

# **INTEGRATED BLOCKCHAIN-BASED DIGITAL TRANSFORMATION CONFIGURATIONS FOR RESILIENCE, ENGAGEMENT, AND GROWTH**

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**INDIAN INSTITUTE OF TECHNOLOGY DELHI**

**SEPTEMBER 2025**

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# **INTEGRATED BLOCKCHAIN-BASED DIGITAL TRANSFORMATION CONFIGURATIONS FOR RESILIENCE, ENGAGEMENT, AND GROWTH**

by

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Department of Management Studies

**Submitted in fulfillment of the requirements of the degree of**

**Doctor of Philosophy**

**To the**



**INDIAN INSTITUTE OF TECHNOLOGY DELHI**

**SEPTEMBER 2025**

## CERTIFICATE

This is to certify that the thesis titled “**Integrated Blockchain-based Digital Transformation Configurations for Resilience, Engagement, and Growth,**” submitted by **Subhadeep Mandal**, to the Indian Institute of Technology, Delhi, for the award of the degree of **Doctor of Philosophy (Ph.D.)**, is a bonified record of the research work done by him under my supervision. The content of this thesis, in whole or in parts, has not been submitted to any other institute or university for the award of any degree or diploma. Material, wherever borrowed, has been duly acknowledged.

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## ACKNOWLEDGEMENTS

The journey of completing my PhD has been one of the most challenging yet fulfilling experiences of my life. It has been a journey of perseverance, learning, and self-discovery, and it would not have been possible without the unwavering support, encouragement, and guidance of numerous individuals. I take this opportunity to express my deepest gratitude to all those who have been a part of this journey and have contributed to its successful completion.

First and foremost, I am immensely grateful to my supervisor, Prof. Arpan Kumar Kar, for his invaluable guidance, mentorship, and constant encouragement. His expertise, insightful feedback, and ability to push me beyond my limits have played a pivotal role in shaping me as an individual and my research. His unwavering support and belief in my work have been instrumental in my academic growth, and I am truly fortunate to have had him as my PhD supervisor. I will keep passing forward the values learnt from him to the upcoming generation of scholars that I would encounter throughout my life. I am also deeply grateful to my co-supervisor, Prof. Shivam Gupta, for his insightful guidance, constructive feedback, and encouragement throughout this journey. He not only pushed me the harder way when I fell back in my journey but also always uttered the most heartfelt words of appreciation during my achievements as I evolved into a scholarly individual. Without either of them, my development into the person who I am today would have been incomplete. Both of their perspectives and mentorship have significantly enriched my research abilities, and I am thankful for their constant support and belief in my abilities.

I am deeply grateful to the members of my research committee, whose invaluable insights and constructive timely feedback significantly contributed to the refinement of my research. I extend my sincere appreciation to Prof. P. Vigneswara Ilavarasan, Chairperson of the research committee, for his guidance and insights that have strengthened my research, Prof. Agam Gupta, Internal Expert and Prof. Anoop Krishnan, External Expert, for their critical evaluation and insightful comments that enhanced the quality of my research. Also, I would like to especially extend my sincere gratitude towards Prof. P. Vigneswara Ilavarasan for letting me experience the most mesmerizing ways of teaching. As a student I would never get to know that classroom learning could be so interesting if I didn't attend his courses.

I would like to extend my sincere gratitude to the Department of Management Studies, IIT Delhi, for providing a conducive academic environment, access to resources, and unwavering support throughout my research journey. The faculty members, administrative staff, and fellow scholars have been an integral part of this experience, and I will be forever grateful for their support. Additionally, I extend my appreciation to all the staff members of the Accounts Section, PG Section, Office of the Dean (Students), and the Institute Ethics Committee, IIT Delhi, for their assistance in administrative processes that ensured the smooth progress of my research. I am particularly grateful to Dr. Fauzia for her support and guidance in navigating the ethical considerations of my research.

A special note of appreciation goes to my seniors who created the pathways and set the benchmarks, following which I strived towards academic success. A special word of

thanks goes to my most favourite senior, Hitesha Yadav, who not only taught me the basics of doing research and teaching assistant duties but also played the role of that protective friend, who taught me through personal life lessons she encountered during her academic journey. Her advice, encouragement, and unwavering support made my academic journey more enriching and resilient to detriments. Undoubtedly, she is the senior on whose working style, I built my base.

My peer circle wasn't actually a circle, but one single individual, Shagun Sarraf, who pushed me beyond my occasional lazy self and helped me recognize my true worth and potential. Our endless sessions on selflessly helping each other in our doctoral journeys, added to a dimension of knowledge discovery which otherwise wouldn't have been possible. Without my juniors, this journey wouldn't have been a heartwarming one as they are the ones who have not only supported me but have also looked up to my ways of working and me as a person. Their enthusiasm, encouragement, and belief in my methods have reinforced my confidence and made this journey all the more meaningful. Their presence has been a source of motivation, reminding me of the importance of leading by example and nurturing the next generation of researchers.

I am and will always remain grateful to my family for being there for me, especially my father, Dr. Sushil Kumar Mandal, and my mother, Sandhya Mandal, for their unconditional love, unwavering belief in me, and continuous support. Their sacrifices, encouragement, and words of wisdom have been my guiding force throughout this journey. They have always instilled in me the values of dedication, integrity, and hard work, which have been instrumental in shaping my academic pursuits. Their unwavering faith in my abilities has been my greatest motivation. Also, I extend my appreciation to my wife, Sumana Dey Mandal, whose patience, understanding, and constant support have made this arduous journey smoother. Her encouragement during moments of self-doubt and her unwavering belief in my dreams have been a source of immense strength. The countless sacrifices she has made while I remained focused on my research are something I can never match. This achievement is as much to my family as it is mine.

Lastly, I am grateful to all my friends, colleagues, and well-wishers who have been a part of this journey. Their words of encouragement, late-night discussions, and constant motivation have played a crucial role in keeping me focused and determined.

This thesis is a testament to the collective efforts of all these individuals, and I am deeply indebted to each one of them. While this marks the culmination of my PhD journey, it also signifies the beginning of new opportunities, challenges, and explorations. I carry forward the lessons learned, the bonds formed, and the gratitude I feel for all those who have been a part of this journey.

## ABSTRACT

Digital transformation has become a critical priority in today's interconnected business environment, with blockchain technology emerging as a key enabler across industries. This thesis, titled "Integrated Blockchain-based Digital Transformation Configurations for Resilience, Engagement, and Growth," explores how blockchain can digitally transform production ecosystems by integrating supply chains, consumers, and organizations. The first study investigates blockchain's role in supply chain resilience during natural disasters, specifically in the aftermath of the COVID-19 pandemic. Using fsQCA analysis on responses from 290 participants across 140 food companies, it reveals that blockchain-based traceability and supply chain digitalization form indispensable configurations that help manufacturers and suppliers adapt and maintain continuity during crises. Building on these findings, the second study shifts focus to consumers, examining why users resist engaging with blockchain-based traceability systems despite their known benefits. Drawing from Innovation Resistance Theory and Status Quo Bias Theory, the study analyzes responses from 339 users of QR code-enabled traceability systems (powered either by blockchain or centralized platforms). Results show resistance stems from a combination of functional, psychological, system-related, and individual barriers, with key issues including perceived security risks and information overload, regardless of the backend system used. Motivated by these user-level barriers and the findings of the first study, i.e. the need to digitalize supply chains, the third study examines how organizations can drive digital transformation through workforce enablement. It introduces the GRAAS (Growth Hacking Routes for Achieving Age-based Scalability) framework, emphasizing the importance of employee skills in scaling blockchain adoption. This mixed-method study includes qualitative interviews with 32 recruitment experts, text mining of 3,000+ job postings, and an fsQCA-based survey of 334 managerial professionals. Findings highlight dynamic organizational catalysts such as ambidextrous leadership, entrepreneurial orientation, and skills in Generative AI-based acquisition, activation, revenue management, and blockchain-based retention and referral. These findings offer actionable insights for managers and policymakers to design targeted blockchain implementation strategies and develop user-friendly platforms for blockchain engagement. They highlight the need for employee reskilling, consumer awareness

programs, and regulatory support for secure, transparent supply chains—ensuring that digital transformation efforts are inclusive, resilient, and scalable across industries.

## सारांश

डिजिटल परिवर्तन आज के आपस में जुड़े हुए व्यावसायिक परिवेश में एक महत्वपूर्ण प्राथमिकता बन चुका है, जिसमें ब्लॉकचेन तकनीक विभिन्न उद्योगों में एक प्रमुख सहायक के रूप में उभर रही है। यह शोध प्रबंध, जिसका शीर्षक है "लचीलापन, सहभागिता और विकास के लिए एकीकृत ब्लॉकचेन-आधारित डिजिटल परिवर्तन विन्यास", यह अन्वेषण करता है कि कैसे ब्लॉकचेन आपूर्ति श्रृंखलाओं, उपभोक्ताओं और संगठनों को एकीकृत करके उत्पादन पारिस्थितिक तंत्र को डिजिटल रूप से रूपांतरित कर सकता है।

पहला अध्ययन प्राकृतिक आपदाओं के दौरान, विशेष रूप से कोविड-19 महामारी के बाद, आपूर्ति श्रृंखला में ब्लॉकचेन की भूमिका की जांच करता है। 140 खाद्य कंपनियों के 290 प्रतिभागियों की प्रतिक्रियाओं पर आधारित fsQCA विश्लेषण से यह सामने आता है कि ब्लॉकचेन-आधारित ट्रेसिबिलिटी और आपूर्ति श्रृंखला डिजिटलीकरण ऐसी आवश्यक संयोजन स्थितियाँ हैं जो निर्माताओं और आपूर्तिकर्ताओं को संकट की स्थिति में अनुकूलन और निरंतरता बनाए रखने में मदद करती हैं।

इन निष्कर्षों के आधार पर, दूसरा अध्ययन उपभोक्ताओं पर केंद्रित है, यह जांचते हुए कि उपयोगकर्ता ज्ञात लाभों के बावजूद ब्लॉकचेन-आधारित ट्रेसिबिलिटी सिस्टम से जुड़ने में क्यों संकोच करते हैं। इनोवेशन रेजिस्टेंस थ्योरी और स्टेटस को बायस थ्योरी के सिद्धांतों पर आधारित यह अध्ययन 339 उपयोगकर्ताओं के क्यूआर कोड सक्षम ट्रेसिबिलिटी सिस्टम (जो ब्लॉकचेन या केंद्रीकृत प्लेटफार्म से संचालित हैं) की प्रतिक्रियाओं का विश्लेषण करता है। परिणाम बताते हैं कि प्रतिरोध कार्यात्मक, मनोवैज्ञानिक, सिस्टम-संबंधित और व्यक्तिगत बाधाओं के संयोजन से उत्पन्न होता है, जिनमें प्रमुख समस्याएँ हैं सुरक्षा जोखिम की धारणा और जानकारी की अधिकता, चाहे बैकएंड प्रणाली कोई भी हो।

इन उपयोगकर्ता-स्तरीय अवरोधों और पहले अध्ययन के निष्कर्षों (आपूर्ति श्रृंखलाओं के डिजिटलीकरण की आवश्यकता) से प्रेरित होकर, तीसरा अध्ययन यह विश्लेषण करता है कि संगठन कर्मचारी-सक्षम रणनीतियों के माध्यम से डिजिटल परिवर्तन कैसे चला सकते हैं। इसमें GRAAS (Growth Hacking Routes for Achieving Age-based Scalability) रूपरेखा प्रस्तुत की गई है, जो ब्लॉकचेन अपनाने को बढ़ाने के लिए कर्मचारी कौशल के महत्व पर बल देती है। इस मिश्रित-प्रणाली आधारित अध्ययन में 32 भर्ती विशेषज्ञों के साथ गुणात्मक साक्षात्कार, 3000+ नौकरी विज्ञापनों का टेक्स्ट माइनिंग और 334 प्रबंधकीय पेशेवरों के

fsQCA-आधारित सर्वेक्षण शामिल हैं। निष्कर्ष बताते हैं कि एम्बिडेक्स्ट्रस लीडरशिप, उद्यमशील झुकाव और जनरेटिव एआई-आधारित अधिग्रहण, सक्रियता, राजस्व प्रबंधन, तथा ब्लॉकचेन आधारित रिटेंशन और रेफरल जैसे कौशल डिजिटल रूपांतरण के लिए गतिशील संगठनात्मक उत्प्रेरक हैं।

ये निष्कर्ष प्रबंधकों और नीति निर्माताओं को लक्षित ब्लॉकचेन कार्यान्वयन रणनीतियाँ तैयार करने, तथा उपयोगकर्ता-अनुकूल प्लेटफॉर्म विकसित करने में व्यावहारिक अंतर्दृष्टि प्रदान करते हैं। ये यह भी दर्शाते हैं कि कर्मचारी पुनः-प्रशिक्षण, उपभोक्ता जागरूकता कार्यक्रम, और सुरक्षित व पारदर्शी आपूर्ति श्रृंखलाओं के लिए विनियामक समर्थन आवश्यक है—ताकि डिजिटल परिवर्तन प्रयास समावेशी, लचीले और उद्योगों में मापनीय बन सकें।

# CONTENTS

<b>CERTIFICATE</b>	i
<b>ACKNOWLEDGEMENT</b>	ii
<b>ABSTRACT</b>	iv
<b>LIST OF FIGURES</b>	xii
<b>LIST OF TABLES</b>	xiv
<b>ABBREVIATIONS</b>	xv
<b>CHAPTER 1. INTRODUCTION</b>	1
1.1 INTRODUCTION	1
1.2 BLOCKCHAIN FOR DIGITAL TRANSFORMATION CONFIGURATIONS	2
1.3 BLOCKCHAIN FOR SUPPLY CHAIN RESILIENCE DURING NATURAL DISASTERS	3
1.4 BLOCKCHAIN FOR USER ENGAGEMENT THROUGH TRACEABILITY	6
1.5 BLOCKCHAIN FOR ORGANIZATIONAL GROWTH AND SCALABILITY	9
1.6 SCOPE OF THE STUDY	10
1.7 STRATEGIC IMPORTANCE OF THE AREA STUDIED	12
<b>CHAPTER 2. LITERATURE REVIEW</b>	14
2.1 INTRODUCTION	14
2.2 COMPLEXITY AND CONFIGURATION THEORY	14
2.3 INNOVATION RESISTANCE THEORY	16
2.4 STATUS QUO BIAS THEORY	17
2.5 SOCIOTECHNICAL SYSTEMS THEORY	17
2.6 RESOURCE-BASED VIEW THEORY	19
2.7 A COMPREHENSIVE REVIEW OF BLOCKCHAIN-BASED SYSTEMS	20
2.7.1 Blockchain for digital transformation	21
2.7.2 Role of blockchain in socio-technical systems	22
2.7.3 Blockchain-based features for supply chain resilience	23
2.8 MOTIVATION AND NEED FOR THE RESEARCH	25
<b>CHAPTER 3. RESEARCH DESIGN</b>	27
3.1 INTRODUCTION	27
3.2 PROBLEM STATEMENT	29
3.3 RESEARCH OBJECTIVES	30
3.4 RESEARCH METHODOLOGY	30

3.4.1	Qualitative data analysis	33
3.4.2	Text mining and content analysis	34
3.4.3	Fuzzy set qualitative comparative analysis	35
<b>CHAPTER 4. ACHIEVING BLOCKCHAIN-AIDED SUPPLY CHAIN RESILIENCE DURING NATURAL DISASTERS</b>		39
4.1	INTRODUCTION	39
4.2	BACKGROUND AND MOTIVATION	42
4.3	RESEARCH PROPOSITIONS THROUGH COMPLEXITY AND CONFIGURATIONAL THEORIES	44
4.4	RESEARCH DESIGN	49
4.4.1	Dependent variables	49
4.4.2	Independent variables	49
4.5	RESEARCH METHODOLOGY	50
4.5.1	Data collection	50
4.5.2	Survey instrument	52
4.5.3	Sample	53
4.6	ANALYSIS	54
4.6.1	Measurement reliability and validity	54
4.6.2	Analysis through fsQCA	55
4.7	FINDINGS	57
4.7.1	Results from fsQCA	57
4.7.2	Necessary conditions	57
4.7.3	Sufficient conditions	58
4.7.4	Testing for specific propositions	60
4.7.5	Testing for predictive validity	62
4.8	DISCUSSION	63
4.9	CONCLUSION	66
<b>CHAPTER 5. MODELLING USER RESISTANCE TOWARDS QR CODE-BASED PRODUCT TRACEABILITY SYSTEMS</b>		68
5.1	INTRODUCTION	68
5.2	BACKGROUND AND MOTIVATION	70
5.2.1	Product traceability scenario	72
5.2.2	QRGBT: Company-owned centralized traceability vs blockchain-based traceability	72

5.2.3	Theoretical background and integrative framework	74
5.3	CONFIGURATIONAL NATURE OF USERS' RESISTANCE BEHAVIOUR	76
5.3.1	Functional barriers and resistance	76
5.3.2	Psychological barriers and resistance	77
5.3.3	System-related barriers and resistance	77
5.3.4	Individual barriers and resistance	78
5.3.5	Understanding combined resistance: The interplay of user and system characteristics	79
5.4	RESEARCH METHODOLOGY	80
5.4.1	Sampling strategy	80
5.4.2	Survey instrument	82
5.4.3	Data collection	82
5.4.4	Data validation	83
5.5	ANALYSIS AND RESULTS	84
5.5.1	Sufficient conditions	86
5.5.2	Testing for specific propositions	90
5.5.3	Cross-validation	93
5.6	DISCUSSION	95
5.7	CONCLUSION	96
<b>CHAPTER 6. AN ORGANIZATIONAL BLOCKCHAIN- INTEGRATION STRATEGY INCORPORATING USERS AND VALUE CHAINS</b>		98
6.1	INTRODUCTION	98
6.2	BACKGROUND AND MOTIVATION	101
6.2.1	The strategic transformational context of Growth Hacking	101
6.2.2	Growth Hacking with a resource-based view for scalability	102
6.2.3	Sociotechnical view of digital transformation	102
6.2.4	Blockchain Technology as a Catalyst for Digital Transformation: A Resource-Based View Perspective	104
6.3	RESEARCH DESIGN	105
6.3.1	Significance of GRAAS Framework	106
6.4	EXPLORATORY STUDY 1 – CONTEXT BUILDING	107
6.4.1	Data collection	107
6.4.2	Findings	108

<b>6.5</b>	EXPLORATORY STUDY 2 – FACTOR MAPPING WITH EXTERNAL VALIDITY	111
<b>6.5.1</b>	Data collection	112
<b>6.5.2</b>	Findings	113
<b>6.6</b>	CONFIRMATORY STUDY – CONFIGURATIONAL NATURE OF GH FOR SCALABILITY	116
<b>6.6.1</b>	Dynamic organizational catalysts and scalability-propositions development	117
<b>6.6.2</b>	Resource-based View of Customer Lifecycle and Scalability-propositions development	119
<b>6.6.3</b>	Scalability	124
<b>6.6.4</b>	Integrative framework	126
<b>6.6.5</b>	Empirical investigation	128
<b>6.6.6</b>	Results	131
<b>6.7</b>	DISCUSSIONS	138
<b>6.7.1</b>	Blockchain implementation for organizational growth	139
<b>6.8</b>	CONCLUSION	140
	<b>CHAPTER 7. DISCUSSION AND CONCLUSION</b>	142
<b>7.1</b>	INTRODUCTION	142
<b>7.2</b>	SYNTHESIS OF STUDIES	143
<b>7.3</b>	DEDUCTION OF META INFERENCES	148
<b>7.4</b>	CONTRIBUTIONS TO LITERATURE	150
<b>7.5</b>	IMPLICATIONS FOR PRACTICE	155
<b>7.6</b>	LIMITATIONS	160
<b>7.7</b>	FUTURE RESEARCH DIRECTIONS	161
<b>7.8</b>	CONCLUDING REMARKS	162
	<b>REFERNCES</b>	164
	<b>APPENDICES</b>	186
	<b>LIST OF PUBLICATIONS</b>	212
	<b>AWARDS / FELLOWSHIPS</b>	213
	<b>CURRICULUM VITAE</b>	214

## **LIST OF FIGURES**

<b>1.1</b>	Logical connection and interlink between the studies of the thesis	12
<b>3.1</b>	Visual summary of the research plan of the thesis	33
<b>4.1</b>	Conceptual model depicting relationship between causal conditions and outcome of interest	47
<b>4.2</b>	Stakeholders under consideration for the current study along with their units in various geographical locations with networks	51
<b>4.3</b>	Allotment of solution scores to the truth table	56
<b>4.4</b>	X-Y plot for proposition 1	61
<b>4.5</b>	Test of model 1 from subsample using data from holdout sample	63
<b>5.1</b>	Typical company-owned centralized traceability system using cloud	73
<b>5.2</b>	The food supply chain on a blockchain and architecture for QR code-based traceability	74
<b>5.3</b>	Theoretical Framework to determine combined active-passive resistance	75
<b>5.4 a</b>	Causal conditions leading to high resistance for BBT	93
<b>5.4 b</b>	Causal conditions leading to high resistance for CCT	93
<b>5.5</b>	Testing for predictive validity	95
<b>6.1</b>	Connections of the findings of the first and second studies with the third study	99
<b>6.2</b>	Consolidated approach of the 3-stage mixed-methods research sequence	107
<b>6.3</b>	Thematic mapping of interview responses and categorizing with STS elements	110
<b>6.4</b>	Sociotechnical extension of existing GH framework for digital transformation	110
<b>6.5</b>	Network visualization of job postings on sociotechnical skills for digital transformation	114
<b>6.6</b>	Set-theoretic Socio-Technical Systems representation of GH-based scalability - Conceptual framework for GRAAS	127
<b>6.7 a</b>	Configurations for high scalability in new organizations	137
<b>6.7 b</b>	Configurations for high scalability in established organizations	137
<b>6.8</b>	Causal sociotechnical configurations for high scalability	138

<b>6.9</b>	Sociotechnical GH configurations differentiating blockchain-implementation for new and established organizations	140
<b>7.1</b>	Vertical and horizontal interpretation of results for the basis of studies 2 and 3	145
<b>7.2</b>	Consistent resistance-causing barriers carried over to study 3 by studying blockchain-based retention and referral as sociotechnical skills	146
<b>7.3</b>	Final logical connections between the findings of all 3 studies	163

## **LIST OF TABLES**

<b>1.1</b>	Some globally-operating companies running blockchain-based supply chain traceability activities	7
<b>2.1</b>	Anchorage of theories study-wise	20
<b>2.2</b>	Established literature on blockchain for digital transformation	21
<b>2.3</b>	Key literature on role of blockchain in sociotechnical systems	22
<b>2.4</b>	Established literature on blockchain-based supply chain digitalization for resilience	24
<b>3.1</b>	Summary of the thresholds and guidelines used in fsQCA	37
<b>4.1</b>	Causal conditions and outcome variable along with their operational definitions	45
<b>4.2 a</b>	Distribution of responses according to company size of working personnel	54
<b>4.2 b</b>	Classification of respondents according to their educational qualification	54
<b>4.3</b>	Analysis of necessary conditions	57
<b>4.4</b>	Configurations of sufficient conditions for determining the outcome	60
<b>4.5</b>	Complex configurations indicating high food safety and security during and post COVID-19 in the I5.0 era for subsample	63
<b>5.1</b>	Demographic profile of respondents-Study 2	82
<b>5.2</b>	Construct definitions used for building the conceptual model	84
<b>5.3</b>	Configurations of sufficient conditions for determining resistance	87
<b>5.4</b>	Theoretical explanation of blockchain-based findings	89
<b>6.1</b>	Definitions of the first-order themes obtained after thematic analysis	109
<b>6.2 a</b>	Mapping of environments based on theoretical lexicons	115
<b>6.2 b</b>	Mapping of factors based on theoretical lexicons	115
<b>6.3</b>	Demographic details of respondents and their respective firms	129
<b>6.4</b>	Sociotechnical GH configurations for new and established organizations	133
<b>7.1</b>	Deduction of meta inferences	148

## ABBREVIATIONS

<b>Acronym</b>	<b>Full Form</b>
FSS	Food Safety and Security
BBT	Blockchain-based Traceability
CCT	Company-owned cloud-based traceability
IRT	Innovation Resistance Theory
SQBT	Status Quo Bias Theory
FB	Functional Barriers
PB	Psychological Barriers
SRB	System-related Barriers
INB	Individual Barriers
STS	Sociotechnical Systems
FsQCA	Fuzzy set Qualitative Comparative Analysis
RBV	Resource-based View
GH	Growth Hacking
QRCBT	QR code-based traceability
I5.0	Industry 5.0