

Augmenting Retail Reality, Part B

This page intentionally left blank

Augmenting Retail Reality, Part B

Blockchain, AR, VR, and AI

EDITED BY

BALRAJ VERMA

Chitkara Business School, Chitkara University, Punjab, India

AMIT MITTAL

Chitkara Business School, Chitkara University, Punjab, India

MURALI RAMAN

Asia Pacific University of Technology & Innovation, Malaysia

AND

BIRUD SINDHAV

University of Nebraska Omaha, USA



United Kingdom – North America – Japan – India – Malaysia – China

Emerald Publishing Limited
Emerald Publishing, Floor 5, Northspring, 21-23 Wellington Street, Leeds LS1 4DL.

First edition 2025

Editorial matter and selection © 2025 Balraj Verma, Amit Mittal, Murali Raman,
and Birud Sindhav.

Individual chapters © 2025 The authors.

Published under exclusive licence by Emerald Publishing Limited.

Reprints and permissions service

Contact: www.copyright.com

No part of this book may be reproduced, stored in a retrieval system, transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the publisher or a licence permitting restricted copying issued in the UK by The Copyright Licensing Agency and in the USA by The Copyright Clearance Center. Any opinions expressed in the chapters are those of the authors. Whilst Emerald makes every effort to ensure the quality and accuracy of its content, Emerald makes no representation implied or otherwise, as to the chapters' suitability and application and disclaims any warranties, express or implied, to their use.

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN: 978-1-83608-709-0 (Print)

ISBN: 978-1-83608-708-3 (Online)

ISBN: 978-1-83608-710-6 (Epub)



INVESTOR IN PEOPLE

Contents

About the Editors	vii
About the Contributors	ix
Preface	xvii
Chapter 1 Revolutionizing Customer Experience: Integrating Blockchain with AR and VR in Retail <i>Kaushikkumar Patel</i>	1
Chapter 2 Revolutionizing Customers Shopping Experience via Augmented-Virtual Reality in Retail Business: Whirling Dreams Toward Transforming Retail Industry Reality <i>Bhupinder Singh, Christian Kaunert, Komal Vig and Ritu Gautam</i>	23
Chapter 3 Revolutionizing Marketing Management: Navigating the Era of New Age Technologies <i>Namrata Prakash, Monu Bhardwaj and Priya Jindal</i>	39
Chapter 4 Revolutionizing Retail: Exploring the Synergy of Cashless, Contactless, and Autonomous Shopping in the Digital Age <i>Mandeep Kaur, Lavisha Luthra, Rajit Verma, Kamaljeet Kaur, Priyanka Salgotra and Nasser Khalufi</i>	55
Chapter 5 Securing the Metaverse: Exploring the Role of Artificial Intelligence in Mitigating Emerging Threats in Manufacturing and Service Industries <i>Arjun J. Nair, Sridhar Manohar and Rishi Chaudhry</i>	67

Chapter 6 Unveiling the Power of Omni-channel Retail Strategies <i>Vinoth S. and Nidhi Srivastava</i>	85
Chapter 7 Analyzing the Effectiveness of AI-Powered Chatbot's: A Smart PLS Approach for Evaluating User Engagement and Satisfaction <i>N. Suma Reddy, Varun Nayyar and Pooja Khanna</i>	113
Chapter 8 Artificial Neural Networks (ANN) for Stock Price Prediction: A Financial Machine Learning Analysis <i>Sulaiman Abdullah Saif Alnasser Mohammed</i>	131
Chapter 9 Augmented Retail Reality: Transforming User Experience, Interactivity, and Attitudes in the Shopping Landscape <i>Lingam Naveen, Rabi N. Subudhi, Dhananjay Beura and Shilpi Sarna</i>	145
Chapter 10 Cryptocurrencies and Blockchain Technology Augmentation Identification in Decentralized Finance <i>Syed Mohd Khalid and Babli Dhiman</i>	167

About the Editors

Balraj Verma is currently serving as an Associate Professor at the Doctoral Research Centre of Chitkara Business School, affiliated with Chitkara University, Rajpura, Punjab. He completed his PhD from Jaypee University of Information Technology (JUIT), Wanknaghat, and holds a Master's Degree in Business Administration, bringing with him over 16 years of combined academic and corporate experience. His teaching portfolio includes courses such as Marketing Management, Strategic Management, Business Statistics, and Research Methodology. He has successfully supervised three scholars to PhD completion under his guidance, showcasing his proficiency in academic mentorship. His research contributions are substantial, with numerous publications in respected journals indexed in SCI, ABDC, and Scopus. Additionally, he has authored and edited books and contributed chapters to leading international publishers. He is actively involved in organising international conferences and serves as a resource person for Faculty Development Programs (FDPs), Management Development Programs (MDPs), and workshops focused on research methodologies. As a peer reviewer for esteemed journals including the *Journal of Knowledge Economy* (Springer), *Economic Change and Restructuring* (Springer), *Electronic Commerce Research* (Springer), *International Journal of Information Management Data Insights* (Elsevier), and *S N Computer Science* (Springer), he contributes significantly to maintaining the standards of academic scholarship in his field. His research interests span E-commerce, Retail Management, Technology Adoption, Aggregator Platforms Models, and Human–Computer Interaction.

Ami Mittal is a Pro-Vice-Chancellor and has over two decades of domestic and international experience in academic leadership, teaching, research, consulting, training, and mentorship. At Chitkara University, his current mandate is to manage and coordinate the PhD programmes, research publications, and international/domestic research collaborations. Seventeen scholars have been awarded PhD degrees under his guidance, and he has published over 120 Scopus/SSCI indexed papers with a number of these included in the ABDC/ABS journal list. He was the Recipient of the Career 360 'Outstanding Faculty Researcher Award' 2023, 'Megastar Award' Chitkara Excellence Awards 2023/4, the Chitkara University Excellence award 2023 (Publications in Business School Category), 2021 (February) for highest cited author and publications with highest H-index (Business School category). He is an Active Resource Person for FDPs, MDPs, and Corporate Trainings. He is a Member of the thesis review board of a number

of universities. He presently reviews for reputable journals such as *Technological Forecasting and Social Change* (Elsevier), *Public Health* (Elsevier), *Benchmarking* (Emerald), *Technology Analysis and Strategic Management* (Taylor and Francis), *International Journal of Consumer Studies* (Wiley), *Journal of Public Affairs* (Wiley), *Routledge Studies in Global Student Mobility*, *International Journal of Emerging Markets* (Emerald), *Sustainability* (MDPI), *Management Decision* (Emerald), *IIM KSMR* (Sage), etc. He serves on the editorial boards of *Frontiers in Psychology* (SSCI/Scopus indexed), *Open Psychology Journal* (Scopus indexed), *Proceedings on Engineering Sciences* (Scopus indexed) and *Research on Enterprise in Modern Economy* (Gdańsk University of Technology, Poland). He is currently guest editing a special issue in *International Journal of Information and Management Data Insights* (Elsevier). He also serves on the executive committee of Indian Business School Advisory Council (BSAC) of ETS Global, USA. He is presently on the jury of the QS Reimagine Education Awards, Abu Dhabi 2023. He is a Research Fellow at INTI International University, Malaysia; Visiting Professor at Pathumthani University, Thailand; and Adjunct Faculty, IMSAR – MD University, India.

Murali Raman is both a Rhodes Scholar and Fulbright Fellow. His academic credentials include a PhD from SISAT, Claremont, USA; MBA (Imperial College, London); MSc Human Resources (London School of Economics, UK). He was affiliated to Stanford's Technology Venture Program as a Faculty Fellow. He has published more than 120 papers in International Journals, Conferences, and Book Chapters, in management information systems related areas. He is currently the Deputy Vice Chancellor at Asia Pacific University of Technology & Innovation, Kuala Lumpur, Malaysia.

Birud Sindhav is a Professor of marketing at the University of Nebraska at Omaha. He has a PhD with a marketing focus from the University of Oklahoma, Norman. His research interests focus on areas of b-to-b relationships, organisational justice, green advertising, social media, grassroots entrepreneurship in emerging economies, and sales function in startups. His work has been published in the *Journal of Retailing*, *Journal of International Marketing*, *Journal of Marketing Theory and Practice*, *Journal of Marketing Channels*, and other outlets. He is on the editorial review boards of the *European Journal of Marketing*, *Journal of Marketing Theory and Practice*, and *Journal of Inter-organizational Relationships*. He is a Senior Research Fellow at the Institute for Collaboration Science at his university. He teaches or has taught Digital Marketing, Social Media Marketing, Marketing in a High Technology Environment, Principles of Marketing, Marketing Research, and Doing Business in China in the MBA and undergraduate programmes. He has also taught in Finland, Austria, Egypt, and India. He is a Recipient of the UNO Alumni Outstanding Teaching Award among other awards. He has also provided service and consultation within and outside of the university. Prior to his academic career, he was a Marketing Executive with Amul, the largest food organisation in India.

About the Contributors

Dhananjay Beura is working as a Professor in Marketing with BIITM, Bhubaneswar, having 20 years of experience. He has completed B. Pharma, PGDM, and PhD in Marketing along with PGDM in Digital Marketing from Purdue University, USA. He has developed his interest in core areas of marketing like consumer behaviour, brand management, and digital marketing and published many articles in international journals. He is also engaged in consulting activities related to strategic advisory with some of the Indian companies and advertising agency. There are eight trademark registered brands and two patent into his credit and few more in the pipeline to be registered. He is also engaged in conducting training programme with few corporate and government institutions for sales force effectiveness and managerial effectiveness. He has published many articles in national and international journal.

Monu Bhardwaj is pursuing a doctorate in management at Graphic Era Hill University. His research and teaching experience of over 2 years involves studies on various aspects of Management. He has presented some good research publications in national and international journals. He has supervised Undergraduate and postgraduate students in their research work primarily on Finance and Marketing.

Rishi Chaudhry boasts an extensive professional background and academic credentials. He holds a PhD in Management focusing on HSIDC and Industrial Development of Haryana from IMSAR, MDU Rohtak, Haryana. Additionally, he earned an MBA in Finance & Marketing and an LL.B from IMSAR and the Department of Law at MDU Rohtak, Haryana, respectively. With a wealth of experience, he has served as both Associate Professor and Assistant Professor at IMSAR, MDU Rohtak, Haryana. His areas of expertise encompass Corporate Finance, Financial Investment, Behavioural Finance, Micro Finance, Banking, Insurance, and Accounting. His teaching repertoire includes courses in Financial Management, Cost and Management Accounting, Indian Financial System, and Business Statistics. Furthermore, he has supervised the doctoral theses of 10 scholars. In university administration, he has held various significant roles such as Dean of the Faculty of Management Sciences & Commerce and Dean of the Centre for International Academic Affairs and has been a Member of the Court of University, UGBOS & PGBOS, Faculty of Management Sciences & Commerce, among others. He has also served as the Convenor of the Academic

and Administrative Audit Committee and Chairman of the Investment Committee at MDU.

Babli Dhiman holds MBA, M.Com, PGDCA, NET Commerce, NET Management and PhD in Finance and presently working as Professor and HOD Finance at Mittal School of Business, Lovely Professional University. Her research area includes strategic finance, financial issues, and behavioural and quantitative finance. She is a Keen Researcher and having more than 110+ research papers in her credit which are published in ABDC, Scopus, and peer-reviewed journals with high H-index and Impact factor, presented in various seminars and conference at national and international level. She has also authored various international books and having various chapters in edited books. She has supervised more than 31+ M.Phil and PhD scholars. She got best patent award for Fraud detection in stock market. She is a Member of editorial and review boards of various reputed UGC, peer-reviewed, ABDC, and Scopus-listed journals.

Ritu Gautam, Assistant Professor, School of Law, Sharda University, is having more than 10 years of diverse experience in the field of Law. She has earned her PhD in Cyber Laws along with LL.M, MBA, B.Com, LLB, and PGCCCL. She is an expert in family mediation and heading a very successful Family Dispute Resolution, in Greater Noida, UP. She is having experience in dealing with more than 600 family dispute cases. She has published 5 books on different social issues, 30 research papers in UGC care and SCOPUS journals, and 40 book chapters on different issues.

Priya Jindal is currently working as an Associate Professor at Chitkara Business School, Chitkara University, Punjab, India, and holds a Master Degree in Commerce and Economics. She earned her Doctorate in Management. She has contributed more than 16 years in teaching. She supervised four PhD research scholars and two M.Phil candidates. There are numerous research papers to her credit in leading journals among them seven research papers have been published in *Scopus Indexed Journal*. Her areas of research included banking, finance, and insurance. She has filed more than 21 patents and 1 copyright. She is the Editor of two books under IGI publications, and the book was indexed in Scopus.

Christian Kaunert is Professor of International Security at Dublin City University, Ireland. He is also Professor of Policing and Security, as well as Director of the International Centre for Policing and Security at the University of South Wales. In addition, he is Jean Monnet Chair, Director of the Jean Monnet Centre of Excellence, and Director of the Jean Monnet Network on EU Counter-Terrorism (www.eucter.net). Previously, he served as Academic Director and Professor at the Institute for European Studies, Vrije Universiteit Brussel, a Professor of International Politics, Head of Discipline in Politics, and the Director of the European Institute for Security and Justice, a Jean Monnet Centre for Excellence, at the University of Dundee.

Kamaljeet Kaur is serving as an Assistant Professor at Maharishi Markandeshwar Institute of Management, Mullana, Ambala. She possesses a background with degrees in B.Com, M.Com, and MBA with a specialisation in Human Resource Management and Marketing. She completed her doctorate and research publications with an impressive track record in Human Resources. She has published her research findings in Scopus Index Journals as well as in UGC care journals. Her academy reflects her commitment to advising HR and Marketing practices and contributing valuable insights to the scholarly community and the students.

Mandeep Kaur is currently serving in M. M. Institute of Management, Maharishi Markandeshwar (Deemed to be University). She has 10 years of working experience as an Academician. She has published 10 research papers in various Scopus Indexed Journals and also published 2 books and 1 patent. She is Editor-in-Chief of the *International Journal of Multidisciplinary Research and Technology* ISSN 2582-7359 peer-reviewed journal with an impact factor of 6.28, RICERCA, *International Journal of Multidisciplinary Research And Innovation* ISSN 2583-083x, peer-reviewed journal with an impact factor of 7.52.

Syed Mohd Khalid completed his M.Com at the prestigious University of Kashmir. Currently, he is on an academic journey pursuing a PhD in Finance at Lovely Professional University, Punjab. His passion for finance and commitment to excellence in education setting his unwavering determination to contribute significantly to the field.

Nasser Khalufi is serving as Assistant Professor in the Department of Management and Marketing, College of Business, Jazan University, Jazan, Saudi Arabia. He also worked as a Quality Coordinator as well as a Marketing Counsellor at the Innovation and Entrepreneurship Centre and previous Supervisor of the Training and Alumni Relationship unit. He got his PhD from the School of Management; Universiti Sains Malaysia specialises in Retailing and Technology Marketing. He obtained his Master's Degree in Marketing and Internet and Social Media Marketing from Saint Xavier University, Chicago, USA. He became a lifetime member of Beta Gamma Sigma (BGS). BGS recognises and honours the top 10% of students. He has more than 10 years of teaching including master level classes and industry experience. He can be contacted.

Pooja Khanna is Associate Professor in Mittal School of Business at Lovely Professional University. He has 19 years of experience in academia and industry. Her research encompasses marketing, with particular emphasis on consumer behaviour a key aspect of their research. She has also published in peer-reviewed journals and presented my work at numerous national and international conferences. Beyond academia, she is also committed to public engagement and outreach, often participating in community events or sharing their expertise with the broader public through media appearances or writing for popular outlets.

Lavisha Luthra is a driven and dedicated Scholar, who has illuminated her academic journey with remarkable achievements. With the prestigious UGC NET and JRF exams under her belt, she stands as a Beacon of excellence in her field. Currently embarking on her PhD at Maharishi Markandeshwar Deemed to be University, Mullana, Ambala, she navigates the frontiers of knowledge with passion and precision. Lavisha's commitment to unravelling the mysteries of her discipline is matched only by her relentless pursuit of scholarly excellence. With each endeavour, she fortifies her legacy as a Visionary Researcher poised to make profound contributions to academia and beyond.

Sridhar Manohar currently works at the Doctoral Research Center of Chitkara Business School, Chitkara University, Rajpura, Punjab. He completed his Doctorate in the area of Services Marketing from VIT Business School, VIT University, and holds a Bachelor's Degree in Technology and Dual Master's Degrees in Business Administration and Organisational Psychology. The author is also certified with FDP at IIM-A and possesses expertise in service marketing, innovation and entrepreneurship, scale development process, and multivariate analytics. Their interests lie in teaching business analytics, innovation and entrepreneurship, research methodology, and marketing management. The author has published around 20 research papers that include Scopus-listed and ABDC-ranked international journals such as *Society and Business Review*, *Benchmarking: An International Journal*, *Electronics Market*, *Corporate Reputation Review*, *International Journal of Services and Operations Management*, and *International Journal of Business Excellence*. They have also presented papers and ideas in numerous international conferences.

Sulaiman Abdullah Saif Alnasser Mohammed, an esteemed Associate Professor of Finance, has a distinguished academic career. He earned his PhD from the School of Management at the University Sains Malaysia USM and has over 700 citations on Google Scholar, including from prestigious institutions such as the University of Oxford and Newcastle University in the UK, University of Victoria in Canada, La Trobe Business School, and RMIT University Vietnam. His academic acumen is complemented by practical applications, as demonstrated by his completion of the Data Science for Investment Professionals course at the CFA Institute, USA. He has also taken on pivotal roles within various academic and administrative domains, including scientific committees, editorial boards, volunteerism units, and operational planning units at the collegiate level. His strategic insights and dedication to institutional progress have merited acclaim, as evidenced by the esteemed appreciation award the University of Hail bestowed him. Beyond academia, his professional repertoire extends into the realm of data science for investment professionals. His scholarly output, comprising over 20 ISI papers and book chapters, underscores his substantive contributions to finance, a fact duly recognised by Emerald's highly commended publication award. His enduring commitment to excellence and research fervour reverberate throughout his multifaceted engagements, positioning him as a luminary in finance. His scholarly endeavours, which have significantly impacted the academic discourse,

testify to his unwavering dedication and invaluable contributions to his institution and the broader educational community.

Arjun J. Nair works as a Professor with St. Lawrence College, Ontario, Canada, and is also affiliated with Chitkara Business School, Chitkara University, Rajpura, Punjab. He holds professional memberships in several organisations, including the International Management Research and Technology Consortium in New York, the International Association of Innovation Professionals, the American Management Association, the National Human Resources Association, and the Institute of Research Engineers and Doctors (Senior Member of the Universal Association of Arts and Management Professionals). With over 15 years of practical work experience in a variety of industries, such as education, exporting, hotel food and beverage, restaurant management, and management training, he offers expertise in curriculum development, project management, lecturing, tutoring, general management, business administration, business development, staff management, and public relations. He is a Strategic Thinker who has made significant contributions to training and facilitation, business development, and the operations and management aspects of various organisations.

Lingam Naveen is currently an Assistant Professor at the Biju Patnaik Institute of Information Technology and Management Studies, India. He is an Ex-corporate Turned Academician in operations and marketing area. He is a Doctorate Scholar from KIIT School of Management, Bhubaneswar, India. His research interests include augmented reality (AR), retail marketing, tourism, and banking and is keenly interested in learning new research methodologies and statistical techniques which he implements in his research work. He has qualified UGC NET and JRF in Management. He has attended many seminars, conferences, and FDPs and orientation programmes organised by different institutes and organisations in India. He has worked on live projects with big brands like HLL Lifecare & Wildcraft. He has published articles in journals of national and international repute.

Varun Nayyar is result-oriented, proactive, and dedicated working professional with 17+ years of end-to-end achievement-driven experience in the field of education, research, and industry. He is currently working as Program Head (Chitkara Centre of Continuing Education). Previously, he has managed multiple responsibilities, such as convenor placements and convenor admissions, in the MBA department while teaching. In addition, he has been invited by numerous colleges and industries for guest lectures on the topics of research, marketing, stress management, motivation, and others. His academic proficiency in research tools like SPSS, AMOS, R, PLS-SEM, VOSVIEWER, BIBLIOSHINY, and NVIVO has fetched 15 research papers and articles in leading international journals like SCI, Scopus, and (ABDC: A, B, and C) categories.

Kaushikkumar Patel is a Distinguished Leader in harnessing data-driven strategies within the financial sector, boasting an extensive career that intersects finance and technology. He is pivotal at TransUnion, where he innovates through Big

Data, enhancing decision-making processes and financial strategies. His profound knowledge extends to Data Analytics, Financial Technology (FinTech), and Digital Transformation, contributing significantly to advancing tech integration in finance. Based in the United States, he is renowned for his strategic oversight in developing solutions that navigate the complex challenges of data privacy and risk assessment, ensuring compliance and governance in dynamic financial landscapes. His insights have fortified business intelligence, utilising machine learning and cloud computing solutions to drive organisational success. As an influential thought leader, he has shared his expertise and vision through various high-impact publications, shedding light on the transformative power of data in finance. His commitment to excellence was internationally recognised when he was honoured with the ET Leadership Excellence Award for his groundbreaking work in data-driven financial strategies. His dedication transcends his immediate professional sphere, having a lasting impact on societal well-being. He actively engages in CSR initiatives, leveraging technology to enhance lives and contribute to sustainable development. His unique blend of technical prowess and strategic acumen establishes him as a visionary in his field, continually pushing the boundaries of what's possible at the intersection of finance and technology.

Namrata Prakash has been associated with teaching as a profession for the last 19 years, and currently, she is serving Graphic Era Hill University, as an Associate Professor. She graduated from Lady Shriram College, Delhi University and M.Com from BHU Varanasi. She is a gold medallist in M.Com. She is an avid researcher and currently supervising four research scholars. Ph.d degree has been awarded to one scholar. In order to keep herself abreast with the latest trends and brush up her knowledge, she has undergone various refresher courses. She feels learning never stops.

N. Suma Reddy is Assistant Professor in St Ann's college for women Autonomous, Hyderabad, having 29 years of experience in Academia. She has rich research experience and presented papers at both national and international level. She published papers in UGC care, Scopus, and peer-reviewed journals and developed E.content Material for B.Com 5th Semester at EMRC, Hyderabad. She has to credit 40 research papers. In addition to academic contribution, she has participated and contributed towards CSR drives.

Priyanka Salgotra is PhD, M.Phil, M.Com, UGC-NET qualified and is currently working as a Professor in Maharishi Markandeshwar Institute of Management, Maharishi Markandeshwar Deemed to be University, Mullana, Ambala. Her area of specialisation is Accounting and Finance. She has a total teaching experience of 15.5 years. She worked with Maharishi Markandeshwar Trust as a Faculty in the Department of Management from 1.7.2008 to 03.06.2019 and from 24.07.2023 till date. Before joining MMDU, she worked as a Lecturer in ApeeJay College of Fine Arts, Jalandhar, also for the period July 2003 to September 2006.

Shilpi Sarna is working as Professor (HR & Law) at Lloyd Business School, Greater Noida. She has earned her PhD in Labour Laws from Jiwaji University, Gwalior, and having 21 years of experience. She is HR Analytics certified by IIM Rohtak and expert in the areas of organisational behaviour, HRM, performance management, strategic HR and stress management, and labour laws. She has numerous publications in international and Scopus indexed journals.

Bhupinder Singh is working as Professor at Sharda University, India and also as Honorary Professor in the University of South Wales, UK, and the Santo Tomas University, Tunja, Colombia. His areas of publications as smart healthcare, medicines, fuzzy logics, artificial intelligence, robotics, machine learning, deep learning, federated learning, IoT, PV glasses, metaverse, and many more. He has authored 3 books, 139 papers, and presented 163 papers in international/national conferences and seminars; participated in more than 40 workshops/FDP's/QIP's and 25 courses from international universities of repute; organised more than 59 events with international and national academicians and industry people's, editor-in-chief and co-editor in journals; and developed new courses.

Nidhi Srivastava is currently working with MEASI Institute of Management, Chennai, as Assistant Professor and has over 11 years of experience in teaching. She has 1 year of industry experience in HR domain and her research interests includes organisational behaviour, leadership, human resource management, general management, and corporate social responsibility. She is a Certified DiSc Trainer and also PhD Reviewer at renowned universities. She has published various research articles indexed in Scopus, ABDC, UGC Care and some renowned peer-reviewed journals.

Rabi N. Subudhi is a Senior Professor at KIIT School of Management, KIIT University, India. With over 34 years of teaching experience, he has published 12 books and over 70 research papers in the area of quantitative research methodology. He is an Active Member of many reputed international academic societies, like, American Society of Engineering Management (ASEM), International Sociology Association (ISA-RC), ORSI, ICA, and ICAS. He has supervised 10 scholars for their PhD degrees and received a senior research fellowship (SRF) award from CSIR, Government of India, for his doctoral research. He was Chapter President of ORSI Bhubaneswar. He is presently the Editor of KIIT Management Research Journal, Parikalpana. He is also a Reviewer for many international journals. He has published many articles in regional languages and takes interest in Children's literature.

Rajit Verma is a confident, extrovert, flexible, and energetic person with good communication skills. He has proven strength in problem-solving and coordination with strong analytical skills. He is a diligent and tenacious worker with a deep sense of ethics and integrity and strong interpersonal skills. He has 15 years of teaching experience in university teaching. He has a PhD in the area of Finance

and Financial econometrics from Kurukshetra University in 2018. He pursued an MBA (Finance) from Kurukshetra University in 2009. His key areas of research are artificial neural networks and machine learning in the security market, portfolio management, investment analysis, blockchains, and cryptography. He has many achievements and has conferred many national and international research awards. He has more than 25 Scopus/SCI publications, and also, and he has 25+ patents to his name.

Komal Vig is working as the Dean of Sharda School of Law, Sharda University, Greater Noida. She is LL.D. in Criminal Law and MBA (HR). She has served in the field of academics in different capacities for more than 20 years. She has published more than 95 research papers in International and National Journals (including 11 Scopus), 20+ book chapters, and 30+ conference paper publications. She supervised six scholars who have successfully completed PhD under her guidance and many others are pursuing. She has presented more than 65 research papers in national and international seminars/conferences. Her area of interest is criminal law, family law, and laws related to women's rights. She is a Member of the inspection committees of various governing and accrediting bodies. She has chaired numerous sessions in international and national conferences/seminars. She is Active Member of Board of Studies of various universities, received life membership of the Indian law Institute (Deemed University) New Delhi, "Women Empowerment Award-2023" from Council of Research and Sustainable Development, India.

Vinoth S. is currently working with MEASI Institute of Management, Chennai, as Assistant Professor and has over 12 years of experience in teaching. He is specialised in marketing and has around three years of industry experience. His research interests include consumer behaviour, green marketing, and organisational behaviour. His area of expertise also includes statistics and operations research. He has published around 15 research papers in various international journals and conferences.

Preface

In the ever-evolving realm of retail commerce, the confluence of groundbreaking technologies is not merely a trend but a transformative force reshaping the industry's very foundations. *Augmenting Retail Reality, Part B: Blockchain, AR, VR, and AI* delves into this dynamic landscape, offering an insightful exploration of how cutting-edge innovations are revolutionising the retail experience. This book is designed to serve as a comprehensive guide for retailers, researchers, students, and technology enthusiasts, illuminating the path towards a future where technology and retail seamlessly intersect.

As the retail sector undergoes rapid metamorphosis, driven by technological advancements, there is a critical need for a resource that comprehensively dissects the symbiotic relationship between technology and commerce. This book addresses that need by providing an in-depth analysis of technologies such as the Internet of Things (IoT), blockchain, artificial intelligence (AI), robotics, augmented reality (AR), and virtual reality (VR). Each chapter meticulously examines how these innovations are not only enhancing customer experiences but also driving operational efficiencies and unlocking new business opportunities.

The integration of these technologies offers unparalleled potential to transform every facet of the retail journey. From personalised and immersive shopping experiences powered by AR and VR to the secure, transparent transactions enabled by blockchain, this book explores the myriad ways in which technology is redefining the retail landscape. AI and data analytics are highlighted for their roles in delivering precision-targeted personalisation, while IoT and robotics are showcased for their contributions to streamlined operations and improved customer satisfaction.

A key feature of this publication is its holistic approach, catering to a diverse audience. Retailers will find practical insights and best practices to implement these technologies effectively. Researchers and students will benefit from the theoretical perspectives and case studies that enrich their understanding of the current trends and future directions. Technology enthusiasts will appreciate the detailed exploration of innovative solutions and their real-world applications in retail.

This book stands out by providing a contemporaneous and comprehensive vantage point, essential for maintaining a competitive edge in an era of rapid technological shifts. It bridges a critical gap in current literature by offering an integrated resource that scrutinises the multifaceted impacts of technology on retail. Through pragmatic examples, success stories, and industry-approved best

practices, it addresses the unique challenges and opportunities faced by stakeholders in the retail ecosystem.

The innovative essence of this book lies in its ability to deliver both breadth and depth of insights. It not only elucidates the latest technological trends but also addresses the practical challenges associated with integrating these technologies into the retail fabric. By doing so, it empowers readers to make informed decisions and drive transformative change within their organisations.

At this transformative juncture, *Augmenting Retail Reality: Blockchain, AR, VR, and AI* serves as a navigational compass, guiding readers through the complex interplay of technology and retail. Its synthesis of comprehensive analysis, forward-looking insights, and actionable strategies makes it an invaluable resource for all stakeholders invested in the future of retail. This publication is not merely a technical exposition of technological disruptions; it is an essential guide empowering retailers to transcend traditional boundaries and confidently navigate the new era of retail innovation.

By presenting a clear, coherent, and compelling narrative, this book aims to inspire and equip its readers with the knowledge and tools necessary to thrive in the rapidly evolving retail environment.

Welcome to the future of retail, where technology and innovation converge to create unparalleled opportunities for growth and transformation.

Balraj Verma, Chitkara Business School, Chitkara University, Punjab, India
Amit Mittal, Chitkara Business School, Chitkara University, Punjab, India
Murali Raman, Asia Pacific University of Technology &
Innovation, Malaysia
Birud Sindhav, University of Nebraska Omaha, USA

Chapter 1

Revolutionizing Customer Experience: Integrating Blockchain with AR and VR in Retail

Kaushikkumar Patel

TransUnion LLC, New York, USA

Abstract

This chapter investigates the integration of blockchain, augmented reality (AR), and virtual reality (VR) in revolutionizing retail experiences. It delves into how these technologies are reshaping consumer engagement and trust, focusing on their combined potential to transform the retail landscape. The chapter aims to analyze the impact of blockchain on transaction transparency and security, explore the immersive shopping experiences afforded by AR and VR, and highlight their role in enhancing customer satisfaction. A multifaceted approach, blending theoretical perspectives with practical case studies and expert insights provides a balanced view of the challenges and opportunities in implementing these technologies. Key findings emphasize the significant enhancement of retail experiences through technological synergy, leading to increased customer loyalty and sales. However, the chapter also addresses the challenges in technical implementation and logistical integration, proposing strategies to navigate these complexities. The conclusion highlights the immense benefits for retailers and consumers, underscoring the necessity of continuous innovation in the retail sector to align with digital advancements. This chapter contributes valuable insights for retailers looking to adopt these technologies, focusing on the ethical and privacy implications of their usage. It serves as a guide for understanding the current and future roles of blockchain, AR, and VR in

retail, offering a pivotal resource for stakeholders in both the retail and technology industries.

Keywords: Blockchain technology; augmented reality; virtual reality; retail innovation; customer experience; digital transformation; consumer engagement; technology integration; data privacy and ethics; future retail

Introduction

- *Evolution of retail in the digital era:* The digital era has revolutionized the retail industry, marking a significant shift from traditional brick-and-mortar approaches to a more dynamic, digital-first strategy. This evolution is characterized by the rise of e-commerce platforms, changing consumer behaviors, and the increased use of digital technologies. The section will explore how the advent of the internet and mobile technology has reshaped shopping habits, enabling consumers to access a global marketplace with the convenience of a few clicks. The discussion will also touch upon the rise of social media as a powerful tool for retailers to engage with customers, market products, and build brand loyalty. Furthermore, the role of data analytics in understanding consumer preferences and personalizing the shopping experience will be examined. This evolution has not just influenced consumer behavior but also compelled retailers to rethink their strategies to stay relevant and competitive in a digital-first world. The shift toward an omnichannel approach, where online and offline experiences are seamlessly integrated, will also be discussed as a key development in modern retail strategy.
- *The rise of blockchain, AR, and VR technologies:* This subsection provides an in-depth look at the emergence of blockchain, AR, and VR technologies and their growing influence in the retail sector. It begins with an exploration of blockchain technology, highlighting its capacity to revolutionize retail through enhanced security, transparency, and efficiency, particularly in supply chain management and payment processing. The section then moves to AR and VR, illustrating how these technologies are reshaping the retail experience by creating immersive and interactive customer experiences. Examples of early adopters and innovative applications of these technologies in retail will be provided to demonstrate their practical implications and benefits. This discussion aims to provide a clear understanding of how these technologies work, their unique benefits, and the reasons behind their increasing adoption in the retail sector. The focus will be on the transformative potential of these technologies to address traditional retail challenges, improve customer engagement, and open new avenues for service delivery and customer interaction.
- *Importance of integrating emerging technologies in retail:* This subsection emphasizes the critical importance of integrating emerging technologies like blockchain, AR, and VR in the retail sector to stay competitive and meet evolving consumer demands. It discusses the potential of these technologies

to revolutionize various aspects of the retail industry, from enhancing supply chain transparency and efficiency with blockchain to providing immersive and personalized shopping experiences through AR and VR. The benefits of these integrations, such as increased operational efficiency, enhanced customer loyalty, and the creation of new business opportunities, will be examined. This section will also address the strategic implications for retailers, including the need for continual innovation and the challenges of integrating new technologies into existing business models and operations. The discussion will highlight how these technologies can not only improve the customer experience but also provide valuable insights and analytics for retailers to better understand and serve their customers. The importance of these technologies in future-proofing retail businesses and staying ahead in a rapidly evolving digital landscape will be underscored, setting the stage for a deeper exploration of each technology in the subsequent sections of the chapter.

Literature Review

Blockchain technology in retail: The adoption of blockchain technology in the retail sector has been a subject of extensive research and discussion. This subsection explores various aspects of blockchain technology's application in retail, drawing from a diverse range of studies and reports.

- *Overview and benefits:* Blockchain technology, initially associated with cryptocurrencies, has broader applications in retail. It offers a secure, decentralized platform for transactions, enhancing transparency and trust between consumers and retailers. Studies have focused on its potential to revolutionize supply chain management, providing a transparent track of goods from origin to consumer, which helps in assuring product authenticity and ethical sourcing practices (Rejeb et al., 2020). This transparency is beneficial not only for consumers but also for retailers in managing their supply chains more efficiently.
- *Supply chain management:* The role of blockchain in supply chain management is crucial. Research indicates that blockchain can help in tracking the origin of products, ensuring their authenticity, and fighting counterfeit goods. This is particularly significant in industries like luxury goods and pharmaceuticals, where product authenticity is paramount (Szewczyk, 2019). Blockchain's immutable ledger system allows for a reliable and unalterable record of every transaction, ensuring product traceability and quality control.
- *Payment processing and customer loyalty programs:* Blockchain's impact on payment systems in retail is another area of significant interest. By utilizing blockchain, retailers can offer more secure and efficient transaction processes, reducing the risks of fraud and errors (Hader et al., 2020; Oberoi et al., 2024). Additionally, blockchain can revolutionize customer loyalty programs by creating more secure and flexible reward systems, allowing for easy transfer and redemption of loyalty points across various platforms.
- *Challenges and limitations:* Despite its potential, the adoption of blockchain in retail faces challenges. Technical complexities, scalability issues, and the need

for standardization are major concerns (Attaran & Gunasekaran, 2019). Additionally, there is a need for greater understanding and trust in blockchain technology among both retailers and consumers for widespread adoption.

- *Case studies and practical implementations:* The practical application of blockchain in retail is illustrated through various case studies. For example, certain global retailers have used blockchain to track the supply chain journey of products like coffee and seafood, ensuring ethical sourcing and quality control (Difrancesco et al., 2023; Verma et al., 2024). These examples demonstrate the real-world benefits and applicability of blockchain in retail.
- *Future prospects:* The future scope of blockchain in retail is promising, with projections of more widespread adoption. The potential for integrating blockchain with other emerging technologies like artificial intelligence (AI) and the Internet of Things (IoT) to further enhance retail operations is also a subject of much interest (Xu, 2022).

AR in retail: AR in retail has become a focal point for enhancing customer engagement and providing immersive shopping experiences. This subsection synthesizes the literature on AR's role in retail.

- *Enhancing customer experience:* AR is revolutionizing the retail experience by offering customers interactive and immersive ways to engage with products. Studies demonstrate that AR can significantly improve customer satisfaction by providing virtual try-ons, in-store navigation, and interactive product information, leading to informed purchasing decisions (Vaidyanathan & Henningson, 2023).
- *Bridging online and offline worlds:* AR is increasingly being used to bridge the gap between online and offline retail experiences. This integration allows customers to enjoy the benefits of both worlds, enhancing the convenience of online shopping with the experiential aspects of physical retail. AR has been shown to replicate in-store experiences in a digital format, enriching the e-commerce experience and increasing customer engagement (Nunes, 2020).
- *Personalization and customer engagement:* Personalization is a key benefit of AR in retail. By leveraging AR, retailers can offer highly personalized experiences tailored to individual customer preferences and behaviors. This level of customization leads to more effective engagement strategies and increased customer loyalty (Scholz & Smith, 2016).
- *Challenges in implementation:* Despite these benefits, the implementation of AR in retail is not without challenges. Technical limitations, high development costs, and user acceptance are significant barriers. There is also a need for continuous innovation to keep the AR experiences fresh and engaging (Masood & Egger, 2019).
- *Case studies of AR applications:* Case studies of successful AR applications in retail provide insights into its practical benefits. For example, certain fashion retailers have used AR for virtual fitting rooms, allowing customers to try on clothes virtually, significantly enhancing the online shopping experience (Henningson et al., 2020).

- *Future trends in AR retail:* The future of AR in retail is promising, with advances in technology making it more accessible and user-friendly. Upcoming trends suggest a deeper integration of AR into various aspects of retail, from marketing to post-purchase services, potentially transforming the way consumers shop (Goswami & Verma, 2024a, 2024b; Tan et al., 2022; Verma et al., 2024).

VR in retail: VR in retail offers unique opportunities for creating immersive shopping environments. This subsection reviews the literature on the application and implications of VR in the retail industry.

- *Immersive shopping experiences:* VR offers the potential to create fully immersive and interactive shopping environments. Studies have shown that VR can significantly enhance the customer experience by providing realistic simulations of products and environments, allowing consumers to explore and interact with products in a virtual space. This can lead to higher levels of customer engagement and satisfaction (Wölfel & Reinhardt, 2019).
- *Enhancing online shopping:* VR is particularly impactful in enhancing the online shopping experience. It enables customers to visualize products in a realistic 3D environment, reducing the uncertainty that often accompanies online purchases. Research has shown that VR can improve the decision-making process and increase the likelihood of purchase (Park & Kim, 2023).
- *Consumer behavior and VR:* The influence of VR on consumer behavior is a significant area of research. Studies suggest that VR experiences can positively affect customer engagement, purchase intentions, and overall satisfaction. VR's immersive nature creates a unique and memorable shopping experience that can lead to increased brand loyalty (Xu et al., 2021).
- *Challenges in VR adoption:* The adoption of VR in retail faces several challenges, including the need for specialized hardware, high development costs, and ensuring user comfort and ease of use. These challenges can limit the widespread adoption of VR in retail settings (Chikarkova, 2018).
- *Successful VR implementations in retail:* Case studies show retailers using VR to improve customer experience. Home decor retailers use VR to let customers visualize furniture and decor in their homes, aiding informed purchasing decisions (de Regt et al., 2020).
- *The future of VR in retail:* The future of VR in retail is bright, with ongoing advancements in technology expected to make VR more accessible and integrated into retail strategies. The literature points to an increasing trend of using VR for experiential marketing, product demonstrations, and creating virtual stores, offering a new dimension to the retail experience (Xi & Hamari, 2021).

Blockchain in Retail

The integration of blockchain technology in the retail sector signifies a monumental shift, ushering in a new era characterized by transparency, efficiency, and trust in consumer transactions. As elucidated in Table 1.1, titled “Overview of Blockchain Technology in the Retail Sector,” blockchain’s incorruptible digital

Table 1.1. Overview of Blockchain Technology in the Retail Sector.

Subsection	Focus Area	Key Points
Introduction	Overview of blockchain in retail	Exploring blockchain's transformative potential in retail
The rise of blockchain, AR, and VR technologies	Emerging significance in retail	Understanding blockchain, AR, and VR's roles in retail innovation
Blockchain for transparency and security in retail	Applications for transparency and security	Enhancing supply chain transparency and securing transactions
Case studies: Blockchain applications in retail	Real-world examples and applications	Illustrating diverse applications through various case studies

Source: Author's compilation.

ledger presents unprecedented advantages across various facets of retail operations. From revolutionizing supply chain management to streamlining payment processing and enhancing customer loyalty programs, blockchain's secure, transparent, and decentralized nature addresses longstanding challenges within the industry. By providing a foundation built on trust and integrity, blockchain not only mitigates issues related to counterfeit goods and supply chain opacity but also ensures robust data security measures. This introduction lays the groundwork for a comprehensive examination of blockchain's transformative potential and its implications for reshaping traditional retail practices and fostering innovative business models in the digital age.

- *The rise of blockchain, AR, and VR technologies:*
 - *Blockchain technology:* Initially gaining prominence through cryptocurrencies like Bitcoin, blockchain has rapidly emerged as a pivotal technology for various sectors, including retail. Its main appeal lies in its ability to offer a secure, transparent, and tamper-proof ledger, which is ideal for managing complex supply chains, enhancing transactional security, and building customer trust. Retailers are increasingly exploring blockchain for its potential to provide authenticity, traceability, and efficiency, crucial in an era where consumers are more conscious about the origins and authenticity of their purchases.
 - *AR:* AR has carved a niche in retail by enhancing the customer shopping experience. Unlike VR, AR overlays digital information onto the physical world, allowing customers to view products in their real-life environment. This technology has found applications in various aspects of retail, from virtual try-ons in fashion to visualizing furniture in homes. AR's ability to

bridge the gap between online and physical retail offers customers a seamless and engaging shopping experience, driving both online and in-store sales.

- *VR*: VR in retail offers immersive experiences that transport customers to virtual environments. This technology is particularly effective in providing a lifelike preview of products or simulating in-store experiences for online shoppers. VR's immersive quality makes it a powerful tool for storytelling and brand engagement, offering retailers a novel way to captivate and engage their customers.
- *Blockchain for transparency and security in retail*
 - *Enhancing supply chain transparency*: Blockchain technology offers significant benefits in the retail sector by enhancing product traceability, combating counterfeit goods, and promoting ethical sourcing and sustainability. Its tamper-proof record-keeping ability is crucial for tracking products from manufacturing to consumer, particularly important in the food and pharmaceutical industries for safety and quality assurance. In the fight against counterfeit goods, especially in luxury markets, blockchain's immutable ledger aids in authenticating products, thus preserving brand integrity and consumer trust. Additionally, as consumer demand for ethical sourcing and sustainability grows, blockchain assists retailers in verifying and demonstrating their adherence to these values, thereby bolstering customer confidence and loyalty.
 - *Securing transactions and customer data*: Blockchain technology offers secure and efficient payment processing in the digital age, mitigating the risk of fraud and errors due to its decentralized structure, which eliminates a single point of failure. Additionally, it addresses growing concerns about data privacy by providing a secure and confidential way to store and manage customer data, thanks to its encryption and decentralized nature, ensuring the protection of sensitive information.
 - *Blockchain in customer loyalty programs*: Blockchain technology is revolutionizing customer loyalty programs by introducing innovative reward systems and personalized offers. These blockchain-based systems ensure the secure and flexible transfer and redemption of loyalty points across different platforms, ultimately boosting customer engagement and brand loyalty. Additionally, retailers can leverage blockchain to provide tailored promotions and discounts to customers, drawing from securely stored data on their purchase history and preferences, enhancing the overall shopping experience.
 - *Challenges and implementation*: Integrating blockchain technology into the retail sector comes with both promise and challenges. It demands substantial investments in technology and infrastructure and requires specialized expertise in blockchain development. Furthermore, achieving scalability for large retail operations and seamless integration with existing systems can be intricate, necessitating thoughtful planning and execution to ensure a smooth adoption process.
 - *Future outlook*: The future of blockchain in retail holds significant promise as it intersects with emerging technologies such as AI, IoT, and big data, leading to more efficient and customer-centric retail models. The wider

adoption of blockchain in the retail industry is anticipated as the technology becomes more user-friendly, while regulatory frameworks are expected to evolve to address the specific challenges and opportunities posed by blockchain within the sector.

- *Blockchain for transparency and security in retail:*
 - *Supply chain transparency in the food industry:* A leading global retailer implemented blockchain to track the supply chain journey of fresh produce. By scanning a QR code, customers can trace the product's journey from farm to store, including information about the harvest, processing, and transportation. This initiative not only increased consumer trust but also improved supply chain efficiency.
 - *Combating counterfeit in luxury goods:* A luxury fashion brand implemented blockchain to authenticate products and combat counterfeits. Each item is tagged with a unique digital identifier stored on the blockchain, allowing customers to verify the authenticity and history of their purchases, thus protecting the brand's integrity and customer trust.
 - *Pharmaceuticals and healthcare products:* In the pharmaceutical industry, a company utilized blockchain to track and verify the authenticity of healthcare products. This system ensures that customers receive genuine products and helps in combating counterfeit medicines, which is a significant concern in the healthcare sector.
 - *Innovative customer loyalty programs:* A retail chain integrated blockchain into its customer loyalty program, allowing for secure and flexible reward points management. Customers can earn and redeem points across different platforms, leading to increased engagement and loyalty.
 - *Blockchain-powered payment systems:* A major e-commerce platform introduced a blockchain-based payment system to enhance transaction security and efficiency. This system reduces transaction costs, minimizes the risk of fraud, and provides a faster and more secure checkout experience for customers.
 - *Smart contracts for retail operations:* Blockchain's smart contract feature was used by a retailer to automate and streamline vendor payments and contracts. This implementation reduced administrative overhead, minimized errors, and ensured timely and transparent transactions.

AR and VR in Enhancing Customer Experience

The integration of AR and VR technologies in retail is catalyzing a transformative shift in the customer experience, reshaping the dynamics of product interaction and brand engagement. As delineated in [Table 1.2](#), titled “Enhancing Retail Experiences through AR and VR,” these technologies are not merely tools but gateways to immersive, personalized, and captivating shopping encounters. AR seamlessly blends digital elements with the physical world, enriching in-store experiences, while VR transcends physical limitations, transporting users to virtual realms that redefine online shopping. By converging physical and digital realms, AR and VR bridge the gap between traditional and contemporary retail