contract.

**Fig1: Smartcard functioning**



(Source: <https://www.softwebsolutions.com/resources/smart-contract-in-blockchain.html>)

Overview of how smart contracts work:

- A contract is written in code using a programming language such as Solidity or Vyper. The code defines the terms of the agreement and the conditions that must be met for the contract to be executed.
- Once deployed on a blockchain network such as Ethereum, the contract is transformed into a smart contract.
- Parties involved in the contract can interact with the smart contract by sending transactions to the blockchain network. These transactions are verified and processed by nodes on the network, and the smart contract is executed if the conditions of the contract are met.
- The smart contract can automatically execute actions such as transferring funds, releasing assets, or updating the state of the contract based on the conditions specified in the code.
- The execution of the smart contract is recorded on the blockchain, providing a transparent and auditable history of the contract's execution.
- Smart contracts are designed to be self-executing, meaning that they are automatically triggered when certain conditions are met and eliminate the need

for intermediaries, such as lawyers, to enforce the contract. This makes them efficient and cost-effective for executing agreements and automating business processes.

#### **2.4.4 Technical details of smart contract functionality**

Smart contracts are self-executing computer programs that are deployed on a blockchain network and are used to facilitate, verify, and enforce the negotiation or performance of a contract (Szabo, 1997). They are designed to be tamper-proof and autonomous, meaning they can automatically execute actions without intermediaries.

The functionality of smart contracts is based on the concept of “if-then” logic, where certain conditions must be met before the contract is executed. For example, a smart contract for the sale of a house could specify that the funds will be transferred from the buyer to the seller only if the title of the property is transferred to the buyer (Salmerón-Manzano & Manzano-Agugliaro, 2019).

Smart contracts are written in a programming language such as Solidity or Vyper, and they are deployed on a blockchain network such as Ethereum. Once deployed, they can be interacted with by sending transactions to the blockchain network. These transactions are processed by nodes on the network, and the smart contract is executed if the conditions of the contract are met.

The execution of the smart contract is recorded on the blockchain, providing a transparent and auditable history of the contract’s execution. This allows the parties involved in the contract to trust the execution of the contract without the need for intermediaries. Smart contracts are self-executing computer programs that facilitate, verify and enforce the negotiation or performance of a contract. They are based on the concept of “if-then” logic and are deployed on a blockchain network.

### **3. SMART CONTRACT EXECUTION AND VALIDATION**

Smart contract execution and validation refer to the process of activating and verifying the terms of a smart contract on a blockchain network.

#### **3.1 Execution:**

Once a smart contract is deployed on a blockchain network, it can be interacted with by sending transactions to the blockchain network. The buyer would send a transaction to the blockchain network, including the funds and the necessary information to transfer the title of the property (Kitsantas & Chytis, 2022). The nodes on the network would then verify that the conditions of the contract are met, and if they are, the contract would be executed. The smart contract would automatically transfer the funds from the buyer to the seller and transfer the title of the property to the buyer.

### 3.2 Validation:

After the smart contract is executed, the nodes on the network would validate the execution of the contract. This includes verifying if the conditions of the contract are met, and that the terms of the contract are executed correctly. For example, in the case of a house sale, the nodes would verify if the funds were transferred from the buyer to the seller and if the title of the property was transferred to the buyer.

If the nodes find any errors or issues with the execution of the contract, they can reject the execution, and the contract will not be considered valid. It is important to note that the execution and validation process of a smart contract is done by the network's nodes, which are independent and decentralized.

## 4 APPLICATIONS OF SMART CONTRACTS

### 4.1 Use cases in finance, supply chain management, and other industries.

Smart contracts have the potential to revolutionize various industries by automating processes, reducing costs, and increasing transparency and trust. Here are some examples of how smart contracts are being used in different industries:

**4.1.1 Finance:** Smart contracts are being used in the finance industry to automate financial transactions and streamline processes. For example, in the insurance industry, smart contracts can be used to automate the claims process, reducing the need for intermediaries and increasing efficiency (Kshetri, 2018). In the banking sector, smart contracts can be used to automate the process of issuing loans, reducing the time and cost associated with traditional loan origination.

**4.1.2 Supply Chain Management:** Smart contracts can also be used to improve supply chain management by automating the tracking and verification of goods as they move through the supply chain (Queiroz et al., 2019). For example, smart contracts can be used to automate the process of tracking inventory and ensuring that goods are delivered to the correct location.

**4.1.3 Real Estate:** Smart contracts can be used to automate and streamline the process of buying and selling property by automating the transfer of ownership and the disbursement of funds. This can reduce the time and cost associated with traditional real estate transactions.

**4.1.4 Healthcare:** Smart contracts can be used to improve the efficiency of healthcare systems by automating the process of managing patient data, tracking medical records and sharing information between healthcare providers (Kshetri, 2018).

## 5 REAL-WORLD EXAMPLES OF SMART CONTRACT IMPLEMENTATION

**5.1 Fizzy by AXA:** Fizzy is an insurance company that uses smart contracts to automate the claims process. Policyholders can purchase insurance policies on the Ethereum blockchain, and in case of a flight delay, Fizzy will automatically compensate the policyholder with the corresponding amount of money, without the need of any intermediaries or paperwork.

**5.2 Provenance:** Provenance is a blockchain platform that uses smart contracts to track and verify the origin of goods as they move through the supply chain. This allows for increased transparency and traceability, making it easier for companies to ensure that their goods are ethically and sustainably sourced.

**5.3 Slock.it:** Slock.it is a company that uses smart contracts to automate the process of renting out properties. Landlords can create smart contracts on the Ethereum blockchain that specify the terms and conditions of a rental agreement, and tenants can use cryptocurrency to pay rent and access the property.

**5.4 Chain Guard:** It is a smart contract-based platform that allows for the secure and transparent tracking of goods as they move through the supply chain. The platform uses smart contracts to automate tracking goods, ensuring that they are delivered to the correct location and providing real-time visibility into the status of shipments.

**5.5 The Ocean:** The Ocean is a decentralized data exchange that uses smart contracts to enable the sharing of data between different parties. Smart contracts on The Ocean's blockchain-based platform automate the process of data sharing, ensuring that data is only shared with authorized parties and providing a transparent and auditable record of data-sharing transactions.

These examples show that smart contracts can be used to automate and streamline various processes in the real world, from insurance claims to property rentals and from data sharing to supply chain management. Smart contracts can provide a cost-effective, secure and transparent way of executing agreements and automating business processes.

## 6 CHALLENGES AND LIMITATIONS OF SMART CONTRACTS

### 6.1 Technical challenges, such as scalability and interoperability

Smart contracts on distributed ledger technology (DLT) have the potential to revolutionize the way businesses are done, but before they can reach their full potential, several technical challenges need to be addressed (Khan et al., 2021). Scalability and interoperability are two of the most pressing issues, as they can greatly impact the performance and adoption of smart contracts. Scalability challenges refer to the ability of a system to handle an increasing number of transactions or data without slowing down or becoming unstable. Interoperability challenges refer to the ability of different systems and technologies to communicate and



work together effectively. Addressing these technical challenges is critical for smart contracts to achieve their full potential and become standard in various industries. Without addressing these challenges, it will be hard for smart contracts to reach mass adoption.

## **6.2 Legal and Regulatory challenges:**

The legal and regulatory challenges associated with the use of smart contracts in distributed ledger technology (DLT) include issues such as the lack of legal recognition and regulation for smart contracts, the difficulty in ensuring compliance with existing laws and regulations, and the lack of standardization across different jurisdictions. One of the main challenges is the lack of legal recognition for smart contracts. Since smart contracts are digital self-executing agreements that rely on cryptographic signatures, they are not always considered legal agreements in the traditional sense. This can make it difficult to enforce the terms of a smart contract in a court of law. Another challenge is the lack of standardization across different jurisdictions. Different countries have different laws and regulations regarding the use of DLT and smart contracts, which can make it difficult for businesses to operate across borders.

## **6.3 Limitations of smart contracts**

**6.3.1. Lack of Flexibility:** Smart contracts have a logic-based execution that may not allow for the subjective and flexible nature of certain contracts ("What are smart contracts? +benefits, limitations, use cases," 2022). Contracts that require room for flexibility, such as relational contracts, may not be well-suited for smart contract technology.

**6.3.2. Legal Considerations:** The reduction of intermediaries and lawyers in smart contract transactions means that parties must have a thorough understanding of the legal ramifications of public, private, criminal, and mercantile law to ensure that the contract is enforceable and legally binding.

**6.3.3. Transaction Delays:** While smart contracts are designed to increase efficiency and reduce transactional costs, they are not immune to technological challenges. Congestion in blockchain networks can result in delayed transactions, potentially increasing costs beyond those of traditional contracts.

**6.3.4. Immutability:** Once a smart contract has been executed, it cannot be modified. This means that any mistakes in the code or unforeseen circumstances that require changes to the contract may not be rectified.

**6.3.5. Limited Functionality:** Smart contracts are currently limited to simple transactions such as payments and asset transfers. They are not yet capable of managing complex business processes that involve human judgment and decision-making.

**6.3.6. Dependence on External Data:** Smart contracts often rely on external data sources to perform their functions. If these data sources are compromised or unreliable, it can negatively impact the execution of the smart contract.

Additionally, smart contracts are usually transparent and open, which can make it difficult to protect sensitive data or maintain privacy and can be a concern for regulatory compliance. Finally, a lack of formal verification techniques can make it difficult to ensure the correctness of smart contracts and can raise concerns about the security and integrity of the information stored in the DLT. Overall, the legal and regulatory challenges related to smart contracts in DLT are significant and must be addressed in order to fully realize the potential of this technology in various industries.

## **7. FUTURE DIRECTIONS FOR SMART CONTRACTS**

### **7.1 Emerging trends and developments in smart contract technology**

Emerging trends and developments in smart contract technology include the use of formal verification, the integration of oracles, the use of multi-chain architectures, and the use of smart contract templates. Formal verification is a method of mathematically proving the correctness of smart contract code. This technique can be used to ensure that a smart contract will behave as intended, which can provide a higher level of security and reliability. Oracles are third-party systems that can provide external data to a smart contract. This allows smart contracts to interact with real-world data, such as stock prices or weather forecasts. Multi-chain architectures involve the use of multiple blockchain networks to support smart contract execution. This can help to increase scalability and improve security by distributing the load across multiple networks. Smart contract templates are pre-written smart contracts that can be easily customized for a specific use case. This can help to streamline the process of creating and deploying smart contracts, making it easier for businesses and developers to take advantage of this technology.

Another trend is the use of zero-knowledge proof to preserve privacy in smart contracts and the use of smart contracts for non-financial use cases such as supply chain, logistics, identity and more. In summary, the emerging trends and developments in smart contract technology include the use of formal verification, the integration of oracles, the use of multi-chain architectures, the use of smart contract templates, the use of zero-knowledge proof, and the use of smart contracts for non-financial use cases. These advancements can help to improve the security, reliability, and versatility of smart contracts and enable their use in a wider range of applications.

### **7.2 Potential of smart contracts to disrupt traditional business models.**

Smart contracts have the potential to disrupt traditional business models by creating new opportunities for automation, efficiency, and trust.

One potential disruption is in the area of automation. Smart contracts can automate many of the manual processes currently used in traditional business models (Priem, 2020). This can lead to cost savings and increased efficiency. For example, in supply chain management,

smart contracts can automate the process of tracking and verifying the authenticity of goods, reducing the need for intermediaries and paperwork, thus reducing costs and increasing efficiency.

Another potential disruption is in the area of trust. Smart contracts use cryptographic signatures and code to enforce the terms of an agreement, which can provide a higher level of trust than traditional agreements. This can make it possible to create new business models based on trust and transparency. For example, in the real estate industry, smart contracts can be used to automate and secure the process of buying and selling property, reducing the need for intermediaries and increasing trust between parties. Smart contracts can also enable new forms of decentralized marketplaces, where parties can interact and transact directly with each other without the need for intermediaries (Kitsantas et.al., 2019). This can lead to disintermediation and can disrupt traditional business models in industries such as finance, real estate, and supply chain management. For example, in the financial industry, smart contracts can enable the creation of decentralized lending platforms where borrowers and lenders can interact directly, reducing the need for intermediaries and resulting in lower costs and faster transactions.

Additionally, smart contracts can also enable new forms of tokenization where assets can be represented by digital tokens that can be easily transferred and traded using blockchain technology. This can disrupt traditional business models in the areas of fundraising and asset management. For example, in the fundraising industry, smart contracts can enable the creation of decentralized fundraising platforms where companies can raise funds by issuing tokens, reducing the need for intermediaries and increasing access to capital. On the whole, the potential for smart contracts to disrupt traditional business models is significant, and many businesses are exploring ways to take advantage of this technology to create new opportunities for automation, efficiency, trust, and new business models.

## **8. CONCLUSION**

The role of smart contracts in distributed ledger technology (DLT) is increasingly gaining attention as a game-changer in various industries. As mentioned in the various studies and articles discussed in this study, smart contracts have the potential to disrupt traditional business models by creating new opportunities for automation, efficiency, and trust. From automating manual processes in supply chain management to enabling decentralized marketplaces in the financial industry, the potential of smart contracts is vast. One of the key advantages of smart contracts is their ability to automate processes and reduce the need for intermediaries, resulting in cost savings and increased efficiency. Additionally, the use of cryptographic signatures and code to enforce the terms of an agreement provides a higher level of trust, which can enable new business models based on trust and transparency (Pinna & Tonelli, 2022). However, there are challenges to overcome, such as the lack of legal recognition and regulation for smart contracts, the lack of standardization across different jurisdictions and the complexity of the contract logic. Additionally, the lack of formal

verification techniques, privacy and regulatory compliance can be a concern. Despite these challenges, the research in this field continues to evolve and progress, as seen from the studies discussed here earlier. From the use of formal verification to ensure the correctness of smart contracts to the integration of oracles to provide external data, the advancements in smart contract technology are considerably increasing.

In the end, the role of smart contracts in DLT is poised to revolutionize various industries with the potential to disrupt traditional business models and create new opportunities for automation, efficiency, and trust. As the technology and research in this field continue to evolve, more and more innovative applications of smart contracts in various industries can be expected to be seen.

8.1 Implications for the future of distributed ledger technology and smart contracts. DLT and Smart Contracts have the potential to revolutionize many industries by increasing automation, efficiency, and trust. As advancements in research and development progress, the emergence of novel applications of blockchain technology and automated contractual agreements in diverse industries can be anticipated conducted (Demirkan et al.,2020). However, there are still challenges that need to be overcome, such as the lack of legal recognition and regulation, the lack of standardization across different jurisdictions, and the complexity of contract logic. Additionally, the lack of formal verification techniques, privacy, and regulatory compliance can be of great concern. Despite these challenges, this concept carries forth a bright future, and it will continue to play a vital role in determining the growth and development of many industries.

## REFERENCES

- Al Khalil, F., Butler, T., O'Brien, L., & Ceci, M. (2017, April). Trust in smart contracts is a process, as well. In *International Conference on Financial Cryptography and Data Security* (pp. 510-519). Springer, Cham.
- Almakhour, M., Sliman, L., Samhat, A.E., Mellouk, A. (2020). On the Verification of Smart Contracts: A Systematic Review. In: Chen, Z., Cui, L., Palanisamy, B., Zhang, L.J. (eds) *Blockchain – ICBC 2020*. ICBC 2020. Lecture Notes in Computer Science (), vol 12404. Springer, Cham. [https://doi.org/10.1007/978-3-030-59638-5\\_7](https://doi.org/10.1007/978-3-030-59638-5_7)
- Cachin, C. (2016) Architecture of the Hyperledger Blockchain Fabric. Workshop on Distributed Cryptocurrencies and Consensus Ledgers, 310, 4.
- Demirkan, S., Demirkan, I., & McKee, A. (2020). Blockchain technology in the future of business cyber security and accounting. *Journal of Management Analytics*, 7(2), 189-208.
- DLT in Blockchain Development - Merehead. (n.d.). Merehead. Retrieved January 15, 2023, from <https://merehead.com/blog/dlt-blockchain/> (Fig 2)
- Ellul, J., Galea, J., Ganado, M. et al. Regulating Blockchain, DLT and Smart Contracts: a technology regulator's perspective. *ERA Forum* **21**, 209–220 (2020). <https://doi.org/10.1007/s12027-020-00617-7>
- Gorbunova, Maria & Masek, Pavel & Komarov, Mikhail & Ometov, Aleksandr. (2022). Distributed Ledger Technology: State-of-the-Art and Current Challenges. *Computer Science and Information Systems*. 19. 65-85. 10.2298/CSIS210215037G.
- Ihle, C., & Sanchez, O. (2019). Smart contract-based role management on the blockchain. In *International Conference on Business Information Systems* (pp. 335-343). Springer, Cham.
- Khan S N, Loukil F, Ghedira-Guegan C, Benkhelifa E, Bani-Hani A. Blockchain smart contracts: Applications, challenges, and future trends. *Peer Peer Netw Appl*. 2021;14(5):2901-2925. doi: 10.1007/s12083-021-01127-0. Epub 2021 Apr 18. PMID: 33897937; PMCID: PMC8053233.
- Kitsantas T, Chytis E. Blockchain Technology as an Ecosystem: Trends and Perspectives in Accounting and Management. *Journal of Theoretical and Applied Electronic Commerce Research*. 2022; 17(3):1143-1161. <https://doi.org/10.3390/jtaer17030058>
- Kitsantas, T., Vazakidis, A., & Chytis, E. (2019, July). A review of blockchain technology and its applications in the business environment. In *International Conference on Enterprise, Systems, Accounting, Logistics & Management*.

- Kshetri, (2018). Blockchain's roles in meeting key supply chain management objectives. *International Journal of Information Management*. 39. 80-89. 10.1016/j.ijinfomgt.2017.12.005.
- Li, Jennifer & Kassem, Mohamad. (2021). Applications of distributed ledger technology (DLT) and Blockchain-enabled smart contracts in construction. *Automation in Construction*. 132. 103955. 10.1016/j.autcon.2021.103955.
- Pinna, A., & Tonelli, R. (2022, March). On the use of Petri Nets in Smart Contracts modeling, generation and verification. In *2022 IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER)* (pp. 1207-1211). IEEE
- Priem, R. Distributed ledger technology for securities clearing and settlement: benefits, risks, and regulatory implications. *Financ Innov* **6**, 11 (2020). <https://doi.org/10.1186/s40854-019-0169-6>
- Punathumkandi S, Sundaram VM, Panneer P. Interoperable Permissioned-Blockchain with Sustainable Performance. *Sustainability*. 2021; 13(20):11132. <https://doi.org/10.3390/su132011132>
- Queiroz, M. M., Telles, R., & Bonilla, S. H. (2019). Blockchain and supply chain management integration: a systematic review of the literature. *Supply Chain Management: An International Journal*.
- Salmerón-Manzano, E., & Manzano-Agugliaro, F. (2019). The role of smart contracts in sustainability: Worldwide research trends. *Sustainability*, 11(11), 3049.
- Secinaro, S.; Mas, F.D.; Brescia, V.; Calandra, D. Blockchain in the accounting, auditing and accountability fields: A bibliometric and coding analysis. *Account. Audit. Account. J.* 2021. Available online: <https://www.emerald.com/insight/0951-3574.htm> (accessed on 3 July 2022).
- Soltani R, Zaman M, Joshi R, Sampalli S. Distributed Ledger Technologies and Their Applications: A Review. *Applied Sciences*. 2022; 12(15):7898. <https://doi.org/10.3390/app12157898>
- Tan, B. S., & Low, K. Y. (2017). Bitcoin—its economics for financial reporting. *Australian Accounting Review*, 27(2), 220-227.
- Tönnissen, S., & Teuteberg, F. (2018, July). Using blockchain technology for business processes in purchasing— concept and case study-based evidence. In *International Conference on Business Information Systems* (pp. 253-264). Springer, Cham.
- What are smart contracts on blockchain?* (2022, December 22). Softwebsolutions. Retrieved January 15, 2023, from <https://www.softwebsolutions.com/resources/smart-contract-in-blockchain.html>
- Laskowski, M. (2019). (Fig 3)

*What are smart contracts? +benefits, limitations, use cases* (2022) *The Whatfix Blog | Drive Digital Adoption*. Available at: <https://whatfix.com/blog/smart-contracts-changing-legal-landscape/>

What is distributed ledger technology? (2017, September 17). What Is Distributed Ledger Technology? from [https://www.bis.org/publ/qtrpdf/r\\_qt1709y.htm](https://www.bis.org/publ/qtrpdf/r_qt1709y.htm) (Fig 1)

# LEVERAGING BLOCKCHAIN TECHNOLOGY IN ACCOUNTING FOR TRANSPARENCY, ACCURACY AND SPEED FOR RECORD KEEPING

***Lina George***  
***Hari Krishna Karri***

---

## ABSTRACT

*Blockchain technology, first created in 2008 for the virtual currency bitcoin, is a multi-faceted technology that is now in use as it can satisfy the privacy and security requirements of the Internet of Things. It is being used in several creative ways across various sectors worldwide. It has a relevant operational impact on businesses as it minimizes costs and outsider involvement in verifying accounting records through the triple-entry accounting system. This paper is an exploratory study based on secondary data and does not aim to establish a specific conclusion, but instead, it offers readers a starting point for further research. In this paper, the authors have tried to explain the concept of Blockchain Technology, Triple Entry Accounting and the workflow of day-to-day business transactions such as purchases and sales using Blockchain technology. This study aims to emphasize the importance of using Blockchain technology for accounting purposes in business.*

**Keywords:** *Blockchain Technology, Triple Entry Accounting System, Distributed Ledger Technology, Transparency, Accuracy and Speed*

## 1. INTRODUCTION

One of the most well-known recent inventions is Blockchain, a modern transformational digital technology. Blockchain is significant because it enables safe and transparent record-keeping without a centralized authority or middleman. Using Blockchain Technology, business transactions can be done directly between parties, without the necessity for a reliable third party to authenticate the transaction or maintain the records. It can dramatically cut costs and has already been proven to yield many “creative” value solutions. As a Digital Ledger Technology (DLT), Blockchain is widely used for diverse applications other than Bitcoin and cryptocurrencies, including data storage, financial transactions, real estate, asset management, and many more.

Blockchain technology can be applied to business accounting to build a secure and transparent system for tracking financial transactions. Accounting records are typically



kept by a dependable third party, such as an accountant or bookkeeper, in a central area, such as a company's accounting department. On the other hand, Blockchain enables a decentralized system in which all transactions are recorded on a distributed ledger that is open to all users. This lowers the possibility of errors or fraud because everyone involved in a financial transaction may access the same information instantly. More transparency can also be achieved through Blockchain technology because all transactions are visible and unchangeable after they have been recorded on the Blockchain.

Traditional companies are now focusing on developing new economic frameworks that encourage openness and trust among stakeholders. For firms to fully benefit from technology's benefits in accounting, it is critical to comprehend how triple-entry accounting can be coupled with Blockchain technology. There have been studies explicitly concentrating on the use of Blockchain in accounting and auditing, however there are only a few. Hence, this study aims to identify probable future accounting practices and sketch the fundamental structure of integrating the potential triple-entry accounting system with Blockchain technology to provide real-time insights into business activities. The current study does not aim to establish a specific conclusion; instead, it offers readers a starting point for further research.

Data collection and grounded theory were the basic methodologies used in this paper. Ground theory and data collecting were carried out in various ways. The study meticulously searched through all published works discovered in the field of literature, including books, academic journals, presentations, and technical reports, as well as searching many databases using keywords.

## **2. RESEARCH QUESTIONS**

The study aims to pinpoint potential future accounting practices and outline the fundamental building blocks of integrating a potential triple-entry accounting system with Blockchain technology. This leads to the following research questions:

- What are the potential applications of blockchain technology in industries, and how does it work?
- What is the triple accounting system, and how is it better than the traditional accounting system?
- What are the accounting procedures that are used in blockchain-based accounting systems for purchases and sales?
- What are the merits and challenges of using an integrated triple accounting system with blockchain technology?

### **3. LITERATURE REVIEW**

Blockchain technology is a dispersed method for storing circulated databases with identical evidence linked in a chain of blocks encrypted and authenticated by the network's users. These blocks indicate the precise time and order of the transactions. Due to the tight cryptographic connections between these blocks, it is impossible to change or insert a new block among two already occurring blocks (Seebacher & SchüRitz, 2017). Each block depends on the other and is stored in a decentralized manner reducing the danger of falsification (Hawlitschek et al., 2018).

Blockchain technology acts as a distributed database, maintaining an endlessly growing list of information entries verified by participating nodes. This implies that all transactions recorded in the blockchain are distributed and accessible to all anonymous nodes, increasing the system's security and transparency (Yli-Huumo et al., 2016). As a distributed database with an orderly directory of ordered blocks, the committed blocks in the blockchain are irreversible. This technique has several potential applications in various industries (Casino et al., 2018).

Today, with the help of modern technology, accountants are also finding it simpler to influence their customers on current and future operations, indicating a positive change in accounting (Nixon, 2016). As a cutting-edge technology, blockchain assists regulators, accountants, and financial experts in converting contracts, agreements, and other important documents (Kokina et al., 2017).. It has originated from an idea of concurrent permission and monitoring the flow of money from many resources; blockchain technology offers the highest level of transparency in recording various transactions (Mustafa, 2019). With all these features, blockchain is considered a digital ledger where transactions can be tracked and accessed according to the transaction date within the entire network of users.

Blockchain is considered trustworthy as the recorded transactions cannot be changed or erased once they are recorded. This is also beneficial for continuous recording and updating the ledger by every firm (Mustafa, 2019). Accountants gain from using blockchain technology because it lowers costs, improves financial report accuracy, and reduces the danger of fraud (Hambiralovic & Karlsson, 2018).

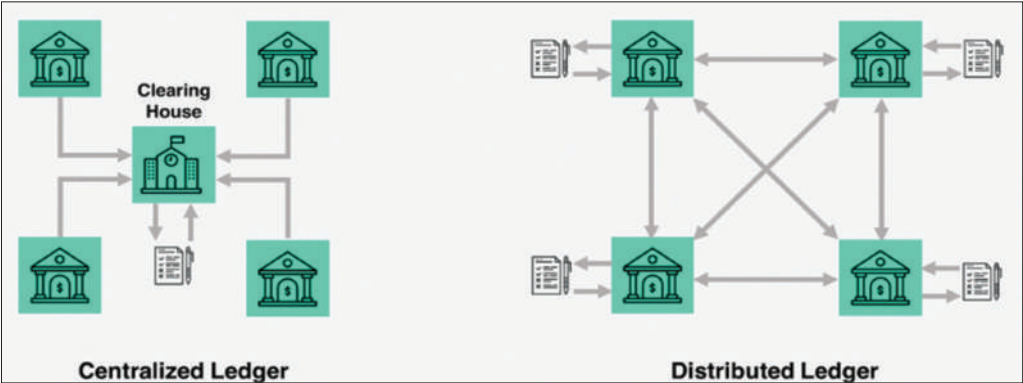
### **4. BLOCKCHAIN TECHNOLOGY**

Blockchain functions as a kind of database that keeps transactions in units called blocks that are sequentially ordered. Collective transactions in one block are appended to its linked prior block if participants accept its authenticity. Each user in the network receives a broadcast of every transaction in a block, allowing them to update their databases simultaneously. Blockchain technology may be better understood by looking at the components listed below.

4.1. **Distributed Ledger System (DLT):**

DLT is used by blockchain technology to store and share data among many stores. It is incredibly challenging to hack the blockchain system since all users have a copy of each transaction logged in the system.

**Fig.1: A comparison between Centralized Ledger and Decentralized Ledger**

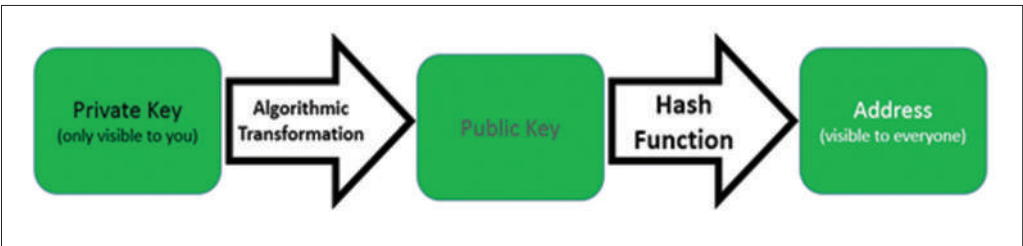


(Source: Sceta, "Distributed Ledger Technologies")

4.2 **Public and Private Keys**

In order to maintain anonymity, the blockchain employs public and private keys. The network broadcasts the public key to authorize transactions and create user addresses. A private key is utilized to secure user permission for a transaction.

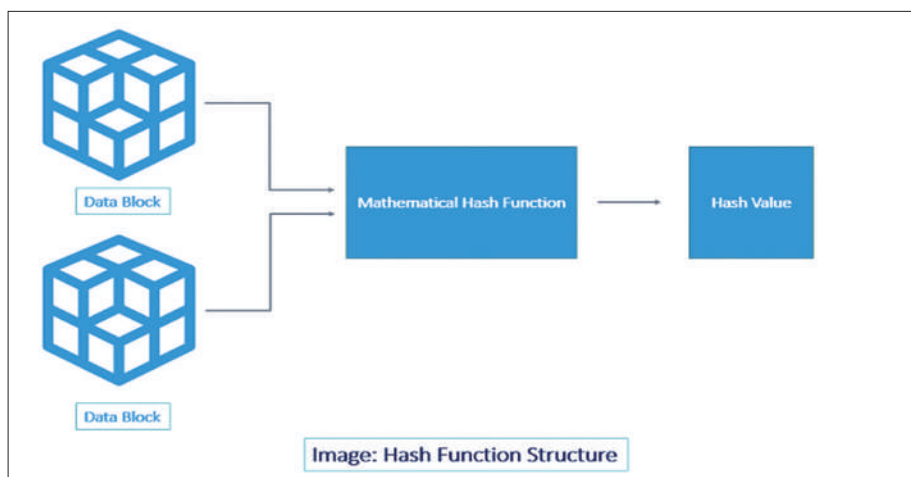
**Fig.2: A simplified design of using Private and Public Keys for Security**



(Source: Leon Di, "Why do I need a Public and Private Key on the Blockchain")

4.3 **Hashing Mechanism**

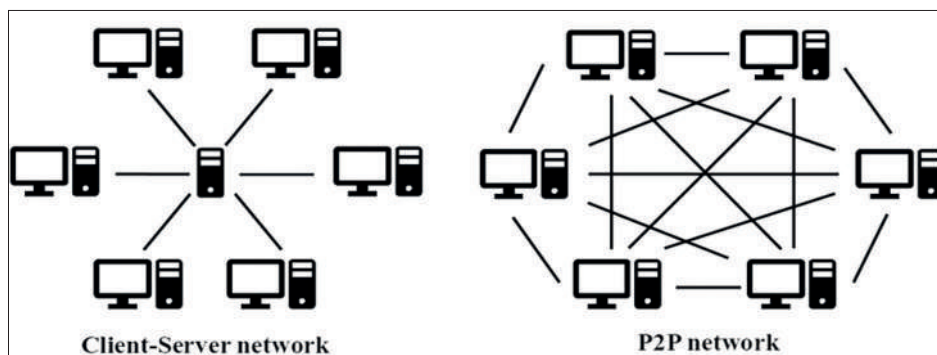
The blockchain technology is secured via hashing. The hash is created using a formula, which helps prevent tampering with the transmission's security.

**Fig. 3: How Hashing Algorithms work**

(Source: Savy Security "Decoded: Examples of Hashing Algorithms Work")

#### 4.4 Model for Peer-to-Peer Networking

Peer-to-peer network paradigm is used by blockchain technology, in which a number of computers are linked together and given equivalent rights and obligations for processing data.

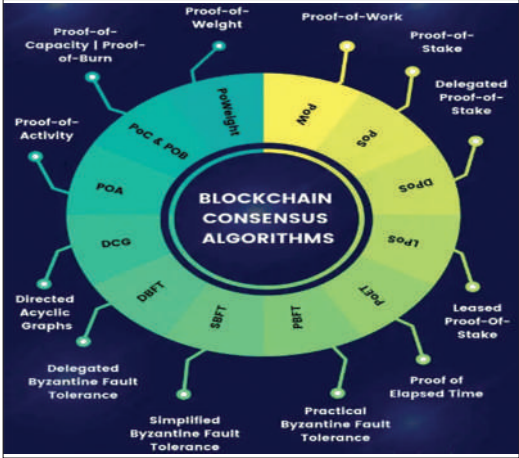
**Fig. 4: Models for Peer-to-Peer Networking**

(Source: Karthika V & Jaganathan S, "A quick synopsis of blockchain technology")

#### 4.5 Consensus Mechanism

Depending on the blockchain and its use, there are several distinct consensus processes. While they vary in energy consumption, security, and scalability, they all serve the same function of ensuring that records are accurate and truthful. The consensus mechanism used by blockchain technology ensures that all network nodes are in sync and that all transactions are valid.

**Fig. 5: Consensus Mechanism in Blockchain**

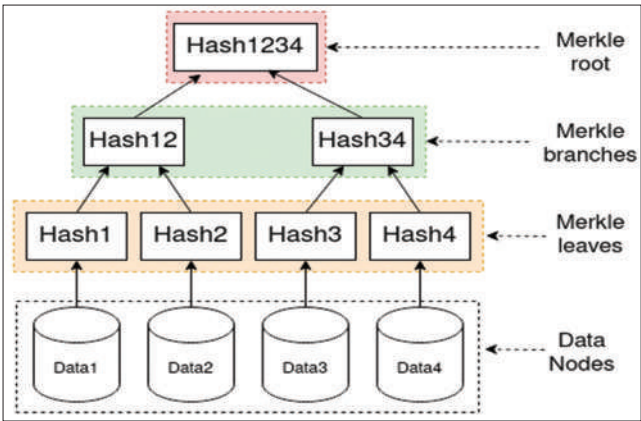


(Source: Akash, 2022 “Blockchain Consensus Protocols”)

**4.6 Format of Merkle Tree**

Utilizing blockchain technology setup, MerkleTree structures data and makes it possible to rapidly and effectively verify the correctness of transactions, recapitulating all the transactions in a block.

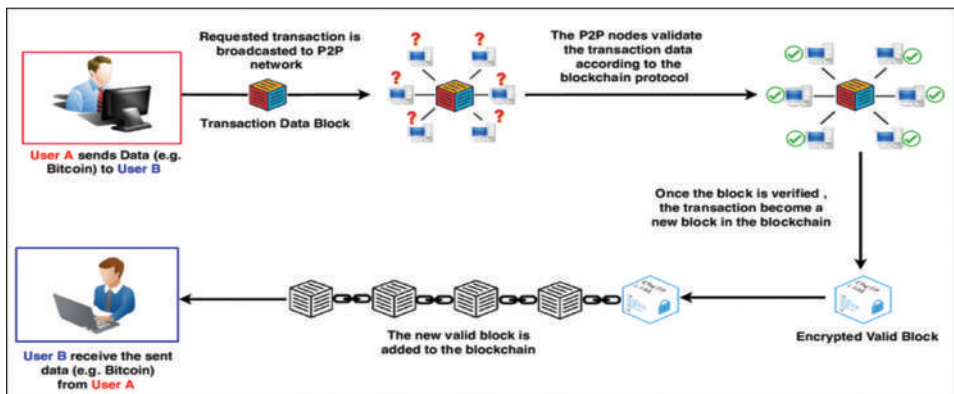
**Fig. 6: Structure of Merkle Tree**



(Source: Teemu Kanstren, Merkle Trees: Concepts and Use Cases)

**4.7 System**

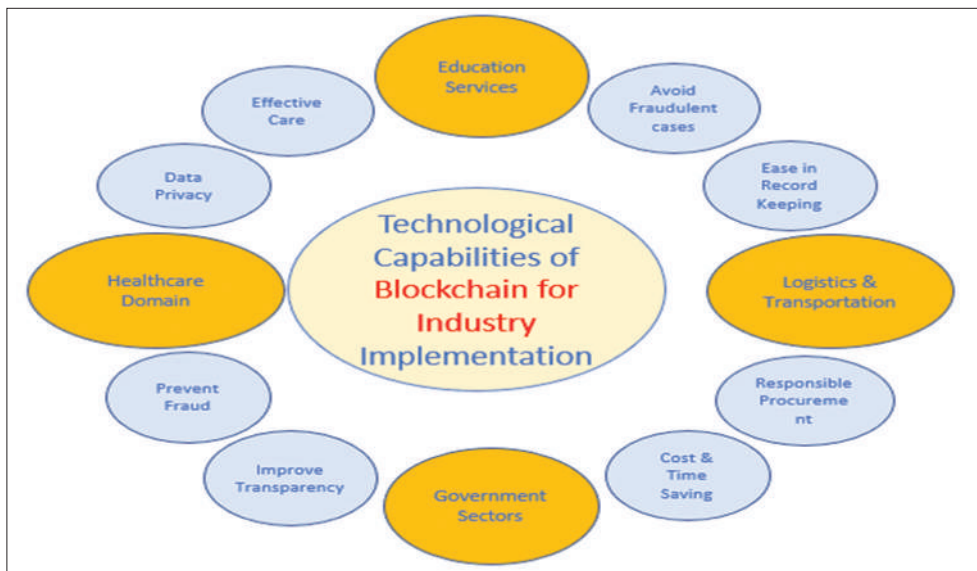
A transaction on the blockchain starts when a user initiates it. Using his personal key, the user then verifies his identity. The substance of the transaction is then secured via hashing. The receiver receives the transaction once the public key is attached to the hash. The recipient uses his private key to verify the transaction at that point. The same transaction may be sent simultaneously to several inheritors by the sender. Reliant on the unique blockchain's set accord process for transaction authentication, transactions are sent around the network to attain a consensus. The existing blockchain is then updated to include time engraving to guarantee that transactions are recorded in proper order.

**Fig. 7: Blockchain System Overview**

(Source: Torkya M, Hassaneinb A E, "Integrating Blockchain and the Internet of Things in Precision Agriculture: Analysis, Opportunities, and Challenges")

#### 4.8 Application

There are several uses for Blockchain Technology, which was first developed in 2008 for the virtual currency bitcoin. It is a fundamental technology now in use because it can satisfy the privacy and security requirements of the Internet of Things. It is being used creatively across various global sectors and places.

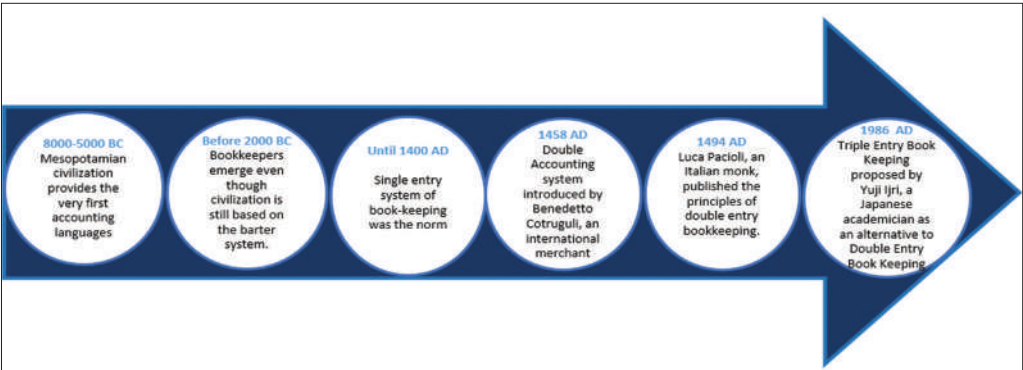
**Fig.8: Application of Blockchain in Different Sectors**

(Source: Javaid, M; Haleem, A; Singh, R P; Khan, S; Suman, R, "Blockchain technology applications for Industry 4.0: A literature-based review, Blockchain: Research and Applications")

5. HISTORY OF ACCOUNTING

The earliest evidence of single-entry bookkeeping was discovered in the Mesopotamian period, which goes back to 5000 BC. Despite the single-entry bookkeeping system being straightforward to maintain, it was impossible to authenticate and examine the accountability of the transactions. This prompted the usage of the double -entry accounting system, which could address all the issues that emerged in the single-entry system of bookkeeping. The double- entry accounting method, created to reduce errors, has its roots in Italy and was first documented by Luca Pacioli in 1494. (Ovunda. A.S, 2015). Its cornerstone is the dual aspect of accounting, and the debit and credit are recorded using two different accounts. This method of accounting was not free of drawbacks. The latency between conducting and recording transactions is the first issue. The reality that billions of people have access to essential financial services is also ignored. Thirdly, it poses a difficulty in blending paper-based methodology with industrial technology. Due to these problems, this method of accounting is thought to be weak. Therefore, using a defined accounting system, such as the Triple accounting system, is the best way to address these issues. Figure 9 elaborates on the history of Accounting.

Fig.9: History of Accounting

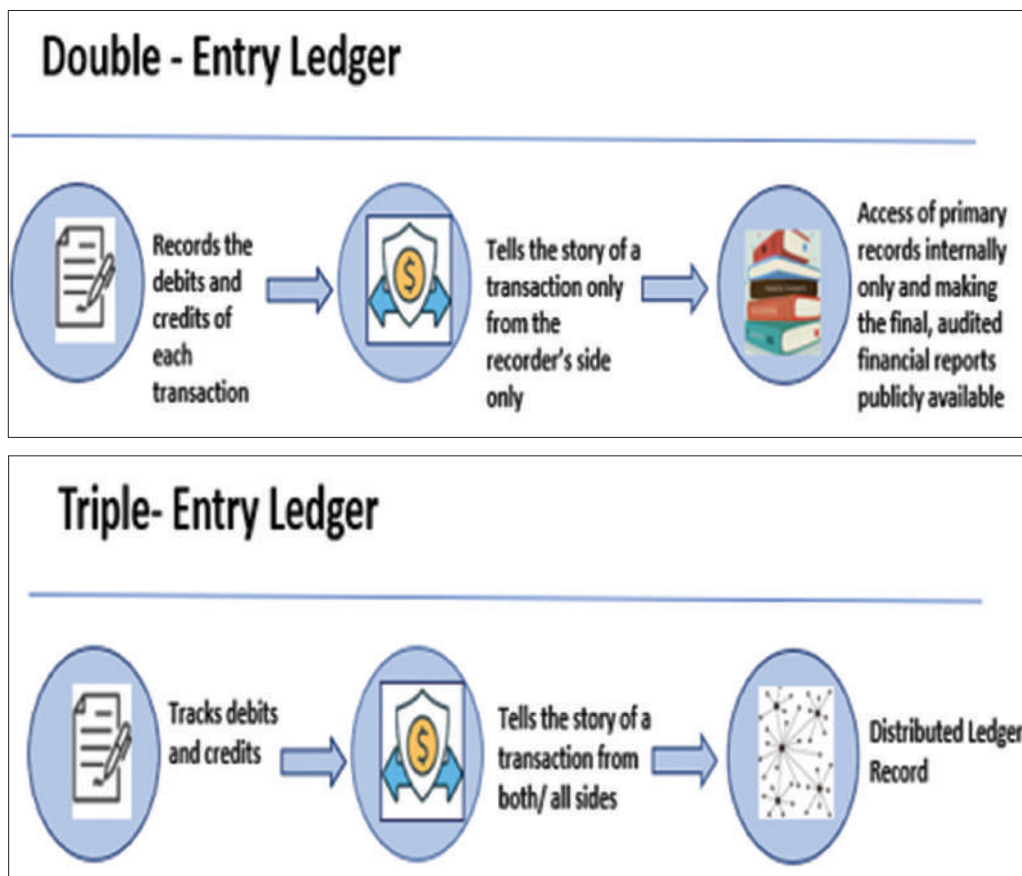


(Source: Created by Authors)

5.1 TRIPLE ENTRY SYSTEM OF ACCOUNTING (TEA)

The triple entry accounting system, which Yuji Ijri first proposed in 1986, is a contemporary and superior method for addressing difficulties with confidence and openness that are common in the accounting systems that are used at present (Cynthia Weiyi Cai, 2019). TEA is an improvement over the conventional double- entry system, where all accounting entries for transactions involving external parties are cryptographically sealed using a third entry. Every entry will have a debit, a credit, and an irrevocable link to all previous debits and credits (Febrero, 2019).



**Fig. 10: Double Entry Versus Triple Entry Accounting System**

*(Source: Created by Authors)*

The usual entries in any business organization, such as the buying and selling of inventory and supplies, payments for taxes and utilities, and other expenses, are entries that include the triple entry method and necessitate that both the parties involved in recording the identical transaction in their respective accounting books. For instance, each of them is stored in a different set of accounting records when cash is debited by the seller for the receipt of cash on a sale, and cash is credited by the purchaser for spending cash on the same transaction. Here, blockchain can be put to use. The accounting records are kept secure for a long time using an interlock system built into the same distributed public ledger instead of storing the entries in different books. These entries are cryptographically sealed, so they cannot be manipulated or erased. The same ledger will be used by both businesses to record transactions, increasing the transactions' accessibility and reliability.

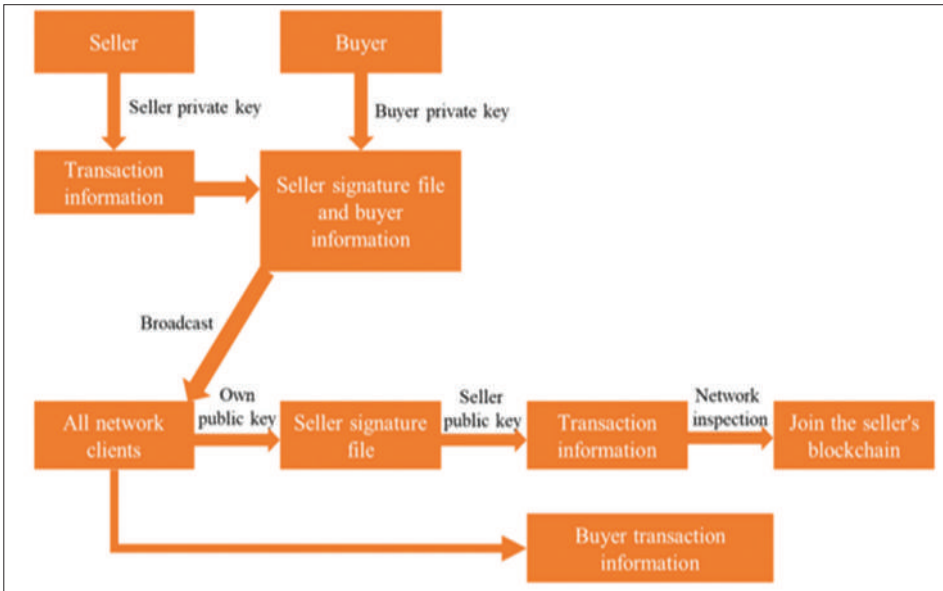


5.2. OPERATION SEQUENCE IN BLOCKCHAIN APPLICATION IN ACCOUNTING

5.2.1 Sequence of operations for accounting blockchain technology in the sale of inventory

Each company should first utilize its corporate organization code as its unique identifier in the blockchain-based Internet of things. A natural person must be identified by their ID card and each identity will exist individually. Each organization’s public and private keys will be included in the system. Every time a transaction occurs, the system sends the buyer a signature file together with details about the purchaser’s name, value, quantity and the product. The purchaser or the buyer will publish the private key-signed signature file comprising the vendor’s and the purchaser’s information across the entire network after the transaction is complete. Once the data is received, each client will use the private key signature after decrypting it with its public key to retrieve the vendor or seller’s signature file. The purchaser or the buyer’s public key is decrypted to verify that the information in the purchaser’s file and the vendor’s signature file agree. If the test is successful, the data record will be added to a block and kept on the seller’s blockchain.

Fig. 11: AIS Workflow of Sales on Blockchain Technology



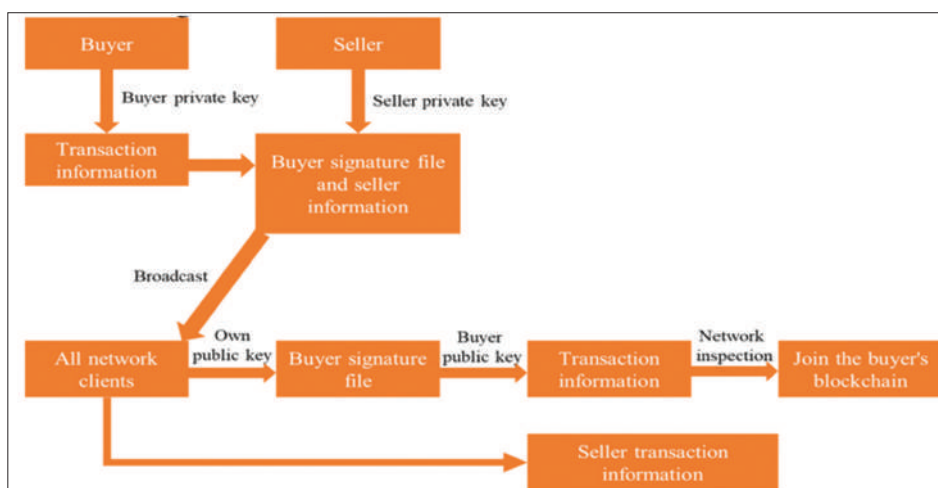
(Source: Zheng R, “Application Research of Blockchain Technology in Accounting System”)

5.2.2 Sequence of operations for accounting blockchain technology in purchases of inventory

The enterprise organization code and ID card continue to be the only way for the buyer to be identified in the internet of things, a system that uses the blockchain, and each identity will continue to prevail as a distinct entity. The system will also give the seller a signature file

that contains details about each transaction, such as the buyer, the cost, and the item. The seller will publish the buyer's signature file and the seller's details across the network using a private key signature following the completion of the transaction. The data in the buyer's signature file is then compared to the seller's file to ensure compatibility using the buyer's public key, which has been decrypted. If all goes well, the data record will be saved, uploaded, and appended to a block on the buyer's blockchain.

**Fig. 11: AIS Workflow of Purchases on Blockchain Technology**



(Source: Zheng R, "Application Research of Blockchain Technology in Accounting System")

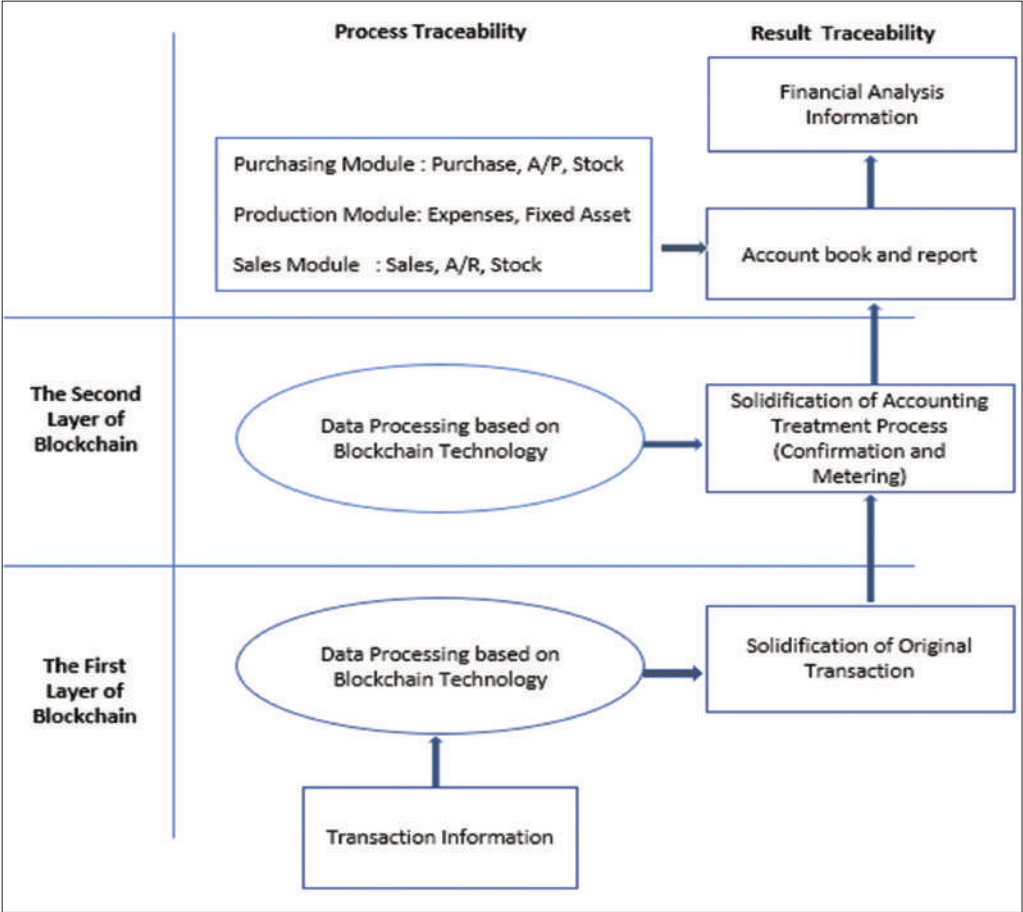
## 6. APPROACHES FOR USING BLOCKCHAIN TECHNOLOGY IN ACCOUNTING SYSTEMS

### 6.1 Horizontal Approach

In this approach, blockchain must be implemented horizontally in one or two links, which corresponds to the various operating modes of the accounting information system. These two links line up with the vertical model's operating layer.

The initiation and input of primary vouchers comprise layer one of the blockchain, while the creation of accounting vouchers comprises layer two. The transactional data from the source and process is strengthened by these two links. The figure displays the structure. The initial layer of blockchain technology serves as the cornerstone for the security and dependability of accounting information from the standpoint of running an accounting information system. The accuracy of accounting data must be guaranteed regardless of whether the system operates in artificial intelligence or man-machine collaborative mode. A mechanism for accelerating the processing of accounting data is part of the next layer of blockchain technology. This layer of blockchain technology can leave a trace on every stage of the accounting process, making it impossible to modify or tamper with accounting information while enhancing its authenticity and dependability.

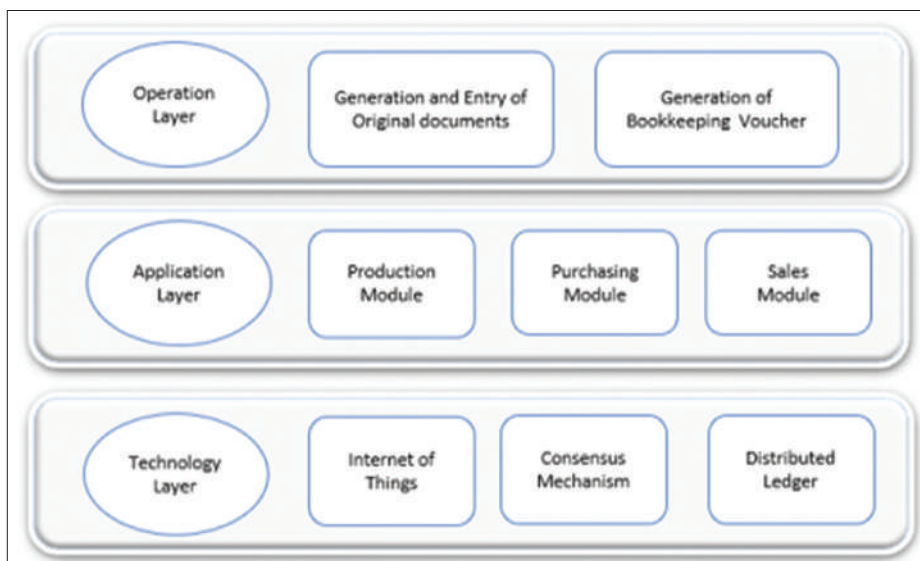
**Fig. 12: Horizontal Approach of Block Chain Technology in Accounting Systems**



(Source: Zheng R, "Application Research of Blockchain Technology in Accounting System")

### 6.2 Longitudinal Approach

The blockchain-based accounting information system can be separated into three tiers according to the longitudinal approach: The Internet of Things blockchain network, which is based on connecting the Internet of Things environment, functions as a decentralized distributed ledger and also has a consensus mechanism, and it is located at the bottom layer. The middle layer is the application layer, which combines several business models and blockchain technology to develop production and procurement. The upper layer is the program layer, which is responsible for both the creation and input of original vouchers and the generation of accounting vouchers.

**Fig. 13: Longitudinal Approach of Block Chain Technology in Accounting Systems**

(Source: Zheng R, "Application Research of Blockchain Technology in Accounting System")

## 7. ADVANTAGES OF APPLYING BLOCKCHAIN TECHNOLOGY TO ACCOUNTING

### 7.1 Data Accuracy

Decentralization, mistrust, transparency, and tamper-proof properties of blockchain technology ensure the veracity, dependability, and authenticity of documented transactions.

### 7.2 Focus on exercises that add value

Resources are freed up by blockchain accounting since it does not need conventional record keeping. These free idle resources can be used inside the business for various value-added tasks.

### 7.3 Reduction in fraud

Because blockchain technology uses a shared digital ledger, fraud may be reduced. All transactions that are recorded cannot be altered or erased. All participants can understand every transaction as they have access to all the recorded transactions in the blockchain related to their business.

### 7.4 Reconciliation is not necessary

Transactions are recorded in real-time, and ledgers are updated promptly; hence reconciliation can be eliminated.

### **7.5 Real-time reporting**

Real-time reporting is possible with blockchain accounting, and participants have access to the required data about a corporation. The regulators would have instant access to every piece of data pertaining to the reporting entity.

## **8. CHALLENGES CONFRONTED IN IMPLEMENTING BLOCKCHAIN TECHNOLOGY IN ACCOUNTING**

There are several challenges to be solved when using this technology; regardless of the fact that blockchain accounting provides various benefits, it has the potential to impact accounting and auditing into new levels of cost-effective, progressive and highly credible systems.

### **8.1 Process that takes time**

The development of such a system will take time and patience from all parties involved, and it may include multiple experiments and failures before generating successful results. Another important duty of the corporation is to connect one function to the other. Examples of such departments are accounting, marketing, finance, sales, production, supply chain management etc.,

### **8.2 Disparity between Corporations**

It may be difficult to obtain permission from several organizations to access their data. Additionally, different businesses and organizations may disagree on the best way to customize the software. Privacy issues and data abuse might also raise moral and legal concerns.

### **8.3 Cybersecurity hassles**

Blockchain technology claims to secure data, but weak infrastructure may cause disaster. Cybercriminals and hackers may change data through viral attacks, resulting in significant financial loss, the loss of important data, and harm to businesses.

### **8.4 Regulatory modifications**

In accounting, regulations have a significant influence. As a result, appropriate legislation must be passed to fully benefit from blockchain accounting. Any adjustments to the legislation can be applied right away without disturbing the complete set up.

### **8.5 Accounting role disruption**

Undoubtedly, blockchain technology may threaten several accounting processes. Accountants must be proficient with computers and numbers. To successfully communicate, they must work in close partnership with the IT division.

## **9. CONCLUSION**

Blockchain technology can to augment accounting procedures by cutting costs involved with the maintenance and reconciliation of ledgers by contributing overall transparency into the background and ownership of assets. This exploratory research addresses the concept of blockchain technology, its framework, and its applicability in several industries. Additionally, it emphasizes the significance of the triple entry system of bookkeeping and uses blockchain technology to analyse the process of common business transactions like purchases and sales. The study demonstrates how blockchain accounting may improve transaction transparency across the whole network, resulting in accuracy and speed in record keeping and fostering trust in the transactions' security and validity. As the usage of triple accounting systems based on blockchains becomes more prominent, future research may focus on the governance and legal frameworks that could be used to ensure integrity, stability and accountability. Future research may also investigate the application of triple accounting in specific industries like supply chain management, healthcare or energy to improve transparency and accountability.

## REFERENCES

- Akash, S (2022), "Blockchain Consensus Protocols" <https://medium.com/coinmonks/blockchain-blog-15-blockchain-consensus-protocols-ac07d35bce4c> [accessed Feb 27, 2022].
- Bystrom, H (2016), Blockchains, Real-Time Accounting and the Future of Credit Risk Modeling, Working Paper/Department of Economics, School of Economics and Management, Lund University, (4), pp. 1-11.
- Casino, F., Dasaklis, T. K., & Patsakis, C. (2018). A systematic literature review of blockchain-based applications: current status, classification and open issues. *Telemat. Informat.* 36, 55–81. doi: 10.1016/j.tele.2018.11.006
- Cynthia Weiyi Cai (2019). "Triple entry accounting with blockchain: How far we have come" JEL Classification: M40doi: 10.1111/acfi.12405
- Dai, J, & Vasarhelyi, M., 2017. Toward Blockchain-Based Accounting and Assurance, *Journal of Information Systems*, 31, 3, pp. 5-21, Business Source Complete, EBSCO host.
- Febrero, P. (2019, June 12). Blockchain 101: From Whiteboard Theory to Real- Life Applications. Retrieved from <https://www.ccn.com/blockchain/> [accessed Oct 12 2021].
- Hambiralovic, M. & Karlsson, R. (2018). Blockchain Accounting in a Triple-Entry System <http://lup.lub.lu.se/luur/download?func=downloadFile&recordId=8953732&fileId=8953736> (Accessed: 06.01.2019) (17) (PDF) Effects of Blockchain Technology on Accounting and Auditing Profession.
- Hari K. K., & Lina G., (2021), "Providing Visibility to Recording of Related Transactions Using Blockchain Technology by Shifting from Double Entry to Triple Entry" *The Management Accountant Journal*, Vol. 56, No.11
- Hawlitsek, F., Notheisen, B., & Teubner, T. (2018). The limits of trust-free systems: A literature review on blockchain technology and trust in the sharing economy. *Electronic Commerce Research and Applications*, 29, 50–63. <https://doi.org/10.1016/j.elerap.2018.03.005>
- Javaid, M., Haleem, A., Singh, R. P., Khan, S., & Suman, R. (2021). Blockchain technology applications for Industry 4.0: A literature-based review. *Blockchain Technology applications for Industry 4.0: A Literature-based Review*, *Blockchain: Research and Applications*, 2(4), 100027. <https://doi.org/10.1016/j.bcra.2021.100027>
- Kaaniche, N. & Laurent, M. (2018), "A blockchain-based data usage auditing architecture with enhanced privacy and availability", *IEEE 16th International Symposium on IEEE Network Computing and Applications (NCA)*, pp.1–5

- Kokina, J., Mancha, R., & Pachamanova, D. A. (2017, September 1). Blockchain: Emergent Industry Adoption and Implications for Accounting. *Journal of Emerging Technologies in Accounting*. <https://doi.org/10.2308/jeta-51911>
- Leon Di. (2017) "Why do I need a Public and Private Key on the Blockchain" <https://wetrust.io/why-do-i-need-a-public-and-private-key-on-the-blockchain> [accessed Sep 02 2021].
- Mustafa, K. (2019) "The effects of blockchain Technology on Accounting and Auditing Profession" *Economic and Business issues in Retrospect and Prospect*, 1st edition pg 395-405
- Neeraj, K., & Mamoun, A. (2020), "Blockchain for Industry 4.0: A Comprehensive Review" *IEEE Access*, Volume 8.
- Nicolai, A., (2021) "Blockchain Technology A game-changer in accounting?" [www.deloitte.com/de/blockchain](http://www.deloitte.com/de/blockchain) [accessed Sep 02 2021].
- Nixon, R. (2016)., 3 Trends Happening Now That Will Impact the Future of Accounting, <https://www.ac-countingweb.com/technology/trends/3-trends-happening-now-that-will-impact-the-future-of-accounting>(Accessed:2.9.2021) (17) (PDF) Effects ofBlockchainTechnologyonAccountingandAuditingProfession.Availablefrom:[https://www.researchgate.net/publication/347891835\\_Effectsof\\_Blockchain\\_Technology\\_onAccounting\\_and\\_Auditing\\_Profession](https://www.researchgate.net/publication/347891835_Effectsof_Blockchain_Technology_onAccounting_and_Auditing_Profession) [accessed Sep 02 2021].
- Ovunda, A. S, (2015) "Luca Pacioli's Double-Entry System of Accounting: A Critique", *Research Journal of Finance and Accounting* ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online) Vol.6, No.18.
- Ozdoğan, B., & Kargın, S. (2018), Blok Zinciri Teknolojisinin Muhasebe Ve Finans Alanlarına Yönelik Yansımaları Ve Beklentiler, *Muhasebe ve Finansman Dergisi*, Ekim (80), 161-175.
- Paritosh Basu. (2018), "Blockchain Technology – The Powerhouse for Industry", *The Management Accountant*, Volume 53, No. 6.
- Pedro Febreiro., (2018) "Blockchain101: From Whiteboard Theory to Real-Life Applications" assessed from <https://www.ccn.com/blockchai> [accessed Oct 08 2021].
- Savy Security. (2020) "Decoded: Examples of Hashing Algorithms Work| <https://cheapsslsecurity.com/blog/decoded-examples-of-how-hashing-algorithms-work/> [accessed Sep 30, 2021]
- Sceta. (2020) "Distributed Ledger Technologies" <https://sceta.io/distributed-ledger-technologies> [accessed Sep 29, 2021].



- Seebacher, S., & Schüritz, R. (2017), "Blockchain technology as an enabler of service systems: a structured literature review", *Lecture Notes in Business Information Processing Exploring Services Science*, pp. 12-23.
- Singer, M., & Kusz, G. (2021), "Blockchain Technology: Shaping the future of the Accountancy Profession"
- Suraj Kumar Pradhan. (2018), "Blockchain: Concept and Practical Application", *The Management Accountant*, Volume 53, No. 6.
- Swapan Sarkar. (2018), "Blockchain Accounting the Disruption Ahead", *The Management Accountant*, Volume 53, No. 6.
- Teemu Kanstren. (2021), "Merkel Trees: Concepts and Use Cases", *Coinmonks*
- Torky, M., & Hassanien, A. E. (2020). Integrating blockchain and the internet of things in precision agriculture: Analysis, opportunities, and challenges. *Computers and Electronics in Agriculture*, 178, 105476. <https://doi.org/10.1016/j.compag.2020.105476>
- Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where Is Current Research on Blockchain Technology?—A Systematic Review. *PLOS ONE*, 11(10), e0163477. <https://doi.org/10.1371/journal.pone.0163477>
- Zheng, R. (2021). "Applications Research of Blockchain Technology in Accounting System", *Journal of Physics- Conference series* doi:10.1088/1742-6596/1955/1/012068

# IMPACT OF TECHNICAL INDICATORS ON THE OPENING VALUE OF STOCK MARKET INDEX - PREDICTION MODEL USING ARTIFICIAL NEURAL NETWORK

**Gopu Jayaraman**  
**Mahalakshmi Venkatachalam**  
**Hanaa Mahmoud Sid Ahmed**  
**Viju Mathew**

## ABSTRACT

*Investments in the stock market are risky but rewarding; the investors get a return over the difference in buying and selling price of the stocks. To get a good return on investments, buying the stock at a low price and selling at a high price becomes essential but the prediction of the stock price movements is a challenging task as the market movements are influenced by various fundamental and technical factors. However, prudent investors who predict market movements by using modern and sophisticated prediction models like Artificial Neural Networks can increase the prediction accuracy levels. The technical indicators can signal the stock price trend and its strength, application of technical indicators as predictors through ANN will certainly increase prediction accuracy. Artificial neural network (ANN) has been proven to be a highly successful and sophisticated model to produce higher prediction accuracy.*

*The current study has been undertaken with the main objective of developing a prediction model applying an Artificial Neural Network (ANN) and predicting the movements of the NIFTY Index. The National Stock Exchange of India developed the NIFTY Index with companies of large market capitalizations, NIFTY-listed companies are MNCs and listed in NASDAQ and New York Stock Exchange also. The NIFTY Index perfectly reflects the Indian Corporate Sector. The present study applies the ANN Model with the key objectives of analyzing the impact of the technical indicators on the daily closing values of the NIFTY Index and predicting whether the closing values will end in Bull mode or Bear mode. The popular technical indicators, p SAR Trend, ADX, RSI, MACD, CCI, William % R Indicators, and SMA, are applied as input variables for developing the ANN. The daily values of these technical indicators are calculated for five years and fed into the ANN model for predicting whether the target value will be closed with a Bullish trend or Bearish trend. The data set is classified as training data, testing data and holding out data to increase the accuracy level of prediction. The results are assessed with the MLP Model, Parameter estimates, ROC Curve, Model summary, Classification of the predicted results, Gain and percentage charts, Lift and percentage charts and the independent variable's importance.*

*To achieve the main objective, the ANN Model with Multilayer Perceptron Model is developed with NIFTY Index. The findings of the study will be very useful to the investors in the stock market to determine the entry and exit points and minimize the risk and enhance the returns. Making use of data mining techniques, especially the ANN, will give better prediction results and help in identifying stock price patterns. The present study will cover the following broad areas: a) Introduction, covering research objectives and importance of the study and methodology, b) Theoretical background and review of literature, c) ANN Architecture and d) Results, Discussions and Conclusion.*

**Keywords:** Artificial Neural Networks, Bullish trend, Bearish trend, Technical indicators, Multilayer Perceptron Model

**JEL: G 11, G 17, G 53, N 25**

## **1 INTRODUCTION**

Equity investments are recognized as the most attractive investment outlet but are subject to a considerable level of risk. Investors and speculators in the equity market always look for methods and models to minimize risk; the risk can be minimized once the future price movements of the stock are predicted with higher accuracy levels. Accurate forecasting methods are essential for successful portfolio management (Guresen et al., 2011). However, the forecasting of stock market movements is quite a challenging task as the stock market movements are influenced by many known as well as unknown factors (Homayouni & Amiri, 2011; Senapati et al., 2018). The widely used time series forecasting methods like Box- Jenkins method can give better results provided the data set is linear and stationery or the data sets that can be transformed as stationery. Hamzaçebi et.al. (2009) argued that the time series data taken from the actual market cannot always be linear, and therefore it is essential to evolve different techniques. Since the daily stock market data has the features of non-linearity and non-stationary, the traditional forecasting models such as Box-Jenkins or Autoregressive integrated moving average are not very accurate in predicting stock market movements (Kazem et al., 2013). Using data mining techniques in financial research, especially stock market prediction, is becoming popular in recent periods (Adebisi et.al., 2012).

Artificial Neural Networks (ANN) are considered the latest and most powerful method in the artificial intelligence research field, and the non-linear model is successfully trained by researchers to develop prediction models, especially in time series data. The ANN Model can be developed with customized parameters, this feature of flexibility facilitates the implementation of a wide number of features along with the cross-validation sets (Deepak et.al., 2017). ANN is getting its popularity and acceptability as a stock market prediction model as it successfully incorporates technical analysis (Selvamuthu et.al., 2019).

## 2 REVIEW OF LITERATURE

The traditional time series forecasting models fail to explore the complete nonlinear structure of the data set. The ANN has its competitive edge in extracting the hidden structures and relationships in the given time series data structure Shachmurove & Witkowska (2000). Adebisi et al. (2012) pointed out that Data mining techniques through ANN can be effectively applied to predict stock market movements.

Leading investment companies like Goldman Sachs, Morgan Stanley and Fidelity Investments apply ANN Model for their portfolio development and analysis Shachmurove & Witkowska (2000), the ANN is becoming more relevant and popular in the field of academic research filed as it is practically applied in the financial investment sector. The ANN is undergoing rapid expansion with greater attention in both the academic and industrial research communities Thenmozhi (2006). Qiu & Song (2016) pointed out that the traditional statistical models are linear; however, the time series analysis in the financial markets involves nonlinear problems, which lead the difficulties in developing accurate prediction models. The various literatures relating to stock market prediction suggests that the better and more reliable model is ANN as it is not focusing on traditional and rigid statistical formulas which are not suitable for the highly dynamic and constantly updated stock market operations. The ANN can be easily adaptable to changes in the stock market Guresen et al. (2011). Paluch and Jackowska-Strumiłło (2018) selected input variables randomly and developed model structures based on the results of ANN. The results of Asadi et.al. (2012) showed that the Hybridization of evolutionary Levenberg–Marquardt neural networks were effective in predicting stock prices with higher accuracy levels. The study of Zhang & Wu (2009) reveals that the mean square errors are minimized when the Back Probation neural network is applied to stock market prediction.

The ANN is widely applied as the emerging and powerful stock prediction model, the ANN suits better for stock price prediction than other models Devadoss & Ligorì (2013). Paluch & Jackowska-Strumiłło (2018) applied ANN to predict stock prices, and the results revealed that the ANN Model of stock price prediction outperforms other models, especially in long-term prediction. The ANN model, with its superior learning abilities like human brains, is capable of handling structural instability of data structure manages effectively the inputs and output containing both regularities and exceptions Thenmozhi (2006). Hoseinzade & Haratizadeh (2019) applied a CNN-based framework for predicting selected indices, and the results showed a significant improvement over another method. The ANN performs when compared to the statistical method of forgetting stock prices as the errors in ANN are comparatively less Vaisla & Bhatt (2010). Guresen et al. (2011) investigated the predictability of stock market price movements through Adaptive Network-Based Fuzzy Inference System and found the system was effective in predicting. Majhi et al. (2009) used an adaptive bacterial foraging technique using a simple linear combiner forecasting model to forecast stock market movements. Back Propagation (BP) is the most preferred training algorithm for ANN Simon & Raoot (2012).

The ANN using Back Propagation (BP) is very popular, and many researchers adopted the BP algorithm for training the data set in predicting stock market movement. Qiu & Song (2016) adopted the BP algorithm and improved it further using a genetic algorithm.

Patel et.al. (2015) proposed a two-stage fusion approach to predict stock indices, and the findings suggested that the two-stage approach is more effective than the single-stage approach. Chong et.al. (2017) developed a systematic approach to deep learning networks for stock market analysis and prediction and provided practical insights and directions for the effective application of deep learning networks for stock market prediction. Araújo & Ferreira (2013) conducted an experimental analysis with four methods, including Multi-Layer Perceptron Model, to predict stock prices. Experimental results of Kim & Han (2000) indicate that the Genetic Algorithm approach in artificial neural networks for the prediction of stock price index outperforms the conventional models. The ANN is considered a powerful model for stock market prediction because it trains the data set and tests it in the prediction process to minimize error. The ANN generates a group of connecting weights, produces an output with a positive spread, and then compares this with the expected output, if the error is more than the acceptable level, then it modifies the weights and redoes the process Lia & Liu (2009). The data is passed through this network and stored in the form of interconnections, and the interconnections between artificial neurons are called weights Simon & Rao (2012). The ANN training and these things consist of a large number of simple processing units, which are wired together in a complex communication network (Manjula et.al., 2011). The training process is the highlight of the ANN Model, and the training of data continues to till the error level is minimized to the minimum target level (Simon & Rao, 2012). Hassan et.al. (2007) found the efficacy of the fusion generated better accuracy in prediction than the popular statistical forecasting tools. Mostafa (2010) found that the Quasi-Newton training algorithm produces fewer forecasting errors in applying the ANN Model of stock price prediction.

The technical indicators are applied by investors and speculators across various equity markets in predicting stock market movements. Most financial managers and investors use technical indicators to get signals about the future movements of stock prices Qiu & Song (2016). The Relative Strength Index (RSI) is a momentum indicator adopted to find out the overbought and oversold levels of financial assets like asset prices, index levels and currency movements. The RSI is presented as an Oscillator moving between the upper limit (100) and lower limit (0). The RSI was developed by J. Welles Wilder Jr during the 1970s. Later technical experts identified the ideal range for RSI as 30 and 70. Relative strength is the most powerful and useful technical indicator used in stock market analysis Pruchnicka-Grabias (2018). The RSI compare the extent of the latest gains and losses, and the range is measured between 0 to 100 Meena & Malyadri (2013). The stock market players consider the RSI range of 30 to identify the bottomed-out price level, triggering the buy signal, the sell signal is identified at RSI 70 level, indicating an overbought level which leads to the trend reversal. Desai (2016) found that RSI can be used as an effective technical indicator to develop sound investment strategies.

The Parabolic SAR (Stop and Reverse system), known as the p SAR Trend, is a very popular technical indicator used in stock market analysis, it was developed by Welles Wilder to determine the price direction of financial assets. The p SAR Trend purpose is to identify potential reversals in the price movement of traded assets (Prasetijo et.al.,2017). The Average Directional Index (ADX) is the technical indicator that measures the overall strength of the stock price trend. The ADX can be effectively used to quantify the trend strength by calculating the moving average of the given period (Ivanovski et.al.,2017). The ADX shows the direction of the stock price trend in terms of negative directional indicator (-D) and positive directional indicator (+DI) (Vezeris et.al.,2020). The Simple Moving Average is the lagging technical indicator which is really versatile and facilitates the investors and speculators to anticipate the stock price trend. Alalaya et.al.(2018) stated that the Simple moving average (SMA) is widely applied. The stock price uptrend occurs when the current closing price moves above the moving average price, and the price downtrend is said to occur when the closing price of the stock moves below its moving average price Hari and Dewi (2018).

### **3 STATEMENT OF THE PROBLEM**

Investors and speculators very much require a stock price prediction model with high accuracy levels to enter and exit at the right price to enhance return prospects in equity investment, the ANN is proven to be an appropriate model in stock price prediction. Stock price movements are highly volatile, prediction becomes highly challenging Simon & Raoot (2012). Dase & Pawar (2010) argue that the traditional time series analysis is not an effective model in predicting stock prices when compared to ANN. The traditional method of predicting stock prices is a tedious, expensive and time-consuming process (Dase & Pawar, 2010). The review of literature relating to predicting stock prices using ANN reveals significant shortfalls in terms of selection of the determinants, adequacy of data and predicting the very target output itself. Many studies used fundamental factors as input variables to predict daily target values, but the fundamental factors are not available daily. A large number of studies used high prices, low prices, and differences in closing prices as technical indicators, whereas the widely used and most trusted technical indicators are ignored. Predicting exactly the future price of stocks is not possible as the stock prices are influenced by a large number of known as well as unknown variables. But predicting the future direction of price movements in terms of a Bullish or Bearish trend is the wisest, most useful and possible with the help of ANN. The present study is an attempt to overcome the above-mentioned shortcomings in developing the most appropriate ANN Model to predict stock price movements.

### **4 OBJECTIVES OF THE STUDY**

The present study has the main objective of predicting the next-day Gap opening of NIFTY 50 through the ANN – Multilayer Perceptron Model. The current day's closing values of the most popular and relevant technical indicators are used as predictors to predict the next day's Gap

opening of NIFTY 50 in terms of the Bull gap or Bear Gap. The study also aims to determine the importance of technical indicators in predicting the target output.

## **5 EXPECTED OUTCOMES OF THE STUDY**

The returns from equity investment depend on the skills of the investors and speculators in predicting the future trend of stock price. For taking a long position, the investor needs to buy the stock at a lower price so that he can sell at a higher price at a future date and book profits. For taking a short position, the investor has to sell the stock first at a high price and buy (square the transaction) at a lower price later. Therefore, to identify the correct entry and exit level, prediction of future price movements is essential. The present study is expected to predict the next day's opening values of the stock based on the current day's closing values of predictors (Technical Indicators). The prediction will certainly help investors and speculators whether to take a long position or a short position. Predicting the price movements before the market opens will certainly reduce the risk and enhance the return prospects of equity trading.

## **6 METHODOLOGY**

The study applies Artificial Neural Net (ANN) work with Multilayer Perceptron Model (MLP) to predict the daily gap opening of the NIFTY 50 Index. The Multilayer Perceptron is the perfect generalization of the perceptron, which effectively resolves the weakness when the perceptron is unable to identify the inseparable linear data (Gao et.al.,2020). Simon and Raoot (2012) found that MLP is very effective in predicting stock prices with high accuracy levels. The present study used one hidden layer, Hamzaçebi et al. (2009) argued that one hidden layer yields good results with high accuracy level. The model uses the daily closing values of eight Technical Indicators as inputs to predict the next day's gap opening values of NIFTY 50. The daily closing values of NIFTY 50 are collected from the National Stock Exchange, and the Technical Indicators (Independent variables) were collected for the period of 2559 trading days from 18/05/2010 to 10/09/2020. The difference between the current closing value of NIFTY 50 and its next day's opening value is taken for determining the NIFTY 50's Bull gap opening or Bear gap opening.

The gap opening will be predicted as a Bullish value when the next day's opening value of NIFTY 50 is greater than the current day's closing value. When the next day's opening value is lower than today's ending value, the NIFTY 50 is said to be opened with Bearish values. The following process is adopted to apply the ANN Multilayer Perceptron Model: a) firstly, the input variables and outputs are calculated by using the appropriate formulas, b) the data were normalized to minimize the experimental errors, c) the Backpropagation algorithm determined the weights and revised weights based on bias and d) the model generated outputs.

**Table 1 : Covariates and Target Output**

<b>Covariates and Target output</b>	<b>Variable Name</b>	<b>Calculations</b>
Covariates (Independent Variables)	P SAR Trend	$p \text{ SAR Trend} = \text{SAR}_{n+1} - a (\text{EP} - \text{SAR}_n)$ Where $\text{SAR}_n$ is current period, $\text{SAR}_{n+1}$ is the next period and $a$ is the Acceleration factor.
	ADX (Average Directional Index)	ADX combines both +DI and -DI +DI = Uptrend > Down trend and Uptrend > '0' -DI = Down trend > Up trend and Down trend > '0'
	RSI (Relative Strength Index)	$\text{RSI} = 100 - [100 / (1 + (\text{AUPC} / \text{ADPC}))]$ Where; AUPC = Average upward price change ADPC = Average downward price change
	MACD (Moving Average Convergence and Divergence)	$\text{MACD} = 12 \text{ Day EMA} - 26 \text{ Day EMA}$ $\text{EMA} = (\text{CMP} \times K) + (\text{Previous EMA} \times (1-K))$ Where; EMA = Exponential Moving Average CMP = Current Market Price K = Smoothing Factor = $2/(N+1)$
	MACD Histogram	MACD- 9 Days EMA
	CCI Oscillator (Commodity Channel Index)	$\text{CCI} = (\text{AP} - \text{SMA of AP}) / (0.015 \times \text{Mean Deviation})$ AP (Average price or Typical price) = $(\text{High Price} + \text{Low Price} + \text{Closing Price}) / 3$ SMA = Simple Moving Average
	William % R Indicators	$\text{William \% R Indicators} = (\text{HH} - \text{CP}) / (\text{HH} - \text{LL})$ Where; HH = Highest price of the stock in the last 14 trading days CP = Current closing price of the stock LL = Lowest price of the stock in the past 14 trading days
Target output (Dependent variable)	10 Days SMA-NIFTY 50	$\text{SMA} = (\text{S}_1 + \text{S}_2 + \dots + \text{S}_n) / n$ Where; $\text{S}_n$ = The closing price of the stock at period of $n$ $n$ = the total number of moving average period
	Next day Bull gap opening of NIFTY 50	The current closing value of NIFTY50 < Next day opening value of NIFTY50
	Next day Bear gap opening of NIFTY 50	Current closing value of NIFTY50 > Next day opening value of NIFTY50



## 7 RESULTS AND DISCUSSIONS

### 7.1 Partitioning of input data

The partition of the input data is an important process in ANN -MLP Model, wherein the input dataset is portioned as training data, testing data and hold-out data. The training process applied by ANN MLP is the essential element, as the deviation and the penetration of the series leads to the sound ANN Model expansion Ghosh (2017), Panda and Narasimhan (2006). Table 3 shows that 80.5% of the data (2060 out of 2559 samples) is allocated for training, 9.6% of the data (246 out of 2559 samples) is allocated for testing, and 9.9% of the data (253 out of 2559 samples) is allocated for holding out. To build efficient training, a very tall proportion of the data (80.5%) is distributed for training. The holdout sample shows the “honest” estimation indicating the projecting capability of the ANN – MLP Model. The application of training data facilitates determining the weights of input variables. The model uses the testing data to find out faults and avoid overtraining during the training procedure. The ANN -MLP Model use the holding data to validate the model Ghosh (2017).

**Table 2 : Descriptive Statistics**

	N	Minimum	Maximum	Mean	S T D . Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	S t d . Error	Statistic	S t d . Error
p SARTrend	2559	4531.15	12430.50	7985.5488	2242.53505	.221	.048	-1.262	.097
ADX Index	2559	9.94	62.77	24.9824	9.09959	.807	.048	.399	.097
RSI	2559	13.04	82.60	53.6586	12.44587	-.214	.048	-.487	.097
MACD	2559	-1003.62	271.69	16.5982	110.07879	-3.198	.048	22.678	.097
MACD Histogram	2559	-278.99	208.12	.2249	32.78636	-.534	.048	14.419	.097
CCI Oscillator	2559	-367.87	356.06	20.9176	107.89189	-.323	.048	-.686	.097
William % R Indicators	2559	-99.30	-.90	-41.5421	31.83673	-.369	.048	-1.279	.097
SMA 10 Days of NIFTY 50	2559	4680.42	12271.70	8019.6055	2243.38409	.220	.048	-1.284	.097
Next-Day Opening of NIFTY 50 (Bull Gap or Bear Gap)	2559	1.00	2.00	1.4170	.49315	.337	.048	-1.888	.097
Valid N (listwise)	2559								

**Table 3 : Partitioning of input data**

Partitioning		N	Per cent
Sample	Training	2060	80.5%
	Testing	246	9.6%
	Holdout	253	9.9%
Valid		2559	100.0%
Excluded		0	
Total		2559	

## 7.2 Backpropagation

The ANN -MLP Architecture selected the least number of components in the Hidden layer as one and the extreme of 50 Hidden layers and the number of units is automatically calculated by the model. To reduce and keep the faults and residues at a lower level, the ANN- MLP Model does the function of Backpropagation of the prejudice to the initial input layer, rereads the weights of the inputs and model reworks the exercise again (Jayaraman & Venkatachalam, 2021). The Backpropagation adopted by the ANN-MLP to reduces errors and improves the accuracy of the prediction Panda and Narasimhan (2006). The model compares the predicted target values with the real target values to determine the bias (errors) by the following equation;

$$E = \frac{1}{2} (\text{forecast output value} - \text{actual output value})^2$$

## 7.3 Activation function

The strength of input data in generating signals to initiate the further process is measured and determined by the Hyperbolic Tangent Activation function. The Hyperbolic tangent activation function nominated the Standardized rescaling technique.

$$y(c) = \tanh(c) = (e^c - e^{-c}) / (e^c + e^{-c}) \text{ (Jayaraman \& Venkatachalam, 2021)}$$

The selected activation function processes all the nodes in the Hidden layer and converts the standards to the array of -1 to 1

## 7.4 Training

The ANN- MLP Model adopted the Batch training method for training the input data The Scaled conjugate gradient optimization algorithm is applied. The training choices adopted are; Initial Lambada 0.0000005, Initial sigma 0.00005, Interval centre '0' and Interval offset  $\pm 0.5$ . The interval centre ( $a_0$ ) and interval offset ( $a$ ) indicates the interval  $[a_0 - a, a_0 + a]$ , while the weight vectors are randomly created when simulated annealing is applied (Jayaraman & Venkatachalam, 2021).

7.5      **The Network structures**

ANN- MLP excludes the cases with the missing values of Covariates and the Target variable. The stopping rule of “1” as the maximum phase deprived of a reduction in mistake is selected by the model. The extreme training period is 60 minutes. Epoch values are automatically calculated by the model. The minimum relative change in training error is 0.0001 and the relative alteration in training error ratio is 0.001. Table 4 shows complete details of covariates, the number of units and the Rescaling technique of independent variables of the input layer. The ANN -MLP Model automatically developed five hidden layers based on the nodes received from the input layers. Figure 1 shows the ANN – MLP Model developed for predicting the daily (next day) opening values of the NIFTY 50 Index, whether the next day’s opening value will be higher than today’s closing value (Bull gap opening) or the next day’s opening value will be lower than today’s closing value (Bear gap opening).

The ANN – MLP Model Figure shows how the inputs are fed into the hidden layer, nodes are moved to the output layer and the predicted output. The output value of Gap opening = 1 indicates the next day’s opening value of NIFTY50 will be higher than today’s closing value, called Bull gap opening. The output value of Gap opening = 2 indicates the next day’s opening value of NIFTY50 will be lower and higher than today’s closing value, called Bear gap opening. The nodes in bold shapes in the ANN – MLP Model Figure reveal a solid connection, whereas the nodes in the slim figure show a feeble connection. The intensity of the connection is quantified by the model and the same is shown in Table 6 - Parameter Estimates of ANN–MLP Model. The Parameter Estimates reveal the Synaptic weights of the data sets of the training data sample used by the model. Table 5 - Model Summary shows the important elements of the results about training, testing, holding out samples of the data applied in the model and the Cross-Entropy Error. The percentage of incorrect predictions during the training process of the data set is 13.8%, and the incorrect predictions during testing of the sample data set are also 13.8%, which is very low for the large data set used in this study, indicating better accuracy of the model. The Cross-entropy error of holding out a data set is 69.8111 against the training Cross entropy error of 599.110, indicating that the model has not overfitted to the training data and has learned to generalize the trend (Jayaraman & Venkatachalam, 2021). The lower Cross entropy error in the testing sample compared to the said error in the training sample indicates that the model prevents overtraining (Zacharis, 2016).

**Table 4 : ANN -MLP - Structure**

Input Layer	Covariates	1	p SAR Trend
		2	ADX Index
		3	RSI
		4	MACD
		5	MACD Histogram
		6	CCI Oscillator
		7	William % R Indicators
		8	SMA 10 Days of NIFTY 50
	Number of units		8
	Rescaling Method for Covariates		Standardized
H i d d e n Layer(s)	Number of Hidden Layers		1
	Number of Units in Hidden Layer 1 <sup>a</sup>		5
	Activation Function		Hyperbolic tangent
Output Layer	Dependent Variables	1	Next-Day Opening of NIFTY 50 (Bull Gap or Bear Gap)
	Number of Units		2
	Activation Function		SoftMax
	Error Function		Cross-entropy
a. Excluding the bias unit			

Figure 1: ANN – MLP Model

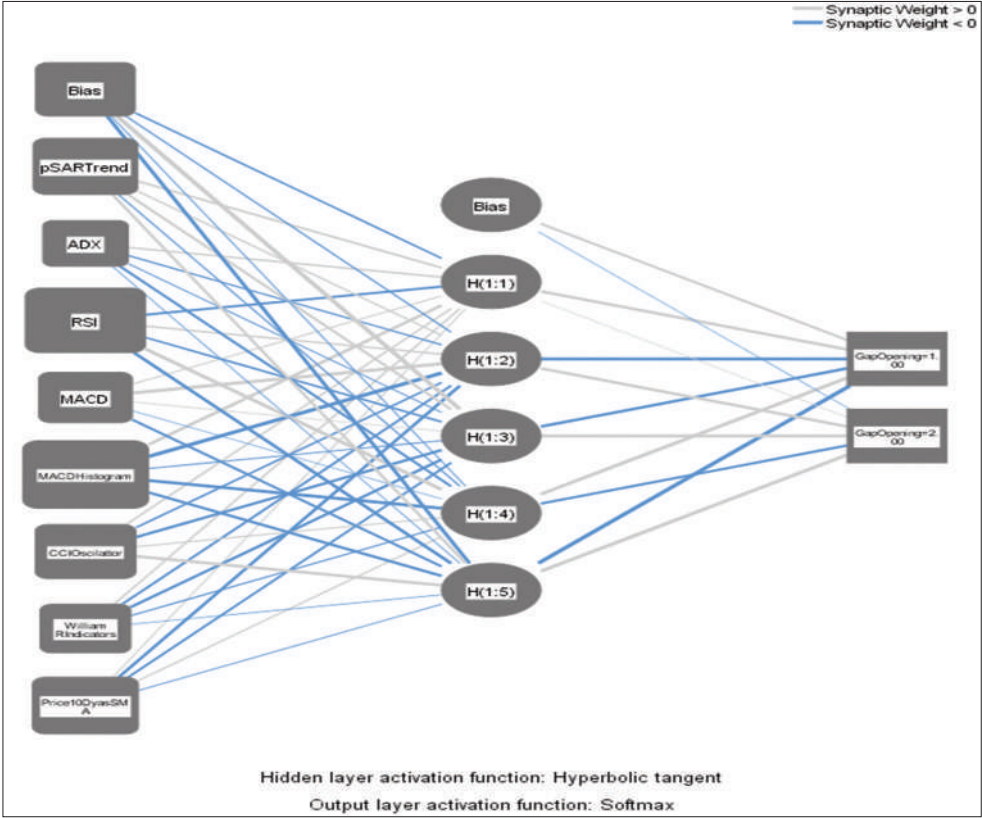


Table 5 : Model Summary

Training	Cross Entropy Error	599.110
	Per cent Incorrect Predictions	13.8%
	Stopping Rule Used	One consecutive step(s) with no decrease in error <sup>a</sup>
	Training Time	0:00:01.12
Testing	Cross Entropy Error	69.811
	Percent Incorrect Predictions	13.8%
Holdout	Percent Incorrect Predictions	15.0%
Dependent Variable: Next Day Opening of NIFTY 50 (Bull Gap or Bear Gap)		
a. Error computations are based on the testing sample.		

**Table 6 : Parameter Estimates of ANN – MLP Model**

Predictor		Predicted						
		Hidden Layer 1					Output Layer	
		H (1:1)	H (1:2)	H (1:3)	H (1:4)	H (1:5)	[Gap Opening= 1.00] NIFTY 50 Bull Gap Opening	[Gap Opening= 2.00] NIFTY 50 Bear Gap Opening
Input Layer	(Bias)	-.330	-.204	1.397	-.117	-.738		
	p SAR Trend	.416	.300	.425	-.191	.471		
	ADX	.353	-.285	-.146	-.422	-.093		
	RSI	-.500	.337	-.355	1.035	-.727		
	MACD	.223	1.306	.115	-.062	-.438		
	MACD Histogram	.760	-1.385	-.194	-.801	-.702		
	CCI Oscillator	.319	-.341	-.693	.283	.798		
	William R Indicators	.316	-.396	-.599	-.250	-.098		
	Price10Days SMA	.176	-.649	-.358	.299	-.136		
Hidden Layer 1	(Bias)						.558	-.022
	H (1:1)						.794	.078
	H (1:2)						-1.022	.765
	H (1:3)						-.758	.938
	H (1:4)						1.119	-.579
	H (1:5)						-1.333	1.309

Table 7 - Classification Summary reveals the efficiency and accuracy of the ANN – MLP Model in predicting the next day's opening value of NIFTY 50, whether it is going to open higher than today's closing value (Bull gap opening) or open lower than today's closing value (Bear gap opening). The model correctly predicted the Bull gap opening of NIFTY for 1059 days and wrongly predicted the Bull gap opening as Bear gap opening for 146 days during the training process. The percentage of correct prediction is 87.9% which is a very high level of prediction accuracy. The model correctly predicted the Bear gap opening of NIFTY for 717 days and wrongly predicted the Bear gap opening as a Bull gap opening for 138 days during the training process. The percentage of correct prediction is 83.9% which is a very high level

of prediction accuracy. The model correctly predicted the Bull gap opening of NIFTY for 132 days and wrongly predicted the Bull gap opening as a Bear gap opening for 18 days during the testing process. The percentage of correct prediction is 88 %, and the percentage of correct prediction during testing is higher than the training process, which indicates the efficiency of the model.

The model correctly predicted the Bear gap opening of NIFTY for 717 days and wrongly predicted the Bear gap opening as the Bull gap opening for 138 days during the training process. The percentage of correct prediction is 83.9% which is a very high level of forecast accuracy. The general forecast accuracy of the ANN-MLP Model adopted in the study is very high, which is in line with the findings of Panda and Narasimhan (2006), Verma et.al. (2017), Thenmozhi (2006), Shachmurove & Witkowska (2000). The prediction accuracy of the Bear gap opening is slightly lower than the prediction accuracy of the Bull gap opening because the market movements take a sudden Bearish trend because of unexpected negative news hitting the markets. The extreme events in the markets are more complex and express more than anything else Sornette (2004).

**Table 7 : Classification Summary**

Sample	Observed	Predicted		
		NIFTY 50 Next day opening (Bull gap) 1.00	NIFTY 50 Next day opening (Bear gap) 2.00	Percent Correct
Training	1.00	1059	146	87.9%
	2.00	138	717	83.9%
	Overall Percent	58.1%	41.9%	86.2%
Testing	1.00	132	18	88.0%
	2.00	16	80	83.3%
	Overall Percent	60.2%	39.8%	86.2%
Holdout	1.00	116	21	84.7%
	2.00	17	99	85.3%
	Overall Percent	52.6%	47.4%	85.0%
Dependent Variable: Next Day Opening of NIFTY 50 (Bull Gap or Bear Gap)				

The value of the Area under the curve shown in Table 8 is 0.946 which is within the excellent range of 0.90 to 1.00. The calculated value of the Area under the curve indicates that if the Bull gap opening and Bear gap opening are nominated arbitrarily, there is a 0.946 likelihood that the model projected pseudo-probability for the Bull gap opening to be in Bull gap opening and the Bear gap opening to be in Bear gap opening, which is more than the model predicted pseudo-probability.

Table 8 : Area Under the Curve

		Area
Next-Day Opening of NIFTY 50 (Bull Gap or Bear Gap)	1.00	.946
	2.00	.946

Figure 2 - shows the Predicted Pseudo – Probability of the target values from the left side, the first boxplot represents the predicted probability of the observed Bull gap opening of NIFTY 50 in the Bull gap category, whereas the second boxplot shows, the probability of Bear gap opening but it actually in Bull gap category. The third boxplot represents the Bull gap opening, but it should be in the Bear gap opening. The fourth boxplot represents the predicted probability of the observed Bear gap opening category, as it should be.

Figure 2 : Predicted Pseudo –Probability

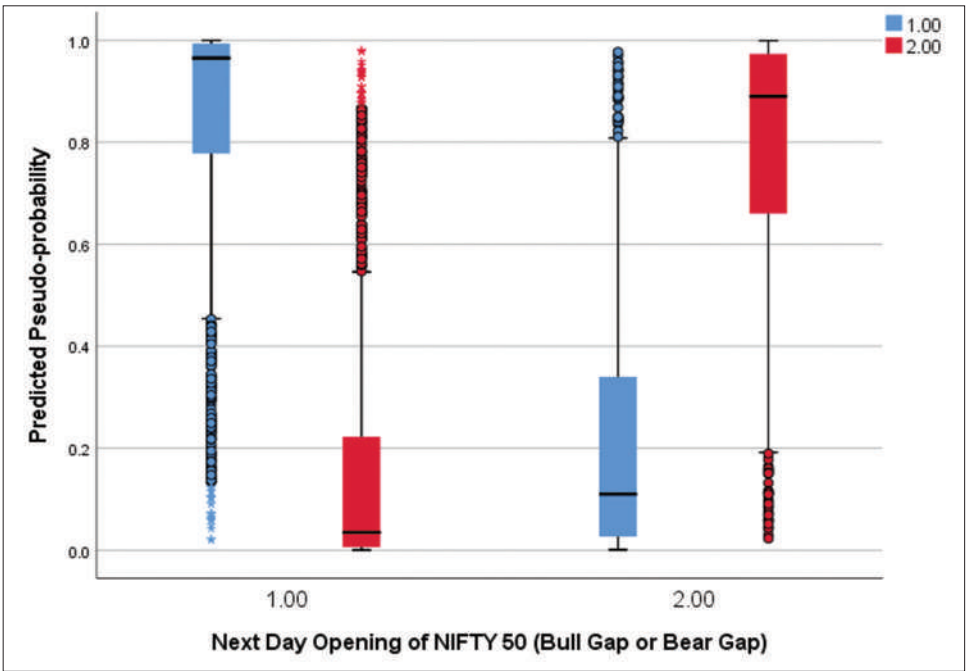


Figure 3 - ROC Curve (Receiver Operating Characteristic Curve) reveals the Sensitivity versus Specificity arrangement presentation for all likely deadlines based on the joint training and testing sample datasets. The functional facts shown by ROC indicate the possible trade-off between a classifier’s sensitivity and specificity Woods and Bowyer (1997). The ROC Chart featuring a 45-degree line from the lower left to the upper right corner exhibits the random prediction of the class. The sensitivity representing the true positive rate is plotted in function of the false positive rate (100-Specificity) for different cut-off points; therefore, both curves



find a place in the upper left corner of the ROC Chart, indicating a high accuracy level of the model (Jayaraman & Venkatachalam, 2021).

**Figure 3 : ROC Curve (Receiver Operating Characteristic Curve)**

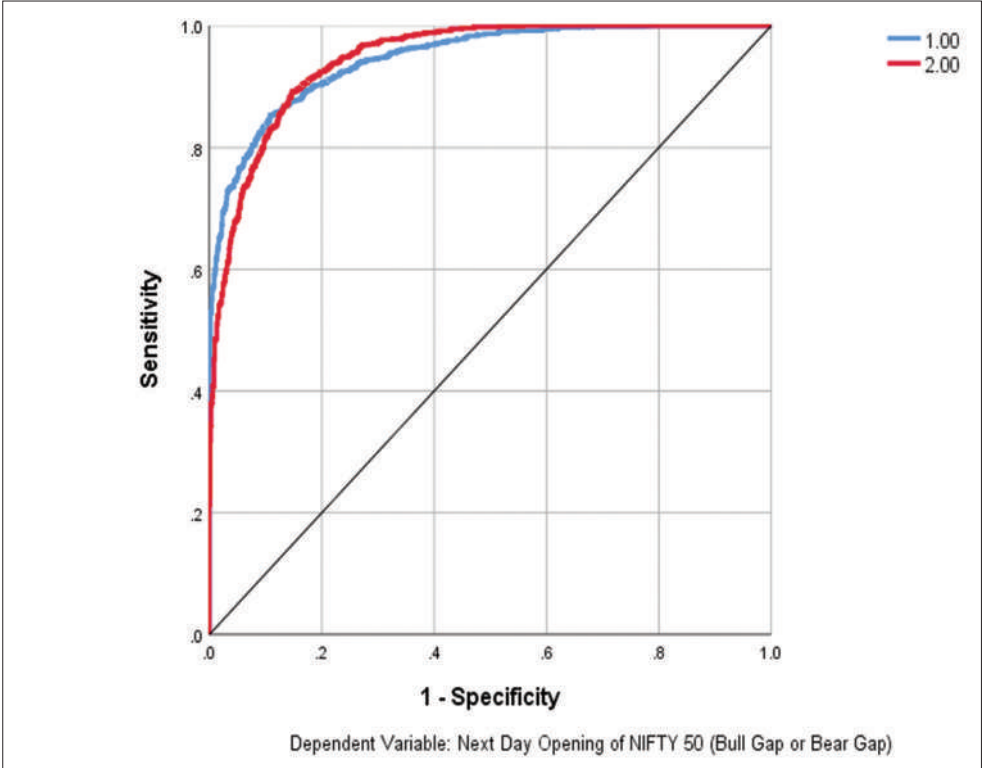


Figure 4 - Gain and Percentage shows the cumulative gains of precise classifications generated by the ANN – MLP Model and the precise classification that could be generated without adopting this ANN- MLP Model. This comparison helps to determine the efficiency of the model developed by the ANN Model against the correct classifications that could be generated without using the ANN Model. The higher the predicted curves go above the baseline, the higher the performance of the ANN -MLP Model adopted in this study. Both the Bull gap curve (1) and Bear gap curve (2) are keeping their places above the baseline, indicating the efficiency and need for using this model. If the curves are farther above the baseline, a greater gain is achieved, and a higher overall gain indicates better performance of the model Zacharis (2016). Table 9 -Independent Variable Importance shows the variables’ importance in predicting the target output (Bull gap opening or Bear gap opening of NIFTY 50. The normalized importance levels start from 23.1% for ADX Index and MACD Histogram has an importance level of 100% in predicting the target value. The importance value of all the covariates indicates that all of them are pertinent in determining the Gap opening values of NIFTY 50.

Figure 4 : Gain and Percentage

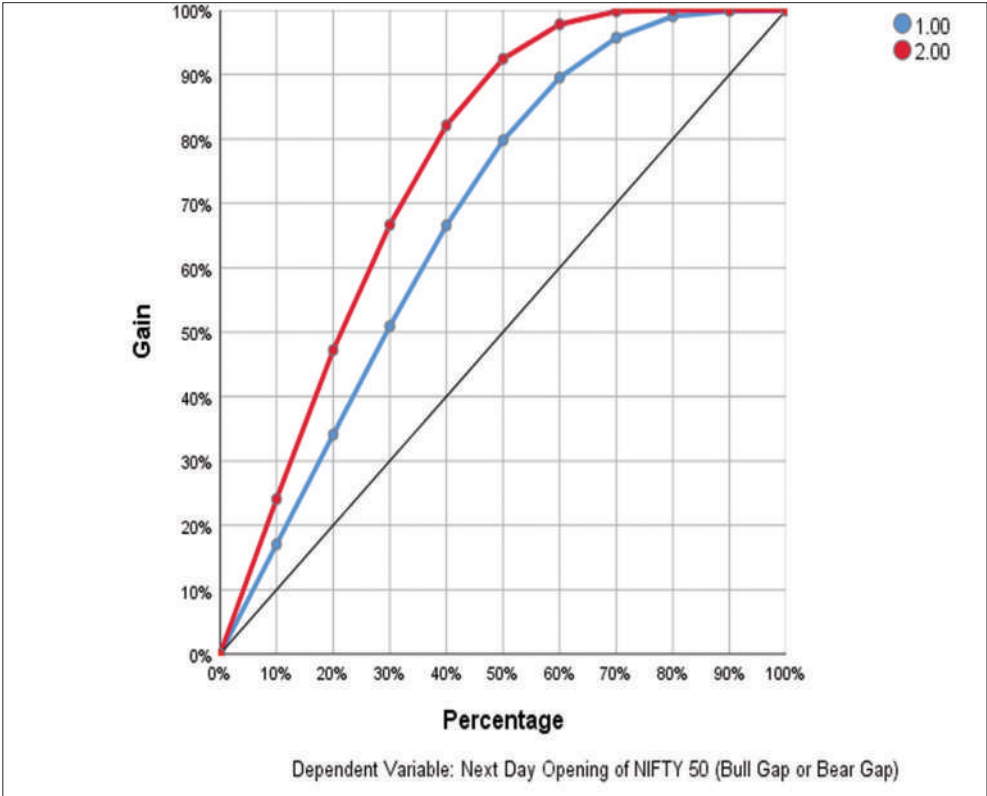


Table 9 : Independent Variable Importance

	Importance	Normalized Importance
p SAR Trend	.130	59.7%
ADX Index	.050	23.1%
RSI	.196	90.1%
MACD	.084	38.5%
MACD Histogram	.218	100.0%
CCI Oscillator	.113	52.0%
William % R Indicators	.072	32.9%
SMA 10 Days of NIFTY 50	.136	62.2%

## 8 CONCLUSION

The prediction of stock market movements is very much required by investors and speculators, since the prediction of stock price movements with higher accuracy levels will determine the profitability of their investment portfolio. The technical indicators are very useful to predict the stock markets but using conventional statistical forecasting methods fails in accurate prediction, as the markets are highly dynamic and the movements are prejudiced by a large number of factors. Application of ANN -MLP enhances the accuracy level of stock market prediction. The present study adopted ANN- MLP Model to forecast the next day's initial value of the NIFTY 50 Index. The prediction of the opening value of the NIFTY 50 a day before its actual opening certainly will help the market participants in taking the right decisions to enter and exit the stocks. The ANN-MLP Model was trained with 80.5% of the sample data, 9.6% of sample data was used for testing and reserved 9.9% for the holdout. The model predicted the Gap opening of NIFTY with an overall accuracy of 86% with training data and testing data. Specifically, the prediction accuracy level is higher for the Bull gap opening when compared to the Bear gap opening. The Cross-entropy error of holding out data and testing data indicates the model is not over fitted. The value under the curve is 0.946, indicating the efficiency model. The ROC, Gain and Percentage charts are supporting the efficiency and prediction accuracy of the ANN-MLP Model. Appropriate selection and application of covariates resulted in the higher level of accuracy of the model; the relevance of the selected covariates is evidenced by the values shown in the normalized importance level of independent variables calculated in the model. The results show a robust signal that the application of the ANN-MLP Model can help the investors and operators in taking the right entry and exit strategy by predicting the next-day gap opening direction of the stock market. The ANN- MLP Model adopted in this study can be further extended to other stock markets to check whether the findings can be generalized to other stock market indices.

## REFERENCES

- Adebiyi, A. A., Ayo, C. K., Adebiyi, M. O., & Otokiti, S. O. (2012). Stock price prediction using neural network with hybridized market indicators. *Journal of Emerging Trends in Computing and Information Sciences*, 3(1), 1-9.
- Alalaya, M., Hani, A., & Alawad, A. D. A. (2018). Moving Average Convergence/Devergerance and Relative Strength Index Applied to Predict Price of ASE. *International Journal of Business and Social Science*, 9(6).
- Araújo, R. d. A., & Ferreira, T. A. (2013). A morphological-rank-linear evolutionary method for stock market prediction. *Information Sciences*, 237, 3-17.
- Asadi, S., Hadavandi, E., Mehmanpazir, F., & Nakhostin, M. M. (2012). Hybridization of evolutionary Levenberg–Marquardt neural networks and data pre-processing for stock market prediction. *Knowledge-Based Systems*, 35, 245-258.
- Chong, E., Han, C., & Park, F. C. (2017). Deep learning networks for stock market analysis and prediction: Methodology, data representations, and case studies. *Expert Systems with Applications*, 83, 187-205.
- Dase, R., & Pawar, D. (2010). Application of Artificial Neural Network for stock market predictions: A review of literature. *International Journal of Machine Intelligence*, 2(2), 14-17.
- Deepak, R. S., Uday, S. I., & Malathi, D. (2017). Machine learning approach in stock market prediction. *International Journal of Pure and Applied Mathematics*, 115(8), 71-77.
- Desai, J. (2016). Relative strength index as an investment strategy in the Indian stock market. *International Journal of Current Multidisciplinary Studies*, 2(5), 247-253.
- Devadoss, A. V., & Ligor, T. A. A. (2013). Forecasting of stock prices using multi layer perceptron. *International journal of computing algorithm*, 2, 440-449.
- Gao, P., Zhang, R., & Yang, X. (2020). The application of stock index price prediction with neural network. *Mathematical and Computational Applications*, 25(3), 53.
- Ghosh, B. (2017). Quest for behavioural traces the neural way: A study on BSE 100 along with its oscillators. *Indian Journal of Research in Capital Markets*, 4(1), 19-25.
- Guresen, E., Kayakutlu, G., & Daim, T. U. (2011). Using artificial neural network models in stock market index prediction. *Expert Systems with Applications*, 38(8), 10389-10397.
- Hamzaçebi, C., Akay, D., & Kutay, F. (2009). Comparison of direct and iterative artificial neural network forecast approaches in multi-periodic time series forecasting. *Expert Systems with Applications*, 36(2), 3839-3844.

- Hari, Y., & Dewi, L. P. (2018). *Forecasting system approach for stock trading with relative strength index and moving average indicator*. Petra Christian University,
- Hassan, M. R., Nath, B., & Kirley, M. (2007). A fusion model of HMM, ANN and GA for stock market forecasting. *Expert Systems with Applications*, 33(1), 171-180.
- Homayouni, N., & Amiri, A. (2011). *Stock price prediction using a fusion model of wavelet, fuzzy logic and ANN*. Paper presented at the International conference on e-business, management and economics.
- Hoseinzade, E., & Haratizadeh, S. (2019). CNNpred: CNN-based stock market prediction using a diverse set of variables. *Expert Systems with Applications*, 129, 273-285.
- Ivanovski, Z., Ivanovska, N., & Narasanov, Z. (2017). Technical analysis accuracy at Macedonian Stock Exchange. *UTMS Journal of Economics*, 8(2), 105-118.
- Jayaraman, G., & Venkatachalam, M. (2021). *Predicting Daily Closing Value of Indian Stock Index Through Artificial Neural Network*. Paper presented at the 2021 International Conference on Decision Aid Sciences and Application (DASA).
- Kazem, A., Sharifi, E., Hussain, F. K., Saberi, M., & Hussain, O. K. (2013). Support vector regression with chaos-based firefly algorithm for stock market price forecasting. *Applied soft computing*, 13(2), 947-958.
- Kim, K.-j., & Han, I. (2000). Genetic algorithms approach to feature discretization in artificial neural networks for the prediction of stock price index. *Expert Systems with Applications*, 19(2), 125-132.
- Li, F., & Liu, C. (2009). *Application study of BP neural network on stock market prediction*. Paper presented at the 2009 Ninth International Conference on Hybrid Intelligent Systems.
- Majhi, R., Panda, G., Majhi, B., & Sahoo, G. (2009). Efficient prediction of stock market indices using adaptive bacterial foraging optimization (ABFO) and BFO based techniques. *Expert Systems with Applications*, 36(6), 10097-10104.
- Manjula, B., Sarma, S., Naik, R. L., & Shruthi, G. (2011). Stock prediction using neural network. *International Journal of Advanced Engineering Sciences and Technologies*, 10(1), 13-18.
- Meena, G., & Malyadri, G. (2013). A study on security price movement of Tata Motor and TVS Motor by using Relative Strength Index with reference to Trustline Securities Pvt Ltd. *Management*, 2(12).
- Mostafa, M. M. (2010). Forecasting stock exchange movements using neural networks: empirical evidence from Kuwait. *Expert Systems with Applications*, 37(9), 6302-6309.

- Paluch, M., & Jackowska-Strumiłło, L. (2018). Hybrid models combining technical and fractal analysis with ANN for short-term prediction of close values on the warsaw stock exchange. *Applied Sciences*, 8(12), 2473.
- Panda, C., & Narasimhan, V. (2006). Predicting stock returns: an experiment of the artificial neural network in Indian stock market. *South Asia economic journal*, 7(2), 205-218.
- Patel, J., Shah, S., Thakkar, P., & Kotecha, K. (2015). Predicting stock market index using fusion of machine learning techniques. *Expert Systems with Applications*, 42(4), 2162-2172.
- Prasetijo, A. B., Saputro, T. A., Windasari, I. P., & Windarto, Y. E. *Buy/Sell Signal Detection in Stock Trading with Bollinger Bands and Parabolic SAR*. Paper presented at the Proc. of 2017 4th Int. Conf. on Information Tech., Computer, and Electrical Engineering (ICITACEE).
- Pruchnicka-Grabias, I. (2018). Empirical study of the relative strength in the currency portfolio construction. *Studia Ekonomiczne*, 356, 109-123.
- Qiu, M., & Song, Y. (2016). Predicting the direction of stock market index movement using an optimized artificial neural network model. *PloS one*, 11(5), e0155133.
- Selvamuthu, D., Kumar, V., & Mishra, A. (2019). Indian stock market prediction using artificial neural networks on tick data. *Financial Innovation*, 5(1), 1-12.
- Senapati, M. R., Das, S., & Mishra, S. (2018). A novel model for stock price prediction using hybrid neural network. *Journal of The Institution of Engineers (India): Series B*, 99(6), 555-563.
- Shachmurove, Y., & Witkowska, D. (2000). *Utilizing artificial neural network model to predict stock markets*: University of Pennsylvania, Center for Analytic Research in Economics and ....
- Simon, S., & Raoot, A. (2012). Accuracy driven artificial neural networks in stock market prediction. *International journal on soft computing*, 3(2), 35.
- Sornette, D. (2004). A complex system view of why stock markets crash. *New Thesis*, 1(1), 5-18.
- Thenmozhi, M. (2006). Forecasting stock index returns using neural networks. *Delhi Business Review*, 7(2), 59-69.
- Vaisla, K. S., & Bhatt, A. K. (2010). An analysis of the performance of artificial neural network technique for stock market forecasting. *International Journal on Computer Science and Engineering*, 2(6), 2104-2109.
- Verma, R., Choure, P., & Singh, U. (2017). *Neural networks through stock market data prediction*. Paper presented at the 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA).

- Vezeris, D., Kyrgos, T., Karkanis, I., & Bizergianidou, V. (2020). Automated trading systems' evaluation using d-Backtest PS method and WM ranking in financial markets. *Investment Management & Financial Innovations*, 17(2), 198.
- Woods, K., & Bowyer, K. W. (1997). Generating ROC curves for artificial neural networks. *IEEE Transactions on medical imaging*, 16(3), 329-337.
- Zacharis, N. Z. (2016). Predicting student academic performance in blended learning using Artificial Neural Networks. *International Journal of Artificial Intelligence and Applications*, 7(5), 17-29.
- Zhang, Y., & Wu, L. (2009). Stock market prediction of S&P 500 via combination of improved BCO approach and BP neural network. *Expert Systems with Applications*, 36(5), 8849-8854.

# HOW FORENSIC ACCOUNTANTS ADD VALUE WHILE INVESTIGATE CLAIMS & FRAUD

*Hisham Said ALGhunaimi*

*Saleh Said AlMamari*

---

## INTRODUCTION

Forensic accounting is a new generation tool that has adopted the implementation of modern technology for detecting financial fraud. The implementation of virtual analysis and record-keeping has created a new genre in accounting by reducing the chances of error and fraud. Applicants with excellent numerical skills are generally employed as forensic accountants. They use their auditing and accounting knowledge and abilities and combine them with specific investigative skills. This helps them to identify the fraudulent activities, if there are any, and to determine the reasons behind the suspicious financial activity. The organization authorities of businesses can use this information as convincing evidence in trials. Forensic accountants represent reports of financial findings as evidence during hearings and stand out as expert witnesses. As they have expertise in the field, their testimonies often lead to the recovering of lost money in a scam. The precise application of specific software tools makes a forensic accountant different from an ordinary chartered accountant. There are various types of tools and methods that help the forensic accountant to check all the reports and to store the records of the transactions and billing reports. Forensic accounting is the inevitable future of accountancy as the embodiment of technology has been proven to be quite successful in the detection and prevention of fraud. Evaluating the success rate of forensic accountants, the youth is tending to lean forward in this field to build their careers. The literature delves deeply into the role of forensic accountants while investigating claims and fraud. The scope and purpose of the forensic accountant are broad and highly significant in the present day. Forensic accountants are highly skilled, knowledgeable and professional and have a dearth and expertise to analyse malpractices and initiate necessary steps for the growth and development of the business. Furthermore, the small scale businesses or the companies do not have the necessary resources to employ forensic accountants, thereby financial scandals, scams, and fraudulent activities are more. The present role of forensic accounts focuses on controlling organisational policies and procedures that are misguided by unauthorised or illegal sources. Hence stringent measures in this aspect are highly beneficial because it prevents loss and enhances operational efficiencies significantly. The major function of the forensic accountants is to detect fraud in the financial statements so that in the future the business can overcome the potential risks in a short time. Early detection of frauds is also cost savings for the company as they do not have to invest hefty amount in the future to mitigate the risks of fraud. Hence the literature provides in- depth insights into the role of forensic accountants in detecting frauds, thereby providing value to the overall business procedures.



## NEED FOR FORENSIC ACCOUNTING

As per experts and critics, the forensic accounting market is expected to expand by 8.2% globally and is expected to reach 8.85 billion within the year 2027. To investigate different financial performances and crime investigation the forensic accounting market utilizes different forms of accountancy, investigation, and audit. So, it can be said that this kind of professionals are responsible for summarization, interpretation of different critical financial and commercial circumstances. As indicated by Chika (2016) forensic accounting uses different quantitative estimations in order to gather different relevant data or information and convey the specific conclusion accordingly. So, from the above assertion, it is quite apparent that forensic accountancy provides various reports with admissible evidence. The Bureau of Labor Statistics (BLS) predicted more than 12% job growth for forensic accounting within 2022. The association also predicted that all sorts of forensic accounting jobs exceed by 20% due to increased form of financial regulations.

As discussed earlier, forensic accounting can help various governments, non-government organizations, along with the society in predicting the number of frauds. Today due to emergence of different technologies the number of business failure occurrence is increasing day by day. Various scandals of astronomical proportions demonstrate that there is great need of adding various forensic skills in the audit process. In various Western countries the majority of large organizations have respective forensic accounting departments. However, on the other hand, Ezekwesili Kr (2021) opined that in the middle east countries there is a compelling need for e forensic accounting that requires definite thrust and boost. In the Middle East countries, this kind of profession generally requires a definite position and importance.

## THE PRESENT, PAST, AND FUTURE OF FORENSIC ACCOUNTING

Forensic accounting audits are the tools for regulating financial sectors in corporate businesses. The implementation of forensic accounting in auditing has pioneered a completely new and technologically evolved method for the regulation and proper operation in accountancy. Forensic accounting was introduced to the corporate world almost seventy years ago to fight against financial fraud (Rechtman, 2020). Since then, the forensic accounting is constantly under development as in this period science and technology have come a long way and have evolved as more skilful techniques and expanded their scope as a preferable career option. At present with the embodiment of high technology and rapid up-gradation of software. The implementation of forensic accounting is so helpful and effective for corporate businesses that upgraded their accounting system by installing forensic accounting facilities (Kramer et al., 2017). Though the implementation of forensic accounting is not yet widely accepted in developing and underdeveloped countries, the application of forensic audit is so appropriate and is considered the future of accountancy and possibly the only trustworthy method to

achieve maximum effectiveness in auditing as in this modern world (Liodorova & Fursova, 2018). The implementation of forensic accounting has not only been able to detect fraudulent activities in faster but also has been effective in preventing scams by operating pre-analysis and logical predictions. Therefore, the implementation of forensic accounting has improvised the entire system of accountancy to many folds (Abdulrahman et al., 2020).

**Figure 1: Opportunities in Forensic Accounting**



(Source: Liodorova & Fursova, 2018)

The modification and improvement in the mode of practice and appropriate application of forensic accounting as a specialized field allow space for growth. Moreover, as the body of knowledge has been spread, the personnel have been able to achieve professional satisfaction. This huge success of forensic accounting has attracted new generations. The youth generation is showing their interest in forensic accounting as the process includes the application of several modern technologies and tools (Ozcan, 2018). Forensic accountants are considered experts who are trained to examine and identify frauds and scams along with handling the entire accounting process. All these aspects are drawing the attention of the new generation as, in this competitive world. They are struggling to be established in common career fields amidst innumerable candidates. Along with these, the role of forensic accountant needs adequate knowledge in the field of technological skills, development of interpersonal skills, and sceptical mind, the ability to handle the pressure of validation, and the ability to imply international efforts into local sectors (Salleh et al., 2017). These criteria challenge the new generation to upgrade their qualification and performance. Therefore, the new generation is eagerly choosing the innovative field of forensic accountancy as their career.

## THE VALUE OF FORENSIC ACCOUNTANTS ON INSURANCE CLAIMS AND FRAUD INVESTIGATIONS

Forensic accounting is an investigating tool that detects the area of scam and prevents the criminal from further fraud, thus leading the concerned organization to avoid the monetary loss due to the scam or insurance claim. Often the insurance company faces the scenario of false insurance claims by fraud and losses huge amounts of money as they cannot prove the claims to be false. Here comes the role of the forensic accountant in the prevention of fraud. It is the job responsibility of a forensic accountant to check the eligibility and reliability of an insurance claim (Richa & Madhu, 2020).

**Figure 2 : Forensic accounting investigation**



*(Source: Richa & Madhu, 2020)*

The aim of forensic accounting in cases of insurance claims is to quantify the financial damage of individual cases. Forensic accountants are experts and highly specialized trained accountants who examine, evaluate and predict the reasons and real scenario of a case. Forensic accountants generally use their enumerative capacity, enhanced by various investigative skills, to predict a probable area of vulnerability that can be breached in the future (Ademola, 2017). They combine previous data and information data, present situations, and future predictions to calculate that damage and, in most cases, provide the most accurate account of possible costs.

A Forensic accountant investigates insurance claims and frauds in several steps: -

- They investigate the financial accounts of the claiming authority to identify if there is any history of illegal activities (Liodorova & Fursova, 2018).
- Illustrate the findings from the investigating operation to present an outline of the case. This helps in identifying the problem or gap.

- Evaluate the financial data, such as transaction records, bills, reports, etc to identify fraudulent activity.
- Imply the knowledge of laws and government policies and the skills of accounting to examine if there is any scope of a false claim or fraud.
- If required, the forensic accountants also work with the association to the law enforcement and to some extent assign private detectives to know the hidden truth of the claiming authority (Ademola, 2017).
- In court trials, forensic accountants testify as the expert witness and the testimonial of the forensic accountant is generally given preference and importance. While testifying in court, the forensic accountant always represents the investigated information in a simplified form to provide clarified understanding to everyone.
- They use their knowledge of legislation and implement the use of various tools and techniques as per the requirement of the case.
- They use their investigating skills and knowledge of accountancy to predict possible vulnerability and thus leading to the prevention of further fraudulent activities.

The highly developed skills and pre-analytical techniques make the entire accounting effective and play a significant role in investigating the authenticity of e insurance claims and fraud investigation. In most cases, the implementation of forensic accounting in investigation and the tactful presentation of a forensic accountant as the major witness save the organization from the loss of a large amount of money and saves important value for the welfare of the entire system.

To accomplish their job role, forensic accountant needs the help of different tools and techniques of forensic accounting but at first, they have to be able to make a decision instantly about which tool is required according to the type of the case. This needs proper assimilation of knowledge and skills and most important an adequate amount of training and observation (Hossain, 2018). The accomplishment of all these criteria makes a forensic accountant effective and trustworthy. Forensic accountant uses several software tools and laws to perform their job and they are -

1. *Percentage and ratio analysis*
2. *Beneish M score*
3. *Dechow's F score*
4. *Benford's law*
5. *Zipf's Law*
6. *Data Mining*

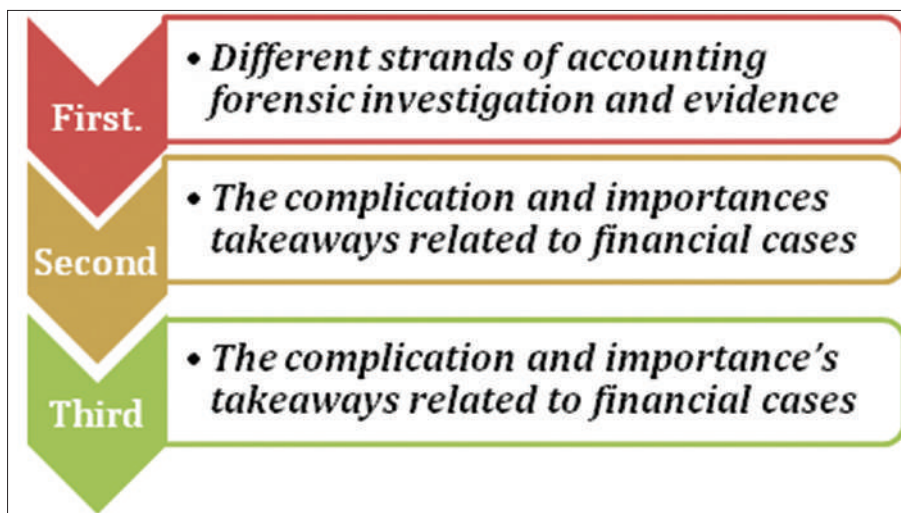
The tools mentioned above and laws help the forensic accountant to regulate, operate and monitor day-to-day transactions and keep records. These also help the forensic accountants

to keep the data safe and secured by identifying any gaps in calculation or by tracking any suspicious activity. Some of these laws provide statistical data that provide an outline idea of the total transaction over a month or certain period. Some specifically analyze the data to detect the probable area of vulnerability where the breaches have taken place (Alshurafat et al., 2019). The pre-analytical tools provide an earlier prediction about the area where fraudulent activities can take place by evaluating the data critically, reducing the chances of further scams. The methods used by the forensic accountants can estimate the total cost or expenses of claimed costs such as injuries due to accidents or business eruption etc. in this way, forensic accountant can identify whether the claim is authentic or not.

All these above-mentioned qualities and qualifications of forensic accountants help them to achieve the preferences from corporate businesses and insurance companies. The knowledge of accountancy and criminology and their investigating skills often lead them to success that serves the purposes of the business by preventing their losses and increasing their profit rate by restricting frauds and scams (Hossain, 2018).

## **ROLE OF FORENSIC ACCOUNTING IN FRAUD DETECTION AND AUDIT**

The current investigation is identifying techniques related to forensic accounting, helping to reduce the accounting risk related to cloud-based services in different departmental works. Similarly, accounting comes under the first search when talking about accounting issues such as managing business accounting and analysing the accounting figures that affect business costs, internet use, and reducing business time by adding employees' needs in business (Hashem, 2021). Accounting data is accessed in business when someone has an internet connection that helps to automatically update the financial reporting and financial information related to the real-time environment (Lateef & Omotayo, 2019). The information of technology and cloud computing services are affecting the working forensic teams by analysing the current issues and risks related to accounting in business (Hashem, 2021). The reason behind fraud cases increases is due to the importance of money and it has become more important for some people to keep earning money rather than caring about integrity and honesty in business. Forensic accounting's importance and its role are described with examples related to fraud cases as follows.

**Figure 3 : Importance of forensic accounting**

(Source: Hashem, 2021)

***The information related to valuable assets and their knowledge to legal professionals-***

The value and information assets contain the valuable information related to organizational objectives and business-main for achieving a successful business. Similarly, the information related to accounting and information assets includes previous audit information, documentation of audit process, database configuration management, emails, software, records, and cassettes, and audits tapes that help to encrypt data related to accounting (Hashem, 2021). **For example**, foreigners accounting in the UK can help to find information of frauds related to financial transactions and deal with other individuals that provide some clues related to fraud cases (Hashem, 2021). Furthermore, the fraud related to computer assets and the largest volume of hacking data is negatively affecting the business market.

***Different strands of accounting forensic investigation and evidence*** - Similarly, there are more than one way of using forensic accounting concepts to find and gather information related to corporate and other fraud cases by using a combination of several accounting methods (Hashem, 2021). Furthermore, the different UK companies are selecting business approaches for gathering information related to valuable assets and attributes for analysing the quality of management works with the help of forensic accounting (Lateef & Omotayo, 2019). **For example, the SOX Act** is adopted by US companies for identifying and getting the financial record of fraudsters by focusing on audits, regulatory requirements, and investigations (Lateef & Omotayo, 2019).

***The complication and importance of takeaways related to financial cases-*** The subsequent trials and investigation process is required when discussing about financial cases related to accounting and finding fraud cases in the market (Lateef & Omotayo, 2019). One of the famous fraud cases of the **UK courts includes a Scottish couple** who was examined and

invested guilty after an overall investigation of a long time, approximately 320 days of trials and involvements of three cases of the UK court related to fraud involved (Lateef & Omotayo, 2019). After analysing the situation, the forensic and financial investigation found a complicated problem related to accounting potential flow, destroyed documents, and falsified documents.

## ROLE OF FORENSIC ACCOUNTANTS TO ANALYZE LOSS PROFIT VALUATION

Valuation analysis is generally performed based on the financial data that are provided by the concerned organization. But sometimes, it is observed that during the procession of the operation that data seems to be altered or manipulated. For example, the formulated expenses of any particular damage seem to be much higher than they should be (Alshurafat et al., 2019). In such cases, the responsibility and role of a forensic accountant are important as well as critical as by profession, and forensic accountants are trained with various investigating skills to reveal the truth by analysing the total profit loss valuation. They help by identifying the hidden resources and detecting the employees who are related to or involved in the scam. This adds significant value to the reputation and economic status of an organization.

The basic steps that the forensic accountant follows to analyse the real profit loss valuation of an organization are-

- **Bank account analysis** - at first, the forensic accountants try to follow the source of the money to reveal the hidden resources or to prove the misrepresentation of financial status by the claiming authority by using the required appropriate methods and techniques (Ahmed & Ali, 2019). The preliminary investigation includes the analysis of bank account statements of the target to detect if there is any kind of manipulation present or not. This reveals the hidden treasures, if there are any, and explains how the target has covered the resources to claim more insurance money.
- **Fraud investigation** - the next step consists of vigorous investigation to detect the fraud that has been taking place. The continuous investigating operation opens the gates permitting access to the hidden assets, manipulated information, and suspicious and fictitious documents that cover the misrepresentations, fraudulent activities, fake carriers of the cases, and the real scenario behind the claim (Ademola, 2017). This investigation allows the forensic accountants to observe the statistical data more intently that gradually leads to the identification of the gaps that have been covered. This helps in evaluating the authenticity of an insurance claim and thus helps in the analysis of the profit loss valuation of an organization.
- **Inventory assessment** - forensic accountants also investigate and evaluate the inventory of a company because the frauds often try to understate the company's inventory and the cost of goods to mislead the conception of the net profit of the company (Abukhalaf et al., 2021). By determining how the company tracks and



accounts for inventory and enlightening the discrepancies, forensic accountants help valuation analysts to determine true inventory costs.

- **Getting the Right Help** - to analyze the real valuation of profit loss of an organization, a forensic accountant aligns their investigation methods with the help of the others such as law enforcement or private detectives. This helps them to gather more information to analyse the real value.

## RELATION BETWEEN FORENSIC ACCOUNTING AND FRAUD INVESTIGATION

As discussed earlier, forensic accounting generally refers to the role that is associated with investigation on fraud, and fraud prevention. But as per Öztürk & Usul (2021), forensic accounting is eventually based on the context of fraud. Therefore, it can be said that forensic accounting focuses on writing different fraud schemes and preventing them as well. Forensic accounting is a broad area as different law enforcement agencies across the globe have successfully recruited different individuals in order to investigate financial matters. Therefore, it can be said that today recruiters across the globe are hiring different financial and accountant graduates specific to forensic accounting. On the other hand, Wahyuni-TD, et al. (2021) opined that there are certain other applications that enhanced the need of forensic accounting in different government and non-government organizations. Therefore, forensic accounting includes different other knowledge based on the fundamental basis that includes Laws, Dispute resolution, Information gathering and preparation. Reporting, experts, and other related knowledge. On the other hand, some major specialized forensic knowledge includes Bankruptcy, reorganization, and insolvency, Economic Damages Calculation, Computer Forensic Analysis, Family Law, and more. On the other hand, Fraud investigation refers to the process of resolving different allegations of fraud. Therefore, the fraud investor should be able to properly obtain different evidences and write an unbiased report accordingly.

### ● **Bankruptcy, Insolvency, and Reorganization**

The role of forensic accountancy is to manage different financial affairs in search of different hidden assets. According to Casterella, et.al. (2019), in some cases, forensic accountants identify different pre -bankruptcy transfers and at the same time, recovering different funds and assets in order to satisfy different creditors or perform any kind of business valuation. Thus, it can be said that forensic accounting plays an important role in resolving the bankruptcy filing. Unfortunately, it is said that bankruptcy is the major fraud faced by various organization and therefore forensic accountants play a major role in investigating bankruptcy related litigation by evaluating various financial- related agreements. Some of the major bankruptcy fraud schemes that are used in the past includes corporate raider bleed out, parallel entities, bust outs, sham facilities, and Ponzi schemes such as investment, church, real estate, and a lot more.



### ● **Economic Damages**

Damages are significant for every lawsuit and are considered to be the calculation loss suffered by a specific party or individual. So, if the party believe that it has been harmed intentionally but cannot identify proper evidences, then in such cases, a forensic accountant calculates such losses with the help of different historical information, conducting interviews, and other related process to calculate the specific damage. Therefore, it can be said that forensic accountants are called upon in order to work regularly on either side of the specific matter, and so it is crucial to remain unbiased and objective.

### ● **Computer Forensic Analysis**

The main application of the computer forensics is to preserve and recover electronic information in order to obtain proper evidences and electronic discovery. Nowadays, in the digitalized era transactions are being completed digitally. Thus, it is quite apparent that various valuable information's and related files can be easily located. So, it is utmost important to maintain and access the valuable information over the internet. Vzarious latest technologies such as iPad, laptops, notebooks, and other related technology-based products can transmit various important electronic information through the internet. Hence it can be said that the role of e forensic accounting is to gain access to it to prevail in litigation.

From the above assertions and analysis, it is quite apparent forensic accounting and fraud investigation are interrelated. As forensic accounting work is performed by respective accountants through the anticipation of litigation and includes various forms of fraud investigation that includes bankruptcy, economic damages, and a lot more. Similarly, it can be said that fraud investigation falls under the forensic accounting category. It is because the majority of the investigations accessed by fraud t are conducted by forensic accountants that assist in anti- fraud or fraud prevention efforts.

## **FORENSIC ACCOUNTING IN FRAUD LITIGATION SUPPORT**

In the context of various fraud and legal dispute, a forensic accountant is considered to be quite suitable to the court based on various debates and dispute resolution. The litigation support represents various factual presentations of various fraud related issues relating to pending or existing litigation. Forensic accounting can provide a definite support in fraud litigations by calculating various economic losses resulting from certain breach of contracts. Accordingly, the forensic accountant quantifies various damages that are involved in legal disputes. Therefore, it can be said that forensic accountant has the capability to resolve legal -related dispute even before the courtroom. Abukhalaf (2016) opined that the significant role of the forensic accountant is to assist the court with relevant information so that it can come to an ultimate conclusion. In the case for business or employee fraud investigations, the forensic accountant provides support by offering a clear and concise explanation to the court. The forensic accountant evaluates the loss calculation either by direct evidence or by

various circumstantial evidences. On the other hand, Enofe et.al. (2016) opined that forensic accountants providing litigation support are generally engaged in various legal actions in which critical analysis is made of financial information in order to provide an assessment with various financial losses. The critical analysis is conducted to calculate and quantify the losses, for instance, whether the concerned party has suffered from a breach of contract, fraud-related disagreements, and a lot more. Similarly, forensic accountants also assist in various professional negligence claims.

Therefore, forensic accountant can provide litigation support in the following ways.

- Assist in gaining various key documents which can be utilized as evidence. This is said to be an important aspect for supporting or refuting claims.
- Review various relevant documents for locating and identifying different possible loss areas.
- Forensic accountant sometimes assists and advise lawyers by reviewing opposing expert's damages report. Hence, they also provide reporting based on the strengths and weaknesses of the case investigation.
- Forensic accountant, while providing litigation support, assist in various settlement discussions and negotiations.
- They also tend to provide oral evidence if the case is settled in the court law.

## **FORENSIC ACCOUNTING TECHNIQUES AND INVESTIGATION PROCESS**

Bhasin (2015) opined about the significant contribution of professional forensic accountants based in the public or private sector. Therefore, it can be said that forensic accounting is considered to be the tool in order to detect the fraud and prevent them in various public sector organizations. It is quite apparent forensic accounting is utilized significantly in order to prevent the occurrence of fraud cases. On the other hand, Oyedokun (2016) conducted research that demonstrates various skills and techniques that is utilized in fraud investigation. The data generated in this specific article utilized the Analysis of Variance (ANOVA) and time series analysis. In this specific article the author has successfully uncovered various forensic skills and techniques. This technique includes detection and deterrence skills, forensic investigation, and forensic audit, litigation, and arbitration skills.

Therefore, based on these key skills, the whole investigation process is conducted by the forensic accountant.

### **Investigation Process**

It is said that all investigations more or less share similar kinds of features, but it is of utmost importance to understand different relevant stages along with the roles, and similarities. Hence by considering the case of financial statement, the whole analysis of the investigation process can be evaluated.

### **Case Initiation**

In this specific process, the investigation can be broadly classified into two categories that include reactive and proactive. As indicated by Efiang et al., (2016), reactive investigation generally occurs through victim-initiated actions. This sort of investigation results from different external notification. On the other hand, proactive instigation is typically based investigator-initiated action. In this kind of investigation, the respective investor investigates the financial crime independent of the victim's report. In this era of digitalization in which computers and technologies control the entire business cycle in terms of revenue, transactions, and another related process, therefore any sort of financial related crimes may be considered to be complex through traditional methods. Hence in this circumstance, the forensic accounting can create a great value in investigating the financial crime investigation.

### **Case Evaluation**

Considering the case of financial investigation, it can be said that these kinds of reports are quite sketchy and as a result of which consists of certain speculation, a mixture of facts, and hyperbole. So, the forensic accountant in such case evaluates and identifies different irrelevant information's and extracts the most important elements of the allegation.

### **Solvability Factors**

Solvability factors are considered to be certain elements or characteristics that can predict how the successful investigation shall be. As per forensic experts, all cases are sometimes not solvable. Therefore, such unsolvable cases must be identified and discarded accordingly. This kind of actions provides the investigator to spend more time with cases that have a higher probability of solution. As indicated by Robb et.al. (2015), there are two kinds of solvability factors that include weighted and unweighted solvability factors. In the case of weighted solvability factors, different weighted systems are utilized to identify all relevant factors that are equally important and can be determined in solvability. On the other hand, unweighted solvability factors utilize various unweighted factors that are not considered to be important for the respective case but, at the same time can be relatively important for any next.

### **Goal Setting and Planning**

For a successful investigation it is of utmost importance that the investigation must be conducted in efficient and logical manner. Each investigation has its significant features like obstacles, intricacies, and success. Therefore, it can be said that any skilful and knowledgeable investigators who conduct their respective investigation in a haphazard way is not likely to proceed with successful investigation. So, it is important for the investigator to understand the uniqueness and logical flow of each financial crime. Hence in investigating any sort of crime, the forensic accountant must identify all relevant complaint goals in a clear and defined manner (Evans, 2021).

## CASE STUDIES IN FORENSIC ACCOUNTING

Forensic accounting is applicable in various sectors of business and personal cases. Generally, forensic accounting is implemented in detecting and investigating financial fraud in different cases (Godwin et al.,2018). The most prevalent area where the need for forensic accounting and accounts are vital are -

- Theft related to financial activities
- Fraud against securities
- Economic damages
- Bankruptcy
- Credential information
- Defaults in debt
- Tax evasion
- Disputes regarding corporate valuation
- M&A related lawsuits
- Professional negligence claims
- Money laundering
- Divorce proceedings

**Figure 4 : Accounting and Criminal Justice**



*(Source: Kurnaz et al., 2019)*

In some cases, the investigation reveals the mistakes were honest and had no other intention but, in most cases, the result comes out with the revelation of frauds and scams (Kurnaz et al., 2019). With the assistance of forensic accountants, the organization or person gets the right

justice and can prevent the loss of a handsome amount of money or other assets, whereas the criminals get the right punishment for the act of fraudulence.

For a better understanding of the implementation of forensic accounting in corporate sectors and how it can add value to the investigation of false insurance claims and fraudulent activities, examples of case studies are described in detail to represent the necessity of forensic accounting to balance the financial status.

Michael Plude, a forensic accountant, came across a case of embezzlement where some of the mischievous employees were trying to steal the authority of the company after the death of the owner. While investigating the embezzlement, Plude had the responsibility to create the legal procedures with the employees (Botacin et al., 2019). As a forensic accountant, while managing the company's documents, Michael Plude used accounting and auditing skills and found that there was some alteration in those documents and reports. Now, according to Michael Plude, people tend to be confused while understanding the difference between forensic accounting and fraud investigation. According to Plude, the fraud investigation is only a part of a large process of forensic accounting. A forensic accountant is more of an expert who can testify and identify the hidden assets of fraud by analysing the information that comes from the investigation. So, as per the job specification, Michael Plude investigated further in detail to identify the misrepresentation and found that the culprits altered the company's valuation by hiding the sources of money to simplify the transfer of ownership as they wanted to get the ownership. Micheal Plude, as an effective forensic accountant, testified the valuation of the company in court and helped the family members and relatives of the dead owner to get justification by retaining the ownership of the company (Ozcan, 2018).

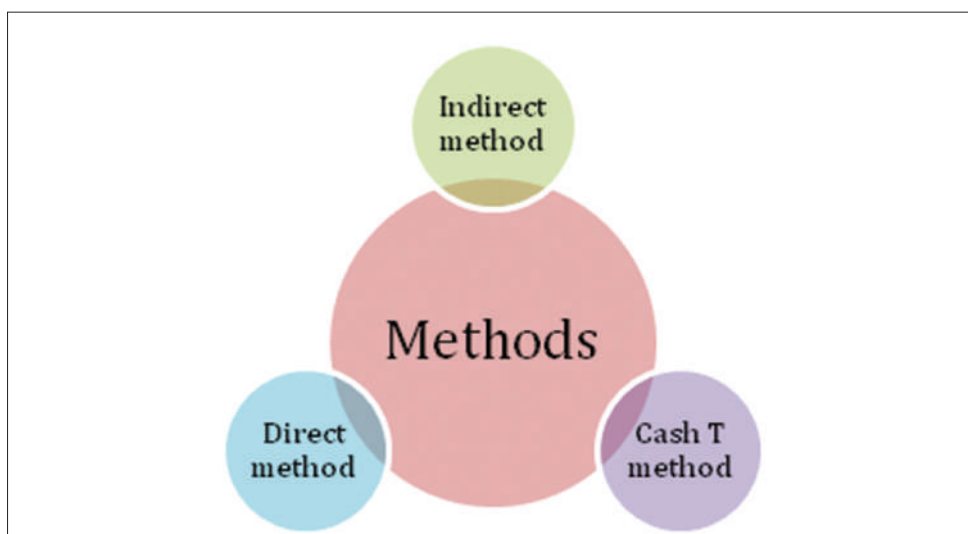
In another case, a forensic accountant was assigned to investigate and examine a case of missing bitcoins. In this case, the defendant was a shareholder of two organizations and the director of the organizations too (Rechtman, 2020). The organizations were limited companies that served their clients by developing websites and digital content and completing other IT project works. The companies were investigated as they repaid their VAT several consecutive times. As the input tax reclaimed was significantly more compared to the output tax that was declared on sales, the companies were facing undeniable losses. Therefore, the question was raised of how they were able to run the business after consecutive losses. While running the forensic investigation, the approximately calculated value of the probable fraud done by the companies was almost £42k (Mamgain, 2019). The defendant was charged, but for the lack of proof, the defendant denied it at first. The forensic accounting investigation and analysis evaluate that the hidden resources that the defendant used in running the business had come from the trading in bitcoins but the profit was neither directly credited to the business bank account nor declared as the deposition for tax purposes. The assessment reveals that the profits from the bitcoin trading were credited to the PayPal account of the defendant to cover the extra income of the defendant so he can claim the insurance. As the forensic accountant analysed the personal bank account records and PayPal records, the resources were revealed. The forensic accountant also reviewed the VAT returns of the company on

account of the Bitcoin trading and calculated the tax liabilities to identify the hidden income. As a consequence of the investigation and forensic accounting analysis, the defendant was taken under legal acts and procedures (Alshurafat et al., 2019).

## FORENSIC ACCOUNTING TECHNIQUES IN INVESTIGATING CLAIMS AND FRAUD

The previous research found that the importance and contribution of accountant professional forensics are not overemphasized when talking about private and public sectors. Similarly, the previous study also examined forensic accounting in techniques and tools used by officers or leaders to detect and prevent fraud cases in both public and private organizations done specifically by governmental organizations in different counties (Godwin et al., 2018). This study provides the significance of forensic accounting techniques that help reduce fraud cases in different sectors in the UK. These techniques conducting ways and types are explained in the next section.

**Figure 5: Methods of Forensic accounting techniques**



(Source: Akinbowale et al.,2020)

**Indirect and direct methods** - The transaction and indirect methods are the effective ways used by forensic accountants for identifying cases by doing special investigations and examining the situation of cases in different ways (Akinbowale et al.,2020). The different auditors, such as traditional and forensic professional accountants, prefer using of forensic accounts to detect fraud cases in the UK. **For example**, forensic investigators in the UK mainly use this type of forensic method only for criminal investigation and discovering the occurrences of crime while using the different technical tools of forensic accounting that include identity thefts, information related to financial statements, and securities fraud. The suggestion of a

forensic account must be for everyone when discussing about reasons for fraud handling and understanding related to specific litigious matters (Akinbowale et al., 2020). It is advised that public sectors in the UK can develop different institutions related to forensic studies and try to develop students interested in their fields for handling the internal and control system in the UK and USA.

**Cash T method** - This method funds application method that help to analyse the transaction histories or information related to cash spent and cash receipts. Similarly, individuals and companies need to understand the concepts of income that affect individual lifestyles, investments, and assets (Godwin et al., 2018). Furthermore, this method is mainly used for financial crimes cases related to private and corporate organizations (Akinbowale et al., 2020). The reason for financial crimes includes rationalization, opportunity, and incentives that create and mitigate vexed issues related to financial crimes. **For example**, logical solutions and relevant approaches can be adopted by forensic officers or auditors for dealing with financial and fraud cases in the UK for finding effective solutions and truth of criminal activities in financial crimes.

**Bank deposit and net worth method** - The accounting terms net worth are defined as accounting methods for calculating the total assets by subtracting the total amount of liabilities of a company or individual. For example, audit investigators in the UK can use concepts of net worth to compare the reported income of individuals in different working periods with other incomes after analysing the transaction history of fraudsters (Akinbowale et al., 2018). The characteristics of accounting forensic services aimed and performed by firms in the UK using exploratory approaches. These approaches help to shape auditors' search by focusing on training adequately for detecting fraud and avoiding the duties of traditional separations related to asset safeguards.

## IMPORTANCE OF EDUCATION AND TRAINING IN FRAUD AND FORENSIC ACCOUNTING

The technical working groups of technical writers on education in forensic and fraud accounting is a diversified group of accounting experts and performing several activities such as remediation, deterrence, fraud prevention, and investigation (Dianati et al., 2018). Similarly, the technical working groups help to represent the industry and corporate stakeholders, law enforcement, services forensic providers, the legal community, and regulatory shareholders' academic specialization. In every sector, knowledge and education are playing a major role in collecting information and proof related to crime (Dianati et al., 2018). However, the national institute of Justice is organizing and examining the issues of forensic and fraud accounting by developing effective models and effective curricular guidelines related to accounting in the USA and UK. Furthermore, the technical working groups of investors are adding content details related to fraud and different criminal activities by using training professional techniques, course developers, professors, and university information related to accounting (Dianati et al., 2018). This information includes.

- To select course content and curricula when investors are to identify and create desires related to multiple training and course modules in areas of forensic and fraud activities.
- To provide information and modification related to information systems, accounting courses, and existing auditing through which professionals are practising the exposures related to forensic accounting (Dianati et al., 2018).
- To provide guidance related to development and training in the different areas of forensic and fraud accounting related to board members, executives, attorneys, management, and interested stakeholders in the business.
- Furthermore, the primary content areas of investors in the UK include some accounting curricula while working on forensic and fraud investigations (Prabowo, 2021). It includes.
- Criminology, fraud scope, nature and orientation of fraud activity, legal, environmental, financial crimes, and ethical issues.
- Remediation, investigation, detection, deterrence, and fraud prevention are the main concerns of investigators (Trunga & Thuana, 2020). Financial fraud statements, corruption, asset misappropriation, and false representation are the influential factors that may affect the quality of investigation in UK fraud activities.
- The digital environment is another element that also improves the education quality of the UK in accounting and forensic sectors and analyses fraud activities by identifying the finger and footprints of criminals (Kramer et al., 2017). Techniques and computer-based tools are used for investigation and detection. In contrast, management and electronics tools are used for performing experiments by UK forensic experts to understand difficult case studies.
- Advisory and forensic services in the UK include analysis and research valuation of damages, loss, conflict resolution, and dispute investigation, including mediation and arbitration.

A review of institutions and existing high education in the UK related to accounting education indicates and offers the quality courses available for investors to perform adequate research and take the help of scholars to understand the techniques of forensic investigation and identify every clue for tracking the truth of any accidents and fraud cases. It is also accepted that in the UK there are several students who are having a degree in accounting in different fields, such as business management, and focusing on accounting skills for achieving the latest information on forensic accounting.

## **WAYS FORENSIC ACCOUNTANT ADDS VALUE TO WHILE INVESTIGATING CLAIMS AND FRAUD**

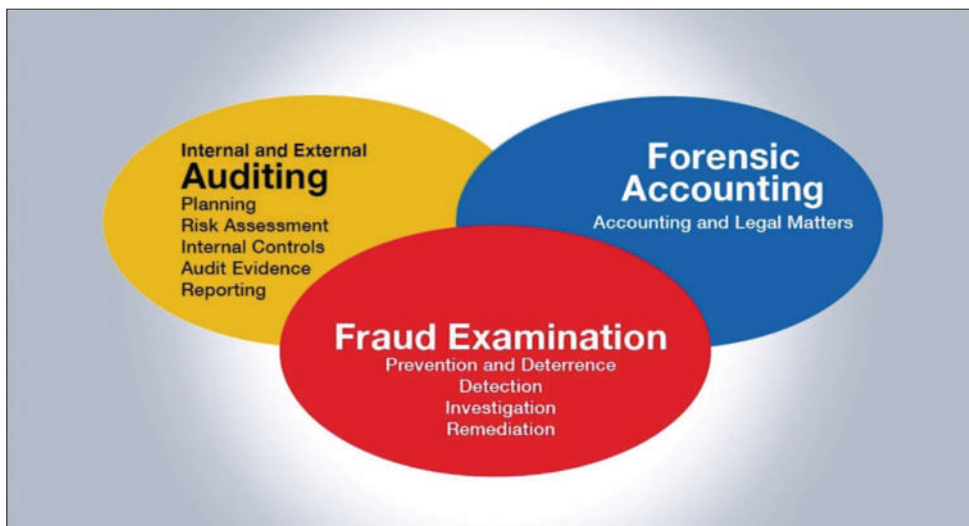
The present article sheds light on evaluating the contribution of forensic accountant experts in adding value towards investigating fraudulent activities and claims in the UK. The role of



forensic accounts professionals is expected to follow economic trials based on writing an effective report and assisting the clients in explaining the financial transactions. Forensic accountant experts are strongly occupied in explaining and appearing in the law of the court where the financial transactions comprised of occurrence of fraudulent activities (Cawi, 2017). Occurrence of criminal disputes takes place in our daily life and are adjudicated in court. Certain parties are involved in conducting civil affairs where the cases are settled outside the courts. In addition to this, the resolution of the court also relies on technical evidence. Countries like UK and US follow an accusatorial system under which financial disputes such as frauds and claims are settled effectively within the sphere of the court. Forensic experts also assess the evidence that applies to appropriate law that provides effective judgment in favor of parties. The court is also making certain decisions regarding the winner, where the parties have the freedom of appealing the decisions of the high court (Cawi, 2017).

Application of statutory law is also practised in the UK and in the US. It is the governing lawsuit that is significantly obtained from the statutes of the judicial decisions. The experts of forensic accountants are engaged in conducting criminal and civil proceedings. During the 21st century, juries are used for conducting civil matters and criminal matters that are heard by the judge. In addition to this, there is continues collaboration of the jurisdiction members for conducting functional activities of criminal trials. This assisted the judge in playing a significant role in providing justice.

Application of case law that is limited in nature plays an important role in assisting the judge in undertaking decisions. Such assistance is provided by the forensic expert (Cawi, 2017). Some nations practice common law permitting the court to adopt legal precedent in performing the role of forensic experts. The application and implementation of the features of common lawsuits will assist the accounting expert in comparing its performance with the general accountant. There are nations such as New Zealand that in adopting the technique of a common form of lawsuit where the accounting expert performs their role as a forensic expert to help the judge in undertaking effective and appropriate decisions with the motive of providing justice. The appropriate form of results and outcomes can be applied for fulfilment of the purpose of application of basic law in different nations that improved form of statutory laws for conducting their functional practices. Also, the results that have been derived from conducting forensic practices towards identifying frauds and claims are based on the applicability of statutory law followed in international nations. The assessment of the decisions conducted by the judge is expressed in the case law that addresses the fact using the accounting discourse based on the reports that are provided by the forensic accounting experts (Cawi, 2017). This assisted in undertaking effective decisions based on specified accounting issues. Also, certain discourses are used in making an effective judgment of the court that produced a dissimilar form of meanings and results that is strongly based on successful elucidation of the user.

**Figure 6 : Implication of forensic accounting in addressing frauds and claims**

(Source: Cawi, 2017)

The application of financial trials is becoming a controversial issue in the court of law for various reasons. For instance: criminals continue to develop new ways of transacting and hiding illicit gains internationally and nationally. In cases of civil litigation, certain married couples dispose of matrimonial assets across various international communities. The criminals in the UK and the USA use technology for transnational tainting assets (Alshurafat et al., 2017). In addition to this, there is also a requirement to conduct conducting financial trials based on the application of scientific techniques and providing evidence by the experts that are recommended and recognized by the courts. Certain forensic accountant experts are recognized by the courts in explaining the effectiveness of the financial transactions that use scientific evidence. Although the judge of the court can identify the evidence, yet they have the authority of deciding the criteria for determining the opinions of the experts that are admissible as solid evidence. Such a thesis will depict the importance of acquiring forensic accountant experts in the court to discuss the significance of the opinion provided by the experts.

A professional forensic accountant makes use of the facts that are provided in the specific case based on the available data for successful evaluation of the financial activities and transactions towards forming an important opinion regarding the financial resources and available assets. In addition, , the experts are also provided with opposing legal counsel where the accountants are engaged in activities based on the civil lawsuit for dealing with financial disputes (Alshurafat et al., 2017). For instance: valuation of the shares of the companies and the individuals. Forensic accountant is responsible for the provision of opinions based on conducting discursive practices such as the valuation of the assets along with their measurement. The assets are then sourced from illicit or legitimate sources. In this

manner, forensic accountant expert assists the forensic accountant in reaching a decision that is consistent with the objectives based on the adoption of relevant legislation. Certain issues are resulting due to the application of ambiguous accounting processes and methods. This adds complexity to the issues in performing the role of forensic accountant experts and collecting the opinion of the experts regarding the ongoing issues. The application of the fair value method is considered an accepted valuation method that is not based on scientific or precise methods. For instance: forensic accountant experts are required to calculate the present value of the assets towards calculating the amount of goodwill associated with the valuation of professional practices (Alshurafat et al., 2017). Therefore, it can be stated that the provision of improved or high-quality accounting services is important for enabling the forensic expert in being the witness of the case.

Irrespective of small or large enterprises forensic accounts are vital for the growth and development of the business because they focus on fraudulent activities. It also helps to enhance transparency. Forensic accounts help businesses to grow in a hassle-free way with the implementation of new tools and techniques in the accounting system, which also helps to eliminate fraud and risks in the business. However, to integrate value into the business the forensic accounts have in-depth awareness about business proceedings and fraudulent activities. Moreover, the proactiveness of forensic accounts is highly accredited because they have the knowledge to understand the fraudulent activities that are integrated throughout the organisation. A thorough understanding of fraudulent activities is vital because it helps in the accurate management of businesses in case of risks. However, procrastination is also fearful because it increases the risks of fraud in the business (Grove et.al., 2017).

The better knowledge of the accountants minimizes fraud from the businesses. The value of the businesses also increases when the accountants have proactiveness in calculating the of the misappropriated business assets. The role of the forensic accountants is to identify the criminal activities in the business so that it does not affect the profitability of the businesses. With the development of the business, it is also vital for the businesses to improvise fraud detection technologies and implement software to have detailed knowledge about the business assets (Van Akkeren & Buckby, 2017). However, innovative methods are the key towards the reduction of malpractices in the accounts of the businesses, which helps to enhance the growth and development of the business simultaneously. Moreover, miscalculations about the liabilities and assets of the businesses can become a major issue in the future. Hence, to restrict the negative practices and to increase value in the businesses the role of the forensic accountants is vital. Forensic accounts also require in-depth interpretation of the financial statements of the companies or the businesses, checking the balance sheet and analyze any mismatch and payroll fraud to enhance the transparency in the development of the businesses.

Presently, the companies are facing abuse of technologies because business terrorism and counterintelligence are increasing significantly. The present degeneration of the business is due to the increase in cybercrime throughout the world. In order to check the value of the

business, it is vital to focus on the business cash flow to keep a track of the business entities (Othman, Aris, Mardziah et al., 2019). Hence the role of the accountants is to enhance their proactiveness so that it leads to the mitigation of cybercrimes and enhances transparency in the business process. Accountants are employed in businesses to enhance value by mitigating risk-prone activities. In the present day business scenario, it is highly likely that bankruptcy is a very common aspect which deregulates the normal work process of the business. The businesses also lose their entity because of bankruptcy and fraudulent activities. Hence the role of forensic accounts is valuable in this case because forensic accounts have the dearth and knowledge to find out the irregularities in the business transactions and processes in the businesses. Furthermore, implementing forensic accountants in the business is also beneficial because the accounting processes are thoroughly checked and bookkeeping records are analyzed in detail so to avoid any missing information. Hence this strategy adopted by forensic accountants is a suitable move to restrict any kind of negative activities in the business procedures (Mansor, 2015).

Hence the above discussion states that forensic accountants add value in investigating claims and frauds by creating awareness, calculating of misappropriate assets, identifying business terrorism and counterintelligence and preventing of bankruptcy. Forensic accountants add value to the claims and fraud by thoroughly checking the above-mentioned measures so that it leads to productivity and profitability of the businesses.

### **Steps towards a Better Future**

With the scam of Enron Corporation and WorldCom, the importance of implementing forensic accounts have developed significantly. However, the United States of America (USA) was very hardly hit by the fraudulent activities in their corporations, which led to the formation of The Sarbanes-Oxley Act of 2002. The act was formulated in 2002 under the leadership of George W. Bush. The act is also known as SOX act, which was formulated to protect fraudulent activities and investors from further financial scams (Effiong, Emechebe, Edet, et al., 2016). The act also introduced the Public Company Accounting Oversight Board (PCAOB), and it comprised of five members who were appointed for a specific time period. The members were only liable to serve for two-five years terms. Furthermore, the act also mentions that 2 of the five members are liable for Certified Public Accountants (CPA). The act also directs to maintain transparency in the audit process. The PCAOB is also important because it establishes standards relating to the audits of public companies. Moreover, the auditors of the public companies also requires enrolment with the PCAOB so that they comply with regulatory and disciplinary actions required for the public companies to restrict fraudulent practices. It also focuses on the rules, regulations and standards of audit practices in public companies to have hassle-free business procedures.

On the other hand, the PCAOB also implemented auditing standards for forensic accountants so that there are no loopholes in the financial analysis of the companies. The auditing standard is set by the PCAOB to increase the value of the companies through detailed analysis by the forensic

accountants. The competent standards set for the auditors or accountants by the PCAOB ensure that enough training and proficiency is required by the accountants to detect the fraudulent work in the companies. Professional care like, robust planning and robust supervision, is required to provide a reasonable basis for the opinion. On the other hand, the PCAOB also ensures that the forensic accountants have a degree of responsibility so that it leads to the betterment of the businesses. However, PCAOB also implements stringent measures in order to increase the standards and compliance of the auditors and to add value in investigating claims and frauds. According to the guidelines of the PCAOB, forensic accounts are prohibited from certain services like bookkeeping, financial system design and implementation, investment services, certain tax services, internal audit outsourcing, HR and management -related functions, appraisal and valuation services and other legal and expert services (Nigrini, 2020).

### **How Forensic Accounts can Add Value while investigating claims and frauds**

Forensic accounting has become a buzzword with the rise of financial frauds. The specific predictions by the forensic accounts are vital to mitigate the risky issues in the growth and development of the business. However, the forensic accounts can add value through the robust use of technology. Technological upgradation is a vital aspect while detecting fraud. Hence to implement technology proactively in companies, forensic accountants require robust knowledge and skill in data management, various data sources, normalization techniques, and visualization and delivery analysis. Hence DiGabriele & Huber (2015) states that these skills are vital to detect fraud and negative activities in the financial statements of the company. The use of technology possesses a wider benefit as it requires less time to detect corrupt activities, thereby leading to the growth and development of businesses. Furthermore, the forensic accounts also need to possess interpersonal skills so that they have the competencies to analyse data and facts and understand according to various cultural backgrounds for the future. Sceptical mind among the forensic accountants is also important to add value in detection of claims and frauds because it verifies facts with diligence (Mojsoška & Dujovski, 2015). Hence these two features enables forensic accounts to enhance their competencies in the detection of fraudulent activities in the future. Forensic accountants have continuously evolved with the change in technology and business procedure both domestically and internationally. Hence the role of forensic accounts has evolved with time, increasing value in the detection of claims and frauds in the global market scenario.

### **FUTURE SCOPE OF THE STUDY**

The scope of forensic accounting services is only restricted to financial irregularities. However, in the future the study can cover bank forensic audits, and economic wings, and focus on serious fraud investigation offices to gather in-depth insight on these issues. The study can also focus on how forensic accountants use tools and technologies to detect and identify fraud from a pool of data. Moreover, the study can also cover the process of using technology to acquire and analyse transparency in the whole process. The study can further delve deeply

into firm and bank auditing to gather insights about incomplete documentation, illegitimate funds and the losses the business are facing at present and will face in the future. The robust auditing strategy in the future will help the organisations to identify their financial position and clean image of work necessary for better enhancement of the business. There are multiple risks involved in the business so forensic accountants can identify the risks of the business, analyse the financial damage and loss associated with the risks. Hence it helps the organisations to analyse their practical position and take decisions on investments. The transparency is highly achieved in the business with detailed financial auditing, and detailed financial auditing also helps to take decisions independently. However, the study can also focus on the role of forensic accountants in insolvency cases. In insolvency cases, the companies hire professionals for investigation of accounting frauds so that the companies can repay their debts. The forensic accountants can identify their flaws and direct the companies on the right path to resolve their insolvency. The study can also focus on the valuation and litigation activities by the forensic accountants to analyse the best possible outcomes followed by the least financial damage in the current position of the company. Hence, apart from the investigation of claims and frauds the study can delve deeply into other areas for properly analysing the role of forensic accounts in the present scenario. Implementation of forensic accounts is vital for the robust growth and development of businesses.

## **SUMMARY**

From the overall study, it can be said that forensic accounting is one of the emerging tools which can be used by organizations to utilize the auditing and investigative skills to conduct a financial examination. Forensic accounting is frequently used in fraud and embezzlement cases to explain the nature of a financial crime in court. In addition, Forensic accountants break down, decipher, and sum up complex monetary and business matters. They might be utilized by insurance agencies, banks, police powers, government organizations, or public bookkeeping firms. Legal accountants accumulate financial proof, foster software applications to deal with the data gathered, and convey their discoveries as reports or introductions. It is evident that Forensic accountants inspect the information to figure out where missing cash has gone and how to recuperate it. They may likewise introduce reports of their monetary discoveries as proof during hearings, where they regularly affirm as master observers. This work fills a significant need at public accountants and counselling firms, law offices, law requirement organizations, and insurance agencies. The job a criminological bookkeeper plays in every one of these settings shifts. Each firm arrangements with cash in various ways, and tricksters target associations dependent on their obligations. A few bookkeepers work on more extensive extortion cases, like those working at law implementation organizations or law offices. Moreover, accountants who are working in more explicit fields, like public bookkeeping or protection, regularly centre explicit kinds of misrepresentation, like protection extortion. In the same context, Legal accountants working at certain organizations are bound to affirm in a court.

## KEY TERMS

**Fraud Detection:** Fraud detection is a set of activities to prevent money or property from falling in the hands of false pretences. It is mainly applied in banking and insurance domains.

**Audit:** Audit refers to detailed verification of activity such as, inspection and examination of a process or quality system. It is used to ensure compliance with the administrative purpose.

**Bankruptcy:** Bankruptcy is a legal proceeding which debars a business or person to repay their outstanding debts.

**Insolvency:** Insolvency is the position where a company is unable to pay debts. For example, companies often become insolvent when it fails to repay their creditors, thereby leading to bankruptcy.

**Reorganisation:** Reorganisation is a change of process or action in which something is organised.

**Investigative skills:** Investigative skills are the abilities individuals use to gather data and generate crucial and confidential information to analyse and identify important facts.

**Financial crime:** Financial crimes involve fraud which also includes fraud related to credit card, corporate fraud, bank fraud and insurance fraud. Financial crime has become a concern to the government all over the world.

**Financial statement:** Financial statements are the formal records of the activities related to the financial position of a business.

**ADDITIONAL READINGS**

- Enobi, A. (2015). Internal Control: Forensic Investigation Certification - Gold Standard in Fraud Detection and Prevention. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2577729
- Julius, O., & Stanley, I. (2021). The Relevance of Forensic Accounting for Detecting and Preventing Fraud in Emerging Economy like Nigeria. *The International Journal Of Business & Management*, 9(5). doi: 10.24940/theijbm/2021/v9/i5/bm2105-074
- Mangala, D., & Kumari, P. (2015). Corporate Fraud Prevention and Detection: Revisiting the Literature. *Journal Of Commerce And Accounting Research*, 4(1). doi: 10.21863/jcar/2015.4.1.006
- Nigrini, M. J. (2020). *Forensic analytics: Methods and techniques for forensic accounting investigations*. John Wiley & Sons.
- Oladejo, M., & Jack, L. (2020). Fraud prevention and detection in a blockchain technology environment: challenges posed to forensic accountants. *International Journal Of Economics And Accounting*, 9(4), 1. doi: 10.1504/ijea.2020.10032205
- Olukowade, E., & Balogun, E. (2015). Relevance of Forensic Accounting in the Detection and Prevention of Fraud in Nigeria. *International Journal Of Accounting Research*, 2(7), 67-77. doi: 10.12816/0017351
- Othman, R., & Laswad, F. (2019). Future Forensic Accountants: Developing Awareness of Perceptual Blindness. *Journal of Forensic and Investigative Accounting*, 11(2).
- Oyedokun, G. (2015). Forensic investigation and forensic audit methodology in a computerized work environment. Available at SSRN 2593263.



## REFERENCES

- Akinbowale, O. E., Klingelhöfer, H.E. & Zerihun, M.F., 2020. An innovative approach in combating economic crime using forensic accounting techniques. *Journal of Financial Crime*. <https://www.academia.edu/download/64629526/1.%20an%20innovative%20approach%20in%20combating%20economic%20crime%20using%20forensic%20accounting%20techniques.pdf>
- Cawi, I., 2017. Expert Report under Scrutiny: A discursive construction of the role of a forensic accountant expert. <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1019&context=theses1>
- Dianati Deilami, Z., Soltani, A. & Omrani, H., 2018. Curriculum Development: A Master's Degree Program in Anti-Fraud & Forensic Accounting. *Valued & Behavioral Accountings Achievements*, 3(5), pp.41-100. <https://www.ojp.gov/pdffiles1/nij/grants/217589.pdf>
- Godwin, O. E., Enyi, E.P. & Dada, S.O., 2018. Forensic accounting techniques & integrity of financial statements: an investigative approach. *Journal of African Interdisciplinary Studies (JAIS)*, 2, p.3. [https://www.academia.edu/download/56922675/Forensic\\_Accounting\\_Techniques\\_&\\_Financial\\_Statement\\_2018.pdf](https://www.academia.edu/download/56922675/Forensic_Accounting_Techniques_&_Financial_Statement_2018.pdf)
- Hashem, F., 2021. The Role of Forensic Accounting Techniques in Reducing Cloud Based Accounting Risks in the Jordanian Five Stars Hotels. *Wseas Transactions on Business & Economics*, 18, pp.434-443. [https://wseas.com/journals/bae/2021/a885107-013\(2021\).pdf](https://wseas.com/journals/bae/2021/a885107-013(2021).pdf)
- Kramer, B., Seda, M. & Bobashev, G., 2017. Current opinions on forensic accounting education. *Accounting Research Journal*. [https://scholarworks.montana.edu/xmlui/bitstream/handle/1/14943/Kramer\\_ARJ\\_2018\\_A1b.pdf?sequence=1&isAllowed=y](https://scholarworks.montana.edu/xmlui/bitstream/handle/1/14943/Kramer_ARJ_2018_A1b.pdf?sequence=1&isAllowed=y)
- Lateef, A. & Omotayo, F.O., 2019. Information audit as an important tool in organizational management: A review of literature. *Business Information Review*, 36(1), pp.15-22. <https://journals.sagepub.com/doi/pdf/10.1177/0266382119831458>
- Prabowo, H.Y., 2021. Undergraduate Forensic Accounting Education in Indonesia: Initiating a Re-Invention. *Australasian Accounting, Business & Finance Journal*, 15(2), pp.3-25. <https://ro.uow.edu.au/cgi/viewcontent.cgi?article=2201&context=aabfj>
- Trunga, N. Q. & Thuana, L.D., 2020. New Essential Dem& for Forensic Accounting Course in Accounting Education. *SUSTAINABLE DEVELOPMENT IN ACCOUNTING, AUDITING & FINANCE*, p.166. [https://www.researchgate.net/profile/Dang-Thu-Ha/publication/351709957\\_Influences\\_of\\_Non-Financial\\_Factors\\_on\\_Financial\\_Performance\\_at\\_Vietnam's\\_Hospitality\\_Companies\\_beyond\\_Profitable\\_Measures/links/60a5ead0299bf106134136ab/Influences-of-Non-Financial-Factors-on-Financial-Performance-at-Vietnams-Hospitality-Companies-beyond-Profitable-Measures.pdf#page=186](https://www.researchgate.net/profile/Dang-Thu-Ha/publication/351709957_Influences_of_Non-Financial_Factors_on_Financial_Performance_at_Vietnam's_Hospitality_Companies_beyond_Profitable_Measures/links/60a5ead0299bf106134136ab/Influences-of-Non-Financial-Factors-on-Financial-Performance-at-Vietnams-Hospitality-Companies-beyond-Profitable-Measures.pdf#page=186)

- Abdulrahman, M. H.A., Ab Yajid, M.S., Khatibi, A. & Azam, S.F., 2020. FORENSIC ACCOUNTING ON FRAUD DETECTION IN THE UAE BANKING SECTOR. *European Journal of Management & Marketing Studies*.
- Abukhalaf, R., Aldridge, M.M. & Smith, J.A., 2021. Methodological deficiencies in the expert testimony of forensic accountants: a qualitative content analysis of judicial statements pertaining to Daubert exclusions.
- Ademola, L. S., 2017. The forensic accountants' skills & ethics on fraud prevention in the Nigerian public sector.
- Ahmed, S. & Ali, M., 2019. FORENSIC ACCOUNTING: A CASE IN POINT FOR COMBATING FINANCIAL CRIMES OF BANGLADESH. *International Journal of Accounting*, 4(23), pp.1-8.
- Alshurafat, H., Beattie, C., Jones, G. & S&s, J., 2019. Forensic accounting core & interdisciplinary curricula components in Australian universities: Analysis of websites. *Journal of Forensic & Investigative Accounting*, 11(2), pp.353-365.
- Botacin, M., Kalysch, A. & Grégio, A., 2019, August. The internet banking [in] security spiral: Past, present, & future of online banking protection mechanisms based on a brazilian case study. In *Proceedings of the 14th International Conference on Availability, Reliability & Security* (pp. 1-10).
- Godwin, O. E., Enyi, E.P. & Dada, S.O., 2018. Forensic accounting techniques & integrity of financial statements: an investigative approach. *Journal of African Interdisciplinary Studies (JAIS)*, 2, p.3.
- Hossain, D. M., 2018. Forensic Accounting & Fraud Investigation: A Conceptual Summary.
- Kramer, B., Seda, M. & Bobashev, G., 2017. Current opinions on forensic accounting education. *Accounting Research Journal*.
- Kurnaz, N., Köksal, İ. & Ulusoy, T., 2019. Forensic accounting in financial fraud control in digital environment: A research on independent auditors.
- Liodorova, J.U.L.I.A. & Fursova, V.A.L.E.R.I.Y.A., 2018. Forensic Accounting in the World: Past & Present. *Journal of Economics & Management Research*, 7, pp.84-99.
- Mamgain, P., 2019. Role of Forensic Accounting in Detecting Financial Frauds in Corporate world. *REVIEW JOURNAL*, p.103.
- Ozcan, A., 2018. The Use of Beneish Model in Forensic Accounting: Evidence from Turkey. *Journal of Applied Economics & Business Research*, 8(1).
- Rechtman, Y. M., 2020. The Past, Present, & Future of Forensic Accounting. *The CPA Journal*, 90(3), pp.10-12.

- Richa, P. & Madhu, T., 2020. Study on Forensic Accounting Practices & Fraud Management in India. *Think India Journal*, 22(43), pp.264-271.
- Salleh, K., Rani, U., Razak, N.A. & Baharim, S., (2017), Traits & Relevant Skills of the Forensic Accountant: Empirical Survey of Public Sector Organisations. *IPN Journal of Research & Practice in Public Sector Accounting & Management*, p.1.
- Saxena, R. K. & Kumar, B., 2019. Forensic Accounting: A Legal ICAI Approach to Investigate Scams & Fraud Cases In India.
- Chika, D. (2016). Impact Of Forensic Accounting On Fraud Control In Nigeria (A Case Study Of Nigerian Deposit Insurance Corporation (NDIC)). *International Journal Of Scientific Research & Management*. doi: 10.18535/ijrm/v4i5.10
- Ezekwesili, T. (2021). Forensic Accounting & Corporate Governance In Nigerian Banking Sector. *African Journal Of Business & Economic Development*, 1(10), 7658.
- Öztürk, M., & Usul, H. (2021). Detection of Accounting Frauds Using the Rule-Based Expert Systems within the Scope of Forensic Accounting.
- Wahyuni-TD, I., Haron, H. & Fern&o, Y., (2021). The effects of good governance & fraud prevention on performance of the zakat institutions in Indonesia: aShariah forensic accounting perspective. *International Journal of Islamic & Middle Eastern Finance & Management*, 14(4), pp.692-712.
- Casterella, J., Desir, R., Stallings, M. & Wainberg, J., (2019). Information Transfer of Bankruptcy Announcements: Examining the Impact of Auditor Opinions. *Accounting Horizons*, 34(1), pp.45-66.
- Bhasin, M., (2015). Contribution of Forensic Accounting to Corporate Governance: An Exploratory Study of an Asian Country. *SSRN Electronic Journal*, 10(4).
- Oyedokun, G., (2016). Forensic Accounting Investigation Techniques: Any Rationalization?. *SSRN Electronic Journal*,.
- Robb, P., Coupe, T. & Ariel, B., (2015). 'Solvability' & Detection of Metal Theft on Railway Property. *European Journal on Criminal Policy & Research*, 21(4), pp.463-484.
- Abukhalaf, R., (2016). Forensic Accountant Competencies Preferred by Courts. North Carolina, United States: Proquest.
- Efiong, E. J., Inyang, E., & Effiong, C. (2016). Underlying dimensions of the hindrances to the application of forensic accounting techniques in Nigeria. *International Journal of Business and Management*, 11(3), 173-182.

- Enofe, A., Ochei, I., Emecheta, C. & Oyibo, O., (2016). Litigation Services & Fraud Cases; Perspective of the Forensic Accountant. SSRN Electronic Journal,.
- Evans, C., (2021). Forensic Accounting & Fraud Deterrence.
- Grove, H., Clouse, M., & Greiner, A. (2017). Risk assessment perspectives for forensic accountants & auditors based on some international evidence. *Journal of Forensic & Investigative Accounting*, 9(1), 676-691.
- Van Akkeren, J., & Buckby, S. (2017). Perceptions on the causes of individual & fraudulent co-offending: Views of forensic accountants. *Journal of Business Ethics*, 146(2), 383-404.
- Othman, R., Aris, N. A., Mardziah, A., Zainan, N., & Amin, N. M. (2015). Fraud detection & prevention methods in the Malaysian public sector: Accountants' & internal auditors' perceptions. *Procedia Economics & Finance*, 28, 59-67.
- Mansor, R. A. N. (2015). Forensic accounting & fraud risk factors: the influence of fraud diamond theory. *The American Journal of Innovative Research & Applied Sciences*, 7(28), 186-192.
- Effiong, S. A., Emechebe, C. B., Edet, G. O., & Ogbeche, O. L. (2016). Correlative influence of external auditors & forensic accountants on effective management of fraud. *International Journal of Management Sciences*, 7(5), 264-272.
- Nigrini, M. J. (2020). *Forensic analytics: Methods & techniques for forensic accounting investigations*. John Wiley & Sons.
- DiGabriele, J. A., & Huber, W. D. (2015). Topics & methods in forensic accounting research. *Accounting Research Journal*.
- Mojsoska, S., & Dujovski, N. (2015). Recognizing of forensic accounting & forensic audit in the South-Eastern European countries. *JE-Eur. Crim. L*, 212



# FINANCIAL TECHNOLOGY AND THE CURRENCY TRANSFORMATION

***Maria Teresa Matriano***  
***Mariya Ahmed Abdullah Al Jabri***  
***Maha Salim Rashid Al Jahwari***

## ABSTRACT

Digital banking and using cryptocurrency to pay for products and other merchandise are examples of significant changes in how people have used their money for the past several years. These two types of currencies, digital and crypto, offer multiple benefits to users, but they also come with security risks. Sultanate of Oman is one of the countries yet to reach the same level as other nations in fully utilizing digitalized financial transactions. This study revealed that cash, or physical money, remains the dominant currency across the whole Sultanate. Many Omanis believe that paper notes and coins are still more secure than their digital counterparts.

Various reports show that the Central Bank of Oman is presently developing the country's first digital currency to help boost the Sultanate's digitalized community. While the younger generations of Omanis now readily take advantage of online banking and electronic wallets, many residents remain hesitant about employing these financial transactions. The current currency transformation happening in the Sultanate of Oman will continue in the future through the help of technological innovation and the adoption of digital and cryptocurrencies through the help of financial technology platforms. Financial technology (fintech) has a wide emergence of platform-based business models, representing the integration of technology for providing financial services to consumers (Feyen et al., 2021). This transformation of currencies will create significant changes in the way financial activities in the future.

## 1. INTRODUCTION

The use of cash for various transactions has been the standard practice for most people globally. Prior to any forms of electronic currencies being developed, paper money and coins were the means used to purchase goods, services and to conduct business. However, the emergence of technology also created new ways to conduct financial transactions using different forms of currencies, and during this time, digital money and cryptocurrencies were born. Unlike physical currency comprising paper notes and coins circulating the market, digital money is not a physical tender. However, it can still be used as a form of payment for

digital transactions and purchasing products in a physical store. Both currencies are regulated by the Central Bank of the country. However, cryptocurrency is quite different in terms of limitations (Carstens, 2021).

This chapter will discuss the financial technology and currency transformation that is occurring in the Sultanate of Oman, considering the global financial activities and changes. Based on the gathered information, it is evident that Oman is currently adopting digital currency while aiming to reduce the circulation of cash in the country. To understand how the Sultanate is undergoing this evolution, the chapter seeks to define the three types of currencies – cash, digital and crypto and how Omanis and businesses are using them. Thus, it is equally important to discuss the process involved in the transformation, including the factors influencing the changes and the role of Oman's central bank. Part three of the chapter will cover the global and local challenges; and the government responses to cryptocurrencies. The chapter's final section explores the future of this currency transformation in the Sultanate of Oman.

## **2.2 BACKGROUND TO CURRENCY**

### **2.2.1 Currency Transformation – Definition**

Currency transformation can be viewed as the changes in currencies, from physical money that most individuals recognize, to digital or cryptocurrency forms. There are many reasons that this transformation occurs, one of them being the financial activities that require a much quicker transaction. Individuals have been using physical money for many years to purchase products, commodities, and services. However, the emergence of technology has given new, alternative ways to conduct financial transactions and business, including how consumers pay for products and the increased use of online banking in the 2000s. These activities and technological innovations are where the currency transforms from its physical form to its digital and cryptocurrency form (Global Data, 2021).

#### **2.2.2. Physical Currency**

Physical currency is defined as the set of assets in an economy that people use to buy goods and services from others (Philippon, 2015). It is also identified as the actual cash that comprises paper notes and currently circulating coins. Although digital currency is widespread across many different countries, physical currency or cash remains the main medium of exchange due to its important economic role. According to the *European Central Bank* (2022), every nation requires certain amounts of cash to maintain its economy.

#### **2.2.3. Digital Currency**

Digital currency is the electronic version of cash. Current technological advancements

encouraged economies to adopt digitalization, and thus initiated the now- developing approach to expand the availability of digital currency. Carstens (2021) confirms that technological innovations have reached the financial system, including that of money design. Similar to cash or physical currency, the digital form is used for financial transactions and in businesses; it is also under the regulation of each country's central bank. An individual's money in the bank that can be accessed through online banking is a good example of digital currency.

#### **2.2.4. Cryptocurrency**

The definition of cryptocurrency is often interchanged with that of digital currency. The reason behind this is that both forms are dependent on technology in terms of transactions. Hardle et al. (2019) explained that cryptocurrency is a digital asset that uses a distributed ledger and has no intrinsic value. Traditional money, in comparison, is what most people know of and this holds value due to people's trust in the central bank. However, cryptocurrency is not regulated by the central bank, and the crowd of participants confirms the ledger it uses.

#### **2.2.5. Background to Currency in Sultanate of Oman**

Sultanate of Oman remains largely dependent on cash payments even in these contemporary times. Although there is a steady increase in Oman's use of electronic payment methods, such as online banking and card-based transactions, the use of cash still has the highest share in the Omani economy, accounting for more than 90 percent of total payment volume for the year 2021 (Oman Cards and Payments – Opportunities and Risks to 2026., 2023). Generally, most Omanis still prefer to use cash across different transactions. For many, cash is perceived to be the most secure payment type compared to its digital counterpart; thus, many individuals still prefer it, as they feel more secure in holding the physical currency. However, even though many transactions, services, and products continue to be paid for in physical money, numerous Omanis' now keep their savings in digital currencies in their respective financial institutions. This development is supported by Nair (2022), who points out that the Central Bank of Oman reported that cashless transactions are gaining significant momentum in the Sultanate.

Apart from online banking, many people also use the services of financial technology (fintech) companies to conduct financial transactions, such as through PayPal. Recently, there was a discussion regarding adopting and expanding electronic wallets, or E-Wallets, in the Sultanate of Oman. According to Chinnasamy et al. (2021), the Central Bank of Oman is exploring the integration of technological innovations in the nation's current payment systems to increase bank activities. Currently, Omanis' use of digital currency continues to grow, despite the dominance of cash transactions across the country.



The Omani government's stance regarding the use of cryptocurrency has always been the same. Cryptocurrency in Oman remains legal despite being unregulated. Thus, Omanis have been warned by the *Central Bank of Oman* about cryptocurrency investments, as individuals could face operational, financial, legal, and security-related risks because, to date, there is still no law protecting users against potential cryptocurrency scams; hence the emphasis is that cryptocurrencies are not legal tender across the Sultanate (Prabhu, 2022).

#### **2.2.6. The Role of the Central Bank in Currency Transformation in the Sultanate of Oman**

The Central Bank of Oman (CBO) has been vigilant regarding the innovation and introduction of digital currency in the country. The primary reason is that the bank is responsible for promoting and maintaining monetary and financial stability in the Sultanate of Oman to ensure sustained economic growth through fostering a sound and progressive banking and financial system. In 2022, the CBO issued warned to the public that because there were no policies or guidelines in place to regulate digital or cryptocurrencies, the public should be cautious when dealing with these. Furthermore, the CBO clarified that it would bear no responsibility for any consequences of such dealing in digital and cryptocurrencies (CBO, 2022).

Because of the increased interest and international focus on this technology, the bank has been prioritizing the development of fintech and the enhancement of innovation in the financial sector. One of the developments is the introduction of suitable regulatory frameworks and approaches, including the Fintech Regulatory Sandbox project (CBO, n.d.). In this regard, the bank agreed to a Memorandum of Understanding (MoU) with Oman Telecommunications Company (Omantel) signed by His Excellency Tahir bin Salim Al Amri, CBO's Executive President, and Talal bin Said Al Mamari, Omantel's CEO on Tuesday, September 13, 2022, at Omantel Headquarters. The agreement is to conduct a six-month accelerator program enabling fintech startups in the Sultanate of Oman (CBO, Omantel ink MoU to launch fintech accelerator programme, 2022). The aim of this memorandum is to support and promote fintech start-ups, small and medium enterprises (SMEs), banks, and technology firms through the establishment of a comprehensive and nurturing fintech ecosystem in Oman under the accelerator program. The program will support innovative fintech start-ups by offering training, mentorship, networking, and fundraising to help them overcome the difficulties often faced in the highly aggressive fintech industry (CBO, 2022.).

Banking is transforming fast as a result of the changes in technology, which leads to the likely conclusion that the use of physical money will cease entirely at some point in the future. This process is already noticeable in routine purchases, for instance, in markets and petrol stations, where credit and debit cards are gradually replacing the use of paper money. Meanwhile, compared to Sweden, for instance, stores have the right to refuse to deal with cash. Most of their transactions are card based. As mentioned by the central bank in Riksbank, only 20% of the shops' transactions are based on cash (Sweden Leads the Race to Become Cashless Society, n.d.b).

Central banks must adapt to the changing nature of money. A digital wallet for cryptocurrencies fulfills much of the same storage and transmission functions of a bank, and this will lead to the rise of digital distribution channels. These channels can sidestep banks' established distribution networks and take control of some activities, such as payments and wealth management (Brueggemann, 2017). Therefore, to limit disintermediation, channels must ensure that the economic design of their sponsored digital currencies focuses on access for banks, interest payment relative to bank policy rates, banking holding limits and convertibility with bank deposits (Broby, 2021).

Banks, moreover, will have to accept deposits and process transactions made in digital forms in the future, either as Central Bank Digital currencies (CBDC) or cryptocurrencies. Dealing with such transactions, however, introduces issues that the bank will have to deal with, such as;

1. The change in the delivery of financial services.
2. A discussion will be required on resilience, security, and competition in payments.
3. The question will be raised of private and public issuance of money (Broby, 2021).

## **2.3. DECISION AND CONCLUSION**

### **2.3.1. The Currency Transformation – How is it changing?**

Nations are undergoing a significant change in how they transact the value of money. Digitalization is widespread worldwide, making digital money more significant compared to previous years. Oman's economy and the nation are also experiencing the transformation of its currency. Although most Omanis still find it more comfortable and secure to conduct cash transactions, online banking is currently expanding across the whole Sultanate.

The transformation of currencies toward embracing digital versions is more than just the use of standard online banking, where the value of money is transferred from one account to another. Although there is still no hard evidence that Oman has an established digital currency, the nation is currently working towards this eventuality. As part of the Oman Vision 2040, enterprises in Oman have been advised to offer their customers alternative payment methods, such as cashless transactions (Yousuf, 2021). The Sultanate's overall goal to achieve a digital society entails adopting all digital forms of payment, thereby reducing the use of actual cash in the future.

As part of this transformation, the Central Bank of Oman has already provided the appropriate point of sales devices across different establishments. Although most Omanis are cash-dependent consumers, adopting a comprehensive range of digital transaction methods in the country has led to an increased cashless payment channel. The currency transformation in Oman has become further apparent due to the expansion of e-commerce and the rise of smartphone technology, where various online transactions are conducted. As part of the

government initiative, digital banking has also been actively promoted in the Sultanate of Oman, a good example being Bank Nizwa, the nation's first Islamic bank, which conducted a forum to increase the Omani youths' awareness and interest in financial technology and to explain its roles in future financial dealings (Santosdiaz, 2020). Additionally, the presence of financial technology companies in the Sultanate has helped in currency reorganization, as they also contribute to the realignment of the country's entire banking sector. Although the penetration of financial technology in the Omani banking division is still in the early stages of development, it is evident that its presence has already had a significant influence on the currency transformation in Oman.

The transformation, involving digital transactions through financial technology, has also led to multiple opportunities for the nation's banking sector. For instance, financial institutions can leverage their ATM network and branch infrastructure by integrating the financial technology platforms, which leads to additional products and services (Ahmed et al., 2021). As a result, Omanis now have increased options in fulfilling their financial activities. Some examples of these options are that they can make multiple financial transactions, such as transferring money across different banks, paying for utilities, and even engaging in online shopping.

Several factors influenced the Sultanate of Oman's currency renewal, such as the need for consumers to have a better financial transaction system and for financial institutions to offer new ways of banking. These changes are significant, especially since more and more Omanis are becoming technology-savvy and are, thus, looking for methods to manage their finances using the current technologies. Oman's currency transformation can be viewed as a process that encourages people away from using cash to using digital currency. However, it is quite impossible to transform the nation's payment system into purely digital.

On a global basis, the expansion of financial technology has been heavily influenced by the COVID-19 pandemic, wherein governments encouraged individuals to use digital currency to purchase their essential goods and services. Oman was not exempted from the enforced need to reduce personal interaction between individuals due to the risk of infection. Thus, the beginning of the currency transformation in the Sultanate started when the e-payment platform was introduced into the country (Kukreja et al., 2021).

The Omani government has also pushed for the digitalization of the country's payment system because of the need to become more globalized, corresponding to the other Gulf Nations. Despite the dominance of the traditional banking system across the Sultanate electronic payment systems have made steady progress, although there is still some way to go before the full utilization of financial technology has been reached.

Apart from online banking or the expanded use of digital currency, Oman is also considering the possibility of having its own money (Sam, 2022). This plan was formulated after the government warned its people about the risks they will face in investing in cryptocurrencies which the government does not regulate. Developing its digital currency would be an

additional approach to transforming the Omani Rial and embracing more than traditional cash transaction methods. The Omani digital currency plan was discussed during the conference in Muscat, which explored the new age of banking for the entire Sultanate.

Various factors have influenced the changes in the transformation of Oman's currency. Primarily, the emergence of new technology has led establishments to adopt new ways of conducting business, including the management of their payment systems. In addition, more and more Omanis are saving their money through digital means, such as E-Wallets, online banking, and other financial technology platforms. The currency transformation in Oman is also influenced by the willingness of Islamic banks' customers to adopt electronic banking services (Echchabi et al., 2019). As part of this transformation, the Central Bank of Oman has already committed to providing innovative support and services, which will help modernize the nation's financial sector while ensuring the country's financial stability.

There is an obvious need for Oman's citizens to be better informed and to understand how digital and cryptocurrencies function. Until the people feel confident and secure using these digital forms of money, the Sultanate may not fully transform the current dominance of cash in the Omani market.

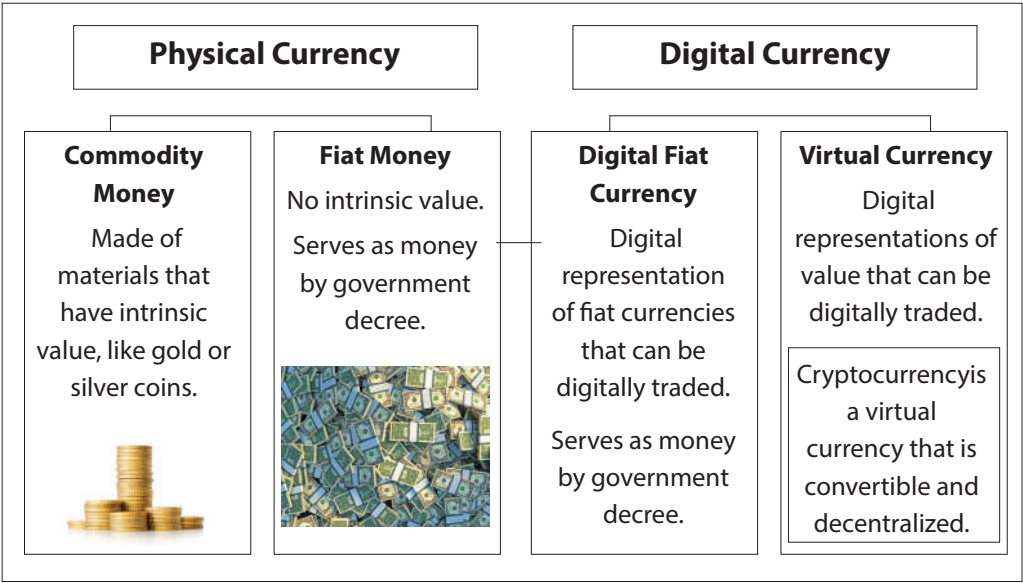
### **2.3.2. Challenges of Currency Transformation**

The rapid technological changes in the financial industry, in conjunction with the COVID-19 crisis in 2020 that sped up this process by the increased demand for digital services, are pushing the banking industry to changes through data abundance and the rise of digital distribution channels (Santosdiaz, 2020). This allows the entry of specialized providers in financial services that can overcome some of the banks' activities which do not require access to a large balance sheet, such as payments and wealth management. The shifting of market conditions, customer needs, the entrance of new players, and new regulations can negatively affect the banking industry and the financial intermediation model (Brueggemann, 2017). These intermediaries, or digital platforms, can interpolate themselves between banks and customers, leading to banks losing their position as the first point of contact for financial services. Philippon (2015) identifies some limitations, however, or at least a delay in the transition to this new environment because these tech financial activities need to be properly regulated to ensure financial stability and address any competitive distortions relative to banks.

Another challenge for banks is the risk regarding Decentralized Finance (DeFi), which reduces the need for involving banks and other financial institutions by allowing consumers to access capital and financial services directly. The DeFi space can unfortunately be used to facilitate illegal activities because of the absence of proper regulation, which will in turn threaten financial and monetary systems (Carstens, 2022).

A further complication faced by the central bank is the continued development of financial technology which alters the way money is made, managed, interacted with, and even defined. (International Approaches to Digital Currencies,n.d) defines ‘money’ as “the set of assets in an economy that consumers, businesses, and governments regularly use to buy goods and services from others”. As shown in Figure 2.1, money has taken two major forms: commodity money and fiat money. Commodity money is money made of materials worth something on its own, like gold and silver coins, while fiat money has no fundamental value but serves as money by government decree. Most countries before World War I were using gold coins or paper money convertible to gold on demand. Today, fiat money is used by most countries as the national currency, including the United States and other major economies (Nelson, 2018). However, technological developments, in addition to customers’ demands, have led to the creation of virtual currencies, which are digital representations of value that function as a medium of exchange and can be digitally traded without any physical banknotes or coins.

**Figure 2.1: Types of money. Source: Created by CRS based on definitions provided in the Financial Action Task Force, “Virtual Currencies: Key Definitions and Potential AML/ CFT Risks,” 2014.**



Nevertheless, virtual currencies only have value by agreement within the community of users, in contrast to a fiat currency with legal tender status by jurisdiction. Digital currency is convertible only on the condition that there are offers by some private participants, which are then accepted by other participants (Virtual Currencies: Key Definitions and Potential, n.d). One well- recognized example of cryptocurrency is Bitcoin which was launched in 2009 and is widely considered to be the first digital asset and used as a means of payment. According to Su (2018), the original objective of digital assets or “crypto assets”, was to enable transferring value without using a bank or other trusted third-party entity.

Since the introduction of Bitcoin a decade ago, about 2,100 cryptocurrencies have been developed, with a total market capitalization of \$121.1 billion as of November 25, 2018 (Market Capitalization of Bitcoin, n.d.). These currencies attract a lot of controversy. Investors think that the international payment system will become better, while others consider the risks and suspect this business model is a scam. The pressure was put on Central banks around the world, who were obliged by the interest and debate surrounding cryptocurrencies, to examine whether the technology could be used to create digital versions of fiat currencies, which would then have legal status in their jurisdiction of the issue. Two examples of central banks who have formally launched a Central Bank Digital Currency (CBDC) are; the eCentral Bank of the Bahamas (Sand Dollar), and the eCentral Bank of Nigeria (e-Naira) (Jahan et al., 2022).

### **2.3.3 Government Response to Currency Transformation (Cryptocurrencies)**

Government response to cryptocurrencies varies from one country to the other, however, there are three commonly noticed reactions:

#### **1) Encouraging the use and development of cryptocurrency within the jurisdictions.**

This can be done by developing a cryptocurrency hub. Malta is an example of a government that wants to attract and develop cryptocurrency industries in the country. The reason behind perspectives like this is that some governments view cryptocurrency as an important financial innovation that can create jobs and generate economic activity which their country needs. They encourage cryptocurrencies through the creation of frameworks that are designed and tailored to attract a range of businesses and activities in the cryptocurrency industry, including exchanges and ICOs. The activities that can be covered by the “crypto-friendly” framework are cryptocurrency brokerages, exchanges, asset managers, and traders, and aiming to provide the “necessary legal certainty to allow this industry to flourish.” (Nelson, 2018). An example of countries with active cryptocurrency hubs is Singapore and Switzerland, which are actively attracting and developing cryptocurrency industries in their nations.

#### **2) Banning or restricting the use of cryptocurrencies or specific activities associated with cryptocurrencies within the jurisdiction.**

These governments generally view the risks of cryptocurrencies as more significant than the potential benefits. Some of the risks that are of concern include undermining financial stability, lack of investor and consumer protections, and the possibility of illicit transactions; as Mullany (2013) outlines, some countries have forbidden businesses to apply any cryptocurrency -related activities, one example being China. In 2018, Chinese authorities in one area of Beijing blocked several public accounts involving ICOs on the popular messaging app WeChat. They further instructed stores, hotels,



and offices not to host cryptocurrency-related speeches, activities or events (Russolillo & Deng, 2018).

### 3) Encouraging financial innovation while regulating the use of cryptocurrencies to minimize potential risks.

Although some governments have no intention of allowing cryptocurrency hubs, at the same time, they are seeking to regulate the use of cryptocurrencies by allowing them to exist and be used as digital currency in their country. In general, these governments are seeking to provide greater clarity surrounding the emergence of cryptocurrencies through regulations while at the same time, aiming for the balance between supporting financial innovation and managing the risks presented by digital currencies. Existing regulations are applied to cryptocurrencies, but new regulations have also been introduced specifically targeting them. Examples of different countries' regulations regarding cryptocurrency transactions can be seen in Figure 2.2.

**Figure 2.2:** Regulations Around the World. Center for a New American Security and The Center of Law and Security at the NYU School of Law, September 2018.



**Examples of Regulations Applied to  
Cryptocurrency Transactions<sup>36</sup>**

**Cryptocurrency Exchanges**

- **Australia:** The government requires exchanges to register with the nation's anti-money laundering (AML) agency and implement anti-money laundering and countering the financing of terrorism (AML/CFT) programs.
- **Estonia:** The Supreme Court upheld the Estonian government's application of AML laws to cryptocurrency exchanges. These laws require exchanges that conduct trades over €1,000 (about \$1,200) to meet their customers in person and keep identification records.
- **Japan:** Exchanges must be registered with the Financial Services Agency, obey minimum capital and cybersecurity requirements, and undergo audits, among other stipulations.
- **Jersey (the Channel Islands):** Exchanges above £150,000 (about \$195,000) are required to register with the Jersey Financial Services Commission and comply with AML and CFT regulations.
- **European Union (EU):** The European Parliament adopted a directive that extends AML/CFT regulations to currency exchanges.
- **Luxembourg:** The government requires all exchanges be licensed by the Finance Ministry.
- **Philippines:** Exchanges are required to apply for a certificate of registration, register with AML authorities, and are subject to fees.
- **United States:** The Securities and Exchange Commission (SEC) requires registration of any trading platform that meet its definition of an exchange. The Treasury Department's Financial Crimes Enforcement Network (FinCEN) requires exchanges to register as money services businesses (MSBs) and implement relevant AML recordkeeping, reporting, and compliance measures. Crypto exchanges are also subject to state regulations.
- **UK:** Government applies its AML regulations to cryptocurrency exchanges.

### Taxation of Cryptocurrencies

- **Many EU countries** have clarified that cryptocurrency transactions are exempt from value-added tax (VAT) following a 2015 European Court of Justice decision.
- **Canada:** Cryptocurrencies are considered commodities and profits from transactions in cryptocurrencies are taxed as a barter transaction, which is subject to income tax.
- **France:** The government updated its tax rules to make cryptocurrencies subject to capital gains tax.
- **Germany:** The government does not tax cryptocurrencies when they are used for payments.
- **Israel:** The government clarified that virtual currency sales would be subject to a capital gains tax and miners and other traders would be subject to a VAT.
- **Poland:** Taxpayers have been advised to file taxes on cryptocurrency trading and profits.
- **Singapore:** Companies that buy and sell cryptocurrencies must pay taxes based on gains from their sale, but gains from long-term investments are considered capital and therefore not taxed (since Singapore does not have a capital gains tax).
- **Sweden:** Cryptocurrencies are not subject to the VAT but may be taxed as capital gains.
- **United States:** The Internal Revenue Service found that cryptocurrencies are considered property, not currency, for tax purposes.

### Initial Coin Offerings (ICOs)

- **Canada:** Canadian Securities Administrators released a notice clarifying that many cryptocurrency offerings involve the sales of securities, although it has approved exemptions for some ICOs from securities law requirements.
- **France:** The government is considering an ICO licensing regime that would regulate ICO token sales.
- **Hong Kong:** The Securities and Futures Commission released a statement that virtual tokens may be subject to securities laws, depending on the facts and circumstances of an ICO.
- **Philippines:** The Securities and Exchange Commission is planning to release regulations regarding ICOs by the end of 2018.
- **Switzerland:** ICOs are treated as securities on a case-by-case basis.
- **United Arab Emirates:** ICOs are regulated as securities on a case-by-case basis.
- **United States:** The SEC may regulate virtual coins or tokens offered as part of an ICO as securities, depending on the specifics of the ICO. ICOs in the United States are also subject to state-level regulations.

## 2.4. The Future of Currency Transformation in the Sultanate of Oman

As the banking needs of people constantly evolve, the possibility of another currency transformation phase in the future increases. In this current transformation period, changes will likely continue in how money is spent and saved. Indeed, Omani consumers will continue to use cash as the major way of conducting e-financial transactions. However, it is expected that Oman's banking system and financial operations will expand its adoption of digital currency and possibly acknowledge a more regulated version of the nation's first digital currency. As the acceptance of the Omanis on electronic banking increases, there is a high chance that the circulation of digital money within the banks' digital ecosystem will increase. Hence, any future currency transformation will also be obliged to consider the customers' perceptions and expectations of electronic banking and digital currency (Echchabi et al., 2019).

Furthermore, it is expected that the Oman government will continue to promote the use of cashless payments throughout the entire country, especially since the government is serious about implementing the Oman Vision 2040. Therefore, a future currency transformation will also become part of financial policymaking across the country to ensure people's security against financial risks. It was reported in 2021 that the Omani government is planning to



mandate all merchants and establishments to accept cashless payments (Ahmed et al., 2021). Reducing the cash circulation in the country is a significant step towards transforming Oman's currency and financial system, which is based on the goal of achieving a digitalized community. Apart from the usual online banking methods, Oman's future currency revolution will probably involve an expanded role of cryptocurrency, such as Bitcoin.

Bitcoin could dominate the future of Oman's currency transformation. Based on the report by Ahmed et al. (2021), the number of Bitcoin traders in Oman is increasing daily. During the early years of cryptocurrency in Oman, it was used simply for online purchases and transactions. However, data shows that digital currency in the country is now being used in businesses with physical stores or establishments. There is certainly evidence showing that the monetary transformation in Oman is leaning toward an increased dependency on digital transactions and currency.

The Omani government is aware of the current risks that Omanis face, which is the core motivation for creating its future digital currency and improving its cryptocurrency data mining. In addition, there is a likelihood that more and more Omani citizens will become interested in adopting crypto and digital currencies due to ease of accessibility, lower transaction fees, security, and availability (Ahmed et al., 2021). These advantages will help facilitate the currency transformation in Oman in the years to come. The increased application of cryptocurrency in the Sultanate will also require a smooth implementation of blockchain technology across the whole country.

The Omani government's vision is to embrace technological innovation to achieve its Vision 2040 initiative. This effort includes launching Blockchain Solutions and Services in 2017, part of the nation's blockchain initiative (Brueggemann, 2017). As part of the outcome, it is expected that trading with digital currency in Oman's future will become more secure due to the government's involvement in blockchain implementation.

Therefore, future currency transformations in Oman will undoubtedly involve more innovative forms of technology. Physical currencies will remain dominant due to their crucial roles in maintaining the economy. However, as Omanis become more comfortable conducting digital financial transactions, the utilization of other forms of currencies such as digital and cryptocurrency will become more evident. As a result, the government will likely impose new policies that will enhance the security of Omanis in conducting digital financial transactions across the various online banking systems and financial technology platforms.

## 2.5. Summary

It is expected that technology will keep evolving and influence the way people conduct their financial transactions. However, there are risks involved in adopting digital or online banking activities and investing in cryptocurrency. Through the effective collaboration of financial

technologies, banking institutions, and government regulations, the risks can be managed effectively.

The Sultanate of Oman is currently undergoing a currency transformation. Investigating the three types of currencies, it becomes evident that most Omani citizens remain more comfortable using cash or physical currency, as they believe it is more secured. However, the emergence of technological innovations has given way to new financial activities and transactions for the Omani citizens, people and businesses in the Sultanate. Online banking was set as an example, and now an increasing number of Omanis are starting to embrace digital currency. In addition, it is also evident that the country is starting to adopt cryptocurrency, although the government remains wary about the risks it provides to users. Part of the government's response to the growing threat of cryptocurrency against the Omanis' financial security is to develop its digital currency.

The existing currency transformation in Oman has been influenced by different factors, such as the changing economic activities, consumer demands, and constant technological innovations, which banks and financial technology companies must keep abreast of to remain competitive. Nevertheless, data shows that not all Omanis are interested in investing through cryptocurrency and want to remain with the traditional banking system, partly due to security issues. For this reason, it is recommended that financial institutions in Oman should constantly review their security protocols, in much the same way that the Omani government must revisit the existing security policies to reduce hesitance in using online banking. These issues can serve as barriers to the successful development of digital banking processes; therefore there are issues which financial institutions must address.

## REFERENCES

- Ahmed, U., Sudevan, S., & Fida, B. A. (2021). Potential of financial technology in transformation of Islamic banking sector in Oman. Regular issue, 10(5), 399402. <https://doi.org/10.35940/ijeat.e2896.0610521>
- Broby, D. (2021). Financial technology and the future of banking. *Financ Innov* 7, 47 <https://doi.org/10.1186/s40854-021-00264-y>
- Brueggemann, R. (2017). Payment Services Directive (PSD2). Swissbanking. <http://www.swissbanking.org/en/topics/current-issues/payment-services-directive-psd2>
- Carstens, A. (2021). Digital currencies and the future of the monetary system. Bank for International Settlements. <https://www.bis.org/speeches/sp210127.pdf>
- Carstens, A. (2022, January 19). Challenges for central banks. <https://www.bis.org/speeches/sp220118a.htm>
- CBO, Omantel ink MoU to launch fintech accelerator programme. (2022, September 13). Retrieved from Oman Observer: <https://www.omanobserver.om/article/1125161/business/banking/cbo-omantel-ink-mou-to-launch-fintech-accelerator-programme>
- CBO, (2022). CBO and Omantel sign MoU to offer Fintech accelerator program. <https://cbo.gov.om/news/362>
- Central Bank of Oman (n.d.). Central Bank of Oman. <https://cbo.gov.om/Pages/FinTech>
- Chinnasamy, G., Shrivastava, P., & Siju, N. (2021). Diffusion and adoption of E-wallets in Oman for sustainable growth. *Fourth Industrial Revolution and Business Dynamics*, 177-198. [https://doi.org/10.1007/978-981-16-3250-1\\_9](https://doi.org/10.1007/978-981-16-3250-1_9)
- Echchabi, A., Al-Hajri, S., & Nazier Tanas, I. (2019). Analysis of e-banking acceptance in Oman: The case of Islamic banks' customers. *International Journal of Islamic Economics and Finance (IJIEF)*, 1(2). <https://doi.org/10.18196/ijief.128>
- European Central Bank. (2022). The role of cash. [https://www.ecb.europa.eu/euro/cash\\_strategy/cash\\_role/html/index.en.html](https://www.ecb.europa.eu/euro/cash_strategy/cash_role/html/index.en.html)
- FATF report (2014, June), Virtual Currencies: Key Definitions and Potential AML/CFT Risks. <file:///C:/Users/maljahwari/Downloads/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>
- Feyen, E., Frost, J., Gambacorta, L., Natarajan, H., & Saal, M. (2021). Fintech and the digital transformation of financial services: implications for market structure and public policy. BIS Papers. <https://www.bis.org/publ/bppdf/bispap117.pdf>

- Hardle, W. K., Harvey, C. R., & Reule, R. C. (2019). Understanding Cryptocurrencies. International Research Training Group. [https://ies.keio.ac.jp/upload/20191125econo\\_Wolfbang\\_wp.pdf](https://ies.keio.ac.jp/upload/20191125econo_Wolfbang_wp.pdf)
- International Approaches to Digital Currencies. (n.d.). <https://crsreports.congress.gov/product/pdf/R/R45440>
- Jahan, S., Loukoianova, E., Papageorgiou, E., Che, N. X., Goel, A., Li, M., Rawat, U., Zhou, Y. S., & Goel, A. (2022). Towards Central Bank Digital Currencies in Asia and the Pacific: Results of a Regional Survey, *FinTech Notes*, 2022(009), A001. Retrieved Feb 9, 2023, from <https://www.elibrary.imf.org/view/journals/063/2022/009/article-A001-en.xml>
- Kukreja, G., Gupta, R., & Gupta, A. (2021). Fintech in Oman: Present and future scenario. Applications of Artificial Intelligence in Business, Education and Healthcare, 173183. [https://doi.org/10.1007/978-3-030-72080-3\\_10](https://doi.org/10.1007/978-3-030-72080-3_10)
- Market Capitalization of Bitcoin. (n.d.). <https://www.globaldata.com/data-insights/financial-services/bitcoins-market-capitalization-history/>
- Mullany, G. "China Restricts Banks' Use of Bitcoin," New York Times, December 5, 2013
- Global Data. (2021). Oman cards and payments: Opportunities and risks to 2025. Market Research Reports & Consulting | GlobalData UK Ltd. <https://www.globaldata.com/store/report/oman-cards-and-payments-market-analysis/>
- Nair, V. (2022). Cashless transactions gain momentum in Oman: CBO. ZAWYA - Your trusted source for business and finance news. <https://www.zawya.com/en/world/middle-east/cashless-transactions-gain-momentum-in-oman-cbo-g1t7hn2n>
- Oman Cards and Payments – Opportunities and Risks to 2026. (2023, January 25). <https://www.globaldata.com/store/report/oman-cards-and-payments-market-analysis/>.
- Russolillo, S. & Deng, C. "China is Getting Even Tougher on Cryptocurrencies a Year After Its Crackdown," Wall Street Journal, August 25, 2018.
- Sam, R. (2022). Oman is currently working on its first digital currency. BeInCrypto. <https://beincrypto.com/oman-is-currently-working-on-it-first-digital-currency/>
- Santosdiaz, R. (2020). How the Sultanate of Oman is promoting Fintech and wider digital transformation. The Fintech Times. <https://thefintechtimes.com/how-the-sultanate-of-oman-is-promoting-fintech-and-wider-digital-transformation/x>
- Su, E. (2018) Financial Innovation: Digital Assets and Initial Coin Offerings. Congressional Research Service. <https://crsreports.congress.gov/product/pdf/IF/IF11004>

- Sweden Leads the race to become cashless society. (n.d.-b). <https://www.theguardian.com/business/2016/jun/04/sweden-cashless-society-cards-phone-apps-leading-europe>
- Philippon, T. (2015). "Has the US finance industry become less efficient? On the theory and measurement of financial intermediation", *American Economic Review*, No 105(4), pp. 1408-38.
- Prabhu, C. (2022, October 10). Central Bank of Oman issues fresh warning over crypto, Ponzi risks. Retrieved from Oman Observer: <https://www.omanobserver.om/article/1126539/business/banking/central-bank-of-oman-issues-fresh-warning-over-crypto-ponzi-risks>
- Virtual Currencies: Key Definitions and Potential. (n.d.). <https://www.fatf-gafi.org/en/publications/High-risk-and-other-monitored-jurisdictions/Public-statement-june-2014.html>
- Yousuf, K. (2021). Say bye to cash from Jan 1: Oman. ZAWYA - Your trusted source for business and finance news. <https://www.zawya.com/en/business/say-bye-to-cash-from-jan-1-oman-g69wv8tr>

# THE EFFECT OF VALUE CO-CREATION ON THE TRANSFORMATION OF ACADEMIC EXPERIENCE: CASE OF HIGHER EDUCATION IN THE SULTANATE OF OMAN

**Sunita Panicker**  
**Shivakami Rajan**  
**Veena Tewari**  
**Saoussen Othmani**

---

## **ABSTRACT:**

*Students in today's world are constantly on the lookout for new experiences that will add value to their education. Alongside an intensified demand for learning encounters, the lecture room has also developed into a backdrop where students anticipate being entertained and engaged. This chapter looks at how value is produced through co-creation and how shared means can contribute to higher educational experiences. It can be viewed as a promise to meet students' expectations and, more importantly, enables the institution to position itself ahead of the competition. Thus, building on the construct of an established higher education ecosystem will contribute to new aspects of thinking that focus on the co-creation of value in a teaching-learning context.*

*The data will be collected from the undergraduate students of public-sector higher education institutions. An online questionnaire was distributed to the student population as the research instrument. Further, the data will be analysed using factor analysis and multiple linear regression. This chapter will contribute to the existing literature on co-creation in the higher education sector with an enhanced emphasis on the Omani context. The proposed objective will be achieved by identifying the indicators of value co-creation from the student's perspective in the Omani context. The main contribution of this chapter is a modified working model of value co-creation in the higher education sector, which can be utilised by policymakers in the higher education sector of culturally similar countries. In principle, the study has taken into account the established DART model. However, the DART MODEL did not justify all of the prerequisites in the Omani context, so the study incorporates new indicators and a modified model of value co-creation in the higher education sector.*

**Key Words:** DART Model, Ecosystem, Higher Education, Service Dominant Logic (SDL), Value Co-Creation

## 1. INTRODUCTION:

The global context in which higher education institutions compete and thrive has given rise to cultivating exceptional marketing policies that highlight student learning involvement. Simoes & Soares (2010). Numerous business concepts have been utilised in higher education (HE) to augment viable benefits and craft a higher image that draws learners into HE. Market alignment and relationship marketing theory have been adopted to view students as consumers, complementing their necessities, refining contributions, and building empowering education platforms to provide a distinctive understanding. Ng, Irene C. L., and Jeannie Forbes (2009).

Even though educational institutions and students want to increase their students' experiences, there are fewer possibilities for them to collaborate in order to align with each other. Thus, co-creation is the process of providing such an experience that would expand the capability of both the universities and students to partner in the learning process. While in contemporary settings, the associations between institutions and students have moved from the outmoded academic association to a more contractual style of association taken from a customer's viewpoint. Thus, the practice of co-creating value is one such possibility, and it develops the capability of institutions of higher education and learners to perform as partners, (Dollinger et al., 2020).

Customer co-creation not only sparks proprietorship but also creates a superior "ownership mentality" in customers. Through this method, student resources are combined with institutional resources, assisting the modification of scholastic amenities in meeting the explicit requirements of learners and, as an outcome, supporting the evolution of a distinctive experience for them through their higher education years. Eagle & Brennan (2007). Despite the fact that there have been studies published on the creation in the higher education marketing literature. It is quite noteworthy to consider that there are very few studies on higher education in the Asian higher education context, with an emphasis on marketing literature. The study is conducted in the context of higher education in Oman, whose population was 5,915,132 in January 2022; thus, there is an increase of 8.32 percent compared to the population of 5,460,693 by 2021. (Schlesinger et. al., 2015). Additionally, higher education is emphasised in Oman's Vision 2040, and steps towards a thorough accreditation review of all higher education institutions that correspond to internationally recognised standards have already been taken. Universities are working to enhance the quality of their services provided to the learning community in order to support such efforts (Schlesinger et. al., 2015). Thus, with this principally new background, this chapter intends to contribute to the higher education literature, with particular attention to the Sultanate of Oman. The findings of the empirical research will be discussed in the following areas and form the content of this chapter.

1. What are the indicators of value co-creation in higher education institutions?
2. How do students perceive value in higher education within the Omani context at present?
3. Is there any model to which policymakers in higher education can refer?

## **2. LITERATURE REVIEW:**

### **1. *Value in the Service dominant logic:***

Last decade has seen an increase in examination of the consumer as a dynamic contributor in co-creating value with businesses (see, for example, Grönroos (2011); Payne et al.(2008); Xie et al.(2008); Vargo & Lusch (2004). In modern literature on marketing (Vargo & Lusch, 2008), the customer is seen as being crucial to both the client's and the business's value creation.

According to service -dominant logic, value is constantly co-created in a sequence of economic and social processes that are centred on relevant resources (knowledge and skills), and the business is continually working to produce value propositions that are superior to those of its rivals (Vargo & Lusch, 2004). Value is intentionally created through the process of "value co-creation" rather than as a result of interactions between customers and businesses (Gummerus & von Koskull, 2015).

Value co-creation is defined in a variety of ways. Value co-creation, according to Grönroos (2008), is the relationship between a client and a business. In addition, he describes value creation as a process whereby actors create value without the assistance of a corporation (Grönroos, 2008). Therefore, the process of creating value may involve interacting with a self-service mechanism or alternative produce (Grönroos, 2008). Although the organization is not directly involved in value creation, it does support the process by giving consumers access to the resources they need (Hibbert et al., 2012). Akaka et.al. (2015) state that they do not differentiate between value creation and value co-creation and treat them as one activity. Thereby, the distinction made by Grönroos between value creation and co-creation is crucial since the value produced by each activity will vary.

According to McMillan & Cheney (1996), the taught-as-user comparison is prone to "practicality" and suggests that instruction is produced somewhat than a practice (e.g. instruction is exchangeable, somewhat more than established). The study contends that the taught-as-user comparison is inappropriate for the authenticities of present higher education and that co-production in instruction is a better comparison, as stated by McCulloch (2009). In co-production in instruction, students, teachers, and other stakeholders whom handhold in the education process are regarded as participating in an accommodating initiative centered on knowledge creation, distribution, and solicitation.



Cook-Sather (2013), while elaborating on the roles and relationships of the teacher and the taught, argued that engaging the taught as collaborators in the pedagogical process takes into account a “threshold concept” in higher education due to the means these aspects and their relationships have traditionally been understood, and that never before instabilities may elicit a different perspective on these roles and relationships.

## **2. *Higher education and Value co-creation***

The process of co-creating value is where customers assume a significant part in refining an organization's products or services (Grönroos & Gummerus, 2014). Co-creation has been taken on by non-profit associations, for example, universities, which have begun to see various stakeholders, including graduates, resources, and students, interact to create value (Arpan et al., 2003). Though faculty and student partnerships are difficult to establish since the idea is transformational to traditional educator and student connections, teaching and learning are collaborative processes. Recent research, however, emphasizes the advantages of including students in co-creating value, which is advantageous to both the university and the students (Lipponen & Kumpulainen, 2011). High-quality interactions, increased satisfaction, and improved graduation capacities are advantages for students. For institutions, they also include student loyalty, university reputation, and student-university identification (Dollinger et al., 2018). Co-creating value in this study is considered as joint production and student participation, where joint creation underlines the crucial role that alliances between students and university staff play in enhancing student involvement in both academic and extracurricular contexts (Maxwell-Stuart et al., 2018).

Ng & Forbes (2009) created a framework for analyzing university education as a service by combining literature from education and services marketing. They propose that the core service in a university experience is a learning experience that is co-created by people within the university, such as students, students and teachers, students and administrators, and so on; the fundamental service in a university set up is a co-created learning familiarity, with instruction (i.e. service) value being evolving, amorphous, collaborating, tentative, and also with a hedonic element. Students' involvement in the instructive process can also be linked to educational development practices. Students as partners in pedagogical processes are examined by Bovill et al. (2011), who identify three types of student participation: students as co-creators of teaching approaches, students as co-creators of course design, and students as co-creators of curricula.

According to Mollie et al. (2018) value co-creation is a tool to enable enhanced collaboration between students and institutions which results in converting today's students into an effective partner. In the long run, this process may lead to innovation by value creation, where skills are integrated with other physical resources. Value co-creation in higher education institutions has two clear steps. First is an engagement to co-produce and then enhance the overall value in use.

Collaboration in pedagogical planning processes and curriculum redesign is a significant part of educational relationships. However, Neary & Winn (2009) opine that instructors and learners must go additionally in reshaping the practices by which educational awareness is formed. They propose that research-based learning can achieve student participation and knowledge co-production by introducing students not only to coaching practices but also to research developments, which are the major methods for knowledge design.

Ideation tools for co-creation enable uninterrupted communication between teachers and students on the objectives or anticipated results. For value co-creation, quality learning environments enable learners to participate in cooperative and combined events with their peers, paving the way for improved anticipated results, including the progress of higher-order thinking abilities. Appealing to learners in the instruction procedure may be viewed as promoting critical thinking abilities, co-creating understanding and importance, and introducing transformative education. Investigating value co-creation is a difficult task, given the numerous ways it shall be validated. Co-creating value can be associated with using instruction excellence to value co-creation, co-teaching, using students as producers, co-producing and co-designing, and so on. As a result, it could be extremely beneficial to be capable of incorporating each inquiry into a cluster based on the arena of education through the usage of a yardstick.

### **3. *Dimensions of Value Creation in Higher Education Context:***

In the present research, we postulate that the value co-creation process has multiple dimensions. Co-production (representing tight cooperation among process participants), experience (as a facilitator of value in use), and relations (interactions typical of the service setting) are its three dimensions (see Fig. 1). The following sub-dimensions were identified as a result of the previous literature review and qualitative study:

**2.3. (i)Co-Production-** Contribution in the service design methods and direct and indirect collaboration with businesses are referred to as “co-production” (Hu & McLoughlin, 2012). (Auh et.al., 2007). Customers can choose how much they want to participate, and they do so consciously based on the information that is accessible. This dimension's elements are comparable to those of the DART model, which outlines the fundamentals of successful actor collaboration (Prahalad & Ramaswamy, 2004; Albinsson et al., 2016).

**Information Access:** According to Kelley et al.(1990) and Yi & Gong (2013), information access refers to a customer's capacity to get all information required to reduce Uncertainty and respond appropriately during the co-production process

**Dialogue:** The ability of a corporation to comprehend consumer demands and take steps to satisfy them is reflected in dialogue. Discussions should center on pressing

concerns and result in cooperative activities (Prahalad & Ramaswamy, 2004; Hsieh & Hsieh, 2015).

**Control:** Control is the capacity of the customer to direct the value co-creation process and the adaptability of the business (Jaakkola et al., 2015). A sign of trust is when a firm is willing to delegate responsibility to a client; nevertheless, this can be dangerous if the consumer chooses to go against the company's expectations (Fisher & Smith, 2011).

**2.3.(ii) Experience:** The experience dimension captures real customer encounters and makes it possible to provide value in a specific situation. Customer participation in the co-creation process is necessary for optimizing the value resulting from the customer experience (Ismail et.al., 2011).

**Involvement:** The degree of involvement is related to the customer's active or passive involvement in the co-creation process (Kristensson et al., 2008). It can refer to several stages of the process and take place on different levels (Agrawal & Rahman, 2015).

**Intellectual Stimulation:** The cognitive character of any given experience within higher education is an outcome of intellectual stimulation and denotes one of the major elements of the value co-creation process (Sheth et al., 1991; Schmitt, 1999; Gentile et al., 2007; Dziwanowska, 2017).

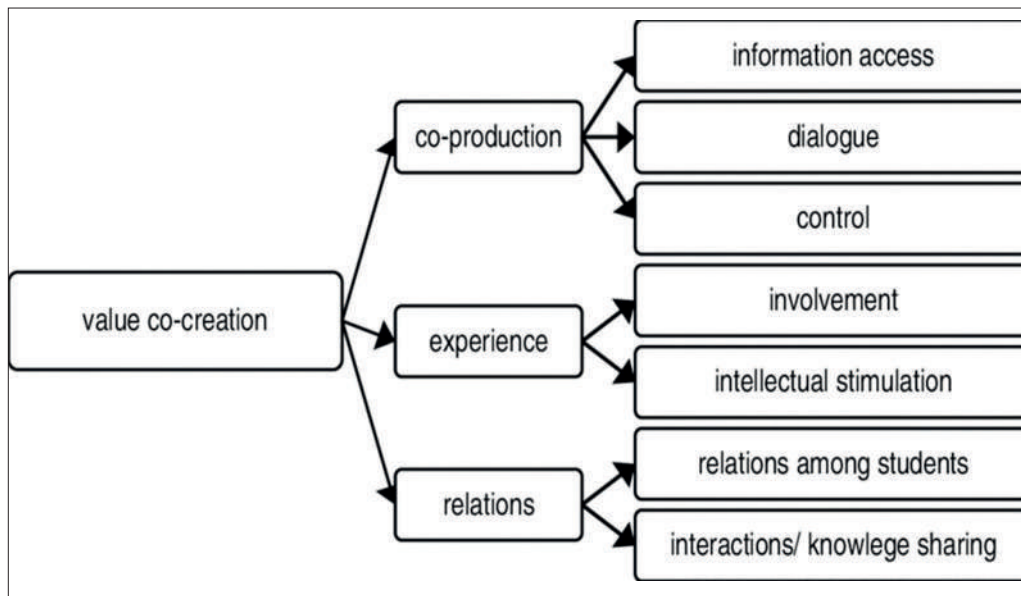
**2.3.(iii): Relations:** According to Lusch & Vargo, (2014), the effectiveness of the co-creation process is impacted by interactions between the different actors/elements and total numbers.

**Relations among the students:** This is a social aspect and contributes as an important source of value co-creation in the higher education sector (Schmitt, 1999; Sheth et al., 1991). This is established that students are a very important collaborator with their teachers in the whole process of value co-creation (Diaz- Mendez & Gummeson, 2012).

**Interactions (Knowledge Sharing):** Interactions between students and teachers are very important for knowledge sharing and enhances the process of value co-creation (Ranjan & Reda, 2016). These interactions also highlight the effectiveness of operational efficiency of the ecosystem within higher education (Nambisan & Baron, 2007).

### 3. DIMENSIONS OF DART MODE

**Figure 1: : Prahalad, C.K. & Ramaswamy, V. (2004). The Future of Competition: Co-Creating Unique Value with Customers.**



### 4. METHODS:

#### 4.1 Data Collection, Scale and Sampling Technique:

Reviewing the pertinent literature and carrying out a preliminary interview with the prospective respondents were the two main steps in the development of the questions, which represented the co-creation initiatives. The data was obtained through this questionnaire, and the main purpose was to determine the degree to which various indicators representing co-creation initiatives agreed with one another for the Omani Business Management students.

The basic components were adapted from the DART Model (Prahalad & Ramaswamy, 2004). The measurements of the various items were based on a Likert scale, which expressed the student's attitude to the items in evaluation with five answer categories from 1 to 5. The range from "Strongly Disagree (1)" to Strongly Agree (5) was used to evaluate the student's attitude. A higher score of five indicates a higher level of student co-creation involvement. The questionnaire had two main parts. The first part was the demographics of the students, and the second part pertained to the themes of co-creation of value in education literature. Three items each were generated using the original components of the DART Model, which were dialogue, information accessibility, student control, student involvement, and relations among peer students.

Data was collected using online platforms through non-probabilistic techniques of convenience and snowballing sampling techniques. The questionnaire was distributed online through a Google Form to all the undergraduate students.

#### **4.2 Population and Sample:**

Undergraduate students who are currently enrolled in Bachelor of Business Administration programmes in the public sector higher educational institutions in Oman include the relevant population for this study. The total sample size of this study towards to support the chapter's objectives is 110 undergraduate students. The unit of analysis is one individual student. Students who have active attendance status were the targeted respondent.

#### **4.3 Sample Profile:**

The respondents consisted of 16 percent male students and 84 percent of female students. Among these, 54 percent of students were in the final year of their graduation, 35 percent were in the 3rd year, 7 percent were in the 2nd year, and 4 percent were in the 1st year of their undergraduate programmes. The age of the students is typically between 18 to 23 years of age. The medium of study for these respondents is English; however, their mother tongue is Arabic.

#### **4.4 Hypotheses Development:**

The importance of knowledge, or different kinds of information, in creating value has been a driving force behind the development of this theoretical stream of value co-creation. According to Vargo & Lusch (2004), value is conceived as a result of a perpetual learning process by the user (students) along with the service provider (higher education institutions). Applying the concept to education and students, the student is a co-creator of value and has to put the educational services offered into some kind of use, experience and perceptions are vital for determining the value derived. The co-created experiences of the students are voluntary. According to Haanpaa (2022), knowledge and experiences are constructed by actively doing or performing by the student. It is his/her discretion to learn or not to learn, finally performing in different arenas of active life (Biehl & Volkmann, 2019). Hence, we conceptualize the co-creation of value as a set of expectations that students will derive from their experiences with the services offered by the university. Thus, the student experience is the sum total of his involvement in academic and non-academic activities inside and outside the classrooms with teaching faculties and classmates. The interactions with the senior students also contribute towards overall pleasant or unpleasant experiences. In this context a priori, we propose the following alternate hypothesis towards achieving the chapter's objective;

*HA1 Student networking is positively related to his/her overall development.*

*HA2 Student self-focus in his own development is positively related to his/her overall development.*

*HA3 Student involvement in academics is positively related to his/her overall development.*

*HA4 Student's belief in their own capabilities is positively related to his/her overall development.*

*HA5 Student's attention to his/her own needs and satisfaction is positively related - to his overall development.*

*HA6 Students bear e minimum effort to succeed in his/her studies and positively influence on his/her overall development.*

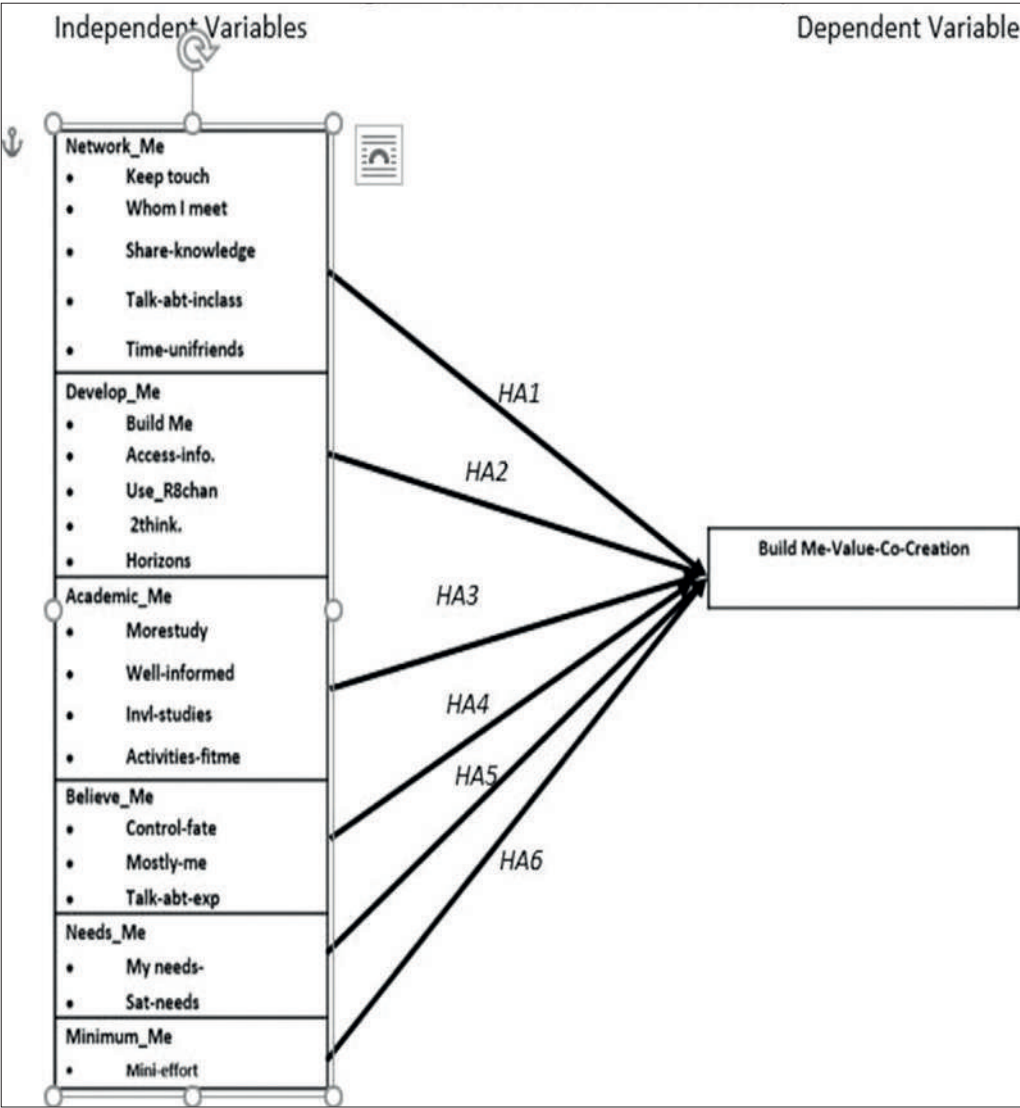
## **5. DATA ANALYSIS TECHNIQUES:**

The Data collected were analysed using SPSS version 22 to generate the needed information by justifying the hypothesis. Statistical outputs such as frequencies, correlations, validity, and reliability measures were generated for the variables under study. A factor analysis was performed to understand the impact of various items on the dependent variable. Further, the multiple linear regression analysis is the key statistical technique used to analyse the relationships among the variables and constructs of dependent and independent variables for the test of the hypothesis.

### **5.1 Results of Data Analysis:**

**5.1.1 Factor Analysis results:** After the data was subjected to the factor analysis, the following results were obtained in terms of identifying the factors responsible for value co- creation in the public sector higher education institutions in the Sultanate of Oman.

**Figure 2 : Proposed value co -creation model for higher education in Oman**



Keeping the DART model as a base , the modified items were treated as the factors of value co-creation. The combination of literature review with the DART Model has given the following relevant factors suitable for Omani undergraduate students to contribute towards the value co-creation. These are:

Networking skills (Network), Building and enhancing knowledge (Develop), Academic endeavors (Academic), Increased self-confidence (Belief), Satisfying individual's needs (Needs), and Minimum efforts needed (Minimum).

**5.1.2 Multiple Regression Results:** Additionally, the Multiple linear regression was used to test if *[Network\_Me]*, *[Develop\_Me]*, *[Academic\_me]*, *[Believe\_Me]*, *[Needs\_Me]* and *[Minimum\_Me]* significantly predicted the *[Build Me]* - value co-creation process from a student's perspective.

The overall regression was statistically significant ( $R^2 = 0.777$ ,  $R^2\text{Adj}=0.764$ ,  $F(6, 103) = [59.823]$ ,  $p < 0.05$ ). It was found that *[Develop\_Me]* significantly predicted *[Build\_Me]* ( $\beta = .916$ ,  $p < 0.05$ ). It was further found that *[Needs\_Me]*, and *[Minimum\_Me]* did not significantly predict *[Build\_Me]* ( $\beta = -.064$  and  $\beta = -.021$  respectively),  $p > 0.05$ . Hence these two factors, which were not significant in predicting the dependent variable, are removed from the fitted regression model.

The multiple linear regression model predicted 77 percent of the variance in the *[Build\_Me]*-value co-creation process from a student's perspective. In other words, it is explained by the predictor variables under study. The student's perception of value co-creation in their individual capability *[Build\_Me]* increases with every unit increase in the application of their network skills-*[Network\_Me]* ( $\beta=0.151$ ), the activities that build and enhance their knowledge-*[Develop\_Me]* ( $\beta=0.916$ ), their academic endeavors- *[Academic Me]* ( $\beta=0.313$ ) and finally their increased confidence over in their own belief of self-control-*[Believe\_Me]* ( $\beta=0.182$ ).

Thus, the fitted regression model is:

$$[Build\_Me] = 4.018 + 0.151 * [Network\_Me] + 0.916 * [Develop\_Me] + 0.313 * [Academic\_Me] + 0.182 * [Believe\_Me]$$

**5.1.3 Coefficient of Regression Model:** The standardized coefficient of the regression model conveys the predictor *[Develop\_Me]* has the largest influence over the dependent value co-creation, followed by *[Academic me]*, *[Believe\_Me]* and *[Network\_Me]*. The analysis of the variance of multiple regression models ( $F=59.823$ ) for the level of value co-creation shows that the overall significance of the model is perfectly matched. The coefficient of determination  $R^2$  value (0.777) showed that these variables simultaneously clarified the variation of value co-creation perception of students in developing themselves to the extent of 77%.



**Table 1: Showing the Coefficient of Regression Model**

<b>Explanatory Variable</b>	<b>Model-Slope Coefficient</b>
<b>Constant</b>	<b>4.018</b>
<b>Network_Me</b>	<b>0.151</b>
<b>Develop_ME</b>	<b>0.916</b>
<b>Academic_ME</b>	<b>0.313</b>
<b>Believe_Me</b>	<b>0.182</b>
<b>Needs_Me</b>	<b>-0.064</b>
<b>Minimum_Me</b>	<b>-0.021</b>
<b>R Square</b>	<b>0.777</b>
<b>Adjusted R Square</b>	<b>0.764</b>
<b>F-Value</b>	<b>59.823</b>
<b>Significance of F</b>	<b>0.000</b>
<b>Standard Error of the estimate</b>	<b>0.550</b>

### **5.1.3 Justification of the Hypothesis:**

Interpreting the results of the above quantitative statistical tools towards justifying the hypothesis,

HA1: Student networking is positively related to his/her overall development.

HA2: Student self-focus in his/her own development is positively related to his overall development.

HA3: Student involvement in academics is positively related to his/her overall development.

HA4: Students' belief in his/her capabilities is positively related to their overall development.

HA5: Students' attention to his/her needs and satisfaction is not positively related to their overall development.

HA6: Students' bare minimum effort to succeed in his/her studies is not positively related to overall development.

**Table 2 : Hypothesis Acceptance/Non-Acceptable Summary**

Hypothesis	Accepted- Yes or No
HA1	Yes
HA2	Yes
HA3	Yes
HA4	Yes
HA5	Not accepted
Ha6	Not accepted

## 6. DISCUSSION:

According to previous research, value creation is a continuous process that is influenced by macroeconomic changes in a specific region. The Sultanate of Oman is witnessing quite several challenges while thriving to stabilize the higher education sector. Policymakers at different levels have taken urgent actions within the last two vision documents Oman Vision 2020 and 2040.

The current higher education scenario has amplified the need for a student-centred approach to teaching and learning. The value of co-creation is pertinent and impossible without collaboration with students, who are the ultimate receivers of the proposed service. As per the proposed model of this study, networking skills, building and enhancing knowledge, various academic endeavours of the student's community, and initiatives provided to the students to increase their self-confidence are the driving forces for value co-creation in higher education within the public sector in the Sultanate of Oman. While meeting the individual needs of students by mentors and requiring the least amount of effort from students are not important.

## 7. IMPLICATIONS:

There are multidimensional implications of this study. The first and foremost is the scholarly community, who are the beneficiaries in the entire value co-creation ecosystem. They opine that if the service provider (higher education institutions) have to thrive, there should be collaboration opportunities, developmental opportunities and trust between the service provider and receiver (students). Secondly, the higher education institutions as a service provider, should establish the standard processes not only for service delivery but also for collaboration with the students during their duration in the institution. Maintaining quality should not be the sole

Objective. However, processes should be aimed at enhanced feedback and collaboration. Last but not least, policymakers within the higher education industry should have monitoring and control systems involving all the stakeholders, including students, mentors, parents, administrators, alumni and the industry.

## **8. CONCLUSION AND FURTHER RESEARCH:**

The chapter concludes that in the present scenario, the Omani higher education institutions intend to provide value while simultaneously providing co-creating opportunities to the students. To achieve this, they need to pave the way by providing networking skills to students, the opportunity to build and enhance their knowledge, promoting their academic endeavours and their increased self-confidence because these students are the future leaders and promising citizens of the Sultanate of Oman.

As Omani society prefers collectivism rather than the individualistic approach, the students look forward to group teaching and learning pedagogies. Due to the illustrious history of economic standing, the society still does not prefer to put extensive efforts towards their life goals. Thus future research may focus on building mindsets to face the evolving challenges in terms of professional life goals.

**REFERENCES:**

- Aarikka-Stenroos, L., & Jaakkola, E. (2012). Value co-creation in knowledge intensive business services: a dyadic perspective on the joint problem -solving process. *Industrial Marketing Management*, 41(1), 15-26.
- Agrawal, A. K., & Rahman, Z. (2015). Roles and resource contributions of customers in value co- creation. *International Strategic Management Review*, 1-2, 144-160
- Akaka, M. A., Vargo, S. L. and Schau, H. J. (2015), "The context of experience", *Journal of Service Management*, Forthcoming.
- Albinsson, P. A., Perera, B. Y., & Sautter, P. (2016). DART scale development: Diagnosing a firm's readiness for strategic value co-creation. *Journal of Marketing Theory and Practice*, 24(1), 42-58.
- Arpan, L .M.; Raney, A.A.; Zivnuska, S. A cognitive approach to understanding university image. *Corp. Commun. Int. J.* 2003, 8, 97–113.
- Auh, S., Bell, S. J., McLeod, C. S., & Shih, E. (2007). Co-production and customer loyalty in financial services. *Journal of Retailing*, 83(3), 359-370.
- Biehl, B. and Volkmann, C. (2019), "'Spirits, dancing in the flesh': choreography and organization", *Culture and Organization*, Vol. 25 No. 4, pp. 284-299, doi: 10.1080/14759551.2019.1608204.
- Bovill, C., Cook-Sather A. & Felten P (2011). Students as co-creators of teaching approaches, course design, and curricula: implications for academic developers. *International Journal for Academic Development*, 16(2), 133-145.
- Cook-Sather, A (2013). Student-faculty partnership in explorations of pedagogical practice: A threshold concept in academic development. *International Journal for Academic Development*, 1-13.
- Diaz-Mendez, M., & Gummesson, E. (2012). Value co-creation and university teaching quality. *Journal of Service Management*, 23(4), 571-592.
- Dollinger, M.; Lodge, J. Student-staff co-creation in higher education: An evidence-informed model to support future design and implementation. *J. High. Educ. Policy Manag.* 2020, 42, 532– 546.
- Dollinger, Mollie, Lodge, Jason, and Coates, Hamish (2018). Co-creation in higher education: towards a conceptual model. *Journal of Marketing for Higher Education* 28 (2) 1-22.
- Dziewanowska, K. (2017). Value types in higher education - students' perspective. *Journal of Higher Education Policy and Management*, 1-12.
- Eagle, L., & Brennan, R. (2007). Are students customers? TQM and marketing perspectives. *Quality Assurance in Education*, 15(1), 44–60. <https://doi.org/10.1108/09684880710723025>

- Fisher, D., & Smith, S. (2011). Co-creation is chaotic: what it means for marketing when no one has control. *Marketing Theory*, 11(3), 325-350
- Gentile, C., Spiller, N., & Noci, G. (2007). How to sustain the customer experience: An overview of experience components that cocreate value with the customer? *European Management Journal*, 25(5), 395-410.
- Grönroos, C., & Gummerus, J. (2014). The service revolution and its marketing implications: service logic vs service-dominant logic. *Managing Service Quality*, 24(3), 206–229. <https://doi.org/10.1108/msq-03-2014-0042>
- Grönroos, Christian (2008), Service logic revisited: who Creates Value? And who co-creates? *European Business Review* 20 (4), 298-314.
- Grönroos, Christian (2011), Value Co-creation in Service Logic. A critical analysis. *Marketing Theory*, Forthcoming.
- Gummerus, J., von Koskull, C. and Magnusson, P.R. (2015) Exploring Value Propositions and Service Innovation: A Service-Dominant Logic Study. *Journal of the Academy of Marketing Science*, 43, 137-158.
- Haanpää, M. (2022). Co-creation as choreography. *Qualitative Market Research: An International Journal*, (ahead-of-print).
- Hibbert, S., Winklhofer, H., & Temerak, M. S. (2012). Customers as Resource Integrators. *Journal of Service Research*, 15(3), 247–261. <https://doi.org/10.1177/1094670512442805>
- Hsieh, J.-K., & Hsieh, Y.-C. (2015). Dialogic co-creation and service innovation performance in high-tech companies. *Journal of Business Research*, 68(11), 2266-2271.
- Hu, Y., & McLoughlin, D. (2012). Creating a new market for industrial services in nascent fields. *Journal of Services Marketing*, 26(5), 322-331.
- Ismail, A. R., Melewar, T., Lim, L., & Woodside, A. (2011). Customer experience with brands: Literature review and research directions. *The Marketing Review*, 11(3), 205-225.
- Jaakkola, E., Helkkula, A., & Aarikka-Stenroos, L. (2015). Service experience co-creation: conceptualization, implications, and future research directions. *Journal of Service Management*, 26(2), 182-205.
- Kelley, S. W., Donnelly, J. H., & Skinner, S. J. (1990). Customer participation in service production and delivery. *Journal of Retailing*, 66(3), 315-335.
- Kristensson, P., Matthing, J., & Johansson, N. (2008). Key strategies for the successful involvement of customers in the co creation of new technology-based services. *International Journal of Service Industry Management*, 29(3), 474-491.
- Lipponen, L., & Kumpulainen, K. (2011). Acting as accountable authors: Creating interactional spaces for agency work in teacher education. *Teaching and Teacher Education*, 27(5), 812–819. <https://doi.org/10.1016/j.tate.2011.01.001>

- Lusch, R. F., & Vargo, S. L. (2014). *Service-Dominant Logic. Premises, perspectives, possibilities*. New York: Cambridge University Press
- Lusch, R., & Wu, C. (2012, August). *A Service Science Perspective on Higher Education*. Center for American Progress, 1-12
- Maglio, P. P., & Spohrer, J. (2008). Fundamentals of service science. *Journal of the Academy of Marketing Science*, 36(1), 18- 20.
- Maxwell-Stuart, R., Taheri, B., Paterson, A. S., O’Gorman, K. and Jackson, W., 2018. Working together to increase student satisfaction: exploring the effects of mode of study and fee status. *Studies in Higher Education*, 43 (8), pp. 1392-1404. ISSN 0307- 5079.
- McCulloch, A. (2009). The student as co-producer: learning from public administration about the student–university relationship. *Studies in Higher Education*, 34(2), 171–183. <https://doi.org/10.1080/03075070802562857>
- McMillan J. J. & Cheney G., (1996). The student as consumer: The implications and limitations of a metaphor. *Communication Education*, 45(1), 1-15.
- Mollie Dollinger, Jason Lodge & Hamish Coates (2018) Co-creation in higher education: towards a conceptual model, *Journal of Marketing for Higher Education*, 28:2, 210-231, DOI: 10.1080/08841241.2018.1466756.
- Nambisan, S., & Baron, R. A. (2007). Interactions in virtual customer environments: implications for product support and customer relationship management. *Journal of Interactive Marketing*, 21(2), 42-62.
- Neary, M. & Winn J. (2009). The student as producer: reinventing the student experience in higher education.
- Ng, I.C.L.; Forbes, J. Education as Service: The Understanding of University Experience through the Service Logic. *J. Mark. High. Educ.* 2009, 19, 38–64.
- Payne, A., Storbacka, K., & Frow, P. (2007). Managing the co-creation of value. *Journal of the Academy of Marketing Science*, 36(1), 83–96. <https://doi.org/10.1007/s11747-007-0070-0>
- Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, 18(3), 5-14.
- Ranjan, K. R., & Read, S. (2016). Value co-creation: concept and measurement. *Journal of the Academy of Marketing Science*, 44(3), 290-315.
- Schlesinger, W., Cervera-Taulet, A., & Iñiesta, M. A. (2015). Key Elements in Building Relationships in the Higher Education Services Context. *Journal of Promotion Management*, 21(4), 475–491. <https://doi.org/10.1080/10496491.2015.1051403>

- Schmitt, B. (1999). *Experiential Marketing: How to Get Customers to SENSE, FEEL, THINK, ACT and RELATE to Your Company and Brands*. New York: The Free Press.
- Simões, C. M. O., & Soares, A. P. (2010). Applying to higher education: information sources and choice factors. *Studies in Higher Education*, 35(4), 371–389. <https://doi.org/10.1080/03075070903096490>
- Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research*, 22(2), 159-170
- Vargo, S.L., & Lusch, R. (2004, January). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing*, 68, 1-17
- Vargo, S. L., & Lusch, R. F. (2007). Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1–10. <https://doi.org/10.1007/s11747-007-0069-6>
- Xie, C., Bagozzi, R.P. and Troye, S.V. (2008) Trying to Prosume: Toward a Theory of Consumers as Co-Creators of Value. *Journal of the Academy of Marketing Science*, 36, 109-122.
- Yi, Y., & Gong, T. (2013). Customer value co-creation behavior: Scale development and validation. *Journal of Business Research*, 66, 1279-1284.

# THE AUTOMATION REVOLUTION: A TRANSFORMATIONAL CHANGE IN RECRUITMENT AND SELECTION THROUGH ARTIFICIAL INTELLIGENCE

***Nasser Al Harrasi***

***Salim Al Daraai***

***Maryam Al Rashdi***

---

## **ABSTRACT**

This Chapter aims to review the literature to find out the recent developments of AI-powered tools in relation to recruitment and selection process. Recruitment and selection consist of four main processes, which are candidate sourcing, candidate screening, candidate matching and candidates assessing. The review revealed that there are many AI- Based candidate sourcing tools such as Fetcher, hireEZ, Textio, Entelo, and XOR. In addition, AI- Based candidate screening tools mainly depend on chatbot technology which helps and guides the candidates throughout the recruitment process. These AI-powered tools are supportive of candidate-matching and ensure that the right candidate will be hired by the company. This is done by matching the applicant's specifications and job requirements in relation to the years of work experience required, the location of the job, skills required, minimum qualifications, and salary requirements. AI-powered candidates assessing tools can analyze the body language, candidate interactions, voice tone and speaking pattern. Recently, studies on AI-powered tools are performed better in scoring objective criteria such as confidence. However, the subjective criteria still need more research in relation to result quality and accuracy. Overall, the review of the literature shows that there is not a comprehensive AI-powered tool that performs all process of recruitment and selection.

**KeyWords:** *Artificial Intelligence, Machine Learning, Recruitment and Selection, Transformation.*

## **1. INTRODUCTION**

Artificial Intelligence (AI) is a technology that gains humongous attention every year. Intelligent and self-learning programs are used in software development and many other areas of Information Technology (IT). AI is still far from human cognitive abilities, but many modern machines can learn, make difficult decisions, and think. AI-based software is the most flexible solution for various areas of business. It gives more opportunities for the automation of processes that don't require a high level of creativity and so can be performed by a machine. The automation of processes becomes possible due to AI's ability to analyze



big data and quickly estimate appropriate options. AI technologies become widely used not only in IT but also in marketing and development. Historically, Organizations depended on traditional media and personal connections to announce job vacancies and find the right candidate. The Internet helped recruiters to digitalize recruitment through job application platforms. However, matching and assessing candidates remained manual and required human interventions (Hemalatha et al., 2021). There's no surprise some companies have start using (or are learning to use) AI-powered tools in recruitment and selection, trying to automate the recruiting process and discover new ways of hiring talent.

Currently, there are many recruitment technology solutions which are: Data-driven recruitment, AI for recruitment, social media recruiting, Video job interview technology and improved candidate experience. Artificial intelligence for recruitment and selection is the next generation of software intended to transform or automate talent acquisition. AI-powered tools can be leveraged to support humans by automating the Sourcing, Screening, Matching, and assessment of the candidates (Shaikh, 2018). Research featured in the Harvard Business Review is a comparison between expert human judgment and AI-powered tools. It has been found that AI-powered tool increases the accuracy of selecting successful job candidates by more than 50% (How AI is going to transform recruitment? , 2017). This paper aims to review the literature review to find out the current development of AI-powered tools in relation to the recruitment and selection process. Recruitment and selection consist of four main processes, which are candidate sourcing, candidate screening, candidate matching and candidate assessing. This study is divided into four sections, in which each section elaborates and describes the availability and accuracy of AI-powered tools for each process of recruitment and selection. Section (1) AI-based Candidates Sourcing is a technology that searches for data that people leave online (e.g., resumes, professional portfolios, or social media profiles) to find passive candidates that match the job requirements. Section (2) AI-based Candidates Screening is utilizing AI-powered chatbots, which automate manual candidate screening by reviewing the applications with candidates, answering candidate queries, and, if the candidate is interested and qualified, the AI-powered tool schedules the first interview. Section (3) AI-based Candidate Matching is a matching algorithm to analyse multiple sources of data, such as candidates' personality traits, skills, and salary preferences, to automatically assess candidates against the job requirements. Section (4) AI-based Candidate Assessing is an AI-driven assessment which uses custom algorithms to select the candidate for the job. This study contributes to gathering the individual AI-powered tools of each process in recruitment and selection to highlight the transformation of recruitment and selection from traditional and human-based methods to AI- based.

## **2. AI-BASED CANDIDATES SOURCING**

Within human resource functions, candidates' sources in recruitment have an impact on each of organizational performance, turnover, tenure, and absenteeism, as highlighted by Williams et al., (1993). A study conducted to compare the traditional and online recruitment processes,

including sourcing, indicates that the survey was distributed to 52 recruiters in different companies. Results showed that 71% of the respondents believe online sources can improve the quality outcome, and 94% of them agree that information provided on social media will enhance the company tracking ability (Gupta et al., 2018).

Nowadays, most job seekers tend to keep their personal, educational and professional details on social media as it becomes a part of their life. As a result, recruiters start orienting towards Artificial Intelligence tools for more effective and flexible search. This technology contains many tools that reduce the time and effort spent by both the employer and the candidate by providing automated tasks and making the process more productive. It takes the unstructured bio-data of candidates and creates a unified and useful structure for the use of recruiters (Geetha & Bhanu Sree Reddy, 2018).

Employers just have to post a new job vacancy, and the AI with the candidate identification tools searches for data that match the keywords defined by the employer, starting from data available in the company database to social media platforms like LinkedIn, Indeed, Facebook and others. Furthermore, it adds details of candidates to the company application tracking system for recruiters and HR managers to record the number of applied candidates, most qualified people, each candidate's status in the recruitment pool etc. It is very important to search for talented candidates and find them easily once the company has a suitable job vacancy (Kulkarni et al., 2019).

There are many AI- based tools that provide sourcing services. (1) Fetcher is an AI platform that can multiply sourcing power without any human touch. Users add details about the available position, and with one click, this application reaches profiles and provides a list of the matching candidates in seconds. Moreover, it updates the candidate with details about new job vacancies uploaded in the application and the recruiter with up-to-date information about candidates (Fraij & László, 2021). (2) hireEZ platform provides services in staffing, healthcare, and security. EZ Sourcing can inter over 45 web platforms and reach 800 million candidate profiles. Adding to that, it allows recruiters to interact with candidates and engage highly qualified people in the follow-up platform (Vedapradha et al., 2019). (3) Textio is a technology that understands languages; analyse meanings, styles and patterns of documents posted by users. Textio provides writing solutions to increase the effectiveness of the hiring process, solutions as writing job advertisements within a few minutes, rating the language effectiveness to recruit highly talented candidates, suggesting alternative words to build stronger language and verifying that post phrases are aligned with the company culture. It is used by many popular companies such as McDonald's, eBay, Nestle, NBA, British Petroleum, Network Rail, and Hulu (Veluchamy et al., 2021). (4) Entelo provides candidate sourcing, talent engagement, and accelerated platforms. To search for talented candidates, recruiters enter search queries to get details about candidates, including their basic details, highlighted careers, how often they switch between jobs and also how many of them are ready to move. Other options to write notes, create a list of the best fit candidates and send messages directly. Netflix, Goldman Sachs, Meredith, and Xero depend on it in candidate

sourcing (Vedapradha et al., 2019). (5) XOR is an AI recruiter targeting hard manual labor –the Blue collar- and hourly workers in the United States. It reduces users' time, money and effort by reaching 1 million candidates and scheduling an interview within a week. They have many global companies, such as Ikea, Mars, Sutter Health, Trucking, MolGroup, and Business Solvers (Fraij & László, 2021).

### **3. AI-BASED CANDIDATES SCREENING**

Screening candidates is the hardest step in the recruitment process. The availability of millions of candidates' profiles online makes it difficult to choose the right candidate. The Boolean search of Chatbots is a solution to minimize time and effort and to be more confident that the selected candidate is the best fit for the vacancy (Singh et al., 2022). Chatbot is a chatting robot which uses artificial intelligence to communicate with human beings. It is a computer application programmed in Eclipse software using Java programming language. Chatbot design is very interesting and simple. It answers users' questions orally or as written text and gives users a feel of a conversation with another person (Dahiya, 2017). This technology has different categories; it works as a knowledge domain that searches for the right information to clear users' doubts or as information that center helps in booking airline tickets or hotel rooms. It categorizes Human-aid, Permissions giver or as a Communication channel (Adamopoulou & Moussiades, 2020).

Nowadays, Chatbots work as a recruiter. When the candidate visits a job posting page, the chatbot immediately starts a conversation. At the same time, it converts the unstructured text into the required contextual data and sends it to the recruiter. Then, the Chatbot stores the gathered data of the applicants in the Application Tracking system for future use. In case the recruiter prefers to meet the candidate, Chatbot can help in scheduling an appointment using the calendar functions (Kulkarni, Swatee B. and Che, Xiangdong, 2019). Furthermore, while creating a chatbot platform, developers provide frequent queries from applicants to reduce the involvement of humans. This helps in its ability to perform better. The attractive uses of Chatbots are the use of human involvement to learn how to answer and what is the right response to each question that is raised in the future. (Adamopoulou & Moussiades, 2020). In summary, chatbot technology guides the candidates throughout the recruitment process (Veluchamy et al., 2021).

Currently, there are many bots used in screening candidates. Firstly, the Mya system is the most popular chatbot used in many countries. As mentioned by L'Oreal's company, the first 10,000 applicants who had a conversation with the Mya system showed a 100% rate of satisfaction, where 92% completed the recruitment process effectively due to Mya's support. It takes the candidate through the entire recruitment steps, starting from sourcing to fixing the appointment for the interview (Veluchamy et al., 2021). Secondly, Wade and Wendy, who are robot personalities and developers, have built a conversational AI platform. Wade provides support and guidelines to applicants after collecting all required details such as education, experience, skillset etc. and then shows the best-fit jobs. Wendy, on the other hand, guides

and supports the recruiters about the best-fit candidates for any new vacancy through screening, matching and shortlisting them for job assessments (Veluchamy et al., 2021). Thirdly, AllyO is an end-to-end conversational Artificial Intelligence recruiter that reduces 60% of the traditional hiring cost, increase 91% of completed applications, and 92% of its users are satisfied with the platform functions. AllyO has the ability to reach talented candidate's profiles in various social media and online job boards such as LinkedIn, indeed, and Monster. Also, communication with AllyO chatbots takes candidates through a good experience with the employer company environment (Oswal et al., 2020). Finally, Humanly is a recruiting AI platform that has a score of 4.8 out of 5 in candidate experience. It saves about 60 hours in screening candidate profiles and increases the volume of diversity. This platform can access LinkedIn, Facebook, indeed, Glassdoor, ZipRecruiter and QR code candidates' details for the purpose of screening, matching and listing shortlisted candidates for job assessment (Oswal et al., 2020). Overall, there are many other technologies which work as AI-based Candidates Screening, like Lisa, Debra, Brazen, Olivia, Ideal and Eightfold.

#### **4. AI-BASED CANDIDATES MATCHING**

Job applicant selection is one of the most important processes a company does to get a talented and qualified candidate (Aljuaid & Abbod, 2020; Romadon et al., 2020). A company usually does certain things to improve the quality of its employee recruitment systems (Maji & Bera, 2020; Gayatri & Babu, 2022). However, when the number of applicants is large or exceeds the predicted number, this system can become complicated and face difficulties in selecting a qualified candidate (Bhatt & Muduli, 2022; Maji & Bera, 2020; Sooraksa, 2021). To address this, using artificial intelligence in matching candidates as a helper tool for the company will allow them to select the most qualified candidate and make a fast decision (Lu et al., 2020). Matching candidates is a predictive analysis utilized in job recruitment where algorithms match the candidate's skills, qualifications, industry experience, personality, and employment history against the job requirements (Jia et al., 2018; Kim & Heo, 2021; Prikshat et al., 2021). The use of algorithms aids the company in predicting the future success of the candidate at their new company (Cen & Newman, 2019; Jia et al., 2018; Qamar et al., 2021). The matching algorithm platforms work as a search engine for those seeking work. Applicants submit their resumes, which are then analysed using predictive technology to discover opportunities that match the capabilities listed on their curriculum vitae (Achchab & Tamsamani, 2021; Bal, Bal, Demirhan, & Ertemsir; Gayatri & Babu, 2022).

Manual candidate matching is a time-consuming and labour-intensive procedure that may result in human error (Champaneria, 2019; Chen, 2022). However, artificial intelligence candidate matching will minimise these risks by combining algorithms and search criteria. The talent acquisition tool gives each applicant a rating score based on pre-defined characteristics such as required skills, number of years of work experience, academic qualifications, and expected salary (Cen & Newman, 2019; Jia et al., 2018; Qamar et al., 2021).

The process of AI candidate matching consists of four main steps (Barboza, 2019; Jia et al., 2018; Tewari & Pant, 2020). Firstly, the custom selection parameters process (Athanasur et al., 2022; Shi et al., 2022). In this process, the recruiters design certain criteria that are required for a certain vacant position (Li et al., 2020; Ming, 2022). These criteria could be the number of years of work experience required, the location of the job, the skills required, minimum qualifications, and salary requirements (Bharathi et al., 2022; Li et al., 2020; Ming, 2022). Secondly, semantic search engines process (Aghaei et al., 2022; Anita Kumari & Thakur, 2019; Shahzad et al., 2020). After figuring out the custom selection parameters, the recruiter uses specific keywords and algorithmic analysis to match a good candidate with the right job (Hmoud & Laszlo, 2019; Lo Piano, 2020).

The third process is fast candidate submission (Kambur & Akar, 2021; Yawalkar, 2019). During this process, the AI candidate matching quickly classifies the candidate and scans for potential candidates to identify the most valuable one (Kambur & Akar, 2021; Singh et al., 2020; Yawalkar, 2019). The last process is instantaneous communication. The candidate receives a notification related to their status immediately after analysing their application (Abdeldayem & Aldulaimi, 2020; Al-Alawi et al., 2021).

Automated recruitment solutions, such as AI candidate matching, accelerate the recruiting processes in significant ways and support company productivity (Barboza, 2019; Hemalatha, et al., 2021). Faster candidate matching helps the company in many ways, like improving time-to-hire metrics (Owais, 2018). The time-to-hire will be reduced by 40 % when the AI candidate matching uses pre-defined potential words and semantic algorithms to match the best candidates with the most suitable jobs (Black & van Esch, 2020; Korzynski et al., 2021). Also, AI candidate matching will reduce the risk of human bias, anonymous feedback, and diversity in the recruiting process (Votto et al., 2021; Tewari, & Pant, 2020).

The AI candidate matching will contribute to making data-driven decisions about recruiting processes (Bekken, 2019; Williams et al., 2020). Thus, AI candidate matching will eliminate manual tasks, analyse more data, and help companies be proactive (Kruhse- Lehtonen & Hofmann, 2020). Lastly, AI candidate matching uses custom algorithms to ensure that the right candidate is hired by the company (Bornstein, 2018; ; Raghavan et al., 2020). This results in saving time, money, and energy for both candidate and company (Van Esch, & Black, 2019; Borges et al., 2021).

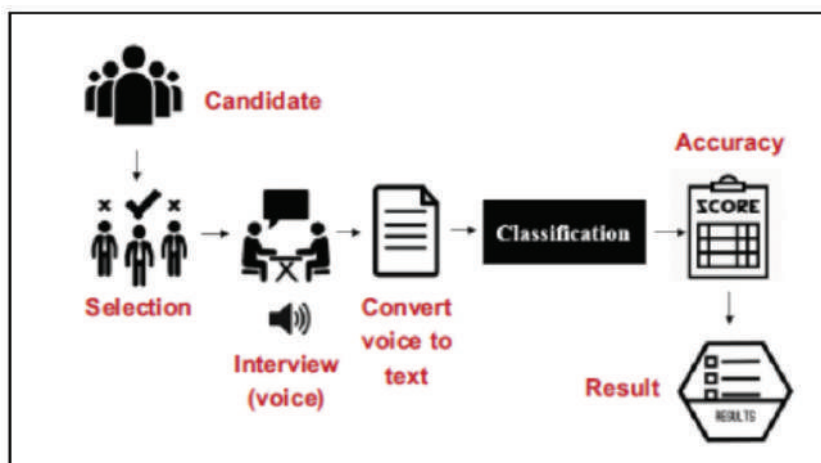
## **5. AI-BASED CANDIDATE ASSESSING**

Candidate-assessing is one of the critical processes in recruitment and selection. It is a challenging process, especially for companies receiving thousands of shortlisted candidates. The methods of candidate assessment are predominantly task-based and knowledge, skills and attitude (KSA)- based. There are numerous tests for the KSA-based method in which organization use one or more such as job knowledge tests, cognitive ability tests, personality tests etc. In addition, task-based methods include tests like work sample tests, assessment

centres, and physical ability tests etc. (Pulakos, 2005). However, the number of shortlisted candidates is more than the expected number in some job vacancies. This can become a problem with the current recruitment and selection system. The problem related to the high cost and time required to assess and analyse the results through one or more of the candidate assessment tests. Therefore, artificial intelligence (AI) and machine learning approaches can be used to overcome this problem (Aljuaid & Abbod, 2020). Chakraborty et.al.(2022) assumed that AI-Based recruitment helps to overcome many challenges, including candidate assessment. AI-Based recruitment is a bias-free job where gender, ethnicity, age, and class blindness are not within the criteria of candidates' assessment. Talented people who meet the job requirements will have the chance such as merit, skill and ability over subjective criteria. Machine learning technique provides a fairer job market.

Romadon and Lhaksmana (2020) investigated the appropriate way of interview grading through feature extraction methods. The study suggested that feature extraction reduces human errors and bias. The study is a comparison between TF-IDF and word embedding which is considered to be the popular feature extraction method. TF-IDF was performed in comparison with word embedding to identify the best method for classifying the literal interviews. The study found that the accuracy rate of TF-IDF outperforms reached by 85.22% compared to 74.88% in word embedding as well as TF-IDF performed better in dimension reduction. Figure 1 show the recruitment process used in this study.

**Figure 1: Recruitment Process**



*(Source: Romadon & Lhaksmana, 2020)*

In addition to TF-IDF and word embedding AI-powered tools, natural language processing is also able to stimulate human interaction through shorthand, emotions, and contextual words (Nawaz et.al., 2019). According to Fernandez & Fernandez (2019), the Video chat analysis can analyse the applicant's characteristics such as tone of voice, keyword, eye contact, age,

emotion etc. For instance, Affectiva, HireIQ, and HireVue assessed candidates' emotional intelligence, honesty, and personality through video interviews by analyzing candidates' tone, frequency of words, facial expression and speaking patterns. Ishita Chakraborty proposed an AI-powered screening and selecting candidates for Salesforce. This tool depends on videos of salesforce interviews to extract relevant features. The tool analyzed body language, candidate interactions, voice tone and speaking pattern for the candidate's success to be one of the Salesforce. The study suggests that AI-powered tool is performed better in scoring objective criteria like confidence and performed poorly in subjective criteria. However, they argue that AI-powered tools can be used to score the subjective criteria if there is good quality of training data and consistency in human scorers on trait measurement methods.

## **6. DISCUSSION AND CONCLUSION**

This study aims to review the literature to find out the current development of AI-powered tools in relation to the recruitment and selection process. Recruitment and selection consist of four main processes which are candidate sourcing, candidate screening, candidate matching and candidate assessing. The review revealed that there are many AI- Based candidate sourcing tools such as Fetcher, hireEZ, Textio, Entelo, and XOR. This AI-powered tool creates a pool of applicants in which the company can select without human intervention. They found out the most appropriate applicants for job vacancies. In addition, AI- based candidate screening tools mainly depend on chatbot technology which helps and guide the candidates throughout the recruitment process ,such as Mya system, Wade and Wendy, AllyO, Humanly Lisa, Debra, Brazen, Olivia, Ideal and Eightfold. However, these AI-based tools are limited in applicant sourcing and screening, in which human intervention is required for the selection process, like tests and interviews. Furthermore, these AI-powered tools are supportive in candidate matching and ensure that the right candidate will be hired by the company by matching the applicant's specifications and job requirements in relation to their years of work experience required, the location of the job, skills required, minimum qualifications, and salary requirements. Moreover, AI-powered candidate assessment tools can analyse body language, candidate interactions, voice tone and speaking patterns. Recently, studies on AI-powered tool are performed better in scoring objective criteria such as confidence. However, the subjective criteria still need more research in relation to quality and accuracy. Nugent & Scott-Parker (2021) argued that the AI system has a record of inaccurate outcomes and many disadvantages for people. Nugent & Scott-Parker (2021) attempted to assess the fairness of AI recruitment tools. Nugent & Scott-Parkers (2021) reported several incapacitations AI recruitment tools, which are: Improper Implementation by not considering the applicants with a disability as they should deal with different assessment methods. For instance, AI powered tools are conducting job interviews which include voice and facial analysis tools. Thus, it may inaccurately exclude people having facial disfigurement. Overall, the review of the literature shows that there is not a comprehensive, accurate and fair AI-powered tool which performs all processes of recruitment and selection.



**REFERENCES:**

- Abdeldayem, M. M., & Aldulaimi, S. H. (2020). Trends and opportunities of artificial intelligence in human resource management: Aspirations for public sector in Bahrain. *International Journal of Scientific and Technology Research*, 9(1), 3867-3871.
- Achchab, S., & Temsamani, Y. K. (2021). *Artificial Intelligence Use in Human Resources Management: Strategy and Operation's Impact*. Paper presented at the 2021 IEEE 2nd International Conference on Pattern Recognition and Machine Learning (PRML).
- Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, 2, 100006. <https://doi.org/10.1016/j.mlwa.2020.100006>
- Aghaei, S., Angele, K., Huaman, E., Bushati, G., Schiestl, M., & Fensel, A. (2022). Interactive Search on the Web: The Story So Far. *Information*, 13(7), 324.
- Al-Alawi, A. I., Naureen, M., AlAlawi, E. I., & Al-Hadad, A. A. N. (2021). *The Role of Artificial Intelligence in Recruitment Process Decision-Making*. Paper presented at the 2021 International Conference on Decision Aid Sciences and Application (DASA).
- Aljuaid, A. a., & Abbod, M. (2020). Artificial Intelligence-Based E-Recruitments System. *10th International Conference on Intelligent Systems*.
- AnitaKumari, D., & Thakur, J. (2019). Semantic web search engines: A comparative survey. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 5(1).
- Athanur, A. A., Ingram, M., & Wellens, M. A. (2022). Additional Custom ODATA Integrations. In *Innovative SAP SuccessFactors Recruiting* (pp. 207-233): Springer.
- Bal, Yasemin, Mert Bal, Ayşe Demirhan and Esin Ertemsir."Beyond Traditional: How Artificial Intelligence Transforms Hunan Resources Management?". *ulakbilge*, 70 (2022 Mart): s. 189–200. doi: 10.7816/ulakbilge-10-70-01
- Barboza, C. (2019). Artificial Intelligence and HR: The New Wave of Technology. *Journal of advances in Social science and Humanities*, 5(4), 715-720.
- Bekken, G. (2019). The algorithmic governance of data driven-processing employment: Evidence-based management practices, artificial intelligence recruiting software, and automated hiring decisions. *Psychosociological Issues in Human Resource Management*, 7(2), 25-30.
- Bharathi, A. P., Pallavi, D., Ramachandran, M., Ramu, K., & Prasanth, V. (2022). A Study on Preference Selection Index Multi-Criteria Decision Making Techniques. *Data Analytics and Artificial Intelligence*, 2(1), 20-25.



- Bhatt, P., & Muduli, A. (2022). Artificial intelligence in learning and development: a systematic literature review. *European Journal of Training and Development*(ahead-of-print).
- Black, J. S., & van Esch, P. (2020). AI-enabled recruiting: What is it and how should a manager use it?. *Business Horizons*, 63(2), 215-226.
- Borges, A. F., Laurindo, F. J., Spínola, M. M., Gonçalves, R. F., & Mattos, C. A. (2021). The strategic use of artificial intelligence in the digital era: Systematic literature review and future research directions. *International Journal of Information Management*, 57, 102225.
- Bornstein, S. (2018). Antidiscriminatory algorithms. *Ala. L. Rev.*, 70, 519.
- Cen, S. H., & Newman, P. (2019). *Radar-only ego-motion estimation in difficult settings via graph matching*. Paper presented at the 2019 International Conference on Robotics and Automation (ICRA).
- Chakraborty, I., Chiong, K., Dover, H., & K.Sudhir. (2022). AI and AI-Human based Screening and Selection for Salesperson Hiring using Interview Videos. Available at SSRN: <https://ssrn.com/abstract=4137872> or <http://dx.doi.org/10.2139/ssrn.4137872>.
- Champaneria, P. (2019). Method and system for managing, matching, and sourcing employment candidates in a recruitment campaign. In: Google Patents.
- Chen, X. (2022). Predicting confidential data value insights at organization level using peer organization group. In: Google Patents.
- Dahiya, M. (2017). A Tool of Conversation: Chatbot. *International Journal of Computer Sciences and Engineering*, 5(5), 158–161.
- Fernández, Carmen, and Alberto Fernández (2019). "AI in Recruiting Multi-Agent Systems Architectu Re for Ethical and Legal Auditing." *The Twenty-Eighth International Joint Conference on Artificial Intelligence (IJCAI-19)*,
- Fraij, J., & László, V. (2021). literature Review: Artificial Intelligence Impact on the Recruitment Process A LITERATURE REVIEW: ARTIFICIAL INTELLIGENCE IMPACT ON THE RECRUITMENT PROCESS. *International Journal of Engineering and Management Sciences*, 6(1), 108–119. <https://doi.org/10.21791/ijems.2021.1.10>
- Gayatri, A., & Babu, J. S. (2022). Artificial Intelligence Accomplishments in Human Resource Management. *Specialusis Ugdymas*, 1(43), 1519-1528.
- Geetha, R., & Bhanu Sree Reddy, D. (2018). RECRUITMENT THROUGH ARTIFICIAL INTELLIGENCE: A CONCEPTUAL STUDY. *International Journal of Mechanical Engineering and Technology (IJMET)*, 9(7), 63–70.
- Gupta, P., Fernandes, S. F., & Jain, M. (2018). Automation in Recruitment: A New Frontier. *Journal of Information Technology Teaching Cases*, 8(2), 118–125. <https://doi.org/10.1057/s41266-018-0042-x>

- Hemalatha, A., Kumari, P. B., Nawaz, N., & Gajenderan, V. (2021, March). Impact of Artificial Intelligence on Recruitment and Selection of Information Technology Companies. In 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS) (pp. 60-66). IEEE.
- Hmoud, B., & Laszlo, V. (2019). Will artificial intelligence take over human resources recruitment and selection. *Network Intelligence Studies*, 7(13), 21-30.
- How AI is going to transform recruitment? (2017). Retrieved from <https://www.slideshare.net/CplRecruitment/how-ai-is-going-to-transform-recruitment-81851733>
- Jia, Q., Guo, Y., Li, R., Li, Y., & Chen, Y. (2018). A conceptual artificial intelligence application framework in human resource management.
- Kambur, E., & Akar, C. (2021). Human resource developments with the touch of artificial intelligence: a scale development study. *International Journal of Manpower*.
- Kim, J.-Y., & Heo, W. (2021). Artificial intelligence video interviewing for employment: perspectives from applicants, companies, developer and academicians. *Information Technology & People*.
- Korzynski, P., Haenlein, M., & Rautiainen, M. (2021). Impression management techniques in crowdfunding: An analysis of Kickstarter videos using artificial intelligence. *European Management Journal*, 39(5), 675-684.
- Kruhse-Lehtonen, U., & Hofmann, D. (2020). How to define and execute your data and AI strategy.
- Kulkarni, Swatee B. and Che, Xiangdong (2019) .Intelligent Software Tools for Recruiting, *Journal of International Technology and Information Management*, 28(2) , Article 1. Available at: <https://scholarworks.lib.csusb.edu/jitim/vol28/iss2/1>
- Li, J., Zhang, X., Wang, K., Zheng, C., Tong, S., & Eynard, B. (2020). A personalized requirement identifying model for design improvement based on user profiling. *AI EDAM*, 34(1), 55-67.
- Lo Piano, S. (2020). Ethical principles in machine learning and artificial intelligence: cases from the field and possible ways forward. *Humanities and Social Sciences Communications*, 7(1), 1-7.
- Lu, G., Dollfus, C., Wozniak, T., & Fleck, M. (2020). *Intelligent Branding for Less Well-Known Enterprises by Matching Culture Values of Employers and Candidates*. Paper presented at the 2020 7th Swiss Conference on Data Science (SDS).
- Maji, K., & Bera, A. (2020). *Developing a Suitability Index Algorithm for Recruitment*. Paper presented at the 2020 National Conference on Emerging Trends on Sustainable Technology and Engineering Applications (NCETSTE).

- Ming, L. (2022). A Deep Learning-Based Framework for Human Resource Recommendation. *Wireless Communications and Mobile Computing*, 2022.
- Nawaz, Nishad, and Anjali Mary (2019). "Artificial Intelligence Chatbots Are New Recruiters." *International Journal of Advanced Computer Science and Applications*, vol. 10, no. 9
- Nugent, S.E. and Scott-Parker, S. (2021) "Recruitment AI has a disability problem: Anticipating and mitigating unfair automated hiring decisions." Available at: <https://doi.org/10.31235/osf.io/8sxh7>.
- Oswal, N., Khaleeli, M., & Alarmoti, A. (2020). Recruitment In The Era Of Industry 4.0: Use Of Artificial Intelligence In Recruitment And Its Impact. *Journal Of Archaeology Of Egypt/ Egyptology*, 17(8), 39–74.
- Owais, A. (2018). ARTIFICIAL INTELLIGENCE IN HR. *IJRAR*, 5(4), 971-978.
- Prikshat, V., Malik, A., & Budhwar, P. (2021). AI-augmented HRM: Antecedents, assimilation and multilevel consequences. *Human Resource Management Review*, 100860.
- Pulakos, E. D. (2005). Selection Assessment Methods: A guide to implementing formal assessments to build a high-quality workforce. *SHRM Foundation*.
- Qamar, Y., Agrawal, R. K., Samad, T. A., & Jabbour, C. J. C. (2021). When technology meets people: the interplay of artificial intelligence and human resource management. *Journal of Enterprise Information Management*, 34(5), 1339-1370.
- Raghavan, M., Barocas, S., Kleinberg, J., & Levy, K. (2020, January). Mitigating bias in algorithmic hiring: Evaluating claims and practices. In Proceedings of the 2020 conference on fairness, accountability, and transparency (pp. 469-481).
- Romadon, A. W., & Lhaksmana, K. M. (2020). Analyzing TF-IDF and Word Embedding for Implementing Automation in Job Interview Grading. *8th International Conference on Information and communication technology (ICIOCT)*.
- Romadon, A. W., Lhaksmana, K. M., Kurniawan, I., & Richasdy, D. (2020). *Analyzing TF-IDF and word embedding for implementing automation in job interview grading*. Paper presented at the 2020 8th International Conference on Information and Communication Technology (IColCT).
- Shahzad, A., Jacob, D. W., Nawi, N. M., Mahdin, H., & Saputri, M. E. (2020). The new trend for search engine optimization, tools and techniques. *Indonesian Journal of Electrical Engineering and Computer Science*, 18(3), 1568-1583.
- Shaikh, A. (Producer). (2018). 5 Recruitment Technology Solutions You'll Kick Yourself for Not Knowing. Retrieved from <https://www.talentlyft.com/en/blog/article/150/5-recruitment-technology-solutions-youll-kick-yourself-for-not-knowing>

- Shi, C., Jiang, Z., Ma, X., & Luo, Q. (2022). *A Personalized Visual Aid for Selections of Appearance Building Products with Long-term Effects*. Paper presented at the CHI Conference on Human Factors in Computing Systems.
- Singh, G., Bhardwaj, G., Singh, S. V., & Kumar, V. (2020). Technology Acceptance Model to Assess Employee's Perception and Intention of Integration of Artificial Intelligence and Human Resource Management in IT Industry. *Technology*, 29(3), 11485-11490.
- Singh, P. K., Polkowski, Z., Tanwar, S., Pandey, S. K., Matei, G., & Pirvu, D. (2022). *Innovations in Information and Communication Technologies (IICT-2020): Proceedings of International Conference on ICRIHE - 2020, Delhi, India: IICT-2020 (Advances in Science, Technology & Innovation)* (1st ed. 2021 ed.). Springer.
- Sooraksa, N. (2021). *A survey of using computational intelligence (CI) and artificial intelligence (AI) in human resource (HR) analytics*. Paper presented at the 2021 7th International Conference on Engineering, Applied Sciences and Technology (ICEAST).
- Tewari, I., & Pant, M. (2020, December). Artificial intelligence reshaping human resource management: A review. In 2020 IEEE International Conference on Advent Trends in Multidisciplinary Research and Innovation (ICATMRI) (pp. 1-4). IEEE.
- Van Esch, P., & Black, J. S. (2019). Factors that influence new generation candidates to engage with and complete digital, AI-enabled recruiting. *Business Horizons*, 62(6), 729-739.
- Vedapradha, R., Hariharan, R., & Shivakami, R. (2019). Artificial Intelligence: A Technological Prototype in Recruitment. *Journal of Service Science and Management*, 12(03), 382-390. <https://doi.org/10.4236/jssm.2019.123026>
- Veluchamy, R., Chattaraj, S., & Gupta, S. K. (2021). ARTIFICIAL INTELLIGENCE WITHIN RECRUITMENT: ELIMINATING BIASES IN HUMAN RESOURCE MANAGEMENT. *JOURNAL OF CRITICAL REVIEWS*, 8(3), 348-357.
- Votto, A. M., Valecha, R., Najafirad, P., & Rao, H. R. (2021). Artificial intelligence in tactical human resource management: A systematic literature review. *International Journal of Information Management Data Insights*, 1(2), 100047.
- Williams, A., Suler, P., & Vrbka, J. (2020). Business process optimization, cognitive decision-making algorithms, and artificial intelligence data-driven internet of things systems in sustainable smart manufacturing. *Journal of Self-Governance and Management Economics*, 8(4), 39-48.
- Williams, C. R., Labig, C. E., & Stone, T. H. (1993). Recruitment sources and post hire outcomes for job applicants and new hires: A test of two hypotheses. *Journal of Applied Psychology*, 78(2), 163-172. <https://doi.org/10.1037/0021-9010.78.2.163>
- Yawalkar, M. V. V. (2019). A Study of Artificial Intelligence and its role in Human Resource Management. *International Journal of Research and Analytical Reviews (IJRAR)*, 6(1), 20-24.



# GENERATIONS AND SUSTAINABILITY: A STUDY OF THREE GENERATIONS – X, Y AND Z WITH SPECIAL FOCUS ON THE ROLE OF EDUCATION AND COMMUNICATION TO PROMOTE SUSTAINABLE BEHAVIOR AMONG ZERS

***Mohammad Taslim***

---

*The concept of sustainability has been gaining burgeoning attention in recent years. The effects of climate change, resource depletion, and a growing number of environmental and social challenges have paved the way for researchers and policymakers to explore the concept of sustainability, adopt sustainable behavior and make a sustainable future.*

*There has been in-depth research on the various dimensions of sustainability, including economic, social, and environmental sustainability. However, little is known and explored about the differences in attitudes among different generations towards sustainability and how they view, prioritize and approach sustainability. Researchers posit that the attitudes and behaviors of different generations certainly play a significant role in determining the success of a sustainable future. So, this is of utmost importance to know the generational attitudes for developing effective strategies for promoting sustainable behaviors and practices.*

*This research aims to explore the perceptions, attitudes and behaviors of three main generations-Generation X, Millennials, and Generation Z towards sustainability. The paper investigates how these attitudes differ across generations and how these perceptions and attitudes may impact the adoption of sustainable practices. Further, the study discusses the role of education and communication in imparting sustainability knowledge and how these two tools are adopted with special reference to Generation Z.*

*Additionally, the study also highlights some of the vital literature on sustainability from Oman's perspective and the integration of sustainability component in Oman vision 2040. It discusses Omani youth, including Generation-Z and their attitude and contribution to developing and maintaining sustainable behavior. The paper argues that understanding the attitudes of different generations towards sustainability is crucial for developing effective strategies for promoting sustainable behaviors and practices. The findings of this paper can be used by policymakers and educators in their efforts to create a more sustainable future for all the generations.*

**Keywords – Sustainability, Sustainable behavior, Sustainable future, Generation X, Millennials, Generation Z, Oman Vision 2040**

## **INTRODUCTION:**

Sustainability has been a growing concern for the last few years due to the visible negative impacts of human activities on the environment. The concept of sustainability has been discussed and defined variously by scholars in economic, social and environmental contexts. It is a complex and versatile notion that requires a holistic intervention to address. In its simple form, the UN has defined it as finding a way to balance economic, social and environmental concerns to meet present needs without compromising the ability to meet the needs of future generations. From a generational perspective, sustainability means making decisions that consider the long-term impact on the globe and future generations.

However, the generational perception of sustainability differs among generations from a traditional view to a more holistic perspective. Their differences are mainly due to their values, experiences and unique characteristics. Each generation has its own identity, characteristics and preferences, which highly influence their attitude and perception towards sustainability. Though they may have different perspectives on sustainability but the role of each generation in promoting sustainability is crucial. Their collective actions will determine the ability of current systems and processes to continue for the foreseeable future without causing harm to the environment, society and future generations. This study presents a combined effort of three generations – X, Y and Z towards sustainability and their perception and attitude towards the adoption of sustainable behavior.

This study is accelerated by the fact that there is a handful of studies on how generations perceive and promote sustainability. This study contributes to the existing literature in two different ways. Firstly, this is a systematic attempt to show the relationship between sustainability and the perception of three generations towards sustainability. And secondly, this study talks about the pivotal roles of two indispensable factors – Education & Communication in promoting sustainable behavior among Generation Z. The study certainly, explores the ways in which different generations perceive and prioritize the different aspects of sustainability and how these perceptions and priorities influence their attitudes and behaviors.

## **LITERATURE REVIEW:**

### **Sustainability and Generations –Why & How Perspectives:**

Sustainability is a shared responsibility that requires the efforts of all generations. It refers to the responsible use of resources to maintain the well-being of present and future generations. By working together and sharing knowledge, values, and ideas, a better future can be ensured for generations to come.

The concept of sustainability has been defined in various ways but generally refers to meeting the needs of the present without compromising the ability of future generations to

meet their own needs. The role of different generations in sustainability is a crucial aspect to consider, as the decisions made by one generation can greatly impact future generations. The below studies envisaged the necessity of learning sustainability and explaining why & how the concept of sustainability became a top priority.

A study was done by Saarela (2015) on 'Sustainable consumption among baby boomers' reveals that baby boomers have a "future-oriented" perspective, however, their understanding of sustainability is limited and often lacks a comprehensive understanding of the interconnections between environmental, social, and economic aspects. It shows the importance of spreading the knowledge and understanding about sustainability. Simpson (2010), in his article 'Sustainability and Intergenerational Equity: Key Issues and Directions' highlights the importance of considering intergenerational equity in the development of sustainability policies and practices. The author argues that the current generation has a moral obligation to ensure that future generations are not left with a depleted environment and that sustainable development must be based on principles of fairness and equity across generations. Intergenerational participation can be used to guide decision-making and promote sustainable development M. Day et.al. (2011).

Further, a study done by West (2013) explores the role of intergenerational transmission in promoting sustainability. The author argues that values and behaviors related to sustainability are often passed down from one generation to the next and that promoting intergenerational communication and understanding can be an effective way to promote sustainability in the long term. Thus, intergenerational equity is a critical factor in ensuring the long-term sustainability of natural resources and the environment Stokes (2015).

Apart from the above literature, there have been several surveys carried out by some leading companies and institutions which perpetuate the significance of sustainability. "The Next Generation of Sustainability: A National Survey of Young Adults," 2020 by the Center for Sustainable Systems, University of Michigan, found that young adults have a strong concern for environmental issues and support for sustainability policies. Generations across countries realize the importance of sustainability. A study by Ipsos MORI (2019) was conducted in 23 countries and found that the majority of people in all these 23 countries believe that sustainable development should be a priority for their country, with the highest support from younger generations. Another survey done by Accenture (2017), "The Future of Sustainability: Millennial Attitudes and Behaviors" reveals that millennials have a greater interest in sustainability than previous generations and are more likely to purchase products from companies that are environmentally responsible. Thus, it becomes evident that millennials are more likely to seek out jobs with companies that have a strong commitment to sustainability and are willing to pay more for sustainable products Deloitte (2015). Another survey on millennials attitudes and behaviors towards sustainability done by Nielsen (2017) in 60 countries also reveals that millennials are more likely to be concerned about environmental issues and to make purchasing decisions based on sustainability factors.



## **SUSTAINABILITY CONCERNS FOR BUSINESSES:**

Businesses and sustainability are two areas that are increasingly becoming interconnected. Businesses have a significant impact on the environment and society, and it is essential for them to adopt sustainable practices to ensure their long-term profitability, competitiveness and success.

“The Role of Business in Sustainable Development” by John Elkington and Jochen Werther, long back in 1998, highlighted the importance of sustainability in ensuring the long-term viability and success of businesses. The authors argued that businesses that prioritize sustainability are better positioned to adapt to changes in markets, regulations, and consumer preferences. Sustainable practices are necessary for mitigating environmental and social risks, reducing costs, and enhancing competitiveness Wallbaum (2015). A study, “Why Sustainability is Critical for the Future of Business”, by Peter Bakker (2012), points out that sustainability is not just a moral obligation but a business imperative that is essential for creating long-term value for stakeholders. The study further argues that businesses must prioritize sustainability in order to remain competitive in an increasingly globalized market.

Companies that adopt sustainable practices can benefit from reduced costs, increased productivity, improved reputation, and enhanced brand loyalty. Moreover, sustainability can also help companies to get customer loyalty, as customers are becoming more demanding with regard to environmental and social responsibility (Jones et.al., 2017). The growing awareness of sustainability is supported by several sustainable initiatives taken by companies globally. For example, IKEA has committed to using 100% renewable energy and becoming climate positive by 2030. Google, for example, has a “Green Team” program that encourages employees to develop and implement sustainability initiatives. Patagonia is committed to using organic cotton and recycled materials in its products and has established a program to monitor the environmental impact of its suppliers. ‘Ben & Jerry’ has established a program to support sustainable agriculture in local communities. In short, companies realize that sustainability is critical for ensuring long-term viability and success. Sustainability is necessary for mitigating environmental and social risks, reducing costs, enhancing competitiveness, and creating value for stakeholders.

## **GENERATION X – ATTITUDES AND PERCEPTION TOWARDS SUSTAINABILITY**

Generation X, known as the “middle generation” or “Post-Baby Boomers,” is a demographic group that includes individuals born between 1965 and 1980 (Howe & Strauss, 1991). This group has been characterized as skeptical, independent, and self-reliant (Kim, Y. J. (2003). This generation is considered the first generation to have grown up with environmental concerns, but they are often overlooked in discussions of sustainability (Hopkins (2005). In relation to sustainability, they have often been described as the “lost generation” due to the lack of attention they have received compared to the preceding Baby Boomers and the subsequent millennial generation (Hopkins (2005). However, recent studies have shown that members of

this generation are increasingly concerned about environmental issues and are taking steps to live more sustainably. According to a survey conducted by the National Geographic Society (2018), 79% of Generation X respondents reported that they are concerned about the impact of human activities on the environment, and 68% said they take personal responsibility for reducing their impact.

A study by Dillman et al. (2007) found that Generations X consumers are more likely to seek out environmentally friendly products and services than their older or younger counterparts. Generation X is more likely to engage in pro-environmental behaviors, such as recycling and conserving energy than Baby Boomers or Millennials (Kollmuss & Agyeman, 2002). They are also known to have a practical approach to sustainability and are more likely to take actions to reduce their environmental impact. For instance, they are more likely to recycle, conserve energy, and buy products that are environmentally friendly (National Geographic Society, 2018). They are also more likely to support government policies that promote sustainability and environmental protection (Doppelt & McKinney, 2007).

### **GENERATION X – BUSINESSES – SUSTAINABILITY: THE TRIANGULAR PERSPECTIVE**

The triangularity of Generation X – Businesses and Sustainability is overwhelming. Several researchers have shown a keen interest in Generation X in keeping sustainability as a top priority in business practices. They give the utmost value to sustainability in the workplace and believe that companies should be environmentally responsible. A study conducted by the Centre for Sustainability & Commerce at Duke University (2015) states that Generation X employees are more likely to choose to work for a company that has a strong sustainability track record. They are also more likely to engage in environmentally responsible behaviors at work and to encourage their employers to adopt sustainable practices.

In terms of their influence on businesses, Generation X is seen as a critical group in driving the shift towards sustainability. As they reach middle age and gain more financial stability, they have the ability to influence purchasing decisions and drive change through their spending habits (Horrigan & Aneja, 2019). Moreover, as they become business owners and leaders, they have the potential to implement sustainable practices in their own companies and shape the future of corporate sustainability.

As far as the consumerism aspect of Generation X is concerned, several researches have been conducted to explore the attitude and behavior of Generation X towards sustainability as consumers. They are concerned and prioritized the products and services that are environmentally and socially responsible (Ching, 2015). They are willing to pay more for products and services that are friendly to the environment and sustainable (Horrigan & Aneja, 2019). Similarly, a survey by Nielsen, 2013 revealed that 64% of Generation X consumers are ready to buy sustainable products even with additional cost. A study conducted by Cone Communications (2011) found that 90% of Generation X consumers believe that companies should take an active role in addressing social and environmental issues. Furthermore, a

study and found that Generation X is more likely to make sustainable choices when it comes to consumer products. (Dolan et.al.,2017).

In conclusion, Generation X plays a crucial role in the drive towards sustainability, both as consumers and as business leaders. Their values and beliefs regarding environmental and social issues have a significant impact on the business landscape, making them an important group for businesses to consider when developing sustainable strategies.

## **THE MILLENNIALS –ATTITUDES AND PERCEPTION TOWARDS SUSTAINABILITY**

Generation Y, also known as the 'Millennials' or 'Digital Natives', is a group born between 1981 and 1996 (Pew Research Center, 2018). This generation is characterized by its digital literacy, diversity, social consciousness and concern for environmental issues (Pew Research Center, 2018).

Generation Y is often considered the first generation to grow up with a global outlook and an understanding of the impact of human activities on the environment. They have been identified as a key demographic in the ongoing conversation about sustainability. Several literatures suggest that Millennials are more concerned about sustainability and environmental issues than older generations – baby boomers and Generation X. They are not only concerned about sustainability but also support sustainable business practices which are beneficial to the community. Generation Y and their perception towards sustainability can be studied categorically as follow:

**Millennials' Efforts for Sustainability as a Social Agent:** Johnson & Wagner (2013) conducted a study on "The Millennial Impact Report," which highlighted the social values of the Millennial generation and their impact on the workplace. They strongly believe in following sustainable business practices that benefit the community (Ernst & Young, 2017). This includes supporting local businesses and investing in sustainable infrastructure projects (Ernst & Young, 2017). Further, developing policies which promote sustainability and corporate community benefits into their sustainable practices (Ernst & Young, 2017).

**Millennials' Efforts for Sustainability as a Business Leader:** As a business leader, millennials are putting in considerable effort to drive sustainability in the business world. They are using their businesses as platforms to raise a new level of awareness and advocacy for environmental and social causes (Fridman, 2018). Furthermore, millennials are also implementing sustainable practices in their supply chain management. They are sourcing materials from sustainable sources, promoting fair labor practices, and ensuring that their suppliers adhere to environmentally friendly standards (Fridman, 2018). Towards sustainable investment a report by UBS Global Wealth Management found that 87% of millennials consider sustainable investment is significant (Boucher, 2020).

**Millennials' Efforts for Sustainability as a Consumer:** Consumers are more likely to support businesses that prioritize environmental and social responsibility (Carroll, 1991). They keep

sustainability in mind when making purchasing decisions and consider the environmental impact of the products they buy (Cone Communications, 2018). They are purchasing environmentally-friendly products (Gatersleben & Steg, 2009). They assume themselves as responsible buyers and know the consequences of over-consumption and wastage of resources A. Devis (2017).

**Millennials' Efforts for Sustainability as an Employee:** Millennials are more likely to support and work for companies that are socially and environmentally responsible (Deloitte, 2016). Employees like to adopt environmentally friendly habits such as reducing paper usage, conserving energy, and recycling. They also participate in sustainability initiatives, such as green teams, volunteer programs, and community projects that support sustainable development (Jacobs & Joireman, 2014).

**Millennials' Efforts for Sustainability as an Individual:** Millennials ensure sustainability in their daily life practices. They are a step ahead of the older generations in recycling and conserving energy in daily life and adopting green habits (Kasser & Sheldon, 2002). They are using public transportation (Gatersleben & Steg, 2009). They are protecting the environment in their daily life practices and are more likely to be involved in environmental activism and support policies that promote sustainability (Dietz & O'Neill, 2013). Generation Y is 'lead by example'. They can set an example for others by making sustainable choices and sharing their knowledge, education and passion for sustainability with others. products (Mintel, 2008).

## **THE ZERS – ATTITUDES AND PERCEPTION TOWARDS SUSTAINABILITY**

Generation Z, also known as the 'iGeneration', 'Centennial's and 'Post-Millennials', is defined as individuals born between 1997 and 2012 (Smith, 2016). They are the most recent generation to come of age, and they are often characterized as being 'tech-savvy' who are highly connected and socially conscious. This generation has grown up in a world where environmental issues and sustainable practices have been at the forefront of public discourse and are widely acknowledged and discussed. They have been recognized as the most environmentally conscious generation to date (Young & Rubicam, 2019). As a result, they have a strong awareness and concern for sustainability and the impact of human activities on the planet. Their awareness and concerns are shown in a study which suggests that Generation Z is highly concerned about environmental issues and is more likely to engage in sustainable behaviors such as recycling, conserving energy, and supporting environmental causes (Kuppers, 2018). Also, they are more likely to be interested in careers that promote sustainability and to prioritize environmentally-friendly products when making purchasing decisions (Eccles, 2018).

## **SURVEYS ON GENERATION-Z COMMITMENT TO SUSTAINABILITY:**

The commitment of Zers towards sustainability is highlighted in a study conducted by the Harris Poll, which said that 90% of Gen Z respondents agreed that climate change is a serious

problem, and 84% said they are willing to make personal sacrifices to help the environment. Additionally, the study found that 69% of Gen Z respondents said considered a company's environmental impact before making a purchase.

There have been several surveys conducted on Generation Z and their attitudes towards sustainability. Some key surveys are:

- A survey done by Accenture (2020) found that 85% of Gen Z respondents consider sustainability when making purchasing decisions, and 77% believe that companies have a responsibility to address environmental and social issues.
- Deloitte (2019) found that 92% of Gen Z respondents state that companies should be doing more to address climate change, and 84% believed that businesses have a role to play in creating a more sustainable future.
- A 2019 survey by PwC found that 67% of Gen Z respondents believe that businesses should prioritize sustainability over profit, and 63% say that they would be willing to pay more for products and services that are environmentally friendly.
- A 2019 survey by Nielsen found that 66% of Gen Z respondents agree that they would be willing to pay more for products and services that have a positive impact on the environment, and 64% agree that they would like to see more environmentally friendly products in the marketplace.
- McKinsey (2019) found that Gen Z is more likely than older generations to consider the environmental impact of their consumption habits.

In a nutshell, these surveys highlight the commitment of Gen Z towards sustainability. They are unquestionably more environmentally conscious and supportive of sustainability efforts than older generations.

## **OMAN – GENERATION Z AND SUSTAINABILITY:**

Oman, like many other countries, has committed to achieving the United Nations Sustainable Development Goals (SDGs) by 2030. These goals include protecting the environment, creating sustainable cities & communities, eradicating poverty, ensuring access to education and healthcare, promoting gender equality etc. Oman Vision 2040 integrates the component of sustainability throughout the plan. The vision aims to transform Oman into a more sustainable, diversified, and knowledge-based economy by 2040. The plan is built around three main pillars: Economic, Social, and Environmental sustainability. The Omani youth, or I-generation, is playing a critical role in promoting sustainability and is actively working towards achieving the UN-SDGs and Oman Vision 2040. A study by Al-Khudairi & Al-Harthy (2019) found that Omani youth are increasingly concerned about issues such as climate change, pollution, and the depletion of natural resources. One of the main ways that Generation Z in Oman

is promoting sustainability is through the use of social media. A study by Al-Harthy & Al-Harth (2018) found that young Omanis are using platforms such as Instagram, Facebook, and Twitter to raise awareness about environmental issues and to encourage others to take action. Another way that Generation Z in Oman is promoting sustainability is through the usage of apps and other digital tools that help to track their consumption of electricity, energy and water, as well as to reduce their carbon footprint (Al-Harthy & Al-Harthy, 2019). Generation Z in Oman is also pushing for greater use of renewable energy, such as solar and wind power. They are advocating for the implementation of green building practices (Saleh, M. S., & Alalouch, C. 2020) and the use of sustainable transportation options, such as electric cars and bikes (Al-Hinai et al., 2020). They are also actively participating in conservation efforts, such as beach cleanups and tree planting campaigns (Al-Farsi et al., 2018).

Further, the Ministry of Environment and Climate Affairs in Oman launched the "Green Generation" initiative, which aims to educate and engage young people in environmental conservation and sustainable practices. The program includes workshops, seminars, and field trips to promote environmental awareness among young people.

Oman's efforts towards sustainability is also highlighted by the United Nations Development Programme (UNDP) in Oman, published in 2018. The report appreciated the Omani's commitment towards sustainability and stated that young people in Oman, specially Generation Z, are becoming increasingly aware of and engaged with issues related to sustainability. The report entails that the majority of youth surveyed were concerned about environmental issues, such as climate change and pollution, and believed that individuals have a responsibility to act and address these issues. In terms of specific sustainable practices, the report found that a significant proportion of youth in Oman had adopted environmentally-friendly behaviors, such as recycling, conserving water, and using public transportation. Additionally, a majority of the youth surveyed expressed support for government policies aimed at promoting sustainability, such as investment in renewable energy and the implementation of laws to protect the environment.

The study also highlighted the important role of education in promoting sustainability among youth in Oman. It found that youth who had received formal education on environmental issues were more likely to be engaged in sustainable behaviors and to support government policies aimed at promoting sustainability (UNDP, 2018).

In conclusion, Generation Z in Oman is a key player in the country's efforts to achieve the United Nations Sustainable Development Goals by 2030. Omani youth, including those in Generation Z, have a strong awareness and interest in sustainability issues. They are seen as being more environmentally conscious than previous generations, and therefore, they are more likely to support and participate in sustainable initiatives. Their use of technology and social media to raise awareness and advocate for change is driving progress in the country's sustainability efforts.

## ROLE OF EDUCATION IN IMPARTING SUSTAINABILITY:

Sustainability through education is promoting and implementing sustainable practices and values by educating individuals, communities, and institutions. The goal of sustainability education is to create a culture of sustainability where individuals understand the importance of conserving natural resources, reducing waste, and minimizing the environmental impact of their actions. According to the United Nations Education, Scientific and Cultural Organization (UNESCO), education is a key driver of sustainable development, as it enables individuals to understand the complex interconnections between economic, social, and environmental systems and to develop the skills and attitudes needed to address them (UNESCO, 2017).

The role of education in promoting sustainability among generations Z is crucial. It helps to develop the knowledge, skills, and values necessary for individuals to take actions that support sustainable development. A number of studies have demonstrated the effectiveness of education in promoting sustainability among generations Z. Scholars have suggested the following crucial ways through which sustainable behavior could integrate with Zers life:

**Promoting Sustainability through Curriculum:** One way that education can promote sustainability among generations Z is through the incorporation of sustainability concepts and practices into the schools, colleges and universities curriculum. For example, a study by Osgood and Smith (2016) found that when schools incorporate sustainable practices such as recycling, composting, and energy conservation, students are more likely to adopt these behaviors in their own lives. The importance of formal education on sustainability is also highlighted in the survey done by the University of British Columbia, which surveyed over 2,000 students and found that those who had received education on sustainability were more likely to engage in sustainable behaviors, such as reducing energy consumption and recycling (Kollmuss & Agyeman, 2002). Additionally, the study found that education on sustainability helped to increase awareness of environmental issues, which in turn motivated students to take action to support sustainability.

Further, a study by Dolan and colleagues (2017) found that a sustainability-focused curriculum can lead to increase awareness and understanding of environmental issues among students, as well as greater motivation to take action to promote sustainability. Similarly, a study by Bowers and colleagues (2015) found that a sustainability-focused education program led to broader knowledge and understanding of environmental issues among students, as well as greater engagement in pro-environmental behaviors.

**Promoting Sustainability through Co-Curricular Programs:** Sustainability initiatives can be introduced through extracurricular activities such as clubs, workshops, and field trips that focus on environmental issues.

**Promoting Sustainability through Community Outreach:** Engaging with local communities and organizations can provide opportunities for students to apply their sustainability knowledge and skills in real-world settings. Also, community outreach programs can educate



people about the importance of sustainability and help engage them in practical solutions. This can include environmental workshops, educational presentations, and hands-on demonstrations.

**Promoting Sustainability through Online Resources:** Another way that education can promote sustainability among Generation Z is through the use of technology. It is a crucial step in addressing the sustainability challenge. Online resources are readily available, diverse, and interactive, providing a comprehensive approach to educating sustainability. According to a study by Fien & James (2019), the use of technology in education can help students to understand the complex issues related to sustainability and to find solutions to environmental and social problems. Online resources, such as websites, videos, and educational games, can provide individuals with accessible and interactive ways to learn about sustainability. A study by the Pew Research Center USA says that 81% of Americans go online daily, and 28% of them go online almost constantly (Anderson & Perrin, 2019). This means that online resources are a convenient way to reach a vast audience and provide them with the information they need to become more sustainable.

Overall, sustainability through education is crucial in creating a more sustainable future. By providing individuals with the knowledge, skills, and values necessary to understand and address environmental, social, and economic issues, education can help individuals develop the capacity to make informed decisions and take actions that promote sustainable development (Dolan et.al.,2017).

## **ROLE OF COMMUNICATION IN IMPARTING SUSTAINABILITY:**

In today's generation, communication is the key to promoting sustainability. Different generations have different communication preferences and behaviors. According to a study by the Environmental Defence Fund, traditional media is effective in reaching older generations, such as Baby Boomers, because these generations tend to be more skeptical of new technologies and prefer more traditional forms of communication (Friedman, 2013). On the other hand, Generation X and Y consider face-to-face communication as an effective strategy for promoting sustainability. Face-to-face communication is effective in reaching all generations, including millennials and Generation X (Gifford, 2011). They believe that face-to-face communication allows them to create personal connections, and also, sharing of information takes place in a more meaningful and engaging way. However, face-to-face communication can be time-consuming and may not reach as wide of an audience as social media or traditional media (Gifford, 2011).

Generation Z, being the 'digital generation', believe 'Social Media' is the most effective strategy for promoting sustainability. Several studies highlighted the communication preferences of Zers and concluded that social media platforms such as Instagram, TikTok, WhatsApp, and YouTube are popular among them and are used to spread awareness about sustainability issues and promote green behaviors.



A study by the University of Sussex found that social media campaigns that use visuals and storytelling are more effective in promoting sustainable behaviors among young people, particularly the Zers (Hargreaves, 2018). Another study by the University of Sussex explains that social media is used to increase awareness and engagement in sustainable behaviors by Zers (Kokko et al., 2019). Social media platforms, such as Facebook and Twitter, are effective in reaching a diverse audience, including Zers, millennials and Generation X (Lefebvre & Flora, 2016). Apart from social media, Generation Z additionally prefers the 'In-person' or 'face to face' use of 'storytelling' and 'emotional appeals' in sustainability communication. The University of Minnesota, in a study, elaborated that in-person communication can be used to build trust and create a sense of community among Generation Z (Chen & Kim, 2020). The study found that when Generation Z was exposed to in-person communication about sustainability, they were more likely to engage in sustainable behaviors and had a greater sense of personal responsibility for the environment. Further, the University of California, Davis, in a study, found that storytelling and emotional appeals were more effective in promoting sustainable behaviors than information-based messages (Sparling & Chawla, 2018). The study found that when messages were framed in a personal and emotional way, they were more likely to resonate with Generation Z and lead to behavior change.

Overall, a combination of different communication strategies is adopted by different generations in promoting sustainability. On one hand, traditional media is effective in reaching older generations, such as Baby Boomers, on the other hand, face-to-face communication is effective in reaching all generations. Generation Z, who are more environmentally conscious and socially aware than previous generations, include the use of social media platforms, storytelling and emotional appeals, and in-person and face-to-face communication in promoting sustainability.

## **DISCUSSION AND CONCLUSION:**

The concept of sustainability is, undoubtedly, a complex and multifaceted concept that requires a holistic approach to address. It requires the collaboration of all generations in a larger and different stakeholders, including governments, businesses, and individuals in a smaller, to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs. The role of different generations in promoting sustainability is crucial, as it is their collective actions that will determine the state of the globe for generations to come.

In this conceptual study, an attempt is made to explore the relationship between sustainability and generational perceptions and attitudes. This study examines how different generations view and prioritize sustainability and how these attitudes may impact the ability to achieve a sustainable future. Further, the study focuses on the role of education and communication in promoting sustainable behavior among the Generation, with special reference to generation Z. The value of this study is to contribute with a detailed knowledge of three generations and

their beliefs on sustainability, which will help policymakers and educators in their efforts to create a more sustainable future for all generations.

The research explores the perception, attitude and behavior of three main generations: Generation X, Y and Z. Each generation are analyzed for their attitudes towards sustainability, including their values, beliefs, behaviors and communication preferences related to environmental and social issues. Based on the literature, it could be drawn that the actions of the past generations have contributed to the current state of the degraded environment and resources. However, it is up to current and future generations to take responsibility and find solutions to preserve the earth long-term.

Young generations today have an exceptional role to play in shaping the future of sustainability. They are the ones who will inherit the consequences of the choices made by previous generations, and they have the potential to create positive change. Older generations, on the other hand, have the advantage of experience and expertise. They can share their wisdom, knowledge, and resources to support and guide the efforts of younger generations on sustainability.

It is worth noting that the present generations are well informed about the importance of sustainability concerns and trying their all level best to adopt sustainable behavior. They understand the interconnectedness of environmental, economic, and social issues and have strong willingness to learn, communicate, collaborate and adopt new ideas and solutions for sustainability. They are more likely to embrace technology and innovative thinking, which can help to drive the sustainability movement forward.

To sum up, it could be held that a collective effort of all generations can create a sustainable future. This requires open communication and collaboration, a willingness to learn from each other, and a commitment to making a positive impact. By valuing sustainability and making it a priority, we can ensure a better future for all generations.

## REFERENCES:

- Abdeldayem, M. M., & Aldulaimi, S. H. (2020). Trends and opportunities of artificial intelligence in human resource management: Aspirations for public sector in Bahrain. *International Journal of Scientific and Technology Research*, 9(1), 3867-3871.
- Al-Harthy, M., & Al-Harthy, A. (2018). The Role of Social Media in Promoting Environmental Sustainability among Omani Youth. *Journal of Environmental Psychology*, 37, 125-134.
- Al-Harthy, M., & Al-Harthy, A. (2019). The Use of Technology in Promoting Environmental Sustainability among Omani Youth. *Journal of Environmental Psychology*, 39, 143-152.
- Al-Hinai, A. A., Al-Hinai, A. A., & Al-Hinai, H. (2020). Environmental awareness and behavior of Omani youth. *Journal of Cleaner Production*, 267, 122465.
- Al-Hinai, A. A., Al-Hinai, A. A., & Al-Hinai, H. (2021). Attitude and behavior of Omani youth towards renewable energy and energy conservation. *Journal of Cleaner Production*, 275, 125554.
- Al-Khudairi, A., & Al-Harthy, M. (2019). Omani Youth and Environmental Sustainability: The Impact of Social Media. *Journal of Environmental Psychology*, 38, 132-141.
- Bakker, P. (2012). Why Sustainability is Critical for the Future of Business. *Harvard Business Review*. <https://hbr.org/2012/07/why-sustainability-is-critical-for-the-future-of-business>
- Carroll, A. B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, 34(4), 39-48.
- Chen, J., & Kim, Y. (2020). In-person communication and community building in promoting sustainable behaviors among Generation Z. *Journal of Environmental Psychology*, 75, 101929.
- Ching, K. Y., & Polonsky, M. J. (2015). Environmental attitudes and behaviors of Generation X. *Journal of Environmental Psychology*, 35(3), 266-274.
- Dietz, T., & O'Neill, D. (2013). 'Norms and the environment'. *Annual review of environment and resources*, 38, 101-124.
- Dolan, L., White, S., & Darnell, A. (2017). The impact of a sustainability-focused curriculum on student understanding and motivation for sustainability. *Journal of Sustainability Education*, 8, 1-16.
- Eccles, J. (2018). The Next Generation of Sustainability: The Role of Generation Z. *Journal of Sustainability Education*, *Environmental Education Research*, 24(5), 557-566.
- Ernst & Young. (2017). Millennial survey 2017: Understanding the millennial mind. Retrieved from [https://www.ey.com/Publication/vwLUAssets/ey-millennial-survey-2017/\\$FILE/ey-millennial-survey-2017.pdf](https://www.ey.com/Publication/vwLUAssets/ey-millennial-survey-2017/$FILE/ey-millennial-survey-2017.pdf)

- Francis, T & Hoefel, F. (2018). True Gen: Generation Z and its implications for companies.
- Fridman, S. (2018). Millennials and Sustainability in the Workplace. Retrieved from <https://www.forbes.com/sites/stefanfridman/2018/04/11/millennials-and-sustainability-in-the-workplace/?sh=6a85ddce26ee>
- Friedman, L. (2013). The Role of Traditional Media in Advancing Environmental Sustainability. Environmental Defense Fund. Retrieved from <https://www.edf.org/sites/default/files/content/traditional-media-environmental-sustainability.pdf>
- Gatersleben, B., & Steg, L. (2009). Environmental attitudes and behaviour: a psychological theory of environmental subjective norms and perceived behavioral control. *Journal of environmental psychology*, 29(3), 309-317
- Gifford, R. (2011). *Environmental psychology: principles and practice*. Nelson Education.
- Hamilton, L. C., & Stampone, M. D. (2012). Understanding the role of generations in the sustainability movement. *Journal of Environmental Planning and Management*, 55(8), 983-1000.
- Hopkins, J. (2005). Generation X goes to college: An updated and expanded report. HERI Research Briefs, 1(1), 1-7.
- Horrigan, B. & Aneja, A. (2019). Generation X and Sustainability: Understanding Their Influence on Corporate Social Responsibility. *Journal of Business Ethics*, 155(1), 23-36
- Howe, N., & Strauss, W. (1991). *Generations: The history of America's future, 1584 to 2069*. The New York: William Morrow, ISBN 0-688-11912-3.
- Jacobs, D. M., & Joireman, J. (2014). The influence of corporate social responsibility on customer loyalty: The mediating role of customer satisfaction. *Journal of Business Research*, 67(10), 2188-2197.
- Jones, P., Comfort, D., & Hillier, D. (2017). Corporate sustainability: A critical review. *International Journal of Management Reviews*, 19(1), 55-79. *Journal of Cleaner Production*, 111, 330-340.
- Kasser, T., & Sheldon, K. M. (2002). What Makes for a Merry Christmas? *Journal of Happiness Studies*, 3(1), 1–22. <https://doi.org/10.1023/A:1015533116899>
- Kim, Y. J. (2003). The X in Gen X: A critical review of the literature on the cohort. *Journal of Youth and Adolescence*, 32(4), 291-299 .
- Kokko, A., & Kääriäinen, M. (2019). Sustainability communication on social media: A content analysis of Facebook pages of leading brands. *Journal of Environmental Psychology*, 60, 101-110
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
- Kuppers, I. (2018). Generation Z and the future of sustainability. *Journal of Cleaner Production*, 172, 3805-3817.

- Lefebvre, R. C., & Flora, J. A. (2016). Social media and environmental communication: Theoretical and practical considerations. *Environmental communication*, 10(3), 259-273
- Mintel. (2008). Green Marketing: Attitudes and Behaviors of American Consumers. <https://www.mintel.com/press-centre/social-and-lifestyle/green-marketing-attitudes-and-behaviors-of-american-consumers>
- Oman Vision 2040: [https://www.vision2040.om/Published by Mckinsey&Company 2018](https://www.vision2040.om/Published%20by%20Mckinsey%20Company%202018).
- ROLE OF THE INDUSTRIALIZED BUILDING SYSTEMS. *The Journal of Engineering Research [TJER]*, 17(1), 1–10. <https://doi.org/10.24200/tjer.vol17iss1pp1-10>
- Saarela, H. (2015). Sustainable consumption among baby boomers: An exploratory study.
- Saleh, M. S., & Alalouch, C. (2020). SUSTAINABLE CONSTRUCTION IN OMAN: THE POTENTIAL
- Sparling, E., & Chawla, L. (2018). Emotional appeals in environmental communication.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, 50(3), 65-84.
- UNESCO. (2017). Education for sustainable development. Retrieved from <https://en.unesco.org/themes/education-sustainable-development>
- United Nations Development Programme (UNDP). (2018). "Youth and Sustainability in Oman: Perceptions and Realities." Retrieved from <https://www.om.undp.org/content/dam/oman/docs/Publications/Youth%20and%20Sustainability%20in%20Oman.pdf>
- Wallbaum, H. (2015). "Sustainability: A Systems Approach". Earthscan, Routledge, London and New York. ISBN: 978-0-415-70782-4.
- Young and Rubicam. (2019). The State of Gen Z 2019. Retrieved from <https://www.yr.com/insights/state-of-gen-z-201>

# BEHAVIOURAL ENGAGEMENT, CURRENT PRACTICES, AND FUTURE PROSPECTS OF INDUSTRIAL SECTORS TOWARDS ENVIRONMENTAL SUSTAINABILITY IN OMAN

*Samskrati Gulvady*  
*Vandana Jyotirmayee*

---

## ABSTRACT

Humankind has been confronting climate change challenges like environmental deterioration, frequent and severe natural disasters, dangers to world health, and the depletion of natural resources. Hence, environmentally sustainable development becomes quintessential. The quality of the environment depends on human behaviour patterns. This paper aims to provide policymakers, professionals, researchers, environmentally mindful individuals, and several other stakeholders in Oman a reflection of the various sustainable environmental practices and a possible way forward. The study is divided into two levels: a) a literature evaluation of texts and references from newspapers, research papers, and other materials published by public and commercial organizations in Oman, and b) a qualitative method through interviews with chosen industry experts. In accordance with Oman Vision 2040 and the Sustainable Development Goals of the United Nations, some encouraging sustainable initiatives have been launched. However, there are possibilities for more initiatives to create social awareness and encourage individual behavioural engagement in environmentally sustainable activities. Few research studies about environmental sustainability in Oman have been conducted, yet there is a large scope for future studies about various industrial sectors. This paper is a small step towards adding knowledge about Oman's environmental sustainability development, contributing to the global ecosystem.

**Keywords:** *environment, green practices, sustainability, Oman Vision 2040, UN SDG.*

## 1. INTRODUCTION

### 1.1. BACKGROUND AND RATIONALE

Planet Earth is undergoing several environmental challenges leading to climate change. Various pieces of evidence for climate change have urged scholars and policymakers to address these contemporary environmental problems at various levels – causes, consequences, and solutions (Moran, 2010). As our planet faces multidimensional threats (e.g., economic, environmental, and social), it is the need of the hour to understand and achieve sustainability for global good (Islam, 2017). Sustainability poses questions about human consumption

patterns, depletion of resources, and environmental protection. With development and globalisation, the present consumption levels are known to be unsustainable, inequitable, and inaccessible to most humans.

It has been a subject of popular discourse and concern for business organisations, governments, and international bodies (Crowther & Seifi, 2019). This has forced organisations to hop on the environmental sustainability 'bandwagon' and increase the momentum of their transition towards adopting environmental management systems and practices from an interdisciplinary perspective (Ababneh, 2021). Environmental sustainability has therefore become essential to corporate life in the 21st century (Norton et al., 2015). Therefore, sustainable development strategies with action plans, objectives, principles, and responsibilities are developed at all local and global levels (Kardos, 2012).

Research on ethical consumerism, conservation behaviours, and ecological marketing from human and organizational perspectives is being conducted, along with public policy measures to address these challenges (Prothero et al., 2011). Furthermore, environmental behaviour, environmental degradation, environmental psychology, and human well-being have also been topics of research interest in the social and behavioural sciences (Vlek & Steg, 2007). An environmentally concerned individual needs to have certain behavioural traits, like being 'pro-innovative'. These characteristics include enthusiasm, dedication, proactivity, and voluntary or philanthropic behaviour, which reflect an individual's attitude, cognitive judgments, perceptions, and social values, which can augment the green initiative (Ababneh, 2021). The challenge that unsustainable forms of consumption represent to sustainable development must be noted. But, if our consumption habits and patterns don't change, the impact of economic policies, environmental technology, industrial systems, and social activities will be diminished (Peattie, 2010).

The role and contribution of businesses in environmental protection are evident in ensuring a sustainable environment. This could be done by streamlining their business pursuits by considering environmental protection and appropriate management of natural resources. An organisation's workforce is one of the key factors in boosting the environmental performance of an organisation. So, organisations need to explore innovative ways to influence their behaviour. In this context, the behavioural engagement of employees will contribute to achieving sustainable goals (Wei et al., 2021). Organisations have been incorporating Corporate Social Responsibility (CSR) initiatives to influence behaviour of their internal and external publics.

It is seen that economic policies, clean-up operations and technological innovations in developed countries have facilitated a significant reduction of environmental influences on human activities. Many strategies have been put forth for influencing behaviour change, including monetary incentives, legal restrictions, and technical alternatives. To prevent the

threat of environmental resource depletion, a variety of methods have been suggested, including giving information, social examples, technical alternatives, and/or organizational reform (Müller et al., 2018). Collaborative initiatives must be taken to tackle this global issue. Due to its growing concern, environmental sociology has emerged as a distinct field of inquiry focusing on contemporary environmental challenges and seeking possibilities and modes of sustainability (Islam, 2017).

This study aims to inspire and initiate a discussion on encouraging undertakings and exploring environmentally sustainable programs from the Omani context. It also contributes to the literature on environmental sustainability, offering an overview for decision-makers and researchers about the current practices in Oman and suggesting the way forward. It is also equally important to create public awareness and inculcate a sustainable lifestyle whereby reducing single-use plastic bags or being mindful of environmentally damaging steps could be some of the ways.

## **1.2 STUDIES RELATED TO ENVIRONMENTAL SUSTAINABILITY IN OMAN**

A study on transportation in Oman suggested improvements in the sector that can boost the economic development and sustainability of the country. It proposed that it can enhance the employability and efficiency in logistics and improve the production capacities of companies following the increase in transportation systems (Al Mukhini et al., 2021). In this article, the significance and function of Oman's manufacturing industry are discussed, along with its relevance in creating jobs and its contribution to GDP and exports. According to the report, Oman's manufacturing industry is fragmented and dependent on a small number of sectors. In order to reach the aim of "Manufacturing for well-being" by 2040, it is suggested that an inclusive strategy be incorporated that focuses on the all-inclusive development of the manufacturing sector (Ravikumar et al., 2020).

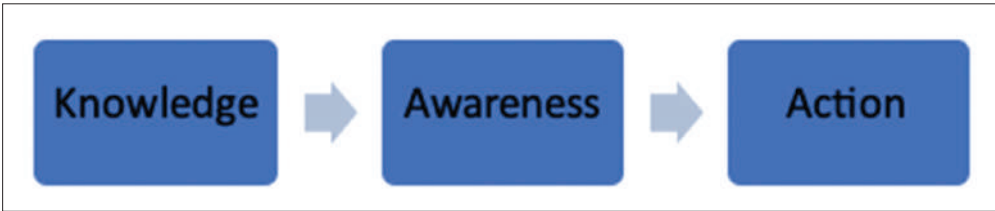
## **1.3 THEORETICAL UNDERPINNING**

To further understand the importance and relevance of the current study, we take support of three theories, which are summarised as follows:

**1.3.1 Behavioural change model:** According to this paradigm, people who are more knowledgeable become more conscious of environmental challenges and are inspired to instil ecologically appropriate behaviour. This basic behavioural model connects information to attitudes and attitudes to behaviour (action). In other words, it gives a starting point for evaluating the potential link between environmental knowledge, consciousness, and attitude, as well as how they translate into action or inactivity (Akintunde, 2017).



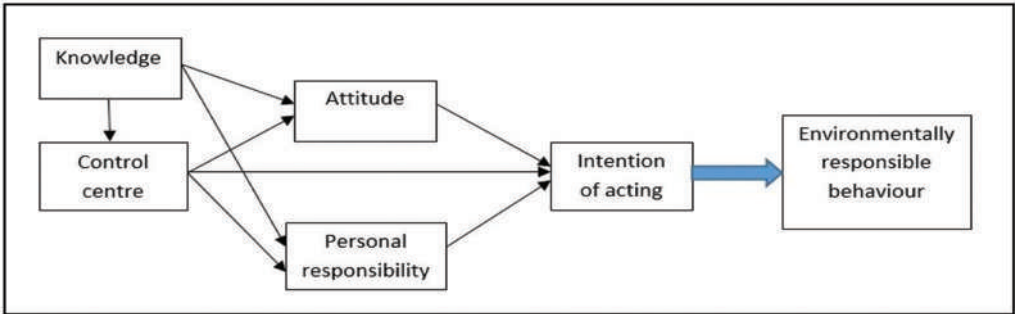
Figure 1: Behavioural Change Model



(Source: A. Akintunde E)

**1.3.2 Environmentally Responsible Behaviour Theory:** The Model of Environmentally Responsible Behaviour was established by Hines, Hungerford, and Tomera, who also emphasised how having the will to act is a major determinant of such behaviour. The Model of Responsible Environmental Behaviour states that the following factors determine whether a person will engage in behaviour: a) intention to act; b) centre of control (an internalised sense of personal control over the events in one’s own life); c) attitudes; d) sense of personal responsibility; and e) knowledge (Akintunde, 2017).

Figure 2: The Model of Environmentally Responsible Behaviour by Hines, Hungerford, and Tomera



(Source: A. Akintunde E)

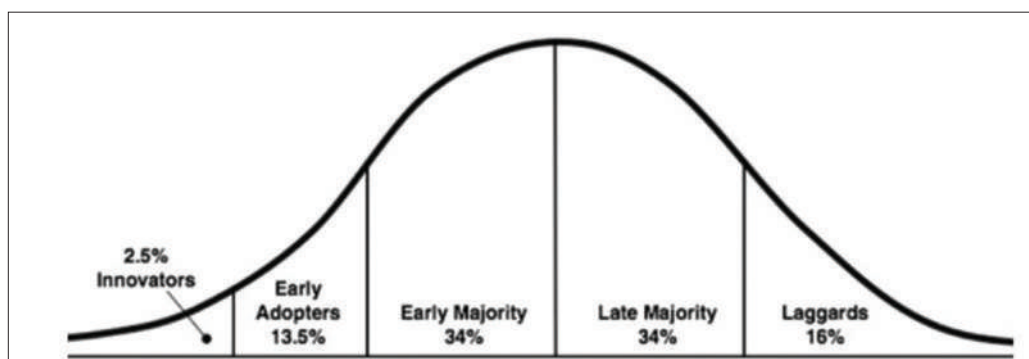
As depicted in the model, the internal control centre has a considerable influence on the intention to act, which serves as the fundamental driver of an individual’s ecologically responsible behaviour. This paradigm also emphasises a link between the control centre, people’s attitudes, and their intention to act. The control centre directly affects a person’s attitudes, which leads to better acting intentions and better behaviour, according to the authors.

**1.3.3 Diffusion of Innovation Model:** Everett Rogers, a communication theorist and sociologist, popularised the idea of innovation diffusion. He argued that change permeates a population via a normal distribution of openness to new ideas. The adoption of an idea

spreads over time to other consumers through communication, a process known as diffusion of innovation. Diffusion is the process by which an innovation is disseminated over time among the individuals within a social system through certain routes (Rogers et al., 2014). The dissemination of a new concept from its origin of invention or creation to its ultimate users or adopters is how he characterised the diffusion of the innovation process. He asserts that the dissemination of innovation is a four-part process that includes the following components: invention, communication channels, time, and social system. When something is described as 'innovative', it means that it is a brand-new product or service. Innovation is 'an idea, activity, or thing seen as new by an individual or other unit of adoption', according to Rogers et al. 2014. Communication channels are tools that aid in disseminating knowledge about innovation to members of the social system through direct communication or the media. The social environment in which diffusion occurs is referred to as the social system. The decision to accept or reject novel concepts, goods, and services is significantly influenced by social influence. People in a social system may feel either positively or negatively towards innovation, and they may embrace it in part or in full. The velocity of acceptance and the subsequent absorption of the novel product are both influenced by time, which is a crucial aspect in the transmission of innovation. It details the time required for people to adopt a new product or service (Diffusion of Innovation: Meaning, Stages, Elements, Examples and Model, 2020).

According to Diffusion Theory, change agents affect behaviours across a community. A change agent's behaviour when spreading innovation is influenced by four factors: engagement, social support, response information, and intrinsic control. This paradigm is significant because it supports social processes and social support within a social context, and it is capable of identifying and evaluating the environmental literacy-inducing information that individuals have learned about content, sources, quality, and effect (Rogers et al., 2014). Malcom Gladwell's successful book 'The Tipping Point: How Small Things Can Make a Big Impact', published in 2000, helped this theory gain widespread acceptance in society.

**Figure 3: Diffusion of Innovation model.**



(Source: Rogers EM)

## 2. METHOD

This qualitative study is based on data collected in dual methods: a) Primary data was collected via semi-structured interviews with selected experts from the industry. b) A literature examination of texts and citations from journals, books, and other works published by various public and commercial organisations in Oman was used to compile secondary data. The qualitative method was chosen as it is suitable for interpreting views and opinions relevant to this study. According to one definition, qualitative research is “multimethod in focus and involves an interpretive, naturalistic approach to its subject matter”. (Guba & Lincoln, 1994).

For primary data collection, companies from various industrial sectors in Salalah, Oman were identified. Convenience purposive sampling was done, and interviewees were contacted. Face-to-face in-depth interviews were scheduled through prior appointments with six experts from various industrial sectors like construction, fisheries, hospitality, media, and seaport to understand their shared beliefs. The sample was selected based on the important managerial level positions they held in their respective organisations and were well cognizant of the organisational policies as well as their implementation.

A set of open-ended questions related to the topic of the study were listed. The same questions were asked to all the respondents during their respective interview sessions. The questions were examined to understand their current plans concerning environmental sustainability in Oman. Semi-structured interviews were conducted with the chosen sample, and their responses were noted. The responses provided by the respondents were analysed from both semantic and latent perspectives depending on the nature of the questions. The surface and evident meanings were identified by understanding the answers from the semantic perspective. On the other hand, based on the responses, the underlying ideas and assumptions were also captured through the latent perspective. Research questions were designed to elicit practical knowledge about behaviour patterns. To elicit their thoughts and perspectives, the following questions were asked to the respondents:

- a. Climatic changes and their consequences from a global perspective.
- b. Relation between the quality of the environment and behavioural patterns.
- c. Their observations on climatic change - challenges and consequences.
- d. The steps were taken by (their) organisations towards environment sustainability.
- e. Kinds of activities / campaigns / awareness conducted.

Secondary data was gathered through a review of texts and references obtained from the online versions of national and regional newspapers. In addition, various academic research papers and, most importantly, published documents of Oman's six public and private organisations available in the public domain are used.

3. RESULTS AND DISCUSSION:

Data collected from primary and secondary sources yielded insight into the area of environmental sustainability and the current practices and prospects in Oman. It was observed that both governmental and commercial entities had launched several promising ecologically sustainable initiatives in accordance with Oman Vision 2040 and the Sustainable Development Goals of the United Nations. Table 1 shows a comprehensive list of the primary and secondary sources used in the present study that reflect the environmental sustainability initiatives undertaken by the various industrial sectors in the Sultanate of Oman.

**Table 1: Environmental sustainability initiatives undertaken by industrial sectors in Oman.**

Industries / sector (Primary data)	Government Initiatives (Secondary data)	Initiatives by Public and Private sector (Secondary data)
The Ministry of Environment and Climate Affairs	Oman Vision 2040	Petroleum Development Oman
Port of Salalah	Oman Sustainability Week 2023	Omantel
Oman Daily Observer	The Second Nationally Determined Contribution 2021	VALE
Oman Investment Authority	The low-carbon economy plan for Oman	Bank Muscat
Oman Construction and Engineering Company LLC	2030 Carbon Control Target Plan	Oman Arab Bank
Crowne Plaza	Climate Preparedness and Resilience	Environmental Society of Oman
	Manufacturing for Wellbeing: The Sultanate of Oman’s Manufacturing Strategy 2040	
	‘Origin Oman’ Campaign	
	Waste management – Be’ah	
	Infrastructure Support – Madayn	
	Green Climate Fund	

**3.1** Six experts from different sectors were interviewed as primary sources, and excerpts from their interviews are mentioned below:

**3.1.1 Ministry of Environment and Climate Affairs** has signed MOUs and contracts with the firms so that the businesses can receive more guidance on how to use water and dispose of

garbage without harming the environment. All parties involved need to know the significance of using treated water. The interviewee highlighted the importance and requirement of increasing community involvement and building awareness and the steps taken by the Ministry towards it. Asking for penalties from companies for not following instructions is one of the ways to enforce better behavioural patterns in companies. The representative at this Ministry (Dhofar Region) informed that there are dedicated units in the Ministry for research and preparing reports on the actions taken regarding environmental safety.

**3.1.2 Port of Salalah** has an ongoing process to educate their staff when the right opportunities arise. Employee training (industry-leading program) are done by Lean Academy the representative. Awareness is created among the staff members as well as among stakeholders about the challenges faced, like the gypsum dust emission. The organisational goals are aligned with Oman Vision 2040, where they are working towards decarbonisation (reduction in carbon-dioxide emissions). Initiatives are in place to use alternative energies and planting 1000 saplings; have a green port by planting more trees; use technologies for reducing carbon emissions as they use diesel in the port etc.

**3.1.3 Oman Daily Observer** gives priority to environmental issues and supports the industrial sector by becoming media partners as and when requested. Future plans include creating awareness among staff to reduce carbon emissions and use green energy, making online products interactive and fast for our clients and customers. Sustainability is the focus of achieving the goals of Oman Vision 2040.

**3.1.4 Oman Investment Authority** initiates awareness among staff, customers/clients to use more renewable energy; to have more greenery in their farms and factories, forcing them to use recycled water rather than spring water, creating awareness among stakeholders. New technologies are used for vertical farming where plants are grown on different floors consuming less water, creating more awareness on recycled water and its usage in farms for growing fruits and vegetables and other crops.

**3.1.5 Oman Construction and Engineering Company LLC** creates awareness among staff; encourages people to change from the use of conventional lights to solar or LED lights; makes customers/clients aware of environmental clearance service provision; encourages a gradual shift towards paperless office; uses environmentally friendly products; and conducts training programmes for college students. The organisation's plan is to continue with the present strategies and further align it with Oman Vision 2040 and conduct activities for employees' families to keep them involved in sustainability initiatives.

**3.1.6 Crowne Plaza** establishes awareness among staff to engage in sustainable behaviour, like stopping plastic straws in their restaurants and banquet halls. In addition, hotel guests are informed about the 'Green Engage' activities, like reusing towels and moving away from takeaway toiletries to refillable options. Future plans may include discussing the possibility of implementing solar energy to meet the Resort's energy requirements; and wider application of the Green Engage initiative in support of the stakeholders.

The primary concerns raised by the experts regarding the consequences of global climatic changes were that the glaciers would melt, many species would disappear, and forests would submerge with the environment getting affected. In addition, due to gas emissions from air conditioners and fridges, the ozone layer is getting affected. The increase in carbon emission and having more glass buildings leads to having greenhouse impact, and needing AC to cool down the temperature are some significant challenges. Agriculture and fish stock may get even more affected in future. Extended sea shores, the frequency of cyclones was observed as some of the changes already taking place. Littering in the sea is affecting the marine life. Desertification has emerged as one of the major problems worldwide as forests are cut, causing soil erosion. Weather fluctuation is observed as an imbalance in nature has been created. Therefore, the focus should not be only on large-scale industries but also on small and medium enterprises. Consequently, the respondents consider that reasonable use of water, food, electricity, paper, and the plantation of trees could be a few solutions for the impending crisis. Waste management is also a necessary step to be taken for environmental sustainability. The experts believe that development should be based on need and not greed, to the extent that our environment gets affected. Working towards decarbonisation and using equipment which reduces dust generated due to gypsum, are some steps to be taken by industries to reduce environmental problems. However, human beings have created problems, and solutions should be found to let the coming generations live healthy lives in a good environment.

This study provides an overview of environmentally sustainable practices in Oman's public and private institutions. From the responses gathered from the interviewees, the following points need to be contemplated to foster behavioural engagement among the citizens and residents of Oman:

- a) Media to be allotted more time for public service advertisements on radio and television and space in newspapers.
- b) Having public awareness billboards about sustainable environments.
- c) Maximum use of public transportation.
- d) Increased usage of renewable energy.
- e) Introducing subsidies on adopting green energy in private sectors.
- f) Developing a greater number of green areas.
- g) Creating more opportunities for waste segregation and recycling.
- h) Engaging more with local communities.
- i) Factories, companies, and hotels to cooperate more with the Ministry of Environment's plans.
- j) Academic-industry collaboration to bring positive changes.

- k) Incorporating lessons on environmental sustainability in the curriculum of all schools and colleges.
- l) Getting more input on how government organisations can engage with activities related to creating awareness.

**3.2** The secondary sources provide a comprehensive idea about initiatives taken by the government in the Sultanate of Oman towards environmental sustainability. They are as follows:

**3.2.1. Oman Vision 2040:** Oman Vision 2040 announces the Sultanate's strategy for overcoming obstacles, keeping up with regional and global changes, creating and seizing opportunities to promote social well-being and economic competitiveness, promoting growth, and fostering confidence in all economic, social, and developmental relationships in the public and private sectors across the country. Vision 2040 is still working to protect natural resources, guarantee that people are protected from harmful environmental effects, and make sure that the environment is properly managed in a way that promotes societal development. It also implies that while formulating policies and making decisions on the development and execution of industrial projects, the environmental perspective is considered.

Fossil fuels (oil and gas) are the only sources of energy used in the energy sector. The production of electricity and transportation comprise the majority of the energy sector's end uses. Because it is situated among several dry locations, the Sultanate is one of the nations that experience a shortage of water resources. One of the constraints and difficulties the water resources sector faces in coastal areas is declining groundwater quality. For the past 20 years, the Sultanate has also experienced an increase in the desertification issue. The illicit oil discharge from ships and trans-carriers that travel through regional waters and reach the beaches exposes the marine ecosystem. Rare sea turtles, whales, and dolphins perish because of unregulated fishing practices that destroy coral reefs and deplete fish stocks. The Sultanate has established several laws, programs, and initiatives to address these issues, including updating the national plan to combat oil pollution, the national program for monitoring pollutants in the marine environment, monitoring the development of fish stocks, the mangrove cultivation project, monitoring the water situation, the National Strategy for improving natural pastures, and creating policies encouraging investment in food production. (Nasseri, 2020).

Saleh bin Naghmoush Al Saadi, the director of the Biodiversity Department of the Environment Authority, asserts that the government has prioritised environmental protection and the preservation of natural resources as part of Oman Vision 2040. Together with achieving Sustainable Development Goals, protecting people from the harmful effects of the environment, and properly managing it, the government also wants to create a society that is safe and wealthy. One of the objectives of Vision 2040 is to secure our energy needs while simultaneously ensuring the sustainable use of natural resources to support our national economy (Nature Protection a Key Aspect of Oman's Vision 2040, n.d.).

While identifying the national priorities, the vision focuses on reshaping the roles of and relation between the public, private and civil sectors to ensure effective economic management; achieve a developed, diversified and sustainable national economy; ensure fair distribution of development gains among governorates; and protect the nation's natural resources and unique environment. All those who have had the privilege of participating in the making of the future vision, "Oman 2040", will now join hands to realise its directions and goals, into a future bursting with ambitions, where each and everyone has a role to play. Towards that future, we shall move forward surefootedly, hastily and with confidence. (Address by His Majesty Sultan Haitham bin Tarik, Oman Vision 2040).

The environment with sustainable components that Oman Vision 2040 emphasises is a secure and well-preserved environment with sufficient and balanced ecosystems and renewable resources. This is highlighted by the importance given to the 'Development of Governorates and Sustainable Cities' considering the strategic direction of "Comprehensive Geographic Development Through Decentralisation and the Development of Restricted Urban Centres; and the Sustainable Use of Lands". The Sultanate wants to build smart cities with cutting-edge infrastructure and contemporary technology systematically. There will also be the construction of three-dimensional cities focused on urban, social, and economic growth. This strategy relies on the involvement of the private sector, especially when it comes to enabling urban communities to create sophisticated, smart, and secure Omani cities that spur economic growth. (Vision Document 2040, 2020).

**3.2.2 Oman Sustainability Week 2023:** Oman moves forward confidently to push the limits of economic growth and sustainable development by the United Nations Agenda 2030 for Sustainable Development. The Ministry of Energy and Minerals sponsors Oman Sustainability Week, a national event focusing on sustainability with a clear linkage to the 2030 SDGs and the 2040 Oman Vision. It also addresses the Sultanate's needs for water and energy, as well as environmental preservation. It aims to engage the business community and residents in shifting the culture towards a sustainable lifestyle and development that will help meet the commitment to 2030 SDG's and Oman Vision 2040, precisely the economy and development theme. Sustainability Week seeks to reinforce sustainable development as a key feature of governance (Oman Sustainability Week, 2023).

**3.2.3 The Second Nationally Determined Contribution 2021 (NDC):** The Oman Vision 2040 serves as the foundation for the National Energy Strategy, which supports a gradual transition to a low-carbon economy and an energy grid with significantly fewer carbon emissions. The 2030 carbon reduction plan's cornerstones are the expansion of renewable energy sources and energy efficiency initiatives. These would make it possible for the Sultanate of Oman to steadily cut and moderate the rise of its greenhouse gas emissions. To promote the coherence and effectiveness of resilient climate development, the nation developed a strategic alignment between their NDC adaptation targets and the National Adaptation Plan (NAP) process. The goal of the NAP is to include adaptation in Oman's development planning so that low-carbon, climate-resilient development objectives, projects, and transition routes



may be created. The study of climate economics and finance is crucial to achieving this goal. The Sultanate of Oman needs a lot of help dealing with climate risks, yet there aren't many resources available. Therefore, a top priority of the NAP process that will be implemented over 2021–2024 is mobilizing climate finance from a variety of sources to address the Sultanate's financial needs to cope with climate change in the context of a quick, fair and transition to a resilient, low carbon economy (Second Nationally Determined Contributions (NDC) | ESCAP Policy Documents Management, n.d.).

**3.2.4 Oman's strategy towards a low carbon economy:** The first strategy for moving from an over-reliance on hydrocarbons to macroeconomic stability and a strong foundation for economic diversification was the Oman Vision 2020. Economic diversification has once again become urgent in the Sultanate of Oman with the implementation of the Paris Agreement. The Oman Vision 2040 was formally endorsed in 2020, which would direct the country over the following two decades on four major topics:

- *A society of creative individuals:* This necessitates a society whose citizens are inventive, self-assured, and globally competitive while also leading respectable lives and living in a way that promotes sustainability.
- *A competitive economy:* This necessitates the creation of a competitive, productive, diverse economy built on innovation, role integration, equal opportunity, and the delivery of inclusive, sustainable development.
- *Responsible state agencies:* This necessitates a nation with responsive machinery, unified governance, effective monitoring, and a prompt judiciary.
- To maintain a secure and well-preserved environment with sufficient and balanced ecosystems and renewable resources to support the national economy.

**3.2.5 2030 Carbon Control Target Plan:** The Oman Vision 2040 and the National Energy Strategy serve as the foundation for the Government Carbon Control Target Plan, which supports a gradual transition to a low-carbon economy and an energy grid with significantly lower carbon emission levels by 2030. The cornerstones of the Sultanate's 2030 carbon management plan are the widespread deployment of renewable energy sources and the intensification of energy efficiency initiatives. The decarbonisation of the transportation sector, which between 2000 and 2015 grew at the quickest rate among significant contributors to greenhouse gas emissions, is another issue that the Sultanate of Oman is worried about. In order to attain even better outcomes and benefits in sustainability and carbon emission reduction, it is necessary to conduct significant research due to the transportation sector's numerous characteristics and diversified effects. Oman will give priority to conducting research that will provide frameworks and plans of action with practical solutions to achieve transportation sustainability and decarbonisation during the next years.

**3.2.6 Climate Preparedness and Resilience:** For the past five years, the Sultanate of Oman has increased its efforts to improve its knowledge and procedures to better manage the risks associated with climate change. National stakeholders have started to identify climate-resilient opportunities within key vulnerable sectors, including water resources, marine biodiversity, and fisheries; agriculture; urban areas, tourism, and infrastructure; and public health, through their recently developed Climate Change Strategy. The Sultanate is no longer a stranger to strong tropical cyclones as dangers from climate change have grown in recent years, as demonstrated most recently by the Category 3 Tropical Storm Mekunu, which struck the southern region of Oman on May 26, 2018. Oman has also taken considerable steps to adapt to climate change for food security. Prioritising domestic production through investments in large-scale agricultural and fisheries projects, as well as groundwater improvement for agricultural uses through recharge dams to reduce salinity and raise groundwater levels close to coastal areas, are adaptation measures to reduce food insecurity in Oman. (Second Nationally Determined Contributions (NDC) | ESCAP Policy Documents Management, n.d.).

**3.2.7 Manufacturing for Wellbeing: The Sultanate of Oman's Manufacturing Strategy 2040** Human capital is one of the three enablers related to the theme of people and society, which is the emphasis of this strategy. As an environmentally sustainable future and the social well-being of the Omani population are at the core of the manufacturing sector's 2040 plan, it has a strong connection to the people and society topic. (Manufacturing for Wellbeing: The Sultanate of Oman's Manufacturing Strategy 2040 | Arab National Development Planning Portal, 2020).

**3.2.8 'Origin Oman' Campaign:** This campaign aims to encourage people and organizations to buy locally produced goods in order to increase awareness of the value of doing so. The campaign's goals go beyond simply improving the individual and societal economy. The campaign's key objectives are to: a) Encourage national pride in the manufacturing sector and emphasize the significance of purchasing Omani goods and services for the economy, the environment, and society; and b) Contribute to fuel efficiency (Origin Oman - Be Local. Buy Local., n.d.).

**3.2.9 Waste management – Be'ah:** The 2009-founded Oman Environmental Services Holding Corporation – Be'ah was created with the purpose of directing Oman's solid waste management. Following the sector plan created by the National Economy Ministry, the corporation puts government policies for the administration and operation of waste sector activities into practice. The lowest level in the GCC and below the global average, Oman now produces 0.7 tonnes of municipal solid garbage per inhabitant annually. Three major categories make up Oman's waste management system: municipal garbage, industrial waste, and hospital waste (Second National Communication, 2019).

**3.2.10 Infrastructure Support – Madayn:** The 17th Sustainable Development Goal of the UN, often known as SDG17, intends to improve public-private partnerships and civil society

participation at the governmental level while fostering greater international cooperation. To fulfil the demands of the nation's expanding population and raise living standards, the Sultanate of Oman works nonstop. Because of this, the Public Establishment of Industrial Estates, often known as Madayn, was founded in 1993. .(Bitwize - <http://bitwize.com.lb>, n.d).

**3.2.11 Green Climate Fund (GCF):** The largest Green Climate Fund in the world and the government of Oman have signed a contract providing monetary assistance to evaluate and address the impacts of climate change from a variety of angles. This project will aid in developing solutions to lessen the threats posed by climate change to agriculture, groundwater resources, and food security, coastal communities affected by rising sea levels, and various other socioeconomic areas over the course of two years by supporting and encouraging studies, raising awareness of the issue, and assisting in the formulation of those solutions. The UN Food and Agricultural Organization (FAO) reports that the GCF initiative, the largest global fund established under the UN Framework Convention on Climate Change (UNFCC), has received an allocation of Omani Rial 365,000 (\$950K). The Civil Aviation Authority, Sultan Qaboos University, and the Ministries of Agriculture, Fisheries, and Water Resources will all collaborate on the implementation of this project. This South Korean-based fund helps developing nations adopt sensible behaviours to combat climate change (Prabhu, 2022).

**3.3** This section covers an overview of various initiatives taken by selected public and private organisations in Oman:

**3.3.1 Petroleum Development Oman (PDO):** It has undertaken several projects that contribute towards a greener planet: environmental sustainability and new technology; renewable energy; water management, forward osmosis, planting drives, solar power usage, single-use plastic campaign, and paper reduction campaign, among many others (*Sustainability Report; 2019, PDO, 2019*).

**3.3.2 Omantel:** This organisation helps to increase investment in high-value sectors, diversify trading partners, and increase the contribution of non-oil sectors to the GDP. It additionally aids the Sultanate in developing smart towns that may take advantage of new amenities (*Sustainability Report 2019, Omantel, 2019*).

**Table 2: Omantel's Sustainability Strategy Framework. (Source: Sustainability Report Omantel, 2019)**

Focus	Digital Inclusion	People	Responsibility
Vision	Enhancing Digital access and enabling a connected society	Enabling the Potential of Every Employee	Supporting the communities And Protecting the Environment in which we Operate
2020 goals	95% coverage and 10 Mbps Internet Speed	Build the Future Leaders of our Society at all Levels of Organisation	Invest RO 10 million in Community Support Program

**3.3.3 VALE:** As required by the environmental rules of the Ministry of Environment and Climate Affairs, VALE has invested in implementing cutting-edge technologies in their palletising and port operations. Systems for dust monitoring, emission controls, wind fences, solar-powered lighting poles, and special spraying systems for palletising are among the technologies. Vale received the ISO 14001 Accreditation in Oman in 2016, demonstrating the organisation's dedication to minimising its environmental effect. (Sustainability Report, Vale, 2019)

**3.3.4 Bank Muscat:** The sustainability strategy of this company focuses on providing long-term advantages to the community and the country while positively influencing society. In accordance with Oman Vision 2040, several initiatives are being carried out, including a public park; a green finance loan; investment in the Misfat village tourism project; green schools for the physically challenged (to provide students with learning experiences and prepare them for a sustainable future) (Sustainability Report Bank Muscat, 2019).

**3.3.5 Oman Arab Bank:** The Environmental Authority's national campaign to plant 10 million trees has been aided by Oman Arab Bank's commitment to plant 10 million trees. The bank's sustainability strategy and emphasis on environmental responsibility are in line with this project. (Observer, 2021).

**3.3.6 Environmental Society of Oman** was founded in 2004 for those interested in environmental conservation. It attempts to influence ecologically sustainable behaviour through education, awareness, and conservation in order to maintain and conserve Oman's natural heritage. According to the Annual Report ESO (2020), the following projects are undertaken: Turtle Research and Conservation; Dedicated Net Clean-up campaigns; Light Pollution Assessments, Renaissance Whale and Dolphin Conservation Project; Whale and Dolphin Field Surveys; Capacity Building and National/Regional Collaboration; Dimaniyat Islands Conservation; Raptor Research and Conservation; Frankincense community outreach and tree planting campaign; Masirah Sea Turtle Awareness Campaign; Plastic Bag Awareness Campaign; Green Schools Initiative; Environmental Heroes – Online Workshop; Whales and Dolphins of Oman Stamps; Earth Hour; Capacity Building Program, Fundraising activities; Coastline, Community and Conservation Exhibition; Tourism Donation Program.

The merit of this study is to contribute to qualitative and explorative research in behavioural engagement and environmental sustainability. As it offers a glimpse into the procedures followed by several governmental and private entities in Oman, the current research may be particularly significant for scholars, politicians, or individuals. The research's conclusions offer advice for improving sustainable practices in Oman. Despite some limitations, the research paves the way for additional investigations into practical environmental sustainability solutions based on the various theories discussed.

#### **4. LIMITATIONS**

Limitations were experienced in scheduling appointments with identified experts in the industry. The convenience purposive sampling method was considered for selecting the interviewees and conducting interviews. Accordingly, experts from Salalah, Oman, were identified and interviewed. As small numbers of research studies are published in the chosen field, Oman-specific research studies on environmental sustainability were few. Reflections gathered from the interviewees pertain to the national level as they felt more comfortable discussing the concerns on national levels, which are also part of the global problems.

#### **5. RECOMMENDATIONS**

Further research on the same topic could be quantitative, qualitative, or even observational, using a sample population from Oman's health, education, higher education, logistics, food and beverage industry, and packaging business. To conduct additional scientific research, create and finance capacity-building initiatives, and identify children's and youth's training and educational needs, a climate change research centre may be built.

#### **6. CONCLUSION**

Environmental sustainability is a complex and multidimensional issue that needs involvement and participation from all sectors and sections of society. It was observed that necessary steps had been taken in the direction of environmental sustainability in the Sultanate of Oman; however, awareness about these programs among individuals should be created to expedite the results and bring about the intended transformation. According to the aforementioned theories, useful information must be created for better actions. The ability of consumers to adopt 'greener' consuming habits is necessary for the development of more ecologically friendly manufacturing and consumption systems. Initiatives like 'Dubai Can' in the UAE are aiming towards reducing or eliminating plastic water bottles every year to promote. More than 30 water stations have been erected in various places to encourage residents and visitors to refill their water from there instead of purchasing new bottles (Motwani, 2022).

It is clear from the interviews and analysis of the reports and research articles that Oman is also susceptible to the effects of climate change. In order to effectively achieve the UN's Sustainable Development Goals, Oman must therefore incorporate climate change mitigation and adaptation into its development strategies and policies as well as raise public awareness of the issue. With environmental protection and preservation of natural resources among the government's top priorities, projects related to developing knowledge and mechanism on food security, agriculture, preservation of natural resources, climate risk management and water resource reflect that Oman is geared up to tackle the challenges and foster positive behavioural changes both at the community level and industries at large.

## REFERENCES

- Ababneh, O. M. A. (2021). How do green HRM practices affect employees' green behaviours? The role of employee engagement and personality attributes. *Journal of Environmental Planning and Management*, 64(7), 1204-1226.
- Akintunde, E. A. (2017). Theories and concepts for human behaviour in environmental preservation.
- Al Mukhini, O. A., Balasa, A. P., & Al Maqbalia, S. I. (2021). The Sultanate of Oman City Transportation in the Sharing Economy: Problems for Sustainable Development. *European Journal of Business and Management Research*, 6(5), 26-38.
- Annual Report (2020). Environment Society of Oman. Retrieved from <http://www.eso.org.om>.
- Bitwize - <http://bitwize.com.lb>. (n.d.). Public Establishment for Industrial Estates unveils new brand identity "Madayn." Times of Oman. <https://timesofoman.com/article/416570/oman/government/public-establishment-for-industrial-estates-unveils-new-brand-identity-madayn>
- Crowther, D., & Seifi, S. (2019). Developing sustainability through collaborative action. In *The Components of Sustainable Development* (pp. 1-17). Springer, Singapore.
- Diffusion of Innovation: Meaning, Stages, Elements, Examples and Model. (2020, November 9). Retrieved November 3, 2022, from <https://www.yourarticlelibrary.com/innovation/diffusion-of-innovation/99839>
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research*, 2(163-194), 105.
- <http://bitwize.com.lb>, B. (n.d.). Nature protection a key aspect of Oman's Vision 2040. Retrieved November 3, 2022, from <https://timesofoman.com/article/105406-nature-protection-a-key-aspect-of-omans-vision-2040>
- <http://bitwize.com.lb>, B. (n.d.). Public Establishment for Industrial Estates unveils new brand identity "Madayn." Retrieved November 3, 2022, from <https://timesofoman.com/article/69066-public-establishment-for-industrial-%20estates-unveils-new-brand-identity-madayn>.
- <https://www.oman2040.om/assets/downloads/oman2040-en.pdf>. Retrieved March 13, 2023, from <https://www.oman2040.om/index-en.html>
- Islam, M. S. (2017). Sustainability through the lens of environmental sociology: An introduction. *Sustainability*, 9(3), 474.
- Kardos, M. (2012). The reflection of good governance in sustainable development strategies. *Procedia-Social and Behavioural Sciences*, 58, 1166-1173.

- Manufacturing for Wellbeing: The Sultanate of Oman's Manufacturing Strategy 2040 | Arab National Development Planning Portal. (2020, January 1). Retrieved November 3, 2022, from <https://andp.unescwa.org/plans/1202>
- Moran, E. F. (2010). *Environmental social science: human-environment interactions and sustainability*. John Wiley & Sons.
- Motwani, D. (2022, February 16). Dubai Can: Sheikh Hamdan Launches Initiative to Reduce Plastic Waste. Retrieved November 3, 2022, from <https://en.vogue.me/culture/hh-sheikh-hamdan-dubai-can-refillable-water-stations-reduce-plastic-waste-dubai/>
- Müller, J. M., Kiel, D., & Voigt, K. I. (2018). What drives the implementation of Industry 4.0? The role of opportunities and challenges in the context of sustainability. *Sustainability*, 10(1), 247.
- Nasseri, Z. A. (2020, November 30). Environmental issues to be addressed in Vision 2040. Retrieved November 3, 2022, from <https://www.omanobserver.om/article/7230/Local/environmental-issues-to-be-addressed-in-vision-2040>
- Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behaviour: A theoretical framework, multilevel review, and future research agenda. *Organisation & Environment*, 28(1), 103-125
- OAB joins national initiative to plant 10 million trees. (2021, December 5). Retrieved November 3, 2022, from <https://www.omanobserver.om/article/1110646/business/banking/oab-joins-national-initiative-to-plant-10-million-trees>
- Oman Sustainability Week. (2023). Retrieved November 3, 2022, from <https://www.omansustainabilityweek.com/home>
- Origin Oman - Be Local. Buy Local. (n.d.). Retrieved November 3, 2022, from <https://www.originoman.om/about-the-campaign.aspx#:~:text=%22Origin%20Oman%22%20%2D%20The%20Campaign&text=To%20further%20support%20the%20sector>
- Peattie, K. (2010). Green consumption: behaviour and norms. *Annual review of environment and resources*, 35(1), 195-228.
- Prabhu, C. (2022, February 18). FAO-led project to address Oman's climate change threats. Retrieved November 3, 2022, from <https://www.omanobserver.om/article/1114878/business/economy/fao-led-project-to-address-omans-climate-change-threats>
- Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. G., Ozanne, L. K., & Thøgersen, J. (2011). Sustainable consumption: Opportunities for consumer research and public policy. *Journal of Public Policy & Marketing*, 30(1), 31-38.



- Ravikumar A, Soundararajan, G., & Madbouly, A. (2020). Shaping the future of Sultanate of Oman's Economy: Manufacturing Sector and its Contribution.
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In *An integrated approach to communication theory and research* (pp. 432-448). Routledge.
- Second National Communication (2019). Retrieved November 3, 2022, from <https://unfccc.int/sites/default/files/resource/Oman%202nd%20National%20Communication%20%2817%20November%202019%29%20-%20Final.pdf>.
- Second Nationally Determined Contribution (NDC) (2019). <https://unfccc.int/sites/default/files/resource/Oman%202nd%20National%20Communication%20%2817%20November%202019%29%20-%20Final.pdf>
- Sustainability Report 2019. (2019). Omantel. Retrieved from [https://www.omantel.om/wcm/connect/c8913651-d65d-4408-9775-14bb63deae53/Sustainability+Report\\_Omantel\\_2019\\_Eng.pdf?MOD=AJPERES&CVID=n7ZV6Wc&CVID=n7ZV6Wc&CVID=n7ZV6Wc](https://www.omantel.om/wcm/connect/c8913651-d65d-4408-9775-14bb63deae53/Sustainability+Report_Omantel_2019_Eng.pdf?MOD=AJPERES&CVID=n7ZV6Wc&CVID=n7ZV6Wc&CVID=n7ZV6Wc).
- Sustainability Report 2019. (2019). Petroleum Development Oman. Retrieved from <https://www.pdo.co.om/en/news/publications/Publications%20Doc%20Library/PDO%20sustainability%20Report%202019%20Latest.pdf>
- Sustainability Report 2019. (2019). Retrieved November 3, 2022, from <http://www.vale.com/oman/EN/aboutvale/relatorio-de-sustentabilidade-2019/Pages/default.aspx>
- Sustainability Report 2019. (2019). Retrieved November 3, 2022, from <https://www.bankmuscat.com/en/about/csr/Documents/Sustainability%20Report%202019.pdf>
- Vision Document 2040. (2020). Oman Vision 2040. Retrieved from <https://www.oman2040.om/assets/downloads/oman2040-en.pdf>
- Vlek, C., & Steg, L. (2007). Human Behaviour and Environmental Sustainability: Problems, Driving Forces, and Research Topics. *Journal of social issues*, 63(1), 1-19.
- Wei, S., Sial, M. S., Comite, U., Thu, P. A., Badulescu, D., & Popp, J. (2021). An examination to explain the mechanism of employees' environment-specific behaviour through CSR and work engagement from the perspective of stewardship theory. *International Journal of Environmental Research and Public Health*, 18(17), 9370.





# DIGITAL TRANSFORMATION OF MARKETING CHANNELS : A STUDY ON THE ROLE OF SOCIAL MEDIA AND PHYSICAL STORES

*Moez Bellaaj*

---

## ABSTRACT

The utilization of social media by businesses and consumers has experienced substantial growth in recent times, which was accelerated by the impact of the Covid-19 pandemic. As a result, companies have elevated their use of social media from a basic communication tool to a crucial marketing channel, leading to the digital transformation of their marketing activities. Despite this shift, managers are still grappling with how to effectively manage both social media and physical channels and how to incorporate them into their marketing efforts. This study presents a framework for coordinating social media and physical stores through harmonized marketing activities based on theories of media richness and environmental psychology which incorporates insights from previous research on multichannel/Omni channel marketing. The benefits of this coordination, from both the customer's and the company's perspectives, are also discussed in the context of the purchasing process.

**Keywords :** *Social media, physical store, digital transformation, channel coordination.*

## SOCIAL MEDIA AND PHYSICAL STORES:

### DIGITAL TRANSFORMATION OF THE MARKETING CHANNELS' COORDINATION

#### 1. INTRODUCTION

Over the past 10 years, social media use has grown among consumers and businesses. Currently, more than half of the world's population uses social media (Datareportal, 2021). In 2018, 97% of all Fortune 500 companies utilized at least one social media platform to market their products and maintain positive relationships with their stakeholders. (Porteous, 2021). According to Eurostat (2020), in 2019, 53% of companies in the European Union utilized at least one type of social media, with 86% of these companies using it to enhance their image and sell their products. Social media is being used by firms to broaden their markets, enhance brand recognition, and establish closer relationships with customers (Li et al., 2021; Marchand et al., 2021; Tafesse & Wien, 2018). On the other hand, social media has given customers more power as they can now generate content and co-create products (Appel et al., 2020; Li et al., 2021). The rise in social media usage has transformed the role of social media from simply

being a marketing tool to becoming a crucial component in introducing innovative digital transformations to the firm's marketing strategies (Li et al., 2021).

According to several authors, the current challenge for firms is not starting social media campaigns but integrating social media into their marketing strategy for improved performance (Li et al., 2021; Marchand et al., 2021). Previous research has highlighted the benefits of using social media strategically (Li et al., 2021; Tafesse & Wien, 2018), but more recent studies have shown that many companies are not utilizing social media to its full potential and struggle to manage multiple channels effectively both online and offline (Garrido-Moreno et al., 2020; Gavino et al., 2019; Olanrewaju et al., 2020; Ramanathan et al., 2017). Inflexible or slow digital integration processes have also hindered the integration of social media and traditional marketing, leading to limited digital transformation (PwC, 2018). Despite a general consensus among experts about the importance of coordinating social media and traditional channels (Fraccastoro et al., 2021; Lemon & Verhoef, 2016; Neslin et al., 2006; Srinivasan et al., 2016), few firms have achieved this coordination effectively (Hanafizadeh et al., 2021). There is also a lack of research on the synergistic use of social media and physical channels. While some studies have examined the interaction between social media and traditional media from a communication/advertising perspective (Killian & McManus, 2015; Kumar et al., 2016; Kumar et al., 2017; Tiago & Verissimo, 2014), a theoretical framework for coordinating a firm's social media and physical channels are missing. Additionally, there is a shortage of research on the expected benefits of combining a firm's social media and physical store throughout the purchasing process. This is partly due to the lack of a clear definition of firm-owned social media and a lack of theoretical frameworks dealing with the complementarities and differences between social media and physical stores.

Therefore, to fill this gap and address the above issues, this paper addresses two questions: RQ1: How could a firm's social media and physical store be coordinated? RQ2: What are the expected benefits of using both channels during the entire purchasing process? To answer these questions, we begin by clarifying the term "social media" in section 2 and discuss in section 3 how it differs from the concept of firm-owned social media. Then, based on media richness and environmental psychology theories, we discuss the differences and similarities between firm-owned social media and firm-owned physical stores in section 4. Referring to these two theories, as well as to the multichannel/omni channel literature, we develop a new theoretical framework in section 5, showing how a firm could coordinate its social media and physical channels during the purchasing process. Drawing upon this proposed framework, we discuss in section 6 the expected benefits of using both social media and a physical store from both the firm's and the customer's perspectives before concluding our paper.

## **2. WHAT IS SOCIAL MEDIA?**

According to Kaplan and Haenlein (2010), social media refers to a group of Internet-based applications that enable the creation and sharing of user-generated content. Social media

encompasses various types of platforms, websites, and applications (Appel et al., 2020). Kumar et al. (2017, p. 271) define social media as “online communication platforms where users create communities and share information.” The literature presents different categorizations of social media, including those by Kaplan and Haenlein (2010), Mangold and Faulds (2009), Misirlis and Vlachopoulou (2018), and Moore et al. (2013). Hanafizadeh et al. (2021) provided a comprehensive definition by categorizing social media into four main types: social networking sites, content communities, blogs, and discussion forums. These categories were further divided into ten subtypes, as presented in Table 1.

### ***Social networking sites***

Social networking sites (SNSs) refer to “Web sites that enable users to articulate a network of connections of people with whom they wish to share access to profile information, news, status updates, comments, photos, or other forms of content” (Steinfeld et al., 2012, p. 2). SNSs represent web-based platforms on which users can create individual public profiles, interact with real-life friends, and meet other people based on shared interests (Boyd & Ellison, 2007). Kaplan & Haenlein (2010) considered SNSs as applications that enable users to connect by creating personal profiles, inviting friends and colleagues to access those profiles, and sending instant messages to each other. Hanafizadeh et al. (2021) classified SNSs into three subcategories: general SNSs (e.g., Facebook), instant messaging (e.g., WhatsApp), and business networking (e.g., LinkedIn).

### ***Content communities***

Content communities are sites that allow users to share multimedia content (Cross, 2014). People using content communities upload images, videos, music, or other content, which other users can then search for and view. Kaplan & Haenlein (2010) considered that the main objective of content communities is sharing media content (e.g., text, photos, and videos) between users. Unlike SNSs, users in content communities are not required to create a personal profile page (Kaplan & Haenlein, 2010). From a corporate viewpoint, firms can benefit from content communities by sharing multimedia that promotes their products/brands or exchanging information with customers (Cross, 2014). Hanafizadeh et al. (2021) classified content communities into two subcategories: creativity works-sharing sites (e.g., YouTube and SlideShare) and educational materials sharing (e.g., ResearchGate).

### ***Blogs***

Blogs represent special types of websites that allow a person or group to post content on a web page as a series of submissions (Cross, 2014). Blogs are “the social media equivalent of personal web pages and can come many different variations, from personal diaries describing the author’s life to summaries of all relevant information in one specific content area” (Kaplan & Haenlein, 2010, p. 63). Blogs may also permit others to comment on the author’s initial entries, allowing interaction with the writer (Cross, 2014).

Whereas blogs represent general web pages, a microblog allows a person to post short messages. The difference between microblogs and general blogs is the size of the content. In microblogs, users share short content, such as short sentences, individual images, and video links (Cross, 2014; Kaplan and Haenlein, 2010). The most popular example of this is Twitter. Firms can use blogs and microblogs as part of their communication strategy to share information with customers, employees, and stakeholders (Cross, 2014; Kaplan & Haenlein, 2010).

**Discussion forums**

Discussion forums are websites or platforms that provide an online exchange of information between people about a particular topic. Hanafizadeh et al. (2021) classified discussion forums into three subcategories: collaborative websites, social review sites, and company-sponsored networks. Collaborative websites bring together Internet users with a common interest to plan, develop, and improve specific projects. They support project teams, research groups, and other collaborative works. Wikipedia is an example of a collaborative website. Social review sites represent websites on which reviews can be posted about people, businesses, products, or services. An example of a social review site is TripAdvisor. Company-sponsored networks are discussion forums about a firm’s brand. Procter & Gamble’s Vocal point is an example of this type of online forum. Table 1 shows the four social media types with illustrative examples of their subtypes.

**Table 1. Social media types (adapted from Hanafizadeh et al., 2021)**

Type	Subtype
1. Social networking sites	General social networking sites (e.g., Facebook)
	Instant messaging (e.g., WhatsApp)
	Business networking (e.g., LinkedIn)
2. Content communities	Creativity works-sharing sites (e.g., YouTube)
	Educational materials sharing (e.g., ResearchGate)
3. Blogs	General blogs (e.g., WordPress)
	Microblogs (e.g., Twitter)
4. Discussion forums	Collaborative websites (e.g., Wikipedia)
	Social review sites (e.g., TripAdvisor)
	Company-sponsored networks (e.g., Vocalpoint)

**3. FROM SOCIAL MEDIA TO FIRM-OWNED SOCIAL MEDIA**

Social media, as discussed in the previous section, represents a collection of four types of Internet-based platforms and applications: SNSs, content communities, blogs, and discussion forums. These social media channels can be used by various users (e.g., individuals, groups, firms, and institutions) to achieve different purposes (i.e., personal or corporate). From the corporate perspective, firms consider social media as digital marketing channels used to influence customer behaviours and improve marketing performance (Appel et al.,

2020; Li et al., 2021). From this perspective, marketers focus on the social platforms that are under the firm's control because they can manage to achieve desirable outcomes (Lemon & Verhoef, 2016). Compared with social media, the online communication platforms on which different users create communities and share information (Kumar et al., 2017), firm-owned social media represents online social platforms and applications that are designed, managed, and controlled by the firm, and allow the creation and exchange of firm-generated content to achieve desirable marketing outcomes (Kumar et al., 2016; Lemon & Verhoef, 2016). Branded websites/apps, firm blogs, firm-owned Facebook pages, Twitter firm accounts, and YouTube firm channels are examples of firm-owned social media. Concerning the advertising literature, which distinguishes between paid, owned, and earned media (e.g., Stephen & Galak, 2012), firm-owned social media is owned and possessed by the brand and remains under its direct control (Lemon & Verhoef, 2016).

Other studies have made the distinction between customer-initiated and firm-initiated channels (Anderl et al., 2016; Kumar et al., 2016), as both customers and firms can initiate contact in the digital environment. In the case of customer-initiated channels, a customer initiates contact with a firm. In contrast, firm-initiated channels refer to firms' ability to initiate contact with customers and generate content on their official social media pages. According to this classification, firm-owned social media is more concerned with firm-initiated channels. Finally, it is worth noting that enterprise social media is different from firm-owned social media. Enterprise social media refers to social media tools used by a firm for internal use to promote interpersonal communication and collaboration among employees (Sun et al., 2021). However, firm-owned social media is for external use (e.g., marketing communication) by the firm of the content it generates (e.g., messages posted by firms to customers on their official social media pages) to achieve marketing outcomes. Table 2 presents the main differences between firm-owned social media and social media based on the discussion above.

**Table 2: Firm-owned social media versus social media (source: the author)**

	<b>Firm-owned social media</b>	<b>Social media</b>
Perspective	Corporate	General (personal and corporate)
Adoption	Adopted by the firm	Adopted by various users (e.g., individuals, groups, and institutions)
Ownership	Firm-owned channels	External/public channels
Management	Designed, managed, and controlled by the firm	Designed, managed, and controlled by various actors
Contact	Firm-initiated channels	Firm-initiated channels and customer-initiated channels
Purpose of use	External	Internal and external
Outcome	Desired marketing outcomes	Personal and business outcomes
Examples	Branded websites/apps, firm blogs, firm-owned Facebook pages, Twitter firm accounts, Instagram firm accounts, and YouTube firm channels	Social networking sites, content communities, blogs, and discussion forums

#### 4. FIRM-OWNED SOCIAL MEDIA AND PHYSICAL STORES

Customers are becoming increasingly “omnichannel” in their attitude and behaviour, as they are choosing to use both online and offline retail channels (Bell et al., 2014; Verhoef et al., 2015). To succeed in this new shopping context, firms need to adjust their multichannel strategies to deliver both information and products to customers. Apart from the ‘pure players’, firms do not use online channels alone, and many of them usually use social media in conjunction with traditional channels, such as physical stores, for generating information and delivering products (Chopra, 2016; Verhoef et al., 2015).

Since a firm’s social media and the physical store are used together in the omnichannel environment, marketers need to be aware of the strengths and weaknesses of each channel to use both of them successfully in a complementary manner (Kumar et al., 2017; Picot-Coupey et al., 2016). As a store and social media represent both a communication medium and a shopping environment at the same time, their distinctive capabilities are analysed below from two theoretical perspectives: media richness theory and environmental psychology theory.

According to media richness theory (Daft & Lengel, 1986), media can be characterized by their ability to convey communicative cues, give immediate feedback, support language variety, and allow personalization. The theory explores how to select appropriate media according to the different communication purposes. This theory assumes that the goal of any communication is the resolution of equivocality and the reduction of uncertainty. It considers that ‘rich’ media can be selected for resolving equivocal issues of high complexity and that ‘lean’ media might be more suitable for simple, certain, and unequivocal issues. The degree of media richness is dependent upon four factors: the immediacy of the feedback (synchronous interactional media are richer than asynchronous non-interactional media); cues (the more cues transmitted, such as sight, sound, and touch, the richer the medium); language variety (the greater the variety of words, signs, and symbols, the richer the medium); and personal focus (the greater the humanization and personalization, the richer the medium). According to media richness theory, for clear problems requiring a direct answer, a lean medium is preferred because it enables straightforward and unambiguous messages that provide more certainty for the receiver. In contrast, for equivocal problems that are highly complex or subjective, rich media is privileged since it enables deeper knowledge and understanding of a problem and leads to well-informed decision-making.

According to media richness theory, firm-owned social media and physical stores have different capabilities in giving immediate feedback, conveying communicative cues, supporting language variety, and allowing personalization. For example, Kaplan & Haenlein (2010) found that blogs scored lowest in media richness as they are often text-based and allow for a relatively simple exchange. However, a physical store allows a rich number of relational and social information cues based on face-to-face communication.

Media richness theory maintains that face-to-face communication is the richest medium, as it carries a large variety of information (e.g., verbal and visual cues) and allows for immediate feedback. Thus, a store is considered a rich channel in which interactions with salespeople offer human feedback and rich exchange with immediate and individualized attention. It also provides a variety of language (e.g., words, tone, and body language) and social cues (e.g., interactions with other customers and the firm's employees). This kind of communication gives the store the power to obtain a deeper understanding of customer needs and to solve equivocal or complicated problems. On the other hand, social media, as a leaner digital medium, has the strength to permit more automated feedback and quicker responses to simple, certain, and unequivocal problems.

In addition to media richness theory, the capabilities of firm-owned social media and physical stores can be analysed through the lens of environmental psychology theory (Mehrabian & Russell, 1974). According to Baker et al. (1992), Research in environmental psychology has produced a body of knowledge that has examined the interaction between the physical environment and human behaviour in many different settings (e.g., housing, offices, schools, prisons)" (Baker, 1992, p. 448). The environmental psychology approach outlines that an individual's perceptions of, and behaviour within, a given environment are the result of emotional states (i.e., pleasure and arousal) created by the environment (Mehrabian & Russell, 1974). This approach was used by Baker (1986) and Baker et al. (1992) to study the interplay between the store environment (i.e., store atmospheric factors) and customer perceptions/behaviours. The framework of environmental factors proposed by Baker (1986) suggested three dimensions of the store environment as influencing emotional states: ambient, social, and design factors. Ambient factors are the background conditions in the environment, such as temperature, scent, noise, music, and lighting. Social factors correspond to the 'people' component of the environment and include both store employees and customers. Design factors represent the functional and aesthetic elements, such as architecture, style, and layout. Ambient, social, and design factors are considered environmental stimuli affecting the emotional states of pleasure and arousal, which, in turn, affect consumers' willingness to buy, intention to repurchase, and word-of-mouth or avoidance behaviours. Pleasure refers to the extent to which a person feels good in an environment, and arousal relates to the extent to which a person feels excited or stimulated (Baker et al., 1992). Approach behaviour includes a willingness/desire to move towards and explore the environment (Baker et al., 1992).

Concerning the environmental psychology approach, the online shopping environment (i.e., firm-owned social media) and physical stores differ from ambient, social, and design factors (Eroglu et al., 2001; Sautter et al., 2004). The range of ambient factors (e.g., olfactory and tactual) in the social media environment is limited because the digital environment is unable to reproduce all the elements of a store atmosphere, specifically those related to the olfactory (e.g., scent and freshness) and tactile (e.g., softness, smoothness, and temperature) dimensions. In addition, social elements, including crowding, the appearance of shoppers, and the behaviour of employees, do not exist in the online environment. However, in the



online context, these elements are replaced by intelligent agents, avatars, and virtual discussions/communities. Likewise, fixtures, cleanliness, changing rooms, aisles, and layout represent the design factors in the offline environment. On the other hand, flow, ease of navigation, and interactivity replace the design factors in the online environment. Table 3 summarizes the main differences between firm-owned social media and physical stores based on the discussion above conducted from the media richness and environmental psychology perspectives.

**Table 3. Firm-owned social media versus physical store (source: the author)**

	<b>Firm-owned social media</b>	<b>Firm-owned physical store</b>
<b>Media richness perspective</b>		
<b>Cues</b>	Technology-based communicative cues	Relational and social human cues
<b>Feedback</b>	Technology-mediated feedback	Immediate face-to-face feedback
<b>Language Variety</b>	Variety of technology-based language	A large variety of human language (verbal, non-verbal, and visual cues)
<b>Personalization</b>	Technology-based personalization	Individual personal attention in a face-to-face exchange
<b>Environmental psychology perspective</b>		
<b>Ambient factors</b>	Visual and auditory digital elements, but no olfactory or tactual factors	Extensive range of ambient factors (visual, auditory, olfactory, and tactual elements)
<b>Design factors</b>	Flow, ease of navigation, ease of access, ease of use, etc.	Fixtures, cleanliness, aisles, layout, etc.
<b>Social factors</b>	Intelligent agents, avatars, online communities, etc.	Crowding, appearance/behaviours of shoppers and employees, etc.

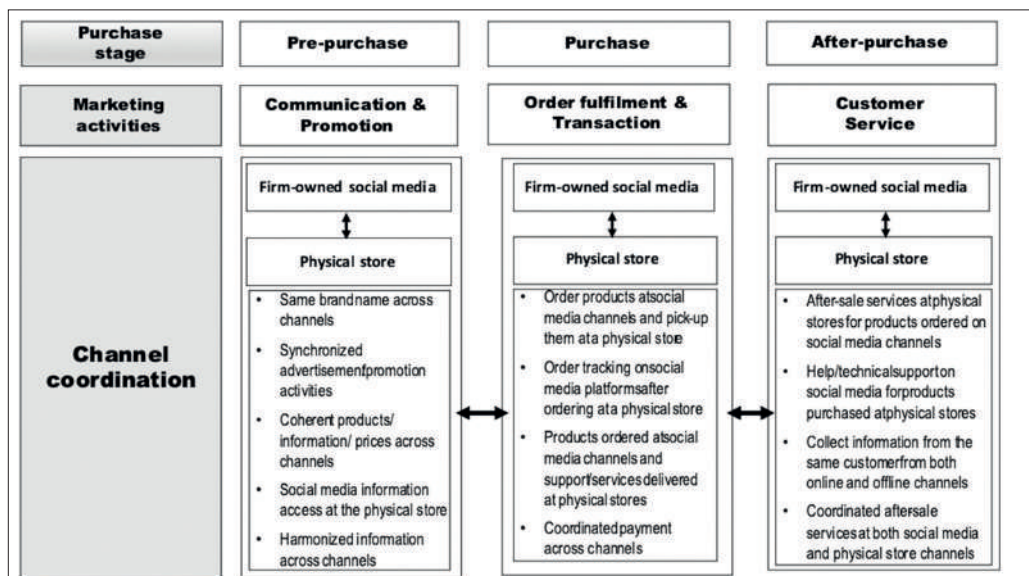
## 5. FIRM-OWNED SOCIAL MEDIA AND PHYSICAL STORES: TOWARDS A CHANNEL COORDINATION FRAMEWORK

The interaction between online and offline channels has previously been studied in the marketing field through the lens of omnichannel literature and integrated marketing communications. For example, Bell et al. (2014) used their information and fulfilment matrix to study the interplay between online and offline stores in an omnichannel retail environment. They considered that customers can visit stores to obtain information or they can seek information remotely. They can also visit a store to collect items, or the store can come to them when products are delivered. Furthermore, Kumar et al. (2017) studied the synergistic effects of social media and traditional channels based on integrated marketing communications. They considered that marketing actions could have synergistic effects that enhance the effect

of one medium through the influence of another. Despite the growing importance of social media, research dealing with the coordination of social media and traditional channels is only just emerging (Kumar et al., 2017). Some studies have outlined that consumer activity on social media is affected by traditional marketing activities (e.g., Kumar et al., 2016; Srinivasan et al., 2016). Nevertheless, prior studies did not develop a comprehensive framework for the coordination between social media and a physical store.

In an effort to address the gap in previous models, such as the information and fulfillment matrix proposed by Bell et al. (2014), our coordination framework was constructed with reference to the works of Neslin et al. (2006) and Lemon & Verhoef (2016). Neslin et al. (2006) presented a framework for multichannel customer management that considers both the customer's and the firm's decision-making process during channel coordination in a multichannel marketing environment. This framework recognizes two forms of channel coordination in the purchasing process: coordination at a specific stage and coordination across all stages. The degree of coordination can range from complete separation to full integration. For instance, channel coordination in the pre-purchase stage allows customers to access information through both online and offline channels. In the post-purchase stage, customers may receive support through in-store or social media channels. To provide a smooth customer experience, firms coordinate their marketing efforts across the different stages of the purchasing process. Our framework, shown in Figure 1, builds on Neslin et al. (2006) framework and its extension by Lemon & Verhoef (2016), incorporates the customer journey, and outlines how a firm can coordinate its firm-owned social media channels and physical store channels throughout the entire purchasing process.

**Figure 1. Firm-owned social media and physical store coordination**



(Source: the author)

According to our framework, the firm combines its social media channels and physical stores to address different stages of the purchasing process. Firm-owned social media, which encompass various social media platforms owned and managed by the firm, are utilized to achieve desired marketing outcomes. On the other hand, physical stores refer to retail locations and showrooms owned by the firm.

At the pre-purchase stage, the firm focuses on promoting the brand and creating awareness through communication and promotion activities. During the purchase stage, the firm facilitates order fulfillment and transaction activities to enable customers to make a purchase decision. Finally, after the purchase, the firm provides after-sale services to support customers.

The coordination of social media channels and physical stores takes place at each stage of the purchasing process, as well as across the entire process. For instance, at the pre-purchase stage, the firm can coordinate its marketing activities by harmonizing its advertisements and promotions across channels. During the purchase stage, the firm can ensure consistent transactional procedures, allowing customers to make payments either online or in-person. Additionally, customers can place orders through one channel and receive their purchases through another, which demonstrates the coordination of channels.

At the after-purchase stage, the firm provides customer service support through both online and offline channels and collects customer information to offer personalized services. By using a combination of firm-owned social media and physical stores, the firm can create a unified vision of the customer and provide more personalized services.

## **6. FIRM-OWNED SOCIAL MEDIA AND PHYSICAL STORES: THE EXPECTED BENEFITS FOR BOTH THE CUSTOMER AND FIRM**

The benefits of using both online and offline channels have been studied in prior multichannel marketing studies from the perspective of the contribution of multiple channels to brand/firm performance metrics (e.g., Baxendale et al., 2015; Pauwels & Neslin, 2015). However, the benefits of using both social media and a physical store at different stages of the purchasing process have not been studied using a comprehensive framework that takes into consideration both the customer's and the firm's points of view. Therefore, based on the discussion above, the expected benefits of the conjoint use of a firm's social media channels and stores are examined here in light of the channel coordination framework developed in the previous section and presented in Figure 1. Furthermore, the strengths of the two channels at each purchasing stage will be highlighted according to the media richness and environmental psychology perspectives discussed in an earlier section.

The expected benefits resulting from the coordination of firm-based social media and a physical store occur at each stage of the purchasing process (as presented in Table 4). During the need recognition phase, channel coordination provides multiple communication/information advantages to the customer and the firm at the same time (Lemon & Verhoef,

2016; Neslin et al., 2006). For example, the firm can reach connected individuals more efficiently via social media platforms. The brand's website, the firm's Facebook page, or the firm's blog offers an opportunity to initiate contact with those customers through different touchpoints and provide them with valuable information about the products and services. On the other hand, at the firm's physical stores, customers may appreciate personal contact with a salesperson and obtaining individualized attention to their specific needs (Scherer et al., 2015). Although social media allows a firm to reach new customers and permits people to be accurately informed about the company's products and events, physical stores enable the firm to give more personal information and provide individualized attention to shoppers in the physical environment.

At the information search stage, a customer could use various social media channels (i.e., SNSs, content communities, blogs, and discussion forums) in addition to the firm's showrooms (Chopra, 2016; Lemon & Verhoef, 2016). At this stage, the physical store can support customers in their information search by providing them with the possibility to obtain personal information based on face-to-face contact. For instance, a traditional showroom can help customers who are uncomfortable with using digital technologies and those seeking personal advice or who have specific needs (Scherer et al., 2015). The ambient factors (e.g., visual, auditory, olfactory, and tactual elements) and the social elements (e.g., appearance and behaviours of employees) of the store can reassure those customers in their decisions (Scherer et al., 2015). From the corporate point of view, firm-owned social media increases the efficiency of delivering information to customers and keeps them closer to the firm's communication in the pre-purchase phase. Using showrooms in addition to social media enables the firm to assist customers who are facing problems with a complex decision or purchase. As a personal channel, the store offers the opportunity to engage customers in personal face-to-face discussions and interactions.

At the purchase stage, the customer can use both social media and physical channels to evaluate different alternatives. Some social media channels (e.g., social review sites) can provide automated tools allowing the online comparison of prices and offers. The physical store could, on the other side, provide humanitarian assistance for the customer to evaluate different options. The store provides social interactions and sensory experiences to help customers in the evaluation of products, and social media platforms provide virtual social interactions/experiences (e.g., the opinions of other users on blogs) and online decision-making tools (Scherer et al., 2015). By doing so, the firm's store can add a rich number of relational and social human cues to its online channels, such as immediate face-to-face feedback, a large variety of human language (verbal, non-verbal, and visual cues), and individual personal attention in face-to-face exchanges to help customers evaluate different alternatives.

At the purchase decision, a product reservation can be done on one channel and the payment on another. A customer can place an order on the firm's website or through other social media channels and then go to the store to make the payment. Other options are also possible. For

instance, a customer could first visit the showroom and then pay over the Internet via social media applications. The migration between online/offline purchasing channels offers more convenience and flexibility to the multichannel customer (Chopra, 2016; Lemon & Verhoef, 2016). Ordering, paying for, and receiving a product could be dissociable tasks that could be carried out both on social media and in physical channels based on integrated information systems.

Finally, at the post-purchase stage, the interaction of social media channels and physical stores could be beneficial to both customers and firms. For example, after visiting a showroom, firm-owned social media could be used to enhance after-sale services by facilitating contact with shoppers and allowing automated feedback and quick responses to simple, certain, and unequivocal problems. In a complementary manner, stores could be used to resolve complex problems or unusual complaints (Scherer et al., 2015). The richness of face-to-face communication in physical stores enables a deeper understanding of customers' problems and facilitates the resolution of complicated issues. Table 4 summarizes the benefits derived from utilizing both firm-owned social media and a physical store during the purchasing process from the customer's and the firm's points of view.

**Table 4. Firm-owned social media and a physical store: the expected benefits throughout the purchasing process**

<b>Purchasing process</b>	<b>Channel</b>	<b>Benefits for firm</b>	<b>Benefits for customers</b>
<b>Pre-purchase</b>	<b>Firm-owned social media</b>	<ul style="list-style-type: none"> <li>• Efficiency in delivering information</li> <li>• Reaching many prospects</li> <li>• Closeness to the connected people</li> </ul>	<ul style="list-style-type: none"> <li>• Ease of access to firm-owned social media channels</li> <li>• Flexibility/convenience in searching for information</li> <li>• Obtaining information from other users/customers</li> <li>• Minimizing search efforts (e.g., time and money resources)</li> </ul>
	<b>Firm-owned physical store</b>	<ul style="list-style-type: none"> <li>• Building personal communication with people</li> <li>• Serving individuals who are uncomfortable with the use of digital technologies</li> <li>• Satisfying people who are less experienced or are unfamiliar with the social media environment</li> </ul>	<ul style="list-style-type: none"> <li>• Obtaining information via face-to-face discussions</li> <li>• Obtaining personalized attention from store employees</li> <li>• Communicating with other shoppers/users in a store/showroom</li> </ul>

<b>Purchase</b>	<b>Firm-owned social media</b>	<ul style="list-style-type: none"> <li>• Collecting valuable data about shoppers' decisions/behaviours</li> <li>• Better understanding of the purchase behaviours of connected people</li> <li>• Efficiency in the transaction process (e.g., automatic recognition of repeat purchases, automated payment, and data collection)</li> </ul>	<ul style="list-style-type: none"> <li>• Comparing easily and quickly large amounts of information and services</li> <li>• Availability of various digital tools/channels to evaluate alternatives</li> <li>• Convenience and flexibility in processing ordering and/or payment</li> <li>• Knowing the recommendations and opinions of other buyers</li> </ul>
	<b>Firm-owned physical store</b>	<ul style="list-style-type: none"> <li>• Developing a relationship and trust by helping customers make valuable choices in store</li> </ul>	<ul style="list-style-type: none"> <li>• Personal assistance and individualized attention at the moment of making a choice</li> <li>• Relational and social human cues and a large variety of human language</li> <li>• Less concern about online security issues</li> </ul>
<b>Post-purchase</b>	<b>Firm-owned social media</b>	<ul style="list-style-type: none"> <li>• Enhancing the quality of after-sales services by using social media channels</li> </ul>	<ul style="list-style-type: none"> <li>• Different social media channels can be used at the post-purchase stage to receive assistance or resolve a problem</li> </ul>
	<b>Firm-owned physical store</b>	<ul style="list-style-type: none"> <li>• Improving service quality by analysing the customer experience on offline channels</li> </ul>	<ul style="list-style-type: none"> <li>• Resolving a complex or unusual problem after the purchase</li> </ul>

(Source: the author)

## 7. CONCLUSION

The interaction between online and offline channels has been examined in previous studies in the multichannel marketing field. However, the issue of the interplay between social media and physical channels is still understudied in the literature. This study aims to fill this gap by analysing how firms' social media and physical stores could be used conjointly throughout the purchasing process. In this paper, we proposed a definition of firm-owned social media based on prior social media literature and discussed the distinctive capabilities of both social media and physical channels from media richness and environmental psychology

perspectives. Based on this comparison and our review of the multichannel/omnichannel literature, we proposed a new theoretical framework showing how firm-owned social media and physical stores could be coordinated by implementing harmonized marketing activities related to communication, transaction, and customer service. This online/offline coordination would allow both the customer and the firm to derive expected benefits at each stage of the purchasing process.

Future research could build upon the framework proposed in this study in several ways:

1. Empirical validation of the framework: Further research could test the validity of the proposed framework by conducting surveys, experiments, or case studies to gather data and measure the impact of the proposed coordination on customer behavior and firm outcomes.
2. Exploration of the mechanisms underlying coordination: Future research could examine the mechanisms that enable coordination between social media and physical channels and the role of key stakeholders (e.g., marketing, IT, and operations) in the implementation of coordination.
3. Examining the effect of environmental and situational factors (e.g., store location, type of product) on the choice of social media or stores by customers during different stages of the purchasing process.
4. Exploring the effects of personal characteristics (e.g., age, income, personality) on the use of social platforms and physical stores by customers during different stages of the purchasing process.
5. Investigation of customer preferences and satisfaction: Further research could examine the role of customer preferences and satisfaction in the coordination between social media and physical channels and their impact on customer behavior.

In conclusion, this study offers a theoretical foundation for further research on the coordination between social media and stores in multichannel marketing. The proposed framework could contribute to a better understanding of how firms can use both of them to create a seamless customer experience and achieve better marketing outcomes.

## REFERENCES

- Anderl, E., Schumann, J. H., & Kunz, W. (2016). Helping firms reduce complexity in multichannel online data: A new taxonomy-based approach for customer journeys. *Journal of Retailing*, 92(2), 185-203.
- 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.
- Baker, J., Levy, M., & Grewal, D. (1992). An experimental approach to making retail store environmental decisions. *Journal of Retailing*, 68(4), 445-460.
- Baker, J. (1986). The role of the environment in marketing services: The consumer perspective. In *The Services Challenge: Integrating for Competitive Advantage*, Eds. John A. Cepeil et al. Chicago, IL: American Marketing Association, 79-84.
- Baxendale, S., Macdonald, E. K., & Wilson, H. N. (2015). The impact of different touchpoints on brand consideration. *Journal of Retailing*, 91(2), 235-253.
- Bell, D. R., Gallino, S., & Moreno, A. (2014). How to win in an omnichannel world. *MIT Sloan Management Review*, 56(1), 45-53.
- Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13(1), 210-230.
- Chopra, S. (2016). How omnichannel can be the future of retailing. *Decision*, 43(2), 135-144.
- Cross, M. (Ed.) (2014). *Social Media Security: Leveraging Social Networking while Mitigating Risk*. Oxford: Syngress.
- Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, 32(5), 554-571.
- Datareportal (2021). More than half of the people on earth now use social media. Available at: <https://datareportal.com/reports/more-than-half-the-world-now-uses-social-media/> (accessed 20 April 2021).
- Eroglu, S. A., Machleit, K. A., & Davis, L. M. (2001). Atmospheric qualities of online retailing: A conceptual model and implications. *Journal of Business Research*, 54(2), 177-184.
- Eurostat (2020). Social media - statistics on the use by enterprises. Available at: Social media - statistics on the use by enterprises - Statistics Explained (Europa.eu)/ (accessed 20 April 2021).
- Fraccastoro, S., Gabrielsson, M., & Pullins, E. B. (2021). The integrated use of social media, digital, and traditional communication tools in the B2B sales process of international SMEs. *International Business Review*, 30(4), 101776.



- Garrido-Moreno, A., García-Morales, V., King, S., & Lockett, N. (2020). Social Media use and value creation in the digital landscape: A dynamic-capabilities perspective. *Journal of Service Management*, 31(3), 313-343.
- Gavino, M. C., Williams, D. E., Jacobson, D., & Smith, I. (2019). Latino entrepreneurs and social media adoption: Personal and business social network platforms. *Management Research Review*, 42(4), 469-494.
- Hanafizadeh, P., Shafia, S., & Bohlin, E. (2021). Exploring the consequence of social media usage on firm performance. *Digital Business*, 1(2), 100013.
- Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59-68.
- Killian, G., & McManus, K. (2015). A marketing communications approach for the digital era: Managerial guidelines for social media integration. *Business Horizons*, 58(5), 539-549.
- Kumar, A., Bezawada, R., Rishika, R., Janakiraman, R., & Kannan, P. K. (2016). From social to sale: The effects of firm-generated content in social media on customer behaviour. *Journal of Marketing*, 80(1), 7-25.
- Kumar, V., Choi, J. B., & Greene, M. (2017). Synergistic effects of social media and traditional marketing on brand sales: Capturing the time-varying effects. *Journal of the Academy of Marketing Science*, 45(2), 268-288.
- Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, 80(6), 69-96.
- Li, F., Larimo, J., & Leonidou, L. C. (2021). Social media marketing strategy: Definition, conceptualization, taxonomy, validation, and future agenda. *Journal of the Academy of Marketing Science*, 49(1), 51-70.
- Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons*, 52(4), 357-365.
- Marchand, A., Hennig-Thurau, T., & Flemming, J. (2021). Social media resources and capabilities as strategic determinants of social media performance. *International Journal of Research in Marketing*, 38(3), 549-571.
- Mehrabian, A., & Russell, J. A. (1974). *An Approach to Environmental Psychology*. Cambridge, MA: The MIT Press.
- Misirlis, N., & Vlachopoulou, M. (2018). Social media metrics and analytics in marketing—S3M: A mapping literature review. *International Journal of Information Management*, 38(1), 270-276.

- Moore, J. N., Hopkins, C. D., & Raymond, M. A. (2013). Utilization of relationship-oriented social media in the selling process: A comparison of consumer (B2C) and industrial (B2B) salespeople. *Journal of Internet Commerce*, 12(1), 48-75.
- Neslin, S. A., Grewal, D., Leghorn, R., Shankar, V., Teerling, M. L., Thomas, J. S., & Verhoef, P. C. (2006). Challenges and opportunities in multichannel customer management. *Journal of Service Research*, 9(2), 95-112.
- Olanrewaju, A. S. T., Hossain, M. A., Whiteside, N., & Mercieca, P. (2020). Social media and entrepreneurship research: A literature review. *International Journal of Information Management*, 50, 90-110.
- Pauwels, K., & Neslin, S. A. (2015). Building with bricks and mortar: The revenue impact of opening physical stores in a multichannel environment. *Journal of Retailing*, 91(2), 182-197.
- Picot-Coupey, K., Huré, E., & Piveteau, L. (2016). Channel design to enrich customers' shopping experiences: Synchronizing clicks with bricks in an omnichannel perspective – the Direct Optic case. *International Journal of Retail & Distribution Management* 44(3), 336-368.
- Porteous, C. (2021). 97% of Fortune 500 companies rely on social media. Here's how you should use it for maximum impact. Available at: <https://www.entrepreneur.com/article/366240> (accessed 20 April 2021).
- PwC (2018). 2018 Global Digital IQ® Survey. Available at: 2018 Global Digital IQ® Survey Regional focus: the Middle East & Africa - PwC Middle East.
- Ramanathan, U., Subramanian, N., & Parrott, G. (2017). Role of social media in retail network operations and marketing to enhance customer satisfaction. *International Journal of Operations & Production Management*, 37(1), 105-123.
- Sautter, P., Hyman, M. R., & Lukosius, V. (2004). E-tail atmospherics: A critique of the literature and model extension. *Journal of Electronic Commerce Research*, 5(1), 14-24.
- Scherer, A., Wunderlich, N. V., & Von Wangenheim, F. (2015). The value of self-service. *MIS Quarterly*, 39(1), 177-200.
- Srinivasan, S., Rutz, O. J., & Pauwels, K. (2016). Paths to and off purchase: Quantifying the impact of traditional marketing and online consumer activity. *Journal of the Academy of Marketing Science*, 44(4), 440-453.
- Steinfeld, C., Ellison, N., Lampe, C., & Vitak, J. (2012). Online social network sites and the concept of social capital. In *Frontiers in New Media Research*, Eds. F. L. Lee, L. Leung, J. S. Qiu & D. Chu. New York: Routledge, 115-131.

- Stephen, A. T., & Galak, J. (2012). The effects of traditional and social earned media on sales: A study of a microlending marketplace. *Journal of Marketing Research*, 49(5), 624-639.
- Sun, Y., Liu, Y., Zhang, J. Z., Fu, J., Hu, F., Xiang, Y., & Sun, Q. (2021). The dark side of enterprise social media usage: A literature review from the conflict-based perspective. *International Journal of Information Management*, 51(35), 102393.
- Tafesse, W., & Wien, A. (2018). Implementing social media marketing strategically: An empirical assessment. *Journal of Marketing Management*, 34(9-10), 732-749.
- Tiago, M. T. P. M. B., & Verissimo, J. M. C. (2014). Digital marketing and social media: Why bother? *Business Horizons*, 57(6), 703-708.
- Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2015). From multi-channel retailing to omnichannel retailing: Introduction to the special issue on multi-channel retailing. *Journal of Retailing*, 91(2), 174-181.

# BUSINESS TRANSFORMATION THROUGH NEUROMARKETING: A CONTEMPORARY STRATEGY OF UNDERSTAND CONSUMER PERCEPTIONS, PREFERENCES, AND BEHAVIOUR

*Reason Masengu*  
*Chenjerai Muchenje*  
*Benson Ruzive*

---

## ABSTRACT

**Purpose:** Neuromarketing, a combination of neuroscience, psychology, and marketing, has been used by marketers to enhance the understanding of consumer behaviour and predict purchasing behaviours in complex marketing environments. Marketers who are incorporating neuromarketing in their strategy can understand and know the buy button. Understanding and use of neuromarketing are now being regarded as sources of competitive advantages. The aim of this study is to understand the perception of consumers on neuromarketing, its potential benefits, and risks. The main objective is supported by sub-objectives, namely: (a) to understand the influences and perceptions of neuromarketing (b) to identify the ethics and regulations of neuromarketing (c) to understand the critics of neuromarketing, and (d) to explain the application of neuromarketing in different industries.

**Methodology:** This study used Preferred Reporting Items for Systematic Review (PRISMA). This methodology used extensive literature search and analysis to understand the concept of neuromarketing and identify gaps within the study area. A systematic cross-sectional review of the literature was used to get an in-depth and better understanding of the study area to come up with well-thought-out conclusions and recommendations.

**Findings:** The study established that consumer preferences, behaviour, thoughts, and actions stem from emotions which could be accelerated by neuroscience to design products that ignite the purchase process. Product recognition is increased by adverts with emotional content (Ambler et al., 2000) and higher levels of recognition and memory are aroused by emotional advertisements compared to merely cognitive thinking (Hafez, 2019). Companies that engage in neuromarketing must seek the consent of participants if ethical considerations are to be upheld. Neuromarketing literature is still in its infancy, and therefore more research is required to substantiate some of the claims made so far.

**Limitations of the study:** The study was carried out using a cross-sectional literature review, making it difficult to generalise the results.

**Originality and future scope:** To the best of the research team's knowledge, this study is an original one whose foundation will be based on the literature reviewed from previous studies.

**Practical Implications:** The study is expected to enhance knowledge by identifying gaps and building on previous studies. Corporates, consumers, and policymakers are expected to benefit from the study by having a better understanding of neuromarketing.

**Keywords:** Neuromarketing, neuroscience, consumer behaviour, consumer preferences, consumer perception

## 1. INTRODUCTION AND BACKGROUND TO THE STUDY

Understanding consumer behavior have been a key debate in marketing discussions. This debate has come into the fold due to the necessity of understanding the ever-changing consumer behavior, attitudes, and tastes. The complexity of human behaviour and the mind has prompted marketers to identify solutions to answer and solve some of the mysteries surrounding certain behavioral traits hidden in the consumer's brain. The need to have deeper insights into consumer conduct has led to a new marketing concept of neuromarketing. Neuromarketing combines neuron science and marketing to get a deeper understanding of consumer decision-making and processes.

According to Deb (2021) and Vences et al., (2020a) views, Neuromarketing is an octopus-like phenomenon that combines neuroscience, psychology, and marketing. Neuroscience is currently being used to measure and understand how various scientific knowledge influences marketing decisions in consumer minds. Neuroscience is the combination of neurological techniques and traditional and conventional marketing strategies (Vences et al., 2020a). According to Morin (2011), the concept of neuroscience application was controversial when it was introduced in 2002, although its continued use by big companies has brought its credibility among marketers. The authors (Deb, 2021; Morin, 2011; Vences et al., 2020b) concur that neuromarketing applies to cutting-edge techniques that directly probe the consumer minds requiring cognitive or conscious participation. While bringing in a new norm, Neuromarketing had serious concerns with ethical considerations, availability of specific skills, expensive equipment, and privacy (Plakhin et al., 2018).

Over the past years, a lot of money has been invested in product development and marketing activities as much as the products and campaigns failed to fulfill customer expectations (Morin, 2011). Many campaigns fail to attract much-needed customers, and they fail to have a positive impact on customers' minds. The brands are easily forgotten due to the use of traditional marketing methods in understanding consumer buying behaviour.

Neuromarketing is being incorporated into most advertising industry operations to assist in understanding how the human brain is psychologically affected by marketing strategies (Morin, 2011). Marketers are seized with trying to understand the part of the brain that is essential in making the buying decision (Ahmed et al., 2022; Zhu et al., 2022). Izadi et al., 2022) allude that the fusion of neuroscience and marketing is assisting marketers in clicking the buy button in the consumer's brains.

The concept of neuroscience has been used in several disciplines to understand behavior; however, marketing science has been lagging in its application of decision- making (Zhu et al., 2022). Neuromarketing has ushered in a new discourse in the commercial marketing communication field by applying neuropsychology to market research, studying consumers' sensorimotor, cognitive, and affective responses to marketing stimuli (Plakhin et al., 2018). It has assisted marketers to gain insight into customers' motivations, preferences, and decisions, which can help inform creative advertising, product development, pricing, and other marketing areas. According to Antoniak (2020), Neuromarketing has been pivotal in highlighting blind spots left by traditional methods of market research, linking physiological reactions to content, improved the reliability of results and value for money.

## **2. INFLUENCES AND PERCEPTIONS OF NEUROMARKETING.**

Understanding what causes consumers to desire goods or services is important in business as this may leverage the performance of the company. Decisions and choices made by consumers are not exclusively and purely on a conscious and rational basis, but sometimes these decisions are purely unconscious. Traditionally, studies focused their attention on understanding consumer choices, but this school of thought has been superseded by behavioral economics. Consumer preferences, behaviour, thoughts, and actions stem from emotions as a fundamental source that triggers purchase behaviour (Ferman & Kurtoglu, 2020). Drivers of consumer needs were first highlighted by Maslow, and these have since been widely used in studies. These needs start from physiological, which is the need for food and water, then comes safety needs and shelter, followed by belongingness in which consumers can exhibit traits of imitating what others in their group are doing for the sake of not being left out of esteem and finally self-actualization (Stanton et al., 2017).

Ariely and Berns (2010) affirm that marketers and scholars have recently paid attention to neuromarketing for two fundamental reasons. The first reason is that understanding these dynamics will help offset the costs and benefits of such studies. Costs relate to the investments targeted at understanding the behavior of the mind of the consumer, and benefits refer to designing the desired products or services after fully understanding these perceptions, thereby reducing product failure. Previous research reflected that emotional advertising generated higher levels of recognition and memory as compared to purely cognitive (Hafez, 2019). Ambler et al. (2000) posit that attractive advertisements with emotional content can

be developed by marketing practitioners to create a favorable brand image in the minds of consumers. This synthesizes the view that emotions play a role in persuading customers in making decisions to buy products or services.

The relationship between emotions induced by advertisements containing audio and video illustrations was studied by (Baraybar-Fernández et al., 2017). The researchers used six basic emotions: joy, surprise, anger, disgust, fear, and sadness. The study found that sadness was the most prevalent emotion influencing purchase decisions. Pletikosa & Michahelles (2013) studied how content communicated by a company on Facebook affects user behavior. The study found that entertainment content is the most influential, posts with information related to the brand increase the level of engagement, photos are the most attractive type of publication medium, and posts shared on weekdays receive more comments. Anger is known to speed up the process of motivating people to act aggressively in their political communication.

Many authors have researched neuromarketing and tried to define it according to their contextual perspectives. Authors De Oliveira & Giraldi (2017) carried out an extensive analysis of definitions by 25 authors to come up with a conclusive Neuromarketing definition, and they defined it as follows:

"Neuromarketing is an interdisciplinary field of science that uses various tools traditionally used in medicine, psychiatry and psychology on neurofeedback, biofeedback and metabolic processes measures, in conjunction with traditional marketing tools in the search to understand better the most diverse types of emotions, cognitions, physiological reactions, behaviors and thoughts of economic agents, both conscious and unconscious related to issues of Marketing and its various sub-areas"

The authors produced a comprehensive definition that highlights the influences and perception of Neuromarketing. The definition gives an in-depth emphasis that Neuromarketing aims to influence and highlights the different tools used to ensure the influence of perception and emotions.

Neuromarketing combines neurology, psychology and marketing in order to analyse how the human brain reacts during the shopping experience or while getting in contact with a certain spot, brand, product or campaign (Rüschendorf, 2020). Its aim is to improve marketing strategies, reaching beyond the conscious hemisphere of the brain, to captivate the unconscious and unexpressed needs of the customer. Neuromarketing focuses on which emotions are relevant in human decision-making and uses this knowledge to make marketing more effective. The knowledge is applied in product design, enhancing promotions and advertising, pricing, store design, and improving the consumer experience.

In the whole skim of neuromarketing influences and perception are the key deliverables to ensure patronage and the delivery of business goals. It is paramount to realise that the profit-making agenda can only be realized when customers make a conscious or unconscious

decision to consume our products. Neuromarketing bridges the gap in driving consumers to take the next of liking or consuming products. It is, therefore, cognisant for businesses to include Neuromarketing in their marketing strategy portfolio to achieve their different conversion goals.

### **3. ETHICS AND REGULATIONS IN NEUROMARKETING**

Several definitions of ethics have been advanced, including that these are theories or principles of behaviour within the branch of philosophy aimed at upholding morality (Bulley et al., 2018). Ethics govern the conduct and behaviour of people, including influencing their decision-making habits (Detert et al., 2008). When carrying out any actions, they are judged either as right or wrong, and this is summed up as morality, referring to the acceptability of that action within a given society.

Ethics are guidelines that regulate an individual's behaviour. In research, these are regarded as vital because they provide a standard of integrity as humans, animals and other biological subjects are used (Bulley et al., 2018). This demands some form of guarantee or precautions regarding the safety, welfare, dignity, and respect of the subjects involved in the study. When a study involves children, ethical issues arise because rarely are these children consulted and given a chance to make independent and informed choices (Alderson & Morrow, 2020).

There has been a debate about using of neuromarketing since it became a topical issue a few years ago. Some people believe that it is a sensitive technique that should be regulated, while others believe that it is an important tool that can be used to improve marketing campaigns. What is the ethical nature of marketing campaigns that use information against an individual's permission?

There are ethical concerns about the use and misuse of neuroscience techniques with the goal of understanding consumer behaviour. There is concern that neuromarketing may be used not only to predict individual consumer choices but also to influence those choices in a way that benefits the company. In addition, the interests of companies that do neuromarketing can be completely different from those of the consumers who use them for their research (Luna-Nevarez, 2021).

According to Thomas et al. (2016), neuromarketing ethical issues can be traced in the bioethical tradition, where questions like the protection of human research subjects, informed consent, privacy, and autonomy are common topics. Thomas et al. (2016) also highlight that giving insights into the subconscious is even more problematic because it lacks Informed consent and laments the absence of ethics and research data practices, and advocates for the creation of neuro ethics and creation of standards to guide neuro marketing processes. Mohd Isa et al. (2019) highlight autonomy, informed consent, confidentiality, privacy, benevolence, and no maleficence-as major issues of ethical concerns with neuromarketing.



Every person has the freedom to choose and make decisions on what they want at any given time without being coerced or manipulated. This is referred to as autonomy and is associated with allowing customers to make informed decisions about products or services they choose to buy (Mohd Isa et al., 2019). On the contrary, research has shown that the emergence of neuromarketing has led to neglecting the autonomy of customers largely because their minds have been manipulated so that they choose certain products (Lara & Dierichsweiler, 2014).

Michael et al. (2019) highlight that conscious decisions are demanding in every decision-making process; however, the unconscious decision (emotional and brain influence responses) has long been known to influence impulsive consumer decisions. Michael et al. (2019) suggest that the unconscious component of the brain may drive or affect overt preferences of consumer purchase decisions. For Dunn et al. (2011), brain studies on decision-making may have ethical issues regarding informed consent and (Swift, 2011), informed consent relates to the ability of an individual to decide without any forms of coercion, under the influence and force or fraud. Neuromarketing violates these important aspects of informed consent (Dunn et al., 2011) and the ability to make decisions without any external influence (Swift, 2011).

#### **4. CRITICISM OF NEUROMARKETING**

Some researchers question the validity and reliability of experiments used in neuromarketing because it is a relatively new research method. Neuromarketing research often has limited applicability because it relies on single experiments that cannot measure all the factors influencing consumer behavior. The large sample size required for neuromarketing studies is usually costly, so it is hard to know if the results of these studies are reliable. It is difficult to measure brain activity if consumers are not willing to participate; as such, not all samples are representative of the population. Additionally, the ethical issues surrounding the use of subjects for neuroscience studies are also apparent in neuromarketing, where several companies are in the habit of hiding their marketing research strategies.

There is some extent of worry ethicists over the behavior by interventionists who alter the mind of participants directly through the manipulation of events and systems without the consent of the subjects (Levy, 2009). Much criticism has also come from the viewpoint that these companies manipulate the social space of the subjects for their benefit by increasing the consumption of products or services (Levy, 2009). A recent study was conducted to evaluate consumer preferences for Coca-Cola or Pepsi. The results were fascinating in that when the subjects were not alerted to which drink they were drinking, some of their brain parts were not active, but when they were told, those parts became active- the dorsolateral prefrontal and hippocampal-responding to Coke (McClure et al., 2004). This was further highlighted by (Hamilton & Dennis, 2005) as a disturbing trend which leads to the conclusion that not only have people been so brainwashed into drinking Coca-Cola, but their brains have

been reconfigured to want it. Similarly, sentiment has been shed about the use of oxytocin to increase confidence in speakers at political rallies (Damasio, 2005). Children and youth are increasingly concerned about the tools, techniques, and ethics used in studies involving them. This is to avoid any potential manipulation or harm to the children and youth involved or taken advantage of by researchers (Bulley et al., 2018).

Ethical issues in neuromarketing have been referred to as guiding principles that companies and researchers must adhere to when conducting studies that apply neuroscience (Mohd Isa et al., 2019). Some critics argue that neuromarketing has negative impacts on consumers despite signs that have shown the effectiveness of neuroscience in marketing. It is claimed that neuromarketing possesses some form of manipulation of consumers' minds that influences their decision-making in the buying processes (Berlinska & Kaszycka, 2016). There is an element of violation of ethical boundaries as well as breaking consumers' trust (Stanton et al., 2017). For example, the use of children mentioned above without their consent. Questions that arise include: Where then, is privacy? Where, then is secrecy? Where, then is humanity and integrity if people are used against their consciences?

Another school of thought argues that there is greater inequality with regard to the acquisition of machines used in neuroscience, that is, the fMRI and the EEG machines, as smaller companies can hardly afford to buy these machines (Mohd Isa et al., 2019). There is a probability that big companies can use neuromarketing to come up with superior products and services than small companies that will ultimately be pushed out of the market. If the aim of neuroscience is to understand consumer minds, a set of laws are required and should be put in place to ensure that actions of companies taking neuromarketing on board embrace ethical actions. Sentiments advanced by critics of neuroscience are that researchers in that field want to understand the consumer's mind and come up with a super-effective message that will act as a push button to trigger the action of buying in the mind of the consumer. Such action has been regarded as immoral and dishonest (Murphy et al., 2008). It, therefore, follows that some guidelines and ethical codes in respect of companies' ethical behavior are needed to safeguard the interests of the consumer (Mohd Isa et al., 2019). These rules will form an ethical code by which companies must abide (Mohd Isa et al., 2019).

## **5. APPLICATION OF NEUROMARKETING IN DIFFERENT INDUSTRIES**

The application of digital technology for political marketing has been used for more than a decade in the USA, and the use of sophisticated tools and techniques (computational politics) is well documented (Tufekci, 2017). There has been a rapid use of neuromarketing across different industries around the world despite its criticism. The 2016 Donald Trump's political campaign is believed to have used neuromarketing techniques to manipulate consumer's minds (Hegazy, 2021). The victory raised too much confusion about the tools and techniques used by Donald Trump's political campaign. The Cambridge Analytica was among one of

the controversial companies using neuromarketing techniques to manipulate consumer behavior (Chester & Montgomery, 2017). The election results became one of the leading discussions if the campaign could have used data from 50 million Facebook profiles and scientific methods to influence the election (Abbas et al., 2019). Consumer sophistication is becoming a major concern in today's business. Marketers have been calling for the need to research using artificial intelligence that provides real-time consumer engagements (Sung et al., 2020). In complex marketing environment, researchers advocated for the application of psychophysiological and neuroscientific techniques to understand consumer cognitive responses to marketing activities (Hegazy, 2021). Although the application of neuromarketing has several critiques, its use commenced as early as the 1960s. Eye-tracking methods have been used in consumer research (Wang & Minor, 2008). The combination of eye tracking and facial recognition analysis in marketing research has proven effective (Isabella et al., 2015). Using neuroscience in research to analyse consumers' brains is a significant improvement as it provides information on ideal generation to the point the product is introduced into the market (Ariely & Berns, 2010; Khushaba et al., 2012)

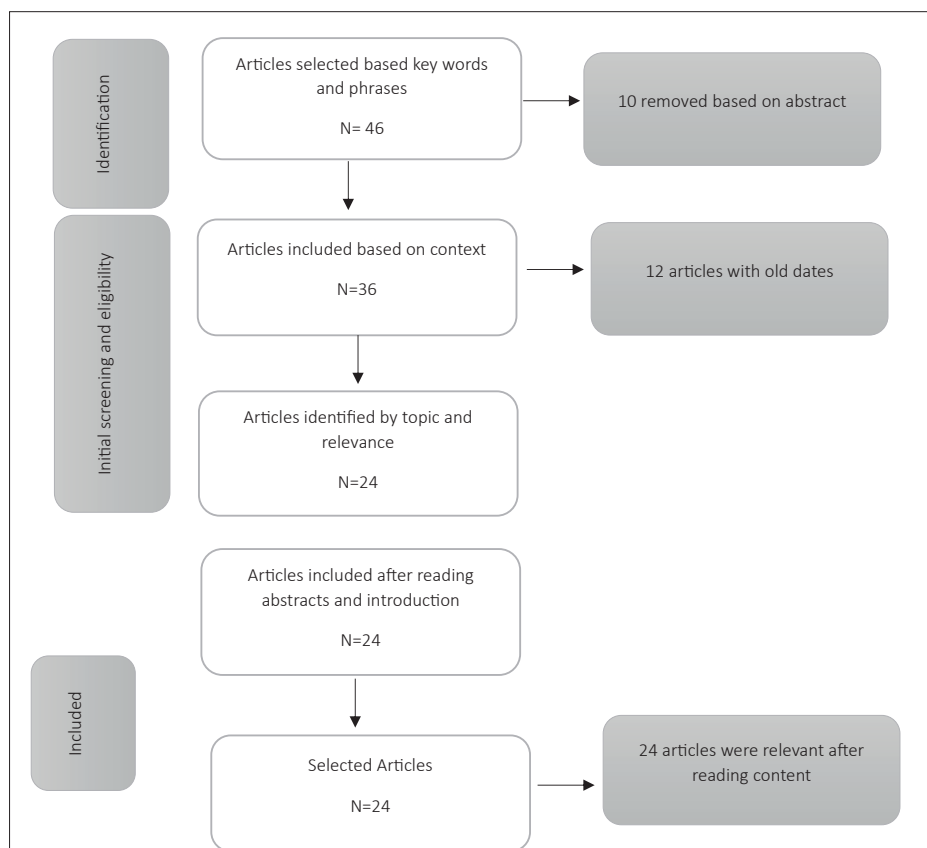
Blue-chip companies have used neuromarketing to understand the consumer buy button. Microsoft and Google use neuromarketing techniques in market analysis and product development. Google is known for using neuroscience in search engine optimization and improving website appeal, unique content and consumer emotional engagement (Lindquist, 2014). In addition, Frito-Lay used electroencephalogram (EEG) to study consumer brain activity in focus groups. The results found positive brain activity in consumers who liked an advertisement. This helped the company in developing insightful advertisements that stimulate the purchase decision (Lindquist, 2014; Thiele, 2019). The results were a wonder as participants in the focus group stated that they disliked the advert, yet the EEG study on the same subjects proved contrary. Hyundai has used EEG to understand consumer preferences that lead to purchase decisions (Hyundai MOBIS, 2022), Yahoo used EEG to test advertisements before airing on Television, and PayPal used neuromarketing to influence the online consumer to use their online payment service (Lindquist, 2014). Hyundai's use of EEG led to a conclusion on how consumers make the decision to purchase, leading to the company adjusting the interior design of their cars based on EEG findings (Burkitt, 2017).

## **6. RESEARCH METHODOLOGY**

This study used the PRISMA methodology to conduct a systematic literature review. The initiative was developed by researchers to improve the quality of review methods reported in published papers. PRISMA is a new review process that is based on scientific principles, which makes it more reliable than traditional reviews. PRISMA is an exhaustive literature search from published material. In this study, we used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which were proposed by (Liberati et al., 2009) and updated by (Sarkis-Onofre et al., 2021).

The systematic literature review methodology was used because it allows large quantities of information to be reduced into palatable pieces of information for digestion. It also allowed for the integration and analysis of information to produce resultant themes. Supported by Gough et al. (2017), the methodology was chosen because bias is reduced, and due to the transparency of the methodology and search strategy enhancement, it is replicable. Although this methodology is more rigorous, it is time-consuming and grey literature (such as government reports and policy documents) is not usually included, which may bias perspectives.

Figure 1 displays the flow diagram for the current study using the PRISMA approach. The search query was "neuromarketing, neuroscience, consumer behavior, consumer preferences, and consumer perception. This search yielded 46 pieces of literature, 24 of which were included in this study. The types of publications were quantitative, qualitative, and conceptual. The selection of articles was based on language. All non-English publications were eliminated, followed by a criterion that articles must be peer-reviewed and published in respectful to academic journals or blogs.



## **7. FINDINGS AND DISCUSSION**

### **7.1. *Influences and perceptions of neuromarketing.***

Literature reveals that consumers make unconscious decisions in their purchases, especially when they are persuaded, and this persuasion can be in the form of outside forces. Neuromarketing falls under the current branch of behavioural economics that seeks to understand consumer behaviour as opposed to traditional approaches that seek to understand consumer choices. Neuromarketing has been summarised as having two-fold purposes in marketing: first is, understanding the dynamics of consumer perception, and second, it aims at offsetting the cost and benefits of understanding consumer behaviour. Basic emotions that is, surprise, joy, disgust, anger, fear, and sadness, have been identified as influencing the purchasing decisions of consumers in marketing. These emotions play an influencing role in consumer buying decisions. Literature reveals that social networks are attached to emotions in moulding or contributing to consumer buying decisions because consumers tend to follow what their peers are doing.

### **7.2. *Ethics and regulations of neuromarketing***

Ethics is a branch of philosophy that is aimed at upholding morality (Bulley et al., 2018), and it takes up most of the aspects of human life. Society will judge something is done either as right or wrong, and that points to the values and morals that are acceptable within the spheres and understandings of that society. The use of animals and children in research studies has been widely criticised because of the lack of consent from those parties. (Bulley et al., 2018) state that children are rarely consulted in research violates their freedom of choice. Criticism laid against neuromarketing is that since its emergence, there has been no visible regulation aimed at protecting consumers (Luna-Nevarez, 2021). Motives for undertaking neuroscience in neuromarketing differ from one company to the other, with some aiming at manipulating and influencing consumer decision-making after predicting their choices (Stanton et al., 2017). Autonomy in decision-making by the consumer is violated.

### **7.3. *Critics of neuromarketing***

Neuromarketing has been criticised on the grounds that it uses single experiments rather than repeat experiments to come up with conclusions about the mind of consumers, therefore these conclusions cannot be conclusive as they cannot be applied to the general population. The equipment that is used in neuroscience is expensive and prohibits the use of large samples. Scientific research requires large samples to prove the repeatability of certain traits under investigation. In addition, not all samples are representative of the population from which they are drawn, as some people refuse to participate in research studies. Companies that engage in neuroscience to enrich their neuromarketing strategies and they do not expose these motives to participants. Literature shows that companies manipulate the social space of subjects by increasing these subjects' consumption patterns solely for the benefit

of these companies. In politics, a substance called oxytocin has been used to bolster the trust of speakers at political rallies. Researchers in neuromarketing want to understand the consumers' minds and come up with super-effective messages that trigger buying actions. This amounts to dishonesty and a lack of morality.

#### **7.4. *Application of neuromarketing in different industries***

The use of digital technology in political marketing has been rampant for a decade. Artificial Intelligence has been applied to establish real-time consumer engagements and consumer responses to marketing activities. (Pozharliev et al., 2017) in advertising, neuroscience has been used to determine the level of attention, emotions, preferences, and future purchasing behavior of consumers in relation to advertising campaigns to which they have been exposed. Wei et al.(2018) posits that peer pressure and other psychological or sociological phenomena regarding individuals within the sample have a negative influence on the efficacy of the research.

### **8. CONCLUSION**

The research team concluded that while neuromarketing is a necessity for companies that engage in neuroscience for them to remain valid and competitive, caution must be taken as over-reliance on results from these studies may be misleading as previous research indicates that social networks have an impact on buying decisions. Stanton et al., (2017) posit that motives for undertaking neuroscience in marketing differ, and they can include manipulating consumers. This is an unwelcome development and therefore, companies must seek consent from participants before the start of any such study. In addition, authorities and policymakers must come up with a legislature that protects the consumers, especially children and other members of society who cannot make rational decisions on their own.

### **9. IMPLICATION FOR FUTURE STUDY**

Neuromarketing has the potential to provide a new and deeper understanding of consumer perceptions, preferences, and behaviors. This field combines neuroscience and marketing principles to study brain responses to marketing stimuli, allowing marketers to better understand what drives consumer behavior and make more informed decisions. Neuromarketing has the potential to improve marketing strategies and increase the effectiveness of advertising efforts by providing insight into the unconscious motivations and emotions that influence purchasing decisions. As a result, sales and customer satisfaction may increase.

## 10. RECOMMENDATIONS FOR FURTHER STUDIES

- Improving measurement methods: As the field develops, researchers should concentrate on improving methods for measuring brain activity and consumer responses to marketing stimuli.
- Broadening the scope of research: Neuromarketing research should look into new products, markets, and cultures to gain a better understanding of consumer behavior.
- Integrating additional data sources: Including self-report measures, eye-tracking, and biometrics in the mix can provide a complete picture of consumer behavior.
- Examining ethical concerns: As neuromarketing becomes more common, it is critical to examine ethical concerns such as privacy, informed consent, and the potential for manipulation.
- Cross-cultural studies: Cross-cultural differences in consumer behavior and brain responses to marketing stimuli should be investigated in neuromarketing research.
- Long-term effects: Research should look into the long-term effects of marketing messages on consumer behavior, memory, and attitudes.

## REFERENCES

- Abbas, A. al, Chen, W., & Saberi, M. (2019). The Impact of Neuromarketing Advertising on Children: Intended and Unintended Effects. *KnE Social Sciences*, 1–16–1–16. <https://doi.org/10.18502/KSS.V3I25.5187>
- Ahmed, R. R., Streimikiene, D., Channar, Z. A., Soomro, H. A., Streimikis, J., & Kyriakopoulos, G. L. (2022). The Neuromarketing Concept in Artificial Neural Networks: A Case of Forecasting and Simulation from the Advertising Industry. *Sustainability*, 14(14), 8546. <https://doi.org/10.3390/SU1414854>
- Alderson, P., & Morrow, V. (2020). *Ethics of research with Children and young people* (2nd ed.). SAGE Publications London.
- Ambler, T., Ioannides, A., & Rose, S. (2000). Brands on the Brain: Neuro-Images of Advertising. *Business Strategy Review*, 11(3), 17–30. <https://doi.org/10.1111/1467-8616.00144>
- Antoniak, M. (2020). Benefits and threats of neuromarketing: theoretical background and practical use. *Scientific Papers of Silesian University of Technology – Organization and Management Series*, 2020(148), 9–25. <https://doi.org/10.29119/1641-3466.2020.148.1>
- Ariely, D., & Berns, G. S. (2010). Neuromarketing: the hope and hype of neuroimaging in business. *Nature Reviews. Neuroscience*, 11(4), 284. <https://doi.org/10.1038/NRN2795>
- Baraybar-Fernández, A., Baños-González, M., Barquero-Pérez, Ó., Goya-Esteban, R., & de-la-Morena-Gómez, A. (2017). Evaluation of emotional responses to television advertising through neuromarketing. *Comunicar*, 25(52), 19–28. <https://doi.org/10.3916/C52-2017-02>
- Berlinska, E., & Kaszycka, I. (2016). (2) (PDF) *Neuromarketing - Chance or Danger for Consumers in Opinion of MCSU's Students*. [https://www.researchgate.net/publication/349501100\\_Neuromarketing\\_-\\_Chance\\_or\\_Danger\\_for\\_Consumers\\_in\\_Opinion\\_of\\_MCSU's\\_Students](https://www.researchgate.net/publication/349501100_Neuromarketing_-_Chance_or_Danger_for_Consumers_in_Opinion_of_MCSU's_Students)
- Bulley, C. A., Braimah, M., & Blankson, F. E. (2018). Ethics, Neuromarketing and Marketing Research With Children. *International Journal of Customer Relationship Marketing and Management (IJCRMM)*, 9(2), 79–95. <https://doi.org/10.4018/IJCRMM.2018040105>
- Burkitt, L. (2017). (2) (PDF) *A view on Tools, Applications, and Challenges of Neuromarketing [in Persian]*. [https://www.researchgate.net/publication/314284279\\_A\\_view\\_on\\_Tools\\_Applications\\_and\\_Challenges\\_of\\_Neuromarketing\\_in\\_Persian](https://www.researchgate.net/publication/314284279_A_view_on_Tools_Applications_and_Challenges_of_Neuromarketing_in_Persian)
- Chester, J., & Montgomery, K. C. (2017). The role of digital marketing in political campaigns. *Internet Policy Review*, 6(4), 1–20. <https://doi.org/10.14763/2017.4.773>



- Chi, C. (2022). *How Neuromarketing Can Revolutionize the Marketing Industry [+Examples]*. <https://blog.hubspot.com/marketing/neuromarketing>
- Damasio, A. (2005). Human behaviour: brain trust. *Nature*, 435(7042), 571–572. <https://doi.org/10.1038/435571A>
- Deb, A. (2021). *A Systematic Literature Review on Neuromarketing-A new Horizon of Marketing*. [www.ijedr.org](http://www.ijedr.org)
- de Oliveira, J. H. C., & Giraldo, J. D. M. E. (2017). What is Neuromarketing? A Proposal for a Broader and more Accurate Definition. *Global Business and Management Research: An International Journal*, 9(2), 19–29. <http://www.google.com.br/trends>
- Detert, J. R., Treviño, L. K., & Sweitzer, V. L. (2008). Moral disengagement in ethical decision making: a study of antecedents and outcomes. *The Journal of Applied Psychology*, 93(2), 374–391. <https://doi.org/10.1037/0021-9010.93.2.374>
- Dunn, L. B., Holtzheimer, P. E., Hoop, J. G., Mayberg, H. S., Roberts, L. W., & Appelbaum, P. S. (2011). Ethical Issues in Deep Brain Stimulation Research for Treatment-Resistant Depression: Focus on Risk and Consent. *AJOB Neuroscience*, 2(1), 29. <https://doi.org/10.1080/21507740.2010.533638>
- Ferman, A. M., & Kurtoglu, A. L. (2020). An exploratory research among fashion business leaders and neuromarketing company executives on the perception of applied neuromarketing. *Pressacademia*, 7(2), 72–80. <https://doi.org/10.17261/pressacademia.2020.1225>
- Gough, D., Oliver, S. and Thomas, J. (2017). *Introducing Systematic Reviews' in An Introduction to Systematic Reviews* (J. Gough, D., Oliver, S. and Thomas (ed.); 3rd ed.). Sage Publications Ltd.
- Hafez. (2019). *Neuromarketing: A New Avatar in Branding and Advertisement*.
- Hamilton, C., & Dennis, R. (2005). *Affluenza: when too much is never enough* | *WorldCat.org*. <https://www.worldcat.org/title/affluenza-when-too-much-is-never-enough/oclc/60695574>
- Hegazy, I. M. (2021). The effect of political neuromarketing 2.0 on election outcomes. *Review of Economics and Political Science*, 6(3), 235–251. <https://doi.org/10.1108/rep-06-2019-0090>
- Hudson, S., Roth, M. S., Madden, T. J., & Hudson, R. (2015). The effects of social media on emotions, brand relationship quality, and word of mouth: An empirical study of music festival attendees. *Tourism Management*, 47, 68–76. <https://doi.org/10.1016/j.tourman.2014.09.001>

- Hyundai MOBIS. (2022). *Hyundai Mobis M.VICS And Smart Cabin Secures Safe And Sound Autonomous Driving*. <https://www.hyundaimotorgroup.com/story/CONT0000000000043965>
- Isabella, G., Mazzon, J. A., & Dimoka, A. (2015). Culture Differences, Difficulties, and Challenges of the Neurophysiological Methods in Marketing Research. *Http://Dx.Doi.Org/10.1080/08961530.2015.1038761*, 27(5), 346–363. <https://doi.org/10.1080/08961530.2015.1038761>
- Izadi, B., Ghaedi, A., & Ghasemian, M. (2022). Neuropsychological responses of consumers to promotion strategies and the decision to buy sports products. *Asia Pacific Journal of Marketing and Logistics*, 34(6), 1203–1221. <https://doi.org/10.1108/APJML-01-2021-0026>
- Khushaba, R. N., Greenacre, L., Kodagoda, S., Louviere, J., Burke, S., & Dissanayake, G. (2012). Choice modeling and the brain: A study on the Electroencephalogram (EEG) of preferences. *Expert Systems with Applications*, 39(16), 12378–12388. <https://doi.org/10.1016/J.ESWA.2012.04.084>
- Lara, K., & Dierichsweiler, A. (2014). *Ethical Issues in Neuromarketing*. [www.scholar.google.com](http://www.scholar.google.com)
- Levy, N. (2009). Neuromarketing: Ethical and Political Challenges. In *Etica & Politica / Ethics & Politics*, XI (Issue 2).
- Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Medicine*, 6(7). <https://doi.org/10.1371/JOURNAL.PMED.1000100>
- Lindquist, M. (2014). *Straylight – TBT: Remembering five of the best-known cases in neuromarketing*. <https://www.straylight.se/tbt-remembering-five-of-the-best-known-cases-in-neuromarketing/>
- Luna-Nevarez, C. (2021). Neuromarketing, Ethics, and Regulation: An Exploratory Analysis of Consumer Opinions and Sentiment on Blogs and Social Media. *Journal of Consumer Policy*, 44(4), 559–583. <https://doi.org/10.1007/S10603-021-09496-Y>
- McClure, S. M., Li, J., Tomlin, D., Cybert, K. S., Montague, L. M., & Montague, P. R. (2004). Neural correlates of behavioral preference for culturally familiar drinks. *Neuron*, 44(2), 379–387. <https://doi.org/10.1016/j.neuron.2004.09.019>
- Michael, I., Ramsoy, T., Stephens, M., & Kotsi, F. (2019). A study of unconscious emotional and cognitive responses to tourism images using a neuroscience method. *Journal of Islamic Marketing*, 10(2), 543–564. <https://doi.org/10.1108/JIMA-09-2017-0098>

- Min, H., & Yun, S. (2019). *The Role of Social Media and Emotion in South - ProQuest*. <https://www.proquest.com/docview/2437905472>
- Mohd Isa, S., Azlina Mansor, A., & Razali, K. (2019a). Ethics in Neuromarketing and its Implications on Business to Stay Vigilant. *KnE Social Sciences*. <https://doi.org/10.18502/kss.v3i22.5082>
- Morin, C. (2011). Neuromarketing: The New Science of Consumer Behavior. In *Society* (Vol. 48, Issue 2, pp. 131–135). Springer Science and Business Media, LLC. <https://doi.org/10.1007/s12115-010-9408-1>
- Murphy, E. R., Illes, J., & Reiner, P. B. (2008). Neuroethics of neuromarketing. *Journal of Consumer Behaviour*, 7(4–5), 293–302. <https://doi.org/10.1002/CB.252>
- Plakhin, A., Semenets, I., Ogorodnikova, E., & Khudanina, M. (2018). New directions in the development of neuromarketing and behavioral economics. *MATEC Web of Conferences*, 184. <https://doi.org/10.1051/matecconf/201818404023>
- Pletikosa Cvijikj, I., & Michahelles, F. (2013). Online engagement factors on Facebook brand pages. *Social Network Analysis and Mining*, 4(3), 843–861. <https://doi.org/10.1007/S13278-013-0098-8>
- Pozharliev, R. I., Verbeke, W., & Bagozzi, R. P. (2017). Social Consumer Neuroscience: Neurophysiological Measures of Advertising Effectiveness in a Social Context. *Journal of Advertising*, 46(3), 351–362. <https://doi.org/10.1080/00913367.2017.1343162>
- Rüschendorf, J. (2020). Neuromarketing: Insights into the Consumer Brain and its Adaption to Brand Management. *Yrkeshögskolan Novia*, 1–65.
- Sarkis-Onofre, R., Catalá-López, F., Aromataris, E., & Lockwood, C. (2021). How to properly use the PRISMA Statement. *Systematic Reviews*, 10(1), 1–3. <https://doi.org/10.1186/S13643-021-01671-Z/METRICS>
- Stanton, S. J., Sinnott-Armstrong, W., & Huettel, S. A. (2017). Neuromarketing: Ethical Implications of its Use and Potential Misuse. *Journal of Business Ethics*, 144(4), 799–811. <https://doi.org/10.1007/S10551-016-3059-0>
- Sung, B., Wilson, N. J., Yun, J. H., & LEE, E. J. (2020). What can neuroscience offer marketing research? *Asia Pacific Journal of Marketing and Logistics*, 32(5), 1089–1111. <https://doi.org/10.1108/APJML-04-2019-0227>
- Swift, T. (2011). Desperation May Affect Autonomy but Not Informed Consent. *Ajob Neuroscience*, 2(1), 45. <https://doi.org/10.1080/21507740.2010.537293>

- Thiele, C. (2019). *The Technology Is Now Available, but Should Your Business Use It?* | chadjthiele.com. <https://chadjthiele.com/2019/01/15/the-technology-is-now-available-but-should-your-business-use-it/>
- Thomas, A. R., Pop, N. A., Iorga, A. M., & Ducu, C. (2016). Ethics and neuromarketing: Implications for market research and business practice. In *Ethics and Neuromarketing: Implications for Market Research and Business Practice*. <https://doi.org/10.1007/978-3-319-45609-6>
- Todd, P. (2022). *Subject guides: Systematic Review: PRISMA*. <https://guides.lib.monash.edu/systematic-review/prisma>
- Tufecki, Z. (2017). *View of Engineering the public: Big data, surveillance and computational politics* | *First Monday*. <https://firstmonday.org/article/view/4901/4097>
- Vences, N. A., Díaz-Campo, J., & Rosales, D. F. G. (2020a). Neuromarketing as an Emotional Connection Tool Between Organizations and Audiences in Social Networks. A Theoretical Review. In *Frontiers in Psychology* (Vol. 11). Frontiers Media S.A. <https://doi.org/10.3389/fpsyg.2020.01787>
- Vences, N. A., Díaz-Campo, J., & Rosales, D. F. G. (2020b). Neuromarketing as an Emotional Connection Tool Between Organizations and Audiences in Social Networks. A Theoretical Review. *Frontiers in Psychology*, 11, 1787. <https://doi.org/10.3389/FPSYG.2020.01787/BIBTEX>
- Wang, Y. J., & Minor, M. S. (2008). Validity, reliability, and applicability of psychophysiological techniques in marketing research. *Psychology & Marketing*, 25(2), 197–232. <https://doi.org/10.1002/MAR.20206>
- Wei, Z., Li, V. C., Wang, X., Supratak, A., Wang, P., & Guo, Y. (2018). Using Support Vector Machine on EEG for Advertisement Impact Assessment. *Frontiers in Neuroscience*, 12. <https://doi.org/10.3389/fnins.2018.00076>
- Zhu, Z., Jin, Y., Su, Y., Jia, K., Lin, C.-L., & Liu, X. (2022). Bibliometric-Based Evaluation of the Neuromarketing Research Trend: 2010–2021. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/FPSYG.2022.872468>



# REDUCTION OF THIRD-PARTY COOKIES – ITS EFFECTS IN DIGITAL MARKETING TRANSFORMATION

*Benson Ruzive*  
*Reason Masengu*  
*Chenjerai Muchenje*

---

## ABSTRACT

**Purpose:** Global businesses are transitioning from traditional marketing techniques to technology-focused marketing to remain competitive in today's shrinking marketplace. The growth of the digital business, driven in part by the widespread use of the Internet, has led to the development of various forms of Internet marketing, with third-party cookies being a particularly prominent tool. This chapter aims to fill gaps from previous research through a systematic literature review.

**Literature review:** Initial secondary data suggests that the proposed removal of third-party cookies will have both positive and negative impacts on digital marketing. On the positive side, consumer privacy rights will be upheld due to regulations like the European Union's General Data Protection Regulation (GDPR). On the negative side, marketers need to find alternative means of gathering information about consumer preferences and behaviours, which may not provide them with the desired market insights. Literature suggests that marketers can still obtain information about consumers through other websites they visit, creating profiles of the same consumers with ease. Cookies have allowed advertisers to accurately measure the success of their campaigns and track conversions from specific advertisements.

**Methodology:** Systematic literature review aimed at addressing the problem of insufficiently documented and transparent review processes in published papers about third-party cookies was conducted. Relevant literature that included research papers, journal articles, other English sources were considered. The use of sources written in English was aimed at avoiding translating versions into other languages because of costs related to the process.

**Findings:** Third-party cookies were used by AdTech companies to track and trace website visitors, collect useful information for targeted advertisements and improve the experiences of website visitors. Among the challenges faced by AdTech companies on over-reliance on third-party cookies information was collecting false data. For example, a user might be having more than one gadget making it hard to trace the visitor.

**Implications:** The disappearance of third-party cookies will create a new era of walled gardens in which individual companies will keep their data. Visibility will be reduced in the new era, and it is important for AdTech firms to partner with each other and share information. Users will most welcome privacy as their rights, such as accumulating their personal information by third-party companies, will no longer be violated. Nevertheless, firms need not panic in the wake of the disappearance of third-party cookies as they must concentrate on providing relevant and valuable information that carries content, create long-term sustainable solutions and share data across the open web.

**Keywords :** *Third-party cookies, advertising campaigns, digital marketing.*

## 1. INTRODUCTION

Companies have relied on cookies as a means of gathering information about their target audiences, including website visits, buying habits, and interests. This chapter examines the literature and the impact of the proposed removal of third-party cookies. It provides a background on the history of third-party cookies and how marketers have utilized them. Third-party cookies have played a significant role in web-based marketing, affecting the behaviour and attitudes of online consumers. The collection and analysis of consumer data for selective and targeted marketing have become central to digital marketing. However, in March 2020, Google announced its plan to remove third-party cookies from Chrome by 2023 and to develop alternative tracking methods. This unexpected announcement has caused confusion and speculation among digital marketers, who are unsure of the future of consumer behaviour tracking without objective profiling. The removal of third-party cookies may negatively impact the production of consumer metrics and the understanding of online consumer buying behaviour. This chapter aims to provide a historical overview of third-party cookies and their use by marketers, assess the impact of Google's policy change on digital marketing, explain the meaning of the new policy, explore customer acquisition without cookies, and suggest possible alternatives for monitoring online consumer behaviour post-third-party cookies. The next section delves into the background of the study.

## 2. BACKGROUND TO THE STUDY

The issue concerning customer privacy has been prominent in most marketing boardrooms. Customer lobby groups and activists have critically questioned the use of customers in many digital marketing activities by different companies. Customer tracking of behaviors has sparked privacy concerns and has been subject to the introduction of a vast number of regulations across the entire world (Geradin et al., 2020). The Biggest tech companies, such as Google and Apple (the so-called de-facto regulators), have been dominating the discourse.

For Miyazaki (2008), although the internet has revolutionized the way marketing is being done globally, internet cookies have been criticized by consumer advocates, policymakers,

and even marketers have raised the potential threat to consumer privacy and possible manipulation. The entire blame is being given to Google due to its vast capacity to host other websites and being one of the biggest search engines. Google possesses different kinds of data sets, which most privacy advocates believe unscrupulous and unethical behavior was involved in the collection process. Cookies tracking is synonymous with slavery, in the paper "Digital Slavery, Time for abolition." From both perspectives there is an increasing trafficking of personal data to supply algorithm-based analytics and Artificial Intelligence is enabling a new form of digital enslavement that has the potential to curtail liberty and cause harm.

Given the outcry from different stakeholders in 2016, the European Union passed the General Data Protection Regulation (GDPR) to regulate how companies process data related to online users (Ardon et al., 2022). It was made a requirement that websites should present cookies banners once a page is loaded, and visitors had to accept or reject cookies. Under the establishment of the law by the EU, Google faced several lawsuits. The France data protection regulator fined Alphabet Google \$57 million due to breaching online rules (handling personal data without consent for personalized ads), and in Ireland, it was fined 60 million Euros (Ardon et al., 2022; Reuters, 2021). The international community has increased its pressure to regulate the use of cookies as countries like Australia, Japan, and Canada have proposed the same level of regulations. In the United Kingdom (UK), advertising regulators announced the third-party cookie control regime (do not track mechanism) in 2013 (Groom, 2013), and the United States of America came up with the Data Processing Agreement Guideline (*Everything You Need to Know About Cookie Policy*, n.d.), European Union adopted the European Union Cookie Law also known as the **ePrivacy Directive** that requires consent from visitors before retrieving or storing their data (European Union, n.d.).

Collecting, processing, and leveraging clients' facts is the heart of Google's success, allowing them to attach customers to net content material and goal advertisements higher than anyone else (Dina Srinivasan, 2020). When comparing the marketing and marketing market, we first want not to forget the distinctive levels of a client's shopping journey (Leah Nylen, 2020). The techniques used to interact with potential clients always evolve from early-stage, growing logo awareness through making sure to buy attention and subsequently into retargeting purchasers with the goal of finalising a sale. To supply this capability, net marketing and marketing may be segregated into predominant formats, show ads, and seek ads, in which Google occupies a near-monopolistic position (Dina Srinivasan, 2020; Groom, 2013; Leah Nylen, 2020). Conversing with the different global regulations to curb the use of third-party cookies, Google announced that it would remove the third-party cookies from its popular search engine site Google Chrome. Digital marketers who used to benefit from utilizing Google applications to monitor online behaviour are unsure about their survival after removing third-party cookies. Some small companies believe this move will not put them out of business, and some even argue that the removing of third-party cookies will increase Google's monopolistic behaviour. This chapter explores the different dimensions of digital marketing post-third-party cookies.



Google was made public in 1998 and has grown its market capitalisation to \$1.438 trillion (YChats, 2021). This makes Alphabet (Google) the 4<sup>th</sup> most valuable company in the World by market cap. The company witnessed monumental success with many strategic acquisitions, building a monopolistic position in the marketing World (Ardon et al., 2022). This resulted in several anti-trust cases and unfair competition cases being raised against the company. Google increased in market value and share, hence enjoying the dominant position. Monetization of the web has granted it a competitive advantage at the expense of marketers and rival publishers (Ardon et al., 2022).

Google has grown in the digital age with greater control over gathering data using applications, and its market share has grown to over 70% (Statista, 2021). The major issue is not about growth but its unethical way of collecting richer data sets of users, largely unaware, who share personal information and intricate online user behavior in real-time (Ardon et al., 2022). This chapter comprehensively assesses the implication of Google policy change in digital marketing, explains the meaning of Google's new policy, understands customer acquisition without cookies and explores possible alternatives to monitor online consumer behavior post-third party cookies.

### 3. RESEARCH METHODOLOGY

The systematic literature review method employed in this study aims to address the problem of insufficiently documented and transparent review processes in published research papers. The method involves a comprehensive search of published material, including journal articles, blogs, and other relevant literature related to third-party cookies and their removal (Todd, 2022). The search process utilized specific keywords, such as **“Third-party cookies,” “Google cookies policy,” and “removal of cookies,”** to ensure a comprehensive collection of relevant information (Sarkis-Onofre et al., 2021; Todd, 2022; Tranfi et al., 2003). The study provides an in-depth examination of the impact of the removal of third-party cookies on digital marketing by analysing the existing literature on the topic. The results of the systematic literature review were used to identify gaps in previous research and provide recommendations for future studies. The use of this methodology provided a robust and comprehensive examination of the issue, helping to understand better the implications of the reduction of third-party cookies for the digital marketing landscape.

### 4. OVERVIEW OF THIRD-PARTY COOKIES AND THEIR SUBSEQUENT USE BY MARKETERS

According to Roberts (Lavin, 2006), a cookie is a small piece of software that a website places on a user's computer to store data about the user's activities on the site. Web cookies were first introduced in 1994 by Lou Montulli. They are used to store information about the users of websites, which the websites can access. The sites were able to recall certain information about the user, such as their login details or preferences. While the technology exists, Lou

describes the commercial benefits of cookie technology. (Louis Montulli II Invents the HTTP Cookie : History of Information, n.d.). Web cookies have been in use for a long time, and their use has continued to evolve over the years. While they were originally only used to store small amounts of data on a user's computer, (Sanchez-Rola et al., 2020) assume that cookies are now used to preserve a user's data, track their history and collect data to use advertisements.

According to Mary Roberts, in the early 2000s, companies began using cookies to track the online behavior of their customers. Online marketers have long been using cookies to track user behaviour and determine how to market products and services. Cookies help determine which website pages work and which need improvement (Demir et al., n.d.). Pantelic et al (2022) acknowledge that cookies are used to ensure that the website works properly and to improve it based on how you arrived at the site and what devices you are using. E-commerce websites place cookies on visitors' browsers to keep track of their login credentials, identify customers, and provide them with a customized shopping experience. Cahn et al., (2016) define first-party cookies as cookies placed by the website domain shown in the browser's address bar commonly used in e-commerce applications.

The continued use of cookies in online targeted marketing led to the development of third-party cookies. Third-party cookies allow advertisers to track users' movements across different websites and provide targeted ads. These concerns led to questions about privacy and the use of web cookies. Third-party cookies are placed by a domain other than the one shown in the browser's address bar. Third-party cookies are a common way for data brokerage firms, online advertisers, and tracking applications to collect information about people's online activities. Since their introduction in 1984, cookies have grown rapidly, occupying an important part of digital marketing decisions (Cheng et al., 2021).

Besides the benefits of third-party cookies, such as privacy and security, customers have been concerned about these issues for a long time. According to Marino, the major challenge with third- party cookies are the collection of massive, sensitive data. Third-party cookies can collect various personal data from individuals, including their IP addresses, search history, and device information. This data can also include private information about individuals' health, sexuality, family, political, and religious beliefs. This data can include your Google searches in the last five years, your credit card transactions, your profile on dating apps, and other activities. This data can create detailed profiles of users based on many data points. The collection of this information puts customer security at risk.

Lavin (2006) noted that while the cookies were collecting this important information about the customers, most customers who accept cookies have no idea what the cookies will be harvesting from their web experience. In his research findings, he suggests that there is a level of misconception about cookies that exists among many internet users, including those likely to be highly informed. (Bianco, 2020) also noted that while users rejected or accepted cookies, most of them do not know what the cookies do and whether they are good or bad for them, although issues to do with privacy and security were a matter of concern for the

few who understood the operations of cookies. To protect internet users, this has promoted several procedures to be followed in the operation of cookies. According to (van Eijk et al., 2012a), informed consent and data security are some of the issues that online vendors should take care of. In response to informed consent, vendors have introduced consent policies that users agree to. Unfair to the users is a long-time-consuming policy that they are required to acknowledge before they are allowed to continue browsing. This has resulted in most users accepting or rejecting the cookies so that they can carry out their work without being concerned about the consequences of the cookie acceptance or denial decision (Wills & Zeljkovic, 2011). This has left the life of the browsers in the hands of the vendors, and this has prompted regulatory authorities to come up with regulations that are meant to protect the ignorant public.

Regarding long and difficult to understand privacy policy, it must be the responsibility of the vendors to come up with simple ease to access and understand the privacy policy. The vendors also need to ensure that the consent process is simple, straightforward, and not laborious for users to confirm consent after appreciating the consequences. This two-way process requires users to be conversant with the process and understand the advantages and disadvantages of consenting to cookies. It is also important for the customers to understand more about cookies and their use by the vendors. As part of social responsibility and goodwill, vendors and bigger players like Google should educate their users about cookies and their uses. Informed users are empowered users who become aware of the impact of third-party cookies and their associated benefits and risks. Whilst Google, is phasing out third-party cookies, the issues of privacy and security also apply to first-party cookies.

The European Union introduced the e-Privacy Directive in 2003, which gave individuals the ability to choose whether to allow their data to be collected by cookies. This document was revised in 2009. Starting in 2009, Websites were required to get "explicit consent" from users before storing or accessing cookies on their devices (European Union, n. d.). On the one hand, Lavin (2006) argues that despite the privacy and security concerns, the customers benefit through increased service quality and improved service delivery.

The development of internet-based technology has brought about fewer possibilities for marketers. However, exploiting these opportunities without clear cookie regulations is detrimental to the companies and consumers. Many countries have introduced different regulations in line with cookie involvement. The European Union was one of the regional economies that introduced measures to protect consumers' privacy against cookies. Gurău et al., (2003) highlight the initiatives by France, UK, and USA to protect customers. The countries introduced laws centered on warning the clients about information access intentions. (van Eijk et al., 2012a) also underscored that the different legislation ensures that internet users are given a choice to approve access to information. The organisation obtaining information is also expected to guarantee the security of the collected data (Wills & Zeljkovic, 2011). The evolving nature of web cookies has seen a lot of changes in the business regulatory framework

in the business world. All these changes were meant to protect consumers from the misuse of information collected from internet users.

Google dominated the search engine market accounting for 92% market share (Statistica.com, 2022). To the shock of many advertisers, Google announced that it would remove third-party cookies from its Chrome browser. This has a major impact on advertisers, who will no longer be able to track users across the web. While Google is implementing these changes, authors like (Cheng et al., 2021) believe that this is in response to regulatory pressure. Cooper (2021) hints that the regulatory pressure intends to ensure that web users have more control of their data, which will negatively affect Google's advertising revenue. The removal of third-party cookies entails that advertisement targets will be reduced drastically which will also affect googles advertisement revenue. New forms of targeted advertising will likely to merge. It is critical to note that the demise of third-party cookies is not the end of targeted advertisement. It is expected that, in the short term, there will be an increase in first -party cookies. The first party- cookies will be expected to embrace privacy, consumer protection, and friendliness.

Geradin et al., (2021) agree that there are benefits to users in terms of privacy from Chrome's policy change. However, they note that this change will not limit the tracking of data conducted on the major platforms operated by Google and Facebook. The authors suggest that the expected privacy benefits will be relatively few in comparison to the expected costs. Geradin et al., (2021) also note accountability and antitrust issues as may distort competition, benefiting Google and leading to a total capture of the entire market. Google owns the career for many sites, which is Chrome. This gives them access to information more than any other online advertising vendor, so this can also be a further consolidation strategy by Google. A particular concern is that Google can still engage in cross-site tracking in a Privacy Sandbox world, relying on its popular Chrome browser. Google's conduct raises complex issues since competition and privacy considerations point to different policy directions. There is an interplay between privacy and competition.

## **5. CONTRIBUTIONS OF THIRD-PARTY COOKIES TO DIGITAL MARKETING**

Third-party cookies enable marketing companies to exercise behavioral targeting using digital applications (Demir et al., n.d.). Brands were able to track visitors on websites, collect information useful for target advertisements and improve the experiences of these visitors using cookies. A history of the visitor would then be created, leading to the creation of visitor profiles that are robust. (Johnson et al., 2020) claim that digital advertising companies receive fifty-two percent less revenue when internet users opt out of online targeted advertising. The same observation was raised by Ravichandran & Karula in (*Effect of Disabling Third-Party Cookies on Publisher Revenue*, 2019) when they pointed out that the effects of disabling third-party cookies area decline in revenue as noted among the top 500 publishers that losses of fifty

percent or more are experienced. Effective and ethical personalization is the gold standard in digital marketing. Nevertheless, the reality in today's business world is that overreliance on cookies may harm personalized efforts. For example, when cookies were first introduced, web visitors had one device, which made it easier to track them. On the contrary, these days, users barely have only one gadget, making it difficult to create consistent customer experiences across all those devices. Third-party cookies give marketers past information about users which is not necessarily what they will do in the future. A new era of walled gardens is coming in which companies enjoy first-party data advertisement creation and monitoring without interference from other companies.

## **6. IMPLICATIONS OF GOOGLE POLICY CHANGE IN DIGITAL MARKETING**

To address the first objective, literature was interrogated to establish why different stakeholders would either be interested or affected by the development. Several organisations collect data about users for the purposes of analysing it with regard to consumer behavior, attitudes, and habits (Pantelic et al., 2022). The authors further state that this data is vital because it affects the company's business and determines the future direction of the business. Advertisers have since been known to have used third- party cookies to compile long- term records of consumer behaviour when browsing through websites, enabling them to target these consumers. Third-party cookies have been described as an incredible way of getting the attention of customers through online advertising because they pop up while a person is in the middle of doing something and sometimes hinder progress in maneuvering or navigating through the webpage. Even though it could be unethical to interrupt someone during their business, these cookies have been credited for achieving much-needed success in advertising. The policy change by Google would mean it will be in control of any form of advertising through its search engine. Advertisers will certainly find some audience, but the challenge is that some of the target audience might not be interested in what would be on offer, thereby reducing the market size. The change will increase the value of deterministic data because that information will be true and difficult to come across. Probabilistic data, which defines an audience group with close precision to their habits and wants, will be harder to come by.

The announcement by Google of the new policy was a herald to the freedom of individuals when navigating and surfing the internet without any form of interruption from advertisers. This new policy will give few advertisers access to private individuals doing their private business, thus giving them privacy. The challenge with third- party cookies is that they are not generated by owners of a website that a consumer would have visited or is actively interacting with (Bianco. 2020). The author further opines that consumers have limited visibility regarding which companies are processing their information and how their data is shared with outside data collectors. This will not be good for consumer rights as this is a sign of violating consumers' rights.

## 7. LEGAL ASPECTS OF IMPLEMENTATION OF COOKIES

The privacy of users can be compromised, and since the primary use of these cookies is not revealed to consumers, it is illegal (Pantelic et al., 2022). The same authors define privacy as the right of an individual to manage his/her data and that no one is allowed access to the data the individual regards as personal. It is important that values pertaining to the right to privacy be respected, as that is a fundamental right of humanity. The processing of personal data requires some form of transparency for their collection procedures, and these organisations must have a legal basis for doing so (Degeling et al., 2019). It is a priority to comply with the law that governs the use of data obtained from users when processing it (Karunaratne, 2021).

The European Union has come up with a legislative, legal framework called the General Data Protection Regulation (GDPR), which seeks to give guidelines for the processing and handling of personal information from people living in the European Union (Frankenfield, 2019). The major question to be asked from such a development is, what protection is given to people living outside the EU whose data may be collected by firms operating from the EU? There must be consent regarding information that is collected from end-users, and this includes giving clear and comprehensive information about the purpose of the data being collected (Wessel-Tolvig, 2022).

Vollmer (2020), citing Recital 32 of the General Data Protection Regulation (GDPR) states that:

*“Consent should be given by a clear affirmative act establishing a freely given, specific, informed, and unambiguous indication of the data subject’s agreement to the processing of personal data relating to him/her, such as by written statement, including by electronic means, or an oral statement. This could include ticking a box when visiting an internet website, choosing settings for information society services or another statement or conduct which indicates in this context the data subject’s acceptance to the proposed processing of his or her data”.*

There has been concern regarding the use of cookies in online activities. In van Eijk et al., (2012) the tracking of online users came at the disadvantage of the users because users end up using control over their data and are prone to privacy intrusions and security. The removal of third-party cookies by Google can be seen as a welcome development in protecting consumers from such risks. Marketers have been calling for the removal of one size fits all cookies since some cookies were violating users’ privacy. Examples of these cookies are the spawning cookies (van Eijk et al., 2012b) or the flashy cookies that are difficult to detect or remove. There is a need to strike a balance between users gaining control of their data and the interests of online marketers using Google platforms to harvest users’ data (van Eijk et al., 2012).

## **8. THE FUTURE OF DIGITAL MARKETING WITHOUT THIRD-PARTY COOKIES**

Since the announcement by Google to remove third-party cookies, digital marketers have panicked and are waiting for the inevitable scenario. The removal of third-party cookies for tracking will influence digital marketing. This will imply that digital marketers must find new ways to track and monitor online users' engagements. The removal of third-party cookies will affect everyone; digital marketers will not be able to do targeted advertising, and 90% of all display impressions will not be digitally identified. It is important to note that advertisers will not be willing to invest in digital advertising. Companies are planning to create cookieless identity solutions such as the Unified ID 2.0, Neustar's Fabrick ID and LiveRamp's ATS. Google has indicated that there is a need to improve by increasing the users' privacy while at the same time providing companies to be competitive online before the removal of third-party cookies (Shein, 2022). To guarantee the sustainability of online engagements after the removal of third-party cookies, Google made a test run of the New Privacy Sandbox APIs while trying to incorporate feedback from developers, publishers, marketers, and regulators.

There is hope that more will be done to ensure that engagements continue to flourish post-third-party cookies (Parizo, 2022). Small companies will most likely suffer due to a lack of resources to track customers online. According to Cohen (2022), the removal of third-party cookies will cause marketers to revisit their online digital strategies; however, this is going to create new opportunities for companies to communicate with audiences in a much-personalised manner. In Cohen (2022) and Parizo (2022), there is widespread use of Google Chrome by marketers and companies, therefore, the removal of third-party cookies will end in personalised adverts in most companies. Embracing new and innovative technologies will be the remaining option for marketers (Parizo, 2022). The removal of third-party cookies will imply that marketers would gather directly from customers through devices they are using without any predictive modelling. To Cohen (2022), marketers can utilise other tracking technologies like device fingerprints and devise marketing and targeting methods without user data.

According to Benjamin (2022), marketers should not panic because of the removal of third-party cookies. Marketers must learn to become adaptable and adopt new methods and be able to test new strategies. In addition, Benjamin (2022) and Parizo (2022), concur that although marketers have enjoyed using third-party cookies, there are problems with cookies including issues of consumer privacy. So, its removal will guarantee online consumer's privacy and security. Relatedly, Benjamin (2022) indicates that recent studies on online personalisation revealed that 57% of the United States of America do not like ad personalisation, and 69% of global consumers believe the biggest beneficiaries of third-party cookies are brands not consumers (Cohen, 2022). This will imply that their removal may not impact consumer satisfaction. Removing third-party cookies means that marketers must pay for most of their



content rather than accessing content for free. This will also imply the growth of “walled gardens” that uses first-party cookies by Facebook and Netflix, among others (Benjamin, 2022; Parizo, 2022; Shein, 2022).

## **9. DISCUSSION OF FINDINGS**

In the new era in which third-party cookies will no longer be a viable business strategy, walled gardens will succeed them. Walled gardens enjoy some form of independence as they do not permit other digital advertising companies to have access to their customers as they surf through the websites. Customers remain logged on their devices in the walled gardens generation even if they decide to use many gadgets. Google is an example of a walled garden practice; once logged in, you can remain on that browser. Despite their promise to accord user privacy, walled gardens are being criticised for monopoly practices, lacking social networks and being a form of online marketplace. Nevertheless, AdTech companies are investing in privacy-compliant ID solutions that promise a persistent understanding of consumer behaviour and performance. Even though signs show that when a large and growing pool of participants are sharing IDs, the effects are the ability to increase accuracy and match rates, the moment has not yet arrived to give an effective judgement about the effectiveness of the approach and its long-term viability. Walled Gardens offer analytics services of their own, but there is a lack of transparency, thereby preventing companies from slicing and dicing their data in the most suitable and unique way.

Marketers must think about three basic things to survive in the future digital marketing field. First, they must provide consumers with relevant as well as valuable content that is guaranteed to protect those consumers' privacy. Secondly, AdTech companies must envision creating long-term sustainable solutions that are likely to face little or no threats. Third, sharing technology across the entire open web is of vital importance, thus preventing walled gardens. Authentication has been in place in digital technology, but this is one application which might be considered by AdTech companies to remain in use as that enables storing data related to consumers in their actual profiles. Sharing data with brands that have a strong association and affiliation with your business is going to be vital in the future of digital advertising. Customers are interested in the content, and as such, it is important for companies to consider rich content in their adverts for customers to be engaged. Lifetime value strategies must be developed that create meaningful relationships with customers as this is envisaged to drive business growth.

## **10. CONCLUSION**

It is estimated that Google has a market share greater than 70% (Statista, 2021) and that might have influenced its practice of collecting richer data from users who are, in most cases,



not aware that their information is being collected (Ardon et al., 2022). The internet has transformed the way marketing is being done globally, and one notable development is the birth of cookies. According to Chisnall (2020), tracking users by cookies is synonymous with slavery. In 2016, the European Union passed the General Data Protection Regulation (GDPR) for the purpose of regulating how companies process data related to online users (Ardon et al., 2022). It is worth noting that most customers/visitors on websites do not know that cookies are used to harvest their much-treasured personal data. (Bianco, 2020), posits that most users do not know whether cookies are good or bad, even though they accept or reject them. Vendors must come up with a simple way to access and understand privacy policy whose consent process is simple, straightforward, and not laborious.

The cookie policy change means that Google will be in control of any online advertising that will be done through its search engine. The use of cookies has been widely criticised on the basis that it is characterised by a lack of consent from users and is therefore regarded as illegal. The removal of cookies will affect everyone, including marketers, who will not be able to do targeted advertising on the one hand, and yet this development presents freedom to users by giving them greater privacy. However, there is hope for advertisers to keep the engagement with customers flourishing post- third-party cookies (Parizo, 2022). Benjamin (2022) points out that there is no need for markers to get into panic mode due to the removal of third-party cookies.

## **11. IMPLICATION**

The removal of third-party cookies is expected to have a significant impact on digital marketing. Companies have widely used third-party cookies to collect information about consumer behaviour, website visits, purchasing habits, and interests. The information gathered by these cookies has been critical in shaping companies' digital marketing strategies. Companies will lose access to this valuable data source if third-party cookies are reduced, forcing them to find alternative methods of gathering consumer information. Furthermore, the absence of third-party cookies may result in less targeted advertising, resulting in less advertising revenue. Advertisers will have to find new ways to reach their target audience, which may not be as effective as the targeted advertising enabled by third-party cookies.

Reduced use of third-party cookies may lead to a decrease in consumer trust, as consumers may believe their online privacy is being protected. As a result, consumer behaviour may change as they become more cautious about sharing personal information online. The reduction of third-party cookies is likely to have far-reaching implications for digital marketing, necessitating companies to adjust their strategies and find new ways of gathering consumer information. This change is expected to have an impact on both businesses and consumers, and it remains to be seen how digital marketing will evolve in the future.

## 12. RECOMMENDATION FOR FURTHER STUDIES

The reduction of third-party cookies is a complex and rapidly evolving topic that requires further research to fully understand its implications on digital marketing. The following are some recommendations for further studies:

- **Alternative methods of gathering consumer data:** Research could focus on exploring alternative methods of gathering consumer data and the effectiveness of these methods in comparison to third-party cookies. This research could evaluate the privacy concerns and ethical implications of these methods.
- **The impact on targeted advertising:** Further research could assess the impact of the reduction of third-party cookies on targeted advertising, including the effectiveness of alternative methods of reaching the target audience and the revenue impact on companies.
- **Consumer behaviour and privacy:** Research could focus on understanding the impact of the reduction of third-party cookies on consumer behaviour and online privacy. This could include studies on consumer trust, willingness to share personal information online, and the impact on the overall online experience.
- **The role of regulators:** Further research could focus on the role of regulators in shaping the future of digital marketing and the impact of regulations such as the General Data Protection Regulation (GDPR) on the reduction of third-party cookies.
- **The impact on small and medium-sized businesses:** Research could focus on the impact of the reduction of third-party cookies on small and medium-sized businesses, including their ability to gather consumer data, reach their target audience, and compete with larger companies.

## REFERENCES

- Ardon, L., Morelli, D., Villani, F., & Wheatley, D. (2022). *Towards a Fairer Digital Marketing Model*. <http://arxiv.org/abs/2201.05368>
- Benjamin, M. (2022). *How Will Marketing Be Affected by the Loss of Third-Party Cookies? - AX Insights*. <https://audiencex.com/insights/how-will-marketing-be-affected-by-the-loss-of-third-party-cookies/>
- Bianco, G. (2020). An empirical analysis of consumer response to Google's decision of phasing out third party cookies. <https://tesi.luiss.it/29414/>
- Cahn, A., Alfeld, S., Barford, P., & Muthukrishnan, S. (2016). An Empirical Study of Web Cookies. <https://doi.org/10.1145/2872427.2882991>
- Cheng, S., Lin, Y., Lu, R., & Zhang, X. (2021). Third-Party Cookies, Data Sharing, and Return Comovement \* Third-Party Cookies, Data Sharing, and Return Comovement. *Working Paper*.
- Cohen, M. (2022). *How Marketers Can Prepare for the Removal of Third-Party Cookies*. <https://www.entrepreneur.com/growing-a-business/how-marketers-can-prepare-for-the-removal-of-third-party/424104>
- Cooper, A. (2021, November 17). Google cookie cull: how we can all approach data differently. *The Drum*. <https://www.thedrum.com/news/2021/11/17/google-cookie-cull-how-we-can-all-approach-data-differently>
- Demir, N., Theis, D., Urban, T., & Pohlmann, N. (n.d.). *Towards Understanding CNAME based First-Party Cookie Tracking in the Field GDPR effects View project Zeit für Forschung View project SEE PROFILE Towards Understanding CNAME based First-Party Cookie Tracking in the Field*. <https://www.researchgate.net/publication/358345287>
- Dina Srinivasan. (2020). *Why Google Dominates Advertising Markets: Competition Policy Should Lean on the Principles of Financial Market Regulation*. <https://law.stanford.edu/publications/why-google-dominates-advertising-markets/>
- Effect of disabling third-party cookies on publisher revenue*. (2019).
- European Union. (n. d.). *Cookie Law Guide for Businesses: EU, US, and the UK - Termly*. Retrieved August 29, 2022, from <https://termly.io/resources/articles/cookie-law/>
- Everything You Need to Know w About Cookie Policy*. (n.d.). Retrieved August 29, 2022, from <https://secureprivacy.ai/blog/cookie-policy-complete-guide>
- Frankenfield, J. (2019). Mining pool. <https://www.investopedia.com/terms/m/mining-pool.asp>

- Geradin, D., Katsifis, D., & Karanikioti, T. (2020). *Google as a de facto privacy regulator: Analyzing Chrome's removal of third-party cookies from an antitrust perspective*. <https://ssrn.com/abstract=3738107>
- Geradin, D., Katsifis, D., & Karanikioti, T. (2021). Google as a de facto privacy regulator: analysing the Privacy Sandbox from an antitrust perspective. *European Competition Journal*, 17(3), 617–681. <https://doi.org/10.1080/17441056.2021.1930450>
- Groom, S. (2013). New ASA 'do-not-track' regime. *Journal of Direct, Data and Digital Marketing Practice* 2013 14:3, 14(3), 263–268. <https://doi.org/10.1057/DDDMP.2013.9>
- Johnson, G. A., Shriver, S. K., & Du, S. (2020). Consumer privacy choice in online advertising: Who opts out and at what cost to industry? *Marketing Science*, 39(1), 33–51. <https://doi.org/10.1287/mksc.2019.1198>
- Karunaratne, T. (2021). For Learning Analytics to Be Sustainable under GDPR—Consequences and Way Forward. *Sustainability*, 13(20), 11524. <https://doi.org/10.3390/su132011524>
- Lavin, M. Cookies: What do consumers know and what can they learn?. *J Target Meas Anal Mark* 14, 279–288 (2006). <https://doi.org/10.1057/palgrave.jt.5740188>
- Leah Nylen. (2020). *Google dominates online ads — and DOJ may be ready to pounce - POLITICO*. <https://www.politico.com/news/2020/06/04/google-doj-ads-302576>
- Louis Montulli II Invents the HTTP Cookie : History of Information. (n.d.). <https://www.historyofinformation.com/detail.php?id=2102>
- Miyazaki, A. D. (2008). Online Privacy and the Disclosure of Cookie Use: Effects on Consumer Trust and Anticipated Patronage: <https://doi.org/10.1509/Jppm.27.1.19>, 27(1), 19–33. <https://doi.org/10.1509/JPPM.27.1.19>
- Pantelic, O., Jovic, K., & Krstovic, S. (2022). Cookies Implementation Analysis and the Impact on User Privacy Regarding GDPR and CCPA Regulations. *Sustainability (Switzerland)*, 14(9). <https://doi.org/10.3390/su14095015>
- Parizo, C. (2022). *Will Google kill third-party cookies?* <https://www.techtarget.com/searchcustomerexperience/tip/Will-Google-kill-third-party-cookies>
- Reuters. (2021). *France fines Google \$57 million for European privacy rule breach | Reuters*. <https://www.reuters.com/article/us-google-privacy-france-idUSKCN1PF208>
- Sanchez-Rola, I., Balzarotti, D., Kruegel, C., Vigna, G., & Santos, I. (2020, April). Dirty clicks: A study of the usability and security implications of click-related behaviors on the web. In *Proceedings of The Web Conference 2020* (pp. 395-406).
- Shein, E. (2022). *Google delays removal of third-party cookies in Chrome through 2024 | TechRepublic*. <https://www.techrepublic.com/article/google-delays-removal-of-third-party-cookies-in-chrome-through-2024/>

- Statista. (2021). • *Global internet ad spend by format 2024* | Statista. <https://www.statista.com/statistics/276671/global-internet-advertising-expenditure-by-type/>
- Statistica.com. (2022). *Worldwide desktop market share of leading search engines from January 2010 to July 2022*. <https://www.statista.com/statistics/216573/worldwide-market-share-of-search-engines/#:~:text=Ever since the introduction of,share as of June 2021.>
- Todd, P. (2022). *Subject guides: Systematic Review: PRISMA*. <https://guides.lib.monash.edu/systematic-review/prisma>
- Wessel-Tolvig, B. (2022). The evolution of the cookie banner. Cookie Information. <https://cookieinformation.com/resources/blog/the-evolution-of-the-cookie-banner/>
- van Eijk, N., Helberger, N., Kool, L., van der Plas, A., & van der Sloot, B. (2012a). Online tracking: Questioning the power of informed consent. *Info*, 14(5), 57–73. <https://doi.org/10.1108/14636691211256304>
- Wills, C. E., & Zeljkovic, M. (2011). A personalized approach to web privacy: Awareness, attitudes and actions. *Information Management and Computer Security*, 19(1), 53–73. <https://doi.org/10.1108/0968522111115863>
- YCharts. (2021). *Alphabet Market Cap*. [https://ycharts.com/companies/GOOG/market\\_cap](https://ycharts.com/companies/GOOG/market_cap)

# POST- PANDEMIC IMPACT OF DIGITAL TRANSFORMATION IN MARKETING

*Jasmine Mariappan*  
*Padmalosani Dayalan*

---

## ABSTRACT:

This research investigates the connection between digital marketing strategies, customer engagement, consumer satisfaction, and consumer intention to buy. The lockdown and shutdown processes that are implemented during a pandemic, as well as the digital marketing tactics utilized by life insurance firms, are the main topics of this article. The goal of this research was to examine the connection between consumer purchase intentions and the digital marketing revolution. COVID-19 has opened the ways for marketing in various ways. So this study has been chosen to know the effects of the digitization of marketing techniques. COVID-19 has changed consumer behavior as well as how these changes have affected marketing strategy and marketing laws. The current economic crisis is comparable to how recessions lead to changes in consumer behavior and marketing strategies. These components were included for operational purposes. The research examined 544 answers from persons who had bought life insurance policies. Customers' level of happiness was shown to significantly influence their inclination to make purchases and served as an effective channel for the dissemination of digital marketing tactics. Additionally, the degree of engagement shown by the target audience governed the connection between content marketing and the transmission of purchase intention. The life insurance marketing sector will profit from the findings of this study. To undertake extensive and in-depth research utilizing the qualitative case study technique, we are constrained in how broadly we can apply our results. They set up their decision-making processes in such a manner as to enhance both the satisfaction felt by consumers and their intention to make purchases in the future. It provides guidance for the future use of various marketing techniques during a pandemic and the lockdowns and closures that may follow the outbreak.

**Keywords:** *Digital Transformation, Digital Marketing, Digital Technology*

## 1. INTRODUCTION

Customers are provided with an once-in-a-lifetime experience as part of the service that insurance providers provide; nevertheless, it is expected that this experience will be positive rather than negative. The vast majority of the time, the manner in which the service is provided and carried out when the claims are made is not the same as the manner in which it

is promoted and made available to clients. When one thinks about all of the different people and organisations that are involved in insurance, the first thing that comes to mind is the organisation that is responsible for selling and marketing the insurance. Next comes to mind is the insurance agent or financial planner who acts as a go-between for the various other significant players, most notably the individual who purchases the insurance. In addition to the three primary participants, regulators and reinsurance businesses are also very important in the process of assuring essential service standards, protecting client interests, and managing the amount of risk to which insurance companies are exposed. The most perplexing question in the insurance industry is the behavior of buyers and sellers. In contrast to the sellers, the buyers seldom ever read about the items they want to acquire and make an effort to learn about them. The sellers, on the other hand, know precisely what they are providing, and they will not deliver any more than what they are paid for. If the buyer does not pay the premiums, the seller will not make any payments, and as a result of this peculiarity, the buyer will also be in violation many other terms and conditions. The customer must pay the money now in order to complete the purchase of the item at a later time. The question of whether or not the insured is receiving the time value of their money for what they are paying for permeates the whole model because every other insurance product will, in essence, have this pay now and get later feature, subject to various restrictions and circumstances. The answer to this question depends on whether or not the insured are receiving the time value of their money. So, even if there is a reduction in the total amount that is covered, clients prefer to pay the lowest feasible rates (Abuzawayda et al.,2013).

The modern world was dealing with one of the biggest problems it has encountered since the conclusion of World War II. The COVID-19 issue had an impact on every aspect of our life. We have nothing but sympathy for those individuals whose lives have been completely upended by the coronavirus, The economy and society have essentially come to a standstill because of the recession affecting almost every nation globally . At this point, digitization has permeated most facets of our daily life. It is changing the conventional ways that companies and customers interact. Significant environmental changes brought on by the COVID-19 outbreak are encouraging businesses to quickly and broadly embrace digital technologies. Since the gap between it and the changes that must be made in the operational environment will grow the longer it takes for enterprises to embrace it, they have tried to do so as quickly as possible. The prevalence of remote workers has increased the urgency businesses must finish their digital transitions. This occurs as a result of firms' inability to function efficiently without remote personnel. Many businesses still base their planning procedures on the premise that normal conditions would persist, even during disruptive upheavals like the one we are now experiencing. As a result, planning is done on an annual or multi-year basis.

The introduction of digital technology and particularly social media has been predicted to result in large behavioral changes in consumers as well as significant effects on businesses and brands. Customers spend an increasing amount of time and attention on the internet and numerous social media platforms. Other connected devices like high-end mobile phones,

tablets, and personal computers, also use internet services for reading, storing and playing music, emailing, and accessing Facebook, and Twitter. The way people use the internet is being completely transformed by this. It seems that current consumer behavior reflects the adage that “if an enterprise can’t be discovered on Google, it doesn’t exist.” Modern organizations should emphasize the usage of cutting-edge digital platforms, which should not come as a surprise. If companies want to advance and be considered seriously in the future, they must adopt this trend (Abuzawayda et al., 2013).

Consumers’ daily lives have become more reliant on web-based networking platforms such as LinkedIn, Facebook, YouTube, and Twitter as a forceful result of the expansion of digital marketing in the 2000s. This is certainly relevant in the United States. Digital marketing may provide the most positive atmosphere for beginners of any age. Promoting goods and services through computerized delivery channels such as cell phones, personal electronic assistants, and other automated devices is known as digital marketing. Modern society increasingly views technology like computers and smartphones as essential tools for individuals. There has been many academic research on internet advertising, but few have looked at the kind of automated marketing methods that consumers like and how they influence their behavior. To have any hope of growing and offering more advantages, digital marketing must include the customer throughout the advertising process. The financial services industry, and notably the insurance sector, is characterized by fierce levels of rivalry on a global scale. New tools made accessible because of improvements in digitalization, such the increased availability of the internet, may now aid the insurance industry’s creative advertising strategies. The most economical technique at any given moment is to sell insurance plans online. Pricing is an essential element since buyers often make their decisions on it when buying necessities like insurance. By creating their own websites, manufacturers and insurance companies are using the online marketplace. The insurance industry underwent a period of transition as a result of considering new problems and technologies (Ågerfalk et al., 2020). Retail insurance is marketed differently from marketing for just physical goods and other financial services. There is fierce competition amongst all insurance firms in the crowded market for internet insurance purchases.

After a web-based business has been fully included in the strategic plans of insurers, analysts will be able to evaluate the extent to which it affects insurance expenditures as well as the value it delivers to insurers. The process by which businesses employ digital technology to adopt new capabilities to make changes to their organizational strategy and operations is known as “digital transformation.” We could not have even begun to imagine some things that digital technology has already made feasible only a few short years ago. Examples are 3D printing, artificial intelligence, and 5G network technologies. Up until March 2020, when the epidemic started to spread, the life insurance industry was expanding rapidly. The effects of COVID-19 were felt till the year 2021. The newly created firm that belongs to the division is being impacted by the sharp drop in people’s disposable incomes. People have postponed decisions on the purchase of additional security because of the economic imbalance that



COVID-19 has produced. The status quo is often maintained when new groups are formed. The negative effect will still be seen in the form of higher rates for policy renewals, even if the market has given policyholders additional time to pay their premiums (Priyono et al., 2020).

The duration of the shutdown and the speed at which the economy returns to normal will decide the impact on the firm. The first three months of the year will have a more noticeable impact, and then things may begin to change gradually. Many people may probably give up their firearms in order to better their financial situation. Everything in the world has become much worse due to the COVID-19 strike. Governments across the globe have begun adopting quarantines as the incidence of coronavirus infections rises. The whole system is now operating in virtual mode. One strategy that has been emphasised in the literature as a means for adjusting to disruptive environmental changes is the transformation of the business model via the use of digital technology, specifically digital technologies that assist organisations in identifying new business practices. One of the ways that people have found to deal with the stressful effects of the environment's evolution is to make this adjustment. Digital technologies are widely seen as vital to provide a workable answer to the disruptive changes brought about by the COVID-19 epidemic. As opposed to the typical effect that results from changes brought about by human development, the impact of the pandemic is distinct and more catastrophic. Business leaders prioritize avoiding their firm from going bankrupt in these instances above, creating a permanent competitive edge. Continuous modifications should be made instead of simply one action in response to this environmental stimulus (Matt et al., 2020).

## **2. REVIEW OF LITERATURE**

The primary drivers of these marketing and sales activities are professional financial planners, insurance agents, and brokers, as well as organizations and people involved in professional financial planning. When it comes to playing on the fears of customers, marketing plays a significant and maybe even questionable role. Regarding marketing strategies, a wide variety of approaches are available. One example is advertising, which can be carried out through various mediums, including print, radio, and television; billboards; magazines; trade publications; flyers; agent business cards; and any other digital channel. It is important to remember that the power and potential of social media should never be discounted. Regardless of the strategies or procedures that are used, there is no way around the need for people to protect their lives, homes, automobiles, health, and other valuables by purchasing insurance policies. Marketers who are astute enough not to take this need for insurance for granted are continuously coming up with innovative ways to meet the ever-increasing need for insurance and are eager to seize any opportunity to shake up the sector (Kotarba, 2017).

A wide range of products and services are necessary, or this novel strategy is meant to replace more established but unsuccessful company strategies. No company can succeed if it simply employs an obsolete model since there is a constant demand from outside factors to innovate business models via the use of digital technology constantly. Many conventional

organizations are continuing their transition to more digitalized business models during this interim phase, and they are eager to integrate digital technology into every aspect of their operations actively. Small and medium-sized businesses (SMEs) may function in a regional market. They can investigate alternative strategic choices faster than huge corporations, which are backed by better established infrastructures and lower fixed production costs. Small and medium-sized businesses (SMEs) have shown their ability to be flexible and adaptable to execute planned motions and react quickly to changing situations. More than half of businesses, the COVID-19 pandemic had a significant negative effect and needs prompt action (Kampf, 2018).

SMEs confront several difficulties, including reduced client buying power, limitations on how and when they may interact with them, a lack of raw materials, order cancellations, cash flow issues, and interruptions in their supply chains, to mention a few. However, a few sectors can benefit from the epidemic and become better off, therefore (Mangold & Faulds, 2009). They can provide money for "disaster entrepreneurship," which determines a company's viability after a natural disaster. The fourth industrial revolution is distinguished by its usage of digitization, artificial intelligence, and the Internet of Things. This validates Industry 4.0, a term that describes the transition from a centralized manufacturing paradigm to decentralized, intelligent, and networked. Industry 4.0, which combines digital technology and the internet with more traditional forms of industry, reimagines how organizations operate internally and interact with their clients, suppliers, and other third parties (Lund et al., 2020).

The likelihood that an advertisement will include notable information and its success at getting people to see it depends on its content. An advertisement must provide enticing ideas as a value extension in order to be effective. SMS marketing is composed of three main parts. Beginning with creating a message that is clear and succinct, answers the requirements of the target audience, and uses simple, comprehensible language is the responsibility of individuals engaged in marketing a product or service (Schilirò, 2012). The message must be created to ensure it is relevant to the requirements and preferences of the audience. Additionally, it was shown that engaging content had a positive SMS impact, which motivated the recipients of the messages. The value of interactive advertising is found in its ability to ensure that the targeted audience receives the personalized and provided messages. Each customer's comments must be handled uniquely since every consumer wants unique content. A personalized message enables the customer to quickly contact the news and contact the news by their preferences and get it at the most suitable moment. Depending on the customer's preferences and other personal data, this message can also include special item offers or suggestions for them. Customers who received updated promos would be advised to observe, adopt better views, and have higher expectations when they visited the institution. Previous research has shown that content marketing techniques are not only far more effective than conventional marketing tactic, but also encourage consumers to make purchases (Dash & Chakraborty, 2021).

The transition to digital business models may be significantly influenced by the corporate

environment's volatility, unpredictability, complexity and the disruptive upheaval brought on by the COVID-19 pandemic (Okazaki et al., 2007). If the essential value that is provided to clients is modified via digital technology, new business models may become more relevant to the fast-changing business environment. The new business models could become more competitive due to this change. Digital business models have qualities that set them apart from conventional ones. This is because many functions may be duplicated at almost no extra cost. The customer-centricity of the digital business model is still another essential differentiation since both the target market and the dimensions of value given by the business models must be decided from the viewpoint of the consumers (García et al., 2019). If a business model dramatically changes in the three areas of value generation, value delivery, and value capture, it may be determined whether a business model move into the digital space was successful. Fundamental changes might occur when organizational capabilities and resources are integrated with digital technology, notably how firms create and capture value. It is impossible to forecast who will be the most successful in the future due to these shifts in company methods (Yin, 1984).

Businesses that are more information-related and do not create their outputs in physical forms, like those in the banking, insurance, or media sectors, will find it easier to execute the transition path to develop a business model that is based on digital technology (Eisenhardt, 1991). This is because companies in these sectors do not produce their products in physical form. Physical product manufacturers face difficult circumstances since the manufacturing and distribution processes need tight coordination. The latter group of businesses are compelled to halt manufacturing and distribution, which makes it challenging to generate revenue. All of the many economic processes, contacts, transactions, and activities that rely on digital technology together are referred to as the "digital economy." The growth of the digital economy has been noticeably accelerated in both developed and developing nations after the COVID -19 virus outbreak. The bulk of the recent changes brought on by the epidemic have profoundly changed the market and economic structure (Bamford, 2008). The interplay between digital innovation and digital transformation, which is mutually beneficial, is accelerating the creation of new business models and market prospects. One of the main forces behind this digital transformation may be seen as the digitization of processes, which expands the potential for information processing, storage, and transmission. This is so that information can be processed, stored, and sent more effectively, thanks to digitalization. The usage of digitally enabled gadgets that use artificial intelligence (AI) is also a part of these operations, as is the exploitation of digital networks for the coordination of financial transactions with algorithms through platforms. In a business climate that is characterized by disruption, companies that have been in operation for a while and have a dominant position in the market sometimes struggle to strike a balance between employing their current business models and learning about new ones. Finding a balance between the two abilities may be difficult for businesses since new ideas sometimes conflict with accepted norms and procedures. It is challenging to develop a convergent managerial perspective on environmental changes. Disparities in the ways that managers perceive changes in their surroundings are one of the barriers that may limit the alteration of a business strategy (Hall et al., 1975).

### 3. RESEARCH METHODOLOGY

This information was entirely unconnected to anything else. To get the data, the most recent issues of journals, periodicals, and newspapers were reviewed. The structured questionnaire was divided into two sections to make things easier. Between male and female responses, different demographic and socioeconomic data were requested. Questions were asked to the targeted respondents to gauge various aspects of digital marketing.

#### 3.1. Data Collection

Data collection was done in the last six months of 2021. Few were collected offline too. “After discarding a few incomplete questionnaires out of the total 544 received from the life insurance policies respondents, we settled at 544 responses that satisfied all the criteria for a filled-in questionnaire”. The normality of the data was confirmed through Correlation and t- tests. Further, no specific pattern was found in the collected data.

**Table 1: Demographic Profile**

		Gender		
		Male	Female	Total
Age (years)	<41	244	152	396
	40-61	80	33	113
	>60	18	17	35
	<b>Total</b>	<b>342</b>	<b>202</b>	<b>544</b>
Education	Secondary	60	26	86
	H i g h e r Secondary	58	56	114
	Graduate	190	112	302
	PG	34	8	42
	<b>Total</b>	<b>342</b>	<b>202</b>	<b>544</b>
M a r i t a l Status	Married	270	165	435
	Unmarried	55	25	80
	Divorcee	16	3	19
	Widower	1	9	10
	<b>Total</b>	<b>342</b>	<b>202</b>	<b>544</b>

There was a two-factor analysis of variance with repeated measurements to test whether there was

- “A significant difference between the groups of the first factor Male and Female (repeated measures) concerning dependent variable”.

- “A significant difference between the groups of the second -factor Category in relation to the dependent variable”.
- There is “an interaction between the two factors, Male and Female, in relation to the dependent variable”.
- The two-factor analysis of variance with repeated measures showed that there is
- “significant difference between the groups of the first- factor Male and Female in relation to the dependent variable”,  $p=aN$ ,
- “significant difference between the groups of the first- factor Category in relation to the dependent variable”,  $p=aN$ ,
- “interaction between the two variables Category and “ Male and Female “ in relation to the dependent variable”,  $p=aN$ .

# Hypothesis

Null hypothesis	Alternative hypothesis
There is no significant difference between the groups of the first -factor Male and Female (measurement repetition) in relation to the dependent variable.	There is a significant difference between the groups of the first- factor Male and Female (measurement repetition) in relation to the dependent variable.
There is no significant difference between the groups of the second factor Category in relation to the dependent variable.	There is a significant difference between the groups of the second factor Category in relation to the dependent variable.
There is no interaction effect between the factor Male and Female and Category	There is an interaction effect between the factor Male and Female and Category

**Table 2: Descriptive statistics**

	N	Mean	Std. Deviation	Std. Error Mean
<b>Male</b>	11	93.27	95.38	28.76
<b>Female</b>	11	55.09	59.55	17.95

**Table 3: t-Test for independent samples**

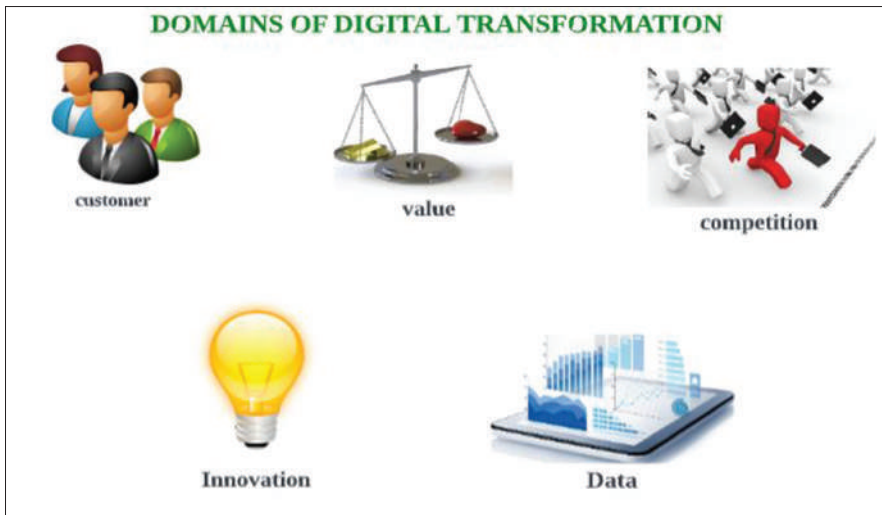
	t	df	p (2-tailed)
<b>Equal variances</b>	1.13	20	.273
<b>Unequal variances</b>	1.13	16.77	.276

**Table 4: Correlation and significance**

		Female	Male
<b>Female</b>	<b>Correlation</b>	1	0.98
	<b>p (2-tailed)</b>		<.001
<b>Male</b>	<b>Correlation</b>	0.98	1
	<b>p (2-tailed)</b>	<.001	

#### 4. The impact of COVID-19 on consumer behavior

The COVID-19 paradox has an impact on consumer behavior, which has an impact on marketing initiatives. The use of marketing during the COVID-19 study and its usage before, during and after times of economic instability has several characteristics. The success of marketing initiatives despite changes in economic circumstances is the subject of the most important research. Contrarily, this crisis differs from a recession in its features and will be followed by one of the latter (contraction). Consumer behavior is changing in numerous ways depending on the product category as a direct consequence of declining share prices, decreasing earnings, rising in consumer loan defaults, and a general decline in available financial resources. Naturally, the COVID-19 outbreak had a bad impact on the economy and caused it to become worsen ever since the economy was put on lockdown, just as it did in other nations throughout the globe. The situation is the same as it was in other nations. Covid-19, therefore, has a big effect on enterprises, society, and the economy. Furthermore, it has considerably increased the urgency with which firms must now implement digital transformation. A fresh story about the business world has been created by Covid-19 that, among other things, takes into consideration the changes that have taken place in the surroundings in which businesses work across all industries. Therefore, it is crucial to have a discussion on how businesses may focus on minimizing the economic effects of the pandemic and making the necessary adjustments to deal with them. The importance of digital transformation as a supporter of economic recovery is covered in this article. This is accomplished by taking into consideration Covid-19, which is the main force behind digital transformation, as well as the fact that organizations must undergo digital transformation in order to be relevant and competitive in the marketplace. The factors that influence consumer behavior are also being impacted by social isolation in addition to these changes in the economy. Customers are being urged to re-evaluate the weight they give to various elements of their life, which might lead to the creation of new criteria for spending and values. As they look for stability and value in the goods and services they buy, consumers and organizations are developing deeper emotional bonds with dependable suppliers. Digitalization is crucial in this regard since it shows how customers, businesses, and workers will be able to continue to run in the future (Sahore, 2019).

**Figure 1: Domains of digital transformation**

## 5. DIGITAL TRANSFORMATION IN INSURANCE AND ITS SIGNIFICANCE

"Digital transformation" refers to the process of purposefully integrating digital technology, processes, and competencies into all aspects of insurance company operations and at all levels. The result of this process is changes in the organization's culture, organisational structure, and operational procedures. Digital transformation is the process of using technology to greatly enhance an organization's performance in addition to its level of productivity and market share. This process is also known as "going digital." It is concerned with how the implementation of digital technologies such as mobile devices, data analysis tools, social networks, and smart gadgets, in conjunction with the improvement of traditional technologies such as ERP, will revolutionise customer interactions, internal operations, and the value of offerings. Digital technology may take many forms, including social networks, smart gadgets, and mobile devices, to name a few examples. The first wave of digitization has made the value chain in the insurance industry more efficient, which has led to increased profitability. While it may be possible for insurers to collect a large amount of data, the fact that many of the individual databases are not yet linked makes it challenging for insurers to use the potential given by scattered data. Insurance companies will be able to transition from their current position as digitalized insurance providers to that of digital insurers if they integrate significant procedures into their operations. As a direct result of improvements in data quality and algorithmic correctness, the next generation of insurers will be made up of artificial intelligence insurers that will learn from the data that is provided by their customers. This will be a direct consequence of breakthroughs in data quality. In the context of insurers' perceived business connection to technology advances, the phrase "digital insurance" may be described as current organisational and product innovation that is capable of achieving

essential objectives. This idea is relevant to contemporary organisational and product innovation that is in a position to accomplish the objectives that have been set. A category that “covers any improvements in commodities, processes, organization, and business models that are perceived by policyholders as more attractive, convenient, and essential” is what is referred to as “digital insurance.” It necessitates adopting a fresh method of communicating with customers. One of the primary reasons supporting digitalization currently is the demand placed on businesses by their consumers. The rules of the digital economy are controlled by the customers and determined by them.

The influence of the customer is always expanding. A recent trend in marketing known as “reverse marketing” democratizes the business world by working backwards, beginning with the consumers and working their way up. The spread of digital technology, which influences every aspect of life, society, and the economy, is causing a fast change in the globe. The digital revolution not only changes how we do business in the current day, but it also continuously offers new chances for success and development for both the public and commercial sectors. Businesses may use digital transformation to boost their competitiveness, enabling them to preserve their market relevance while concentrating on invasion strategy. A significant portion of the world’s population became connected to the internet due to the COVID-19 pandemic, which accelerated the ongoing digital revolution. Many people started working from home to operate and maintain certain revenue streams, children who had access to the Internet in their homes started taking lessons online, and other firms adjusted their business models in order to interface with digital platforms. This allowed the businesses to continue to operate and maintain the revenue streams. Researchers are making use of artificial intelligence (AI) to learn more about the virus and further their hunt for a vaccine. Smartphone applications have also been created in order to “monitor and track” the development of the epidemic. The epidemic sped up the transition to a digital economy, as shown by the fact that the amount of traffic on the internet jumped by as much as 60 percent in certain countries not long after it spread. Even though these activities demonstrated the tremendous potential made available by the digital revolution, the outbreak also highlighted the gaps that still needed to be addressed. This was the case despite the fact that the outbreak brought to light the great potential offered by the digital revolution. The COVID-19 issue has drawn attention to the necessity of communications infrastructures and services, as well as access to and efficient management of data, as a result of the requirement that a large number of businesses and institutions go online, as well as the implementation of lockdowns and social isolation measures. This is due to the fact that the COVID-19 issue has brought about the necessity of these things. It is possible that the improvement of data exchange and access, the elimination of socioeconomic gaps in broadband access between urban and rural areas, and the modernization of networks to the next generation of fixed and wireless broadband will each have a positive impact on the economy and society as a whole (Eckert & Osterrieder, 2020).



**Table 5: Digital competitiveness ranking 2021 on Life Insurance**

Overall Rank	Country	Knowledge	Technology	Future Readiness
1	USA	2	6	3
2	Singapore	3	2	11
3	Denmark	5	10	2
4	Sweden	3	5	7
5	Hong Kong SAR	6	3	9
6	Switzerland	4	10	6
7	Netherlands	15	9	3
8	Korea Rep.	11	13	4
9	Norway	15	4	7
10	Finland	16	9	8

Due to the utilization of technology, people, and processes, the organization can advance as a result of digital transformation. However, the extensive use of digital technology is one of several components that make up the digital transformation. It is crucial for businesses to change the way they think in order to understand how leveraging digital tools and skills may provide value and give them an edge over rivals. The phrase “digital transformation” can be used to describe a variety of subjects, including “digital marketing, the digitization and automation of business processes, business models, sales channels, digital procurement, Big Data, and other pertinent activities” involved in the difficult change that organizations must go through. People who possess a wide range of technologically sophisticated abilities, such as reading, math, and problem-solving, may be expected to utilize digital tools more efficiently, participate in more complicated online activities, and adjust to changes in the digital world more successfully. As a result of the surge in socially and economically facilitated by digital activity, COVID-19 has upped the stakes surrounding access to and participation in digital media. This emphasizes the always- changing nature of both connectivity and the usage of technology. However, it is expected that the amount of online activity will continue to be high in industries where the pandemic has had a positive influence, such as telework, online shopping, online healthcare services, and online payment systems. Some online involvement may decline if COVID-19 treatments become available, enabling more in-person contacts. This increases people’s and businesses’ capacity to embrace more complex digital solutions while maintaining pressure on developing high-quality connections. Governments should be aware that increasing reliance on digitalization involves the danger of either escalating already-existing digital disadvantages or widening digital inequalities that have persisted over time when adjusting policy in response to changing circumstances.

Since COVID-19, there has been a growing dependence on digital technology. Because of this, it is more important than it has ever been to put more effort into creating confidence in the digital environment. This is particularly important in terms of digital security, but it is also important in terms of privacy, data protection, and consumer protection. A greater reliance on digital technology has been seen in the time period after COVID-19 event. As the epidemic developed, con artists took advantage of the overall shift to online activity by increasing the frequency of phishing attacks and other fraudulent schemes that included coronaviruses. The overwhelming majority of OECD nations have whole-of-government digital security strategies in place; nevertheless, these programmes often lack an independent budget, assessment mechanisms, and key performance indicators (KPIs), and they seldom correspond with the more general national digital objectives. Already, companies and other types of organisations are adapting as a direct consequence of the ongoing digital revolution, which has raised serious concerns about the nature of labor in the future. Due to this high degree of connection, a significant proportion of firms and families in the OECD were able to get online after national lockdowns were implemented by governments to stop the early spread of COVID-19. This was made feasible by how easily available the internet was at the time. Because of the epidemic, people are spending more time online, whether for work, education, or social interactions, necessitating more attention to their well-being. Governments should take advantage of this chance to address the many social issues that the digital revolution has brought to light. These difficulties include, among many others, problems like screen addiction, false information, and data-driven healthcare. The COVID-19 dilemma, which comes at a time when start-ups and small- and medium-sized enterprises (SMEs) are struggling for their very survival and when enormous technical giants are increasingly in control of our digital lives, has raised concerns around market concentration. Governments have a duty to evaluate how this transformation may alter economic dynamics and inclusion as fewer companies function as gatekeepers between individuals and the Internet (Heo, n.d.).

## 6. CONCLUSIONS

There is no question that the Covid-19 epidemic has accelerated enterprise-level digital transformation procedures. Businesses began to see digitalization as both an opportunity and a workable way to ensure their viability in the future as a result of the Covid-19 epidemic. We may learn a great deal about our recent past from the circumstances we are in right now. Many businesses just have a cursory understanding of what it takes to function effectively. Instead of being seen as a process of obtaining new technology as a strategy for firms to survive, digitization has been recognized as a process of transformation and an excellent chance to lower operating costs. This change in viewpoint has affected how digitalization is seen. Digitization has been utilized, among other things, to help companies become ready to be more competitive in both home and international markets. The internet's function as one of the main drivers of the growing gap between markets and enterprises is one of the most important features of modern marketing. The way that companies operate and interact with

society at large has been radically changed by the usage of digital marketing. It is quickly becoming a tool that can no longer be disregarded and must be used in order to meet the issues facing the marketing sector. Similarly, sustainability has come to be recognized as one of the most urgent issues that organizations, particularly marketers, must solve in the modern world.

The results of this research suggest that one of three main approaches may help small and medium-sized firms (SMEs) become digital businesses: they can accelerate their digitalization, digitalize their sales activities, or locate digital partners to access the market. The decision between the three digital transformation models depends on several variables, including the existing level of digital maturity, the learning culture, the adoption trend of digital technology, and others. In order to overcome the challenges given by low levels of digital literacy, it may be advantageous for small and medium-sized organizations (SMEs) with a significant physical footprint and a high volume of customized product manufacture to work with digital enterprises. Researchers have concluded that marketing and sustainability may complement one another after conducting a thorough investigation into this connection. The supply chain, product distinctiveness, accessibility to knowledgeable investors, and increased staff commitment are just a few of the changes that may be made thanks to sustainability. A high level of digital maturity is required for a successful digital transformation of a business model, making this strategy unsuitable for small and medium-sized businesses (SMEs), which are often just starting with their use of digital technology. Additionally, SMEs do not typically have the resources necessary to fully implement this strategy. Companies that belong to this category must also have a strong digital strategy and be long-term prepared. The corporate model cannot start from scratch as it travels down this path of digital transformation. Customer interaction finally established if there was a link between digital marketing, customer satisfaction, and purchase intent.

## REFERENCES

- Abuzawayda, Y. I., Yusof, Z. M., & AZIZ, M. A. (2013). Electronic Records Management in Institutions of Higher Learning in Libya: Adoption of Dirks Model. *Journal of Theoretical & Applied Information Technology*, 53(3).
- Abuzawayda, Y. I., Zawiyah, M., & Ab Aziz, M. (2013). Automated Retention Schedules: The Importance of Its Implementation by Universities in Malaysia. *Journal of Theoretical & Applied Information Technology*, 54(1).
- Ågerfalk, P. J., Conboy, K., & Myers, M. D. (2020). *Information systems in the age of pandemics: COVID-19 and beyond*: Taylor & Francis.
- Priyono, A., Moin, A., & Putri, V. U. G. (2020). Identifying Digital Transformation Paths in the Business Model of SMEs during the COVID-19 Pandemic. *Journal of Open Innovation*, 6(4), 104. <https://doi.org/10.3390/joitmc6040104>
- Matt, D.T., Modrak, V., & Zsifkovits, H. (2020). *Industry 4.0 for SMEs: Challenges, Opportunities and Requirements*. <https://library.oapen.org/bitstream/20.500.12657/22857/1/1007304.pdf>
- Kotarba, M. (2017). Measuring Digitalization – Key Metrics. *Foundations of Management*, 9(1), 123–138. <https://doi.org/10.1515/fman-2017-0010>
- Kampf, G. (2018). *Antiseptic Stewardship: Biocide Resistance and Clinical Implications*. <http://lib.uok.ac.ir:8080/site/catalogue/217311>
- Mangold, W. G., & Faulds, D. J. (2009). Social media: The new hybrid element of the promotion mix. *Business Horizons*, 52(4), 357–365. <https://doi.org/10.1016/j.bushor.2009.03.002>
- Lund, S., Madgavkar, A., Manyika, J., & Smit, S. (2020). What's next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries. McKinsey & Company. <https://www.mckinsey.com/featuredinsights/future-of-work/whats-next-for-remote-work-an-analysis-of-2000-tasks-800-jobs-and-nine-countries>
- Schilirò, D. (2012). Knowledge-based economies and the institutional environment. *Theoretical and Practical Research in the Economic Fields*, 3(1), 42–50.
- Dash, G., & Chakraborty, D. (2021). Transition to E - Learning : By Choice or By Force – A Cross - Cultural and Trans-National Assessment. *Prabandhan: Indian Journal of Management*, 14(3), 8. <https://doi.org/10.17010/pijom/2021/v14i3/158151>
- Okazaki, S., Katsukura, A., & Nishiyama, M. (2007). How Mobile Advertising Works: The Role of Trust in Improving Attitudes and Recall. *Journal of Advertising Research*, 47(2), 165–178. <https://doi.org/10.2501/s0021849907070195>.

- García, J. A., Lizcano, D., Ramos, C. M. Q., & Matos, N. (2019). Digital Marketing Actions That Achieve a Better Attraction and Loyalty of Users: An Analytical Study. *Future Internet*, 11(6), 130. <https://doi.org/10.3390/fi11060130>
- Yin, R. K. (1984). *Case Study Research: Design and Methods*. <https://cds.cern.ch/record/1171670>
- Eisenhardt, K. M. (1991). Better Stories and Better Constructs: The Case for Rigor and Comparative Logic. *Academy of Management Review*, 16(3), 620–627. <https://doi.org/10.5465/amr.1991.4279496>
- Bamford, D. (2008). The Use of Grounded Theory in Change Management Research. *Journal of Change Management*, 8(2), 111–121. <https://doi.org/10.1080/14697010801907286>
- Hall, G. E., Loucks, S. F., Rutherford, W. F., & Newlove, B. W. (1975). Levels of Use of the Innovation: A Framework for Analyzing Innovation Adoption. *Journal of Teacher Education*, 26(1), 52–56 <https://doi.org/10.1177/002248717502600114>
- Sahore, N. S. (2019). Insurance Marketing through Digital Tools: Opportunities and Challenges. ResearchGate. [https://www.researchgate.net/publication/331989452\\_Insurance\\_Marketing\\_through\\_Digital\\_Tools\\_Opportunities\\_and\\_Challenges](https://www.researchgate.net/publication/331989452_Insurance_Marketing_through_Digital_Tools_Opportunities_and_Challenges)
- Eckert, C., & Osterrieder, K. (2020). How digitalization affects insurance companies: overview and use cases of digital technologies. *Zeitschrift Für Die Gesamte Versicherungswissenschaft*, 109(5), 333–360. <https://doi.org/10.1007/s12297-020-00475-9>
- Heo, W. (n.d.). Demand for Life Insurance: A Consumer Perspective. Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. [https://openprairie.sdstate.edu/consumer-sci\\_pubs/19/](https://openprairie.sdstate.edu/consumer-sci_pubs/19/)

# THE ADOPTION OF CONTEMPORARY APPROACHES IN HUMAN RESOURCE MANAGEMENT FOR BUSINESS TRANSFORMATION AND SUSTAINABILITY

***Rahma Mohammed Talib Al Bahri***

---

## **ABSTRACT**

Roody is not satisfied with his organizational procedures and does not feel secure. He thinks that the processes of the Human Resource Department need to be transformed. He believes that there is no proper planning for training, and the organization is at a high risk of bad performance and, worse it might face bankruptcy. Several reasons he had to think that way. First, there is a high number of expatriates who might leave at any moment, especially with the continuous changes in the governmental rules regarding visa pans. Second, remarkable number of senior staff who are close to retirement age. Third, a lot of highly competent staff resigned last year whom he believes were not satisfied and did not feel secure too, although they had good salary. Fourth, the performance appraisal methodology, he believes, is not fair and does not provide transparency and no recognition scheme is applied for high performance. Fifth, he feels that employees are not given the opportunity to unleash their skills and knowledge in doing their duties and not empowered with the needed level of authority to make decisions related to their work. Sixth, executive management is not concerned about providing the tools, machines, and systems that might enhance the efficacy of the work. Finally, the competency is not recognized and utilized properly in order to enhance the working process within his organization. He has low loyalty towards the organization. He is always asking himself, is it a common situation, or the human resource management processes should be reengineered? Is there any transformational approach implemented by any entity elsewhere that he should recommend to fix this situation? Indeed, the following lines provide the answers to all Roody's questions. Throughout this chapter, the readers will see how contemporary organizations have shifted from old approaches in managing their Human Resources to new transformational approaches in order to survive in today's dynamic world. These approaches have enabled organizations to change their processes using technology. These approaches have helped them to retain their existing employees, acquire new employees, avoid a lot of potential strategic, financial, managerial and reputational risks and effectively managing their resources; financial and non- financial ones and, most especially their human resources.

**Key Words:** *Transformation, Human Resource Management, Sustainability, Corporate Innovation, Knowledge Management*

## 1. INTRODUCTION

In order to survive in today's dynamic business world, which is continuously changing and its level of uncertainty is getting higher, organizations must be responsive, adaptable and their processes and practices should be continuously reviewed and transformed, whenever needed, in all aspects (Liao et.al.,2010). This transformation should be applied to operations, finance, marketing and human resources management. Organizations should understand and identify the changes that are happening in their internal and external environments and understand to what extent their businesses, processes and resources are affected and implement the proper actions accordingly. However, this transformation should be through the involvement of everyone in the organization not only the executive management.

As employees are one of the valuable assets for any organization, effective and efficient Human Resource Management is essential for any organization aiming to survive and achieve sustainability in today's dynamic and tough business world, regardless of its type or size. Although Abraham Maslow has identified five levels of needs through his Hierarchy of Needs Theory since 1943, fulfilling these needs is becoming harder and harder due to ecological, economic, political, technological and social factors. Indeed, what might be a motivation for someone might not be attractive to others, and what makes an employee satisfied might not add value to others. The following paragraphs will provide a comparison between the old practices in Human Resource Management and the transformational ones that have been adopted by contemporary entities in order to survive while taking into consideration their size, type, available resources, available competencies, working pressure and complexity of processes. This kind of comparisons is important to understand the transformational practices and approaches adopted by contemporary organizations that enabled them to cope with changes in their environments and achieve sustainability, especially regarding their Human Resource Management activities. The comparison is structured based on Deming Cycle/ Shewhart Cycle or what is also known as PDCA (Plan, Do, Check, Act).

According to this cycle, organization will plan a change after identifying the opportunity, implement the planned procedure, than test it to assess its effectiveness and act accordingly. This cycle provides a systematic approach that depends on repeating the aforementioned four processes (Plan-Do-Check-Act) on repeating with the aim of continuous improvement to the processes, products and/or services. The adaptation of this approach will guarantee the avoidance of failure risk which might encounter due to directional deviation (Göktaş, 2017; Xingxiaoli, 2016). The aim of using the PDCA cycle in shedding light on the Human Resource Management transformational practices is to provide a systematic approach in which contemporary organizations should act in order to achieve sustainability in managing their staff and be able to retain them. Through the four main processes emphasized by this cycle, organizations will avoid random work and actions. The systematic approach brought by this cycle forces the organizations to assure the existence of planning strategies for managing all of its resources, more specifically the Human Recourse, work adhesively to the well-established plans, assess the effectiveness and efficiency of these plans, and act accordingly. This also

will ensure that the executive management's decisions were made based on facts due to the availability of data and information obtained from the assessment or checking phase.

## **2. PLAN**

Planning is the essential step in every kind of management. There is a noticeable change in human resource planning between traditional and contemporary practices. If we take the recruitment planning as an example, we can see that the aim has been transformed to be more qualitative than quantitative. Transformational human resource planning is more about establishing a clear and detailed Job descriptions, Career Path Plan, Training Plan based on individual and departmental KPIs, Succession Plan, Capacity Building Plan and Corporate Innovation Plan instead of filling the gap only in terms of number of staff within the department. The necessity of having these different plans is not the number but to have a portfolio of all the corporate's human resources that reflects the current competencies and enables the executive management forecasts and have a good view of available competencies for future expansion. This will assure that executive management's decisions are based on many facts and thus will ensure excellent governance for all resources of the entities, not only human resources. For instance, having a comprehensive portfolio of human resources will support the executive management in their decisions regarding promotion, rotation, and transfer and/or choosing members for the different taskforce within the organization. As a result, the targeted output will be achieved, and competent staff will be satisfied and retained as they are in a job that matches their qualifications and go in-line with their interests. These plans enable organizations to avoid any potential risks occurred due to resignation or retirement especially of key staff. For example, forming a task force and applying a rotation strategy will support rotated staff in acquiring new knowledge that differs from their day to day work. Yang (2007) stated that it is better to have more staff with less skill than having fewer employees with several skills.

Similarly, earlier, competency which refers to appropriate education, training or experience, as described in ISO 9001:2015, were the main criteria for hiring an employee as traditional practice were concerned mainly with hard skills. Therefore, candidates were hired based on the type of qualifications they have; academic, training and professional. Hard skills were considered to be the key for ensuring employees' success in performing the operational work, as soft skills were considered as complementary. However, nowadays, Human Resource Managers are more focused on hiring candidates who are competent in terms of soft skills, too based on the philosophy "Hire for Attitude, train for experience". At present, soft skills are considered to be strategic key capabilities for personal and professional success (Cimatti, 2016). Interpersonal communication, teamwork, conflict management and problem-solving are some of the soft skills (Rachmawati, 2012; Zhang, 2012). Identifying individual competencies, hard and soft, is not only critical for recruitment but also it can be the base of many other plans such as Career Path, Succession, Training, Capacity Building and Corporate Innovation.



Moreover, in old practices, decisions were made by the executive management only as the decision-making process was going from top to bottom, while in contemporary practices, it is from bottom to top. Reducing bureaucracy via the involvement and empowerment of employees, especially from the planning phase of introducing a change, and allowing them to use their potential to improve their working process and fulfilling employee's desire to make decisions, especially for their assigned tasks, help in building the supporting culture for that change, enhance the effectiveness of change, enhancing organizational and employees productivity, quality and people attitudes (Lin et.al.,2006; Cotton, 1993 & Lawler, 1994 cited by Daily & Bishop, 2003; Kappelman & Richards, 1996; Drafke & Kossen, 2002 cited by Psychogios, Wilkinson & Szamosi, 2009).

Conducting meetings, presenting lectures/speeches or sending informative emails from the executive management, and providing training are critical and effective practices adopted by contemporary entities. These approaches can help in building the culture for the coming change to be implemented. They support the executive management to transmit the knowledge to the employees about the expected outcome, possible challenges and risks that might be faced, eliminate ambiguity and fear of uncertainty of the coming change, assure the existence of shared understanding between management and employees and support employees with the needed skills for the change. Moreover, they help in accelerating open and two-way communication, staff involvement and empowerment, which are enablers for reducing staff resistance and helping them adopt and adapt to the planned change. These factors will enable the executive management to avoid any possible financial and/or managerial disasters (Lin et.al.,2006; Hicks & Mathews, 2010; Nazari et al., 2011).

Undoubtedly, human resource documentation was also transformed in current practice in comparison to the traditional one. Besides all aforementioned documented plans required to be prepared and implemented by Human Resource Departments, there are several other documents that should be available to ensure the proper governance of the corporate's human resources. Nowadays, and in order to be effective, executive management must ensure the availability of documented vision, mission and strategic objectives for the corporate, which shall be used as the base for detailed objectives and Key Performance Indicators (KPIs) of all departments/sections as these are essential for providing the direction (Madan, 2010; Oakland, 2011). This will assure harmony of all goals and efforts within the entity.

Furthermore, the executive management should ensure the availability of the most updated and documented Procedure Manuals (PMs) that describes the process workflow, purpose and scope within each division besides the Service Level Agreements (SLAs), whenever required, as they describe the details of what must be done, when, where, how, who is responsible, what is the expected performance and timelines. Consequently, not only quality of work will be verified during the audit through the comparison of actual work against the documented arrangements (Lo & Sculli, 1996) but also, these documents provide guidelines for new joiners of the division. Senior staff will have low pressure in teaching new staff, rotated staff and/or trainees about the work within the division. As a result, consistency of work will be

assured all the time. These transformational practices in the planning stage/phase have also enabled contemporary management to survive in different catastrophes such as downsizing, resignations, especially crowd resignations and retirement of senior staff. However, preparing plans without implementing them will give no benefits to the organizations.

### 3. Do

In the past, it was mentioned that “Not all managers can be leaders while all leaders can be managers”. This was repeated while explaining the differences between leaders and managers with the aim of differentiating between these two characters and how they act based on their level of given authority and the personal charisma which describes their methods in performing their missions and achieving their assigned goals. However, this seems to be, somehow, not applicable anymore in today’s dynamic and interrelated working environments. Today, executive management is urging that each individual should possess leadership skills in order to cope with all changes and meet expectations. Today’s continuously changing working environment, along with its complexity and uncertainty, makes leadership a key factor for achieving corporate goals (Werder & Holtzhausen, 2009). This transformation can be realized in different scenarios.

As organizations have shifted from hierarchy-based organization towards projects/task/goal-based organization, peoples’ interactions within the organization has also changed. Previously, employees’ interaction was limited to their working teams within their departments/sections, while in today’s corporate transformational situation, people are more exposed and more required to work with each other within the corporate regardless of the interaction extent between their departmental processes. Therefore, executive management is urged to adopt an alteration through the formation of cross-functional teams for implementing the different projects and achieving milestones. Switching to such an approach has opened new horizons for the organizations not only towards having a mixture of competencies within teams but also providing a kind of flexibility and creating a chance for open communication between the different task force members regardless of their jobs and managerial level which is crucial for avoiding performance misstatement, transformation failure (Cochran, 2010 ; Malina & Selto, 2001). In addition, open communication reduces employees’ absenteeism and turnover while helping to increase organizational commitment and employees’ productivity and satisfaction, knowledge transmission and development of ideas through employees’ interactions (Hargie et al., 2002 cited by Al-Nashmi & Syd Zin, 2011; Gold et al., 2001 cited by Nazari et al., 2011).

According to Hirtz et al. (2007, p.24), several researchers have concluded that *“a leaders’ characteristics directly influence a subordinate’s actions in dealing with their assigned tasks, and adopt a common belief system when the leader takes a direct interest”*. In fact, regardless of the type of leadership style adopted by leaders, there are five core values for leadership or good corporate governance. These core values are transparency, accountability, fairness and equity, independency and reporting or complying with laws and regulations (Setyahadi,

2020). The absence of these values will have a negative impact not only at the organizational level but also at the individual level. Teams cannot perform willingly where there is no full and equal transparency or fairness. They will not follow someone who cannot be a role model in being accountable, independent or compliant with the law. Therefore, leaders must provide ideal influence by acting as role model (Schwepker & Good, 2010; Wright & Pandey, 2010). Although there is no perfect organization in having all role model leaders and/or managers, the differences between yesterday's and today's situations are the followed strategies by executive management. For instance, the approach adopted by executive management in terms of team governance has been transformed. The old-fashioned management's team governance was based on the end performance and achievement of goals. Modern management is more concerned about the attitude of the team members as well as of the leader him/herself, interactions, communication, knowledge sharing, and goals achievements. This means that executive management should adopt a transformational leadership style due to its direct impact on employees' performance, as there is a positive relationship between transformational leadership and employees' creativity (Shin & Zhou, 2003) cited by Gong et.al.(2009).

There is no doubt that knowledge management is a very critical aspect needs to be considered in all of human resource planning processes. Knowledge Management Planning brings several benefits to the organizations. This plan helps employees to share their knowledge, ideas and opinions and enhance their understanding of their departmental work in specific and the organizational processes in general. Hsu & Shen (2005) stated that knowledge Management is a *"key accelerator for realizing synergies among units, achieving higher added value for customers, accelerating innovation and for boosting revenues for market development to bring that competitive advantages"*.

Previously, executive management was considering training plan and succession plan as the key pillars to ensure knowledge management. Training plans were made of scheduled on-site training courses either in-house (within the corporate) or external training programs that might be conducted locally or abroad. A succession plan, on the other hand, was focusing on transferring the knowledge from expert/senior staff to junior staff or expatriate to local employees through defined periods of shadowing and reverse shadowing. This approach seems, somehow, ineffective and has many consequences. For instance, not all organizations were able to prepare and adhere to implement a comprehensive training plan that targeted all employees due to the costs encountered, especially with abroad training. Indeed, in some companies, abroad training was given rarely and for certain technical jobs, maybe.

According to Álvarez et.al.,(2013), cited by Peñarrubia-Lozano et. al. (2021), today's globalized working world made the integration between training and information technology a basic requirement. Certainly, the technology has transformed the learning methods through the digital platforms and Artificial Intelligence (AI) (Satar et. al., 2020). Although it might be believed that this transformation was a result of the Pandemic of COVID-19 and its lockdowns following procedures in many countries around the globe, in fact, the e-learning phenomena

existed earlier in fields like education. Contemporary firms have also used the advantage of advanced technology to enhance knowledge management to be more comprehensive and in a flexible way than earlier practices. For example, corporates are not, any more, depending on on-site training programs due to the availability of virtual training courses offered through digital training platforms, which enable employees to get the knowledge anytime and anywhere that suits them. Facilitating access to such platforms provides evidence that contemporary executive management is smarter than previous ones. For instance, by providing and encouraging staff to use such platforms, several costs encountered with abroad training like accommodation, tickets and insurance have been eliminated. Moreover, Human Resource Departments are able to have a better picture of staff who is concerned with developing themselves. Indeed, through such platforms, executive management is able to extract dashboards of the number of courses attended by each individual, types of courses, staff accountability to finish the training courses within the given time, course withdrawals by each staff and unfinished enrolled courses. These training platforms are also providing a kind of knowledge- sharing opportunity for the staff enrolled in one of their courses with those who enrolled on the same course via evaluating and leaving feedback on other enrolled trainees' work.

Obviously, many organizations have realized the benefits of knowledge sharing. The differences between before and now are: the availability, the diversity and the usage of methods. Ideation sessions and focused group discussions are some key tools for knowledge sharing, innovation enhancement and creative thinking. They have been conducted by many organizations for a long time in order to create an opportunity for its management and staff to exchange and share their views, creative ideas and brilliant solution (s) for their working issues. Besides, this practice can enable to provide the higher/ executive management opportunity to identify competencies within the organization. The mechanism of carrying out these sessions/discussions has been transformed. Previously, these activities were done in a closed manner within the organization by its own people or by contracted professionals or experts in the field. However, currently, these discussions and sessions are done in a more dazzling and innovative way. Nowadays, there is no need to conduct such sessions on-site anymore due to advancements in technology. Corporates nowadays are able to use special platforms for their employees share and express their ideas and accelerate innovation behavior ( Beretta, 2019; Ferraris et al., 2019 cited by Krufft & kock, 2021). These platforms are providing corporates with a unique chance to obtain solutions to their own working dilemmas not only from their experts but also external experts from the market. This seems to be a very beneficial transformation as it also provides corporates with the opportunity to explore potential experts to be hired or contracted. In addition, these platforms are of great help to organizations in having databases of all of its different internal and external experts, database of all issues shared, feedback and solutions. Furthermore, organizations are able to avoid many costs encountered in order to conduct such sessions such as inviting external experts, hiring places and other logistic arrangements. However, the effectiveness and efficiency of the implemented plan cannot be identified without measurement.

#### 4. CHECK

Undeniably, the effectiveness of implemented plans will not be known unless there is a proper and comprehensive assessment mechanism. Measuring the performance of a plan will enable the executive management to assess employees and guide them, assess the effectiveness of the managerial activities and decisions, and help in defining the criteria for future actions (Malina & Selto, 2004). Earlier, staff attendance was a key dimension to assessing the employees' accountability towards work. However, nowadays attendance can be more useful to measure punctuality while accountability of employees can be defined as how effective an employee is in being positively interactive, contribute and performing assigned duties.

Unquestionably, performance appraisal is a key method to be performed by every entity, and lack of appropriate performance management can cause failure of any implemented change or improvement (Amaratunga & Baldry, 2002). Performance appraisal types and frequency stand as paradigms of transformation happened between the past practice and current one. An annual performance appraisal filled by the managers to assess the performance of an employee was a typical practice. However, this was not an effective method as some employees were relaxed during the year and show hard work and provide initiatives when this appraisal is close. Besides, this classical appraisal was a one-way evaluation. Assessments of managers from the point of view of his/her subordinates were not considered. However, nowadays, Performance appraisal is more comprehensive, panoramic and accurate. Examples of currently used performance appraisal systems are 360 Degrees and 720 Degrees. These methods are intense, personalized, and are enablers for organizations to get feedback on an employee from internal and external sources such as superiors, subordinates, colleagues, customers and investors (Aggarwal & Thakur, 2013). In regards, to the periodicity and frequency, quarter appraisals seem to be more common to be conducted and preferred in today's contemporary firms.

Furthermore, performance measurement is the process where actual progress is assessed against planned objectives, and the outcomes are essential for identifying strengths, opportunities for improvement and future initiatives to be implemented with the goal of enhancing organizational performance (Amaratunga & Baldry, 2002). At present, some corporates have shifted their aim of conducting performance from an individual level to a corporate level. For instance, instead of identifying how far an individual has performed against his/her Key Performance Indicators (KPIs), organizations have linked the KPIs of each individual and the performance of their division to the corporate's KPIs through the usage of balance scorecard tool where the performance of the organizations will be evaluated against four perspectives; financial, customer, internal processes and growth and each of these perspectives is built on four elements; strategic objectives, performance measure, target value and strategic initiatives (Romph, 2020). Moreover, some entities have gone beyond

the evaluation of performance purposes to a linkage of results from such method with the privileges given like bonuses. It seems that adopting such system will work indirectly to enhance accountability, responsibility, transparency and cooperation within the organization.

Similarly, earlier, training evaluation was done by the trainees in regard to different dimensions such as contents, timing, duration, venue and trainer. This evaluation was essentially required by the training organizers, but to the trainees' employers, it wasn't of that importance. At the present time, however, organizations have realized the criticality of training investment in building the capacity, knowledge and skills (Curado & Sousa, 2021), thus, organizations are more concerned nowadays about evaluating the training programs and trainee. This evaluation is based on feedback from the trainee, the trainee's superior and the human resource department. This transformational direction has enabled organizations to act proactively than reactively at the strategic level (Kuchеров & Maokhina, 2017). Currently, entities are able to decide what training courses to go for, which training providers and can customize special course for certain personnel in a specific field with coordination with training providers. These arrangements are crucial for establishing a training plan, career path plan, succession plan and capacity building plan.

Satisfaction of internal customers' and the employees are critical to the external customers' satisfaction, as their satisfaction is inextricably related (Davis, 2007). At old- fashioned entities, executive management focused on assessing external customers' satisfaction only and neglecting the importance of checking the satisfaction level of their employees. On the other hand, contemporary management pays great attention to checking employee satisfaction and morals through periodic meetings between management and the rest of the employees as a method of building effective communication channels between the two parties. During these meetings, management gives the floor to the employees to express their feelings and perceptions towards their roles, assigned tasks, management decisions and the organization as a whole. This meeting provides upward and downward communication and provides assurance to the employees of their management's commitment towards listening to them and being open to their ideas. On the one hand, employees can understand what the management expects from them, and on the other hand, management will be able to understand how their employees feel, be aware of their satisfaction level and be able to identify factors for their employees' job-related issues (Downs & Hazen, 1977) cited by Al- Nashmi & Syd Zin (2011). One of the useful tools used by contemporary firms is the "Index of Organizational Reactions (IOR)" through which eight aspects of job- satisfaction are assessed (Burke et.al., 2005). Working on understanding and identifying the needs and expectations of the employees will help in establishment of corrective actions plans that aims to build a constrictive working environment, increase employees' satisfaction, retain staff, and enhance their productivity (Kappelman & Richards, 1996).

## 5. ACT

Bessant & Francis (1999);Egan (1993), cited by Oliver (2009, p.547) stated that *“continuous improvement will be achieved if learning takes place within the organisation”*. Certainly, transformation in managing resources is not an option any more especially if it is related to human resources, one of the critical assets for any organization. Entities are at a high risk of losing staff at any moment due to the different threats in the market, and poor management of this valuable resource makes the situation worse. Hiring excellent staff, retaining them and assuring their loyalty is a tough and challenging task for any enterprise willing to stay in the market and expand. It is critical that executive management is able to understand the needs, expectations and requirements not only of the job but also of the employees themselves and act accordingly.

In the past, executive managements, even at big corporates, considered high salaries and bonuses as the most important requirements for any staff to stay. However, as people's needs and expectations are continuously changing, contemporary management realized that there is a necessity to establishing motivational schemes that include special privileges, incentives, attractive remuneration package, and recognition mechanism. This has to be built on the philosophy that people within the organization are not the same, especially in regard to attractions and people with critical roles and knowledge, and astonishing performance must be recognized and rewarded. Some examples of incentives offered by contemporary entities, but are not limited to, interest-free loans, health club membership, health insurance, specialized training opportunities, challenging tasks and jobs, clear career path, empowerment level, job security assurance, and free tickets.

Making a profit is not any more the key enabler for any organizations to assure sustainability. Achieving sustainability has driven many entities to emphasize on encouraging corporate innovation. Huse (2005) has defined three types of corporate innovations; Novel Organizational structure of an administrative system, New products/ services or modifications for existing ones and New technology to improve production methods. Accordingly, there are three sources from which organization can stem these innovations from. First, Acquisitive innovation from which corporate will adopt innovative approaches from outside via purchasing, obtaining licensed agreements or joint venture. Second, Imitative innovation is through which an entity imitates another organization in terms of its products, services and/ or processes. Lastly, incubated innovations which usually developed by the organizational research and development section through its own effort in order to create and generate innovation internally (Huse, 2005). Regardless of the type or source an organization might be chosen to go for, corporate innovation and working within a dynamic environment has created a need that for corporates work on becoming a contextual ambidexterity organization to act on a balanced base compared to structural and sequential in terms of exploration and exploitation (Brix, 2018).



This transformational target has led to a transformational change in the firm's internal environment that affect directly its human resources in terms of capacity building. Through corporate innovation, employees are involved and able to interact, exchange and share knowledge, develop their competency and advance in their career. Contemporary executive management are also provided with the opportunity to identify and utilize internal and external talents and competencies, and accelerate communications, teamwork, cooperation and innovation within its internal environment. As a result, empowerment and loyalty of the staff will be gained too. Besides, this will build employee's ownership towards their assigned tasks and improving their work continuously (Oakland, 2011).

However, firms should develop, acquire or adopt a flexible approach that enables individuals and management within the organizations to be able to switch between exploration and exploitation smoothly whenever there is a need to avoid any consequences by emphasizing on exploration as it creates high- risk of utilizing scarce resources or exploitation which increases the risk of reducing the learning of new skills (Brix, 2018) .

Equally, providing employees with the required knowledge and skills is essential, but providing the tools, equipment, machines and systems to utilize that knowledge is crucial too. This definitely, will not only save employees time, energy and effort but also save their physical and mental health. Previously, organizations concerned with assuring occupational health and safety practices were more committed to provide their employees with the needed equipment, directions and procedures based on their working nature and associated risks compared to other entities. Currently, corporates have gone beyond this limit. This can be obviously seen from the various adopted practices that aim to assure a hazard-free working environment, such as periodic checks and maintenance of the firms' premises and their appliances, calibrations of used machines, applications of comprehensive and systematic risk management, provision of psychosocial corporate consultancies, provision of clinic within the organization, besides the periodic studies, audits and evaluations aiming to assess the working pressure and people's attitude towards the company and its management from different angles.

## **6. DISCUSSION**

Old practices in managing employees are not effective in today's dynamic business world. Advanced technology, globalization, intense competition and continuously changing needs of customers; internal and external make Human Resource Management Transformation is a must for any organization regardless of its type or size. Organization must be continuously adaptive, flexible and willing to change in their approaches. Paying a high level of concern in developing employees and working on assessing and enhancing their satisfaction will help to retain current employees, acquire new potential ones, reduce their resistance to change, change employees' attitudes and mindset, managing time and financial resources as well as



avoiding possible strategic, financial and reputational risks that might be encountered due to change failure or the loss of competent staff due to resignation or retirement (Yang, 2007; Hicks & Mathews, 2010; Nazari et al., 2011; Cotton, 1993; Lawler, 1994, cited by Daily & Bishop, 2003)

## **7. SUMMARY**

As a matter of fact, transformation is not always related to technology, but it is a re-engineered-processes that enable organizations to achieve sustainability through the advancement in different aspects like innovation, capacity building, digital transformation, process enhancement and process re-engineering. The transformation has been noticed in all dimensions of human resource management, such as recruitment, training, capacity building, knowledge management, performance evaluation and recognition. Indeed, as organizations do not work in isolation, organizations cannot survive in today's aggressive working world if did not continuously work on assessing their own practices and transform them whenever needed. Organizations should identify and fully understand what to be transformed, when, where and the impact of this transformation in order to be prepared to mitigate the negative effect of such transformation through the usage of identified controls to mitigate them. However, besides all of the aforementioned transformational efforts taken by contemporary entities, there is always a need to tie them with the essential policies, frameworks, rules and regulations that aim to protect employees' rights not only against the different types of harassment but also to protect their intellectual property.

## REFERENCES

- Aggarwal, A. & Thakur, G. S. (2013), Techniques of Performance Appraisal-A Review. *International Journal of Engineering and Advanced Technology (IJEAT)*, Vol. 2 (3), pp. 617 – 621.
- Amaratunga, D. & Baldry, D. (2002) Moving from performance measurement to performance management. *Facilities*, 20 (5/6), pp. 217 – 223
- Al – Nashmi, M. M. & Syd Zin, S. A. R. (2011), Variation in communication satisfaction of academic staff in universities in Yemen depending on national culture. *Cross Cultural Management: an International Journal*, 18 (1), pp. 87 – 104.
- Burke, R. J., Graham, J. and Smith, F. J. (2005). Case Study: Putting the customer second. *Emerald Group Publishing Limited*, Vol. 17 (1), pp 85-91
- Brix, J. (2018). Innovation capacity building: an approach to maintaining balance between exploration and exploitation in organizational learning (a conceptual paper), Emerald, pp. 12-24
- Cimatti, B. (2016), Definition, Development, Assessment of soft skills and their role for the quality of organizations and enterprises. *International Journal for Quality Research*, Vol. 10 (1), pp. 97 – 130.
- Cochran, G. (2010) , The promise and pitfalls of organizational change. *Nonprofit World*, 28 (4), pp. 7 – 11.
- Curado, C. and Sousa, I. (2021), Training evaluation of a sales programme in in a Portuguese cosmetics SME. Emerald: Industrial and Commercial Training, Vol. 53 (3), pp. 283-293.
- Daily, B. F. & Bishop, J. W. (2003), TQM workforce factors and employee involvement: the pivotal role of teamwork. *Journal of Managerial Issues*, 15 (4), pp. 393 – 412.
- Davis, T. R. V. (2007) , Part I: Satisfying Internal Customers: The link to external customer satisfaction. Emerald, pp. 34 – 36.
- Göktaş, P. (2017) , Approach of EFQM Excellence Model and PDCA (Plan Do Check Act) Cycle in terms of Human Resources Management. In Demir, S. S. (Ed.), CIEP 2017 Processing Book: 2nd Congress on International Economic and Administrative Perspectives: Sustainable Global Competition, pp. 218-220.
- Gong, Y., Huang, J. C. & Farh, J. L. (2009) , Employee learning orientation, transformational leadership and employee creativity: the mediating role of employee creative self-efficacy. *Academy of Management Journal*, 52 (4), pp. 765 – 778.

- Hicks, B. J. & Matthews, J. (2010) , the barriers to realising sustainable process improvement: a root cause analysis of paradigms for manufacturing systems improvement. *International Journal of Computer Integrated Manufacturing*, 23 (7), pp. 585 – 602.
- Hirtz, P. D., Murray, S. L. & Riordan, C. A. (2007), The effect of leadership on Quality. *Engineering Management Journal*, 19 (1), pp. 22 – 27.
- Huse, M. (2005) , Corporate Innovation and Competitive Environment (an empirical study). *Academia*, pp. 312-333
- Hsu, S. H. & Shen, H. P. (2005) , Knowledge Management and its Relationship with TQM. *Total Quality Management*, 16 (3), pp. 351 – 361.
- Kappelman, L. A. and Richards, T. C. (1996). Training, empowerment, and creating a culture for change. *Empowerment in Organizations*, MCB University Press, Vol. 4 (3), pp. 26-29.
- Kruft, T. and Kock, A. (2021) . Unlocking novel opportunities: how online ideation platforms implicitly guide employees toward better ideas by spurring their desire to innovate. *Wiley*, pp. 816-834.
- Kuchеров, D. and Manohina, D. (2017). Evaluation of training programs in Russian manufacturing companies. *Emerald: European Journal of Training and Development*, Vol. 41 (2), pp. 119-143.
- Liao, S. H., Chang, W. J. & Wu, C. C. (2010) , Exploring TQM-Innovation relationship in continuing education: A system architecture and propositions. [Electronic Version]. *Total Quality Management & Business Excellence*, 21 (11), pp. 1121-1139.
- Lin, W. T., Yang, H. J. And Lin, M. Y. (2006) , The implementation of Enterprise resource planning and product data management in Semiconductor related industries: an empirical study in Taiwan [Electronic Version]. *International Journal of Management*, 23 (1), pp. 117 – 131.
- Lo, V. H. Y. and Sculli, D. (1996) , An application of TQM concepts in Education. *Training for Quality*, Vol. 4 (3), pp. 16 – 22.
- Madan, P. (2010) , An award journey for business excellence: the case study of a public sector unit. *Total Quality Management & Business Excellence*, 21 (12), pp. 1343 – 1364.
- Malina, M. A. & Selto, F. H. (2004) , Choice and change of measures in performance measurement model. *Management Accounting Research*, Vol. 15, pp. 441 – 469.
- Malina, M. A. and Selto, F. H. (2001) , Communicating and controlling strategy: an empirical study of the effectiveness of the balanced scorecard [Electronic Version]. *Journal of Management Accounting Research*, 13, pp. 47 – 90.

- Nazari, J. A., Herremans, M., Robert, G., Manassian, A., & Kline, T. J. B. (2011) , Organizational culture, climate and IC: an interaction analysis. *Journal of Intellectual Capital*, 12 (2), pp. 224 – 248.
- Oakland, J. (2011) , Leadership and Policy deployment: the backbone of TQM. *Total Quality Management & Business Excellence*, 22 (5), pp. 517 – 534.
- Oliver, J. (2009) , Continuous improvement: role of organisational learning mechanisms. *International Journal of Quality & Reliability Management*, 26 (6), pp. 546 – 563.
- Peñarrubia-Lozano, C., Segura-Berges, M., Lizalde-Gil, M. and Bustamante, J. C. (2021). A Qualitative Analysis of Implementing E-Learning during the COVID-19 Lockdown, *MDPI*, 13 (3317), pp. 1 – 28.
- Psychogios, A. G., Wilkinson, D. & Szamosi, L. T. (2009) , Getting to the heart of the debate: TQM and middle manager autonomy. *Total Quality Management*, 20 (4), 445– 466.
- Rachmawati, R. (2012) , The implementation quantum teaching method of graduate through up-grade hard skill and soft skill (Case study on Management Accounting Class). *Procedia – Social and Behavioural Sciences*, Vol. 57, pp. 477 – 485.
- Romph, N. (2020). The balance scorecard for school management: case study of Thai public schools. *Emerald: Measuring business excellence*, vol. 24 (3), pp. 285-300.
- Satar, N. S., Morshidi, A. M and Dastane, O. (2020) , Success Factors for e-Learning Satisfaction during COVID-19 Pandemic Lockdown. *International Journal of Advanced Trends in Computer Science and Engineering*, Vol. 9 (5), pp. 7859 – 7865.
- Schweperker, C. H. & Good, D. J. (2010), Transformational leadership and its impact on sales force moral judgment. *Journal of Personal Selling & Sales Management*, 30 (4), pp. 299 – 318.
- Setyahadi R. R., I Made NARSA (2020) , Corporate Governance and Sustainability in Indonesia (a conceptual paper). *Journal of Asian Finance, Economics and Business*, Vol. 7 no. 12, pp. 885–894
- Werder, K. P. & Holtzhausen, D. (2009) , An analysis of the influence of public relations department leadership style on public relations strategy use and effectiveness. *Journal of Public Relations Research*, 21 (4), pp. 404 – 427.
- Wright, B. E. & Pandey, S. K. (2010) , Transformational Leadership in the Public Sector: Does structure matter?. *Administration Research & Theory*, Oxford Academia, 20 (1), pp.75 – 89.
- Xingxiaoli (2016) , Enterprise Human Resource Management Innovative Thinking in the Age of the Internet. 3rd International Conference on Management, Education Technology and Sports Science (METSS), pp. 367-370.

- Yang, K. K. (2007) , A comparison of cross-training policies in different job shops. *International Journal of Production Research*, 45 (6), pp. 1279 – 1295.
- Zhang, A. (2012) , Peer Assessment of soft skills and hard skills. *Journal of Information Technology Education: Research*, Vol. 11, pp. 155 – 168.