Factors Driving Individuals' Behavioural Intention to Use Cryptocurrency in Saudi Arabia

BY

SAAD ALAKLABI

A THESIS SUBMITTED IN FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

Under the supervision of

Dr. Kyeong Kang and Dr. Osama Sohaib

University of Technology Sydney

Faculty of Engineering and Information Technology

April 2022

Certificate of Original Authorship

I, Saad Alaklabi declare that this thesis, is submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the Faculty of Engineering and Information Technology at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

Signature:

Production Note:
Signature removed prior to publication.

Date: 20 Aug 2022

Acknowledgement

First, I would like to start by thanking "Allah", my Lord, for giving me the strength and ability to reach this point in my study journey.

My sincere thanks go to my mother and father for their continuous prayer and encouragement. Besides my parents, I would like to thank my brothers and sisters for supporting me spiritually throughout my research and life. Also, I would like to extend my thanks to my lovely wife Asmaa and my children Fayez and Tuqa for their motivations, patience, and sharing this journey with me.

I also would like to express my sincere gratitude to my supervisors, Dr Kyeong and Dr Osama, for their continuous support of my PhD study and guidance during my study.

I am very grateful to my great uncle Dr Saud Alaklabi for his support during my study journey. He used to back me up and encourage me during my scholarship.

Many thanks are also due to my friends Saleh Alharbi and Abdullah Alshamrani, who supported me at the beginning of my PhD journey. Also, I would like to thank Dr Cherry Russell and Gordana Ristic for providing proofreading service for my thesis.

Last but not least, I would like to thank all of the friends I met during my PhD study who were there when needed.

List of Publications

The following research papers were published from work undertaken by the author during this PhD research study.

- Saad ALAKLABI and Kyeong KANG (2022), "The Extended TRA Model for the Assessment of Factors Driving Individuals' Behavioral Intention to Use Cryptocurrency." *Interdisciplinary Journal of Information, Knowledge, and Management 17 (2022):* 125-149.
- Saad ALAKLABI and Kyeong KANG (2021), "Perceptions towards Cryptocurrency Adoption: A case of Saudi Arabian Citizens ", *Journal of Electronic Banking Systems, Vol. 2021* (2021), Article ID 110411, DOI: 10.5171/2021.110411.
- Saad ALAKLABI and Kyeong KANG (2020), "Factors Influencing Intention to Adopt Cryptocurrency" Proceedings of the 36th International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-5-7, 4-5 November 2020, Granada, Spain, pp. 1470-1479.
- Saad ALAKLABI and Kyeong KANG (2019), "Factors Driving Individuals' Behavioural Intention to Adopt Cryptocurrency" Proceedings of the 34th International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-3-3, 13-14 November 2019, Madrid, Spain, pp. 2070-2078.
- Saad ALAKLABI and Kyeong KANG (2018), "Factors Influencing Behavioural Intention to Adopt Blockchain Technology," Proceedings of the 32nd International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-1-9, 15-16 November 2018, Seville, Spain, pp. 5170-5174.
- Saad ALAKLABI and Kyeong KANG (2018), "The Impact of Social Influence on Individuals' Behavioural Intention to Adopt Blockchain Technology," Proceedings of the 32nd International Business Information Management Association (IBIMA), ISBN: 978-0-9998551-1-9, 15-16 November 2018, Seville, Spain, pp. 6428-6432.

Abstract

Although globalisation and new advanced technologies have brought numerous benefits to humankind in the last 30 years, they have also caused numerous concerns and corporate scandals, leading to the emergence of the first digital currency, Bitcoin, after the global crisis of 2008. Since then, cryptocurrency uses and uses cases have grown exponentially yet remain limited in scope and geographical dispersion. Also, despite the growing interest of the scientific community and both official and private stakeholders in the topic, scholarly research on the factors influencing individuals' intention to use cryptocurrency is still scarce and provides contradictory evidence regarding some factors. Also, several factors from the technology adoption field had never been tested in the cryptocurrency field. Moreover, several regions have been excluded from prior research, including Saudi Arabia, with no previous empirical research on this topic.

For these reasons, the purpose of this study was to explore the factors driving individuals' behavioural intention to use cryptocurrency in Saudi Arabia by employing a unique research model based on the theory of reasoned action and extending with several external factors which some have not yet been tested in the field of cryptocurrency use. Data are obtained from September to November 2019 by a quantitative research methodology – an online, self-administered survey and analysed by several statistical techniques. The study's final sample included 181 respondents, citizens of Saudi Arabia.

This study has confirmed some previous study results and came with new findings. The attitude was the most significant predictor of intention to use cryptocurrencies in Saudi Arabia, with a direct and positive effect. Subjective norm was also a significant predictor of Saudis' intention to use cryptocurrencies, having a positive direct effect. The additions to the original TRA model, namely perceived usefulness, perceived enjoyment, and

personal innovativeness, were found as statistically significant predictors of both attitude and intention to use cryptocurrencies with a positive effect. In contrast, privacy risk and financial risk were found as statistically significant predictors of attitude and intention to use cryptocurrencies with a negative effect. Security risk was not a significant predictor of the attitude and intention of Saudi residents to use cryptocurrencies.

This study contributes to both theory and practice by extending the TRA model with a range of external factors enabling the assessment of the factors affecting the intention to use cryptocurrency from human, financial and security perspectives and providing the first empirical data on this topic in Saudi Arabia. The study also enables further research on this topic and comparing study results, thus improving understanding of the phenomenon. It also provides various stakeholders with valuable information and recommendations regarding cryptocurrency use, enabling them to make better decisions in this area.

Table of Contents

Certificate of Original Authorship i

Acknowledgement ii

List of Publications iii

Abstract iv

List of Abbreviations xi

List of Figures xiii

List of Tables xv

Chapter 1. Introduction 1

1.1. Research Background 1

1.2. Purpose and Objectives of the Study 3

1.3. Research Questions 6

1.4. Significance of the Study 7

1.5. Methodological Overview 9

1.6. Research Outline 10

Chapter 2. Literature Review 12

2.1. Introduction to Cryptocurrencies 12

2.1.1. History and Features of Cryptocurrencies 12

2.1.2. Advantages and Opportunities of Cryptocurrencies 15

2.1.3. Issues and Gaps of Cryptocurrencies 18

2.2. Empirical Research on Behavioural Intention to Use Cryptocurrency 21

2.2.1. Related Cryptocurrency Studies 21

2.2.2. Cryptocurrencies in Saudi Arabia 32

2.3. Factors Influencing Behavioural Intention to Use Cryptocurrency 35

2.3.1. Subjective Norms (SN) 35

2.3.2. Attitude (AT) 37
2.3.3. Perceived Risk 38
2.3.3.1. Privacy Risk (PR) 40
2.3.3.2. Security Risk (SR) 41
2.3.3.3. Financial Risk (FR) 43
2.3.4. Perceived Usefulness (PU) 44
2.3.5. Perceived Enjoyment (PE) 46
2.3.6. Personal Innovativeness (PI) 48
2.4. Chapter Summary 49
Chapter 3. Theoretical Background and Research Model 51
3.1. Theoretical Background 51
3.1.1. Theory of Reasoned Action (TRA) 52
3.1.2. Theory of Planned Behaviour (TPB) 55
3.1.3. Diffusion of Innovation Theory (DIT) 57
3.1.4. Technology Readiness Index (TRI) 58
3.1.5. Technology Acceptance Model (TAM) 59
3.1.6. Unified Theory of Acceptance and Use of Technology (UTAUT) ... 61
3.2. Research Model 63
3.3. Hypotheses 66
3.3.1. Subjective Norms (SN) 67
3.3.2. Attitude (AT) 68
3.3.3. Perceived Risk 69
3.3.3.1. Privacy Risk (PR) 70
3.3.3.2. Security Risk (SR) 71
3.3.3.3. Financial Risk (FR) 72

3.3.4. Perceived Usefulness (PU) 73
3.3.5. Perceived Enjoyment (PE) 74
3.3.6. Personal Innovativeness (PI) 75
3.4. Chapter Summary 78
Chapter 4. Methodology 80
4.1. Research Paradigm 80
4.2. Research Design 82
4.3. Quantitative Design 83
4.4. Instrument Translation 87
4.5. Sample and Sample Size 87
4.6. Data Collection 88
4.7. Data Analysis 89
4.8. Ethics of the Research 90
4.9. Summary 91
Chapter 5. Quantitative Data Analysis 92
5.1. Introduction 92
5.2. Descriptive Analysis 92
5.2.1. Survey 93
5.2.2. Demographic Characteristics of Respondents 93
5.3. Data Examination 99
5.3.1. Missing Data Analysis and Replacement 100
5.3.2. Checking Multivariate Assumptions 101
5.3.2.1. Normality 101
5.3.2.2. Linearity 103
5.3.2.3. Multicollinearity 118

5.3.3. Outlier Review 120
5.3.4. Standard Deviations and Standard Errors of the Mean 121
5.4. Measurement Scale Analysis 128
5.4.1. Item-total Correlations 129
5.4.2. Scale Reliability: Internal Consistency 135
5.5. Exploratory Factor Analysis (EFA) 136
5.6. Confirmatory Factor Analysis (CFA) 140
5.6.1. Initial Model 141
5.6.2. Common Method Bias 143
5.7. Structural models 144
5.7.1. Hierarchical Models 145
5.8. Standard Model 149
5.9. Mediation Analysis 151
Chapter 6. Discussion and Conclusion 153
6.1. Research Aim and Questions 153
6.2. Findings 156
6.2.1. Subjective Norm 156
6.2.2. Perceived Risk 158
6.2.2.1. Privacy Risk 159
6.2.2.2. Security Risk 161
6.2.2.3. Financial Risk 163
6.2.3. Perceived Usefulness 164
6.2.4. Perceived Enjoyment 166
6.2.5. Personal Innovativeness 168
6.2.6. The Role of Attitude in the Intention to Use Cryptocurrency 169

6.3. Saudi Citizens' Intention to Use Cryptocurrency 171

6.4. Research Contributions and Implications 174

6.4.1. Theoretical Implications 174

6.4.2. Practical Implications 177

6.5. Conclusions 181

6.6. Limitations and Future Research Directions 187

References 192

Appendices 214

Appendix A. The English Survey Version 214

Appendix B. The Arabic Survey Version 225

List of Abbreviations

AT: Attitude

BI: Behavioural Intention

CFA: Confirmatory Factor Analysis

CMB: Common Method Bias

DTPB: Decomposed Theory of Planned Behaviour

EFA: Exploratory Factor Analysis

FR: Financial Risk

GCC: Gulf Cooperation Council

IUCC: Intention to Use Cryptocurrencies

IDT: Innovation Diffusion Theory

MAR: Missing at random

MCAR: Missing completely at random

NAATI: National Accreditation Authority for Translators and Interpreters of Australia

PPM: Push-Pull-Mooring theory

PE: Perceived Enjoyment

PI: Personal Innovativeness

PR: Privacy Risk

PU: Perceived Usefulness

SEM: Structural equation modelling

SN: Subjective Norm

SPSS: Statistical Package for Social Sciences

SR: Security Risk

TAM: Technology Adoption Model

TPB: Theory of Planned Behaviour

TRA: Theory of Reasoned Action

TRI: Technology Readiness Index

UTAUT: Unified Theory of Acceptance and Use of Technology

VIF: Variance Inflation Factor

List of Figures

Figure 2.1. Transactions in the Blockchain 14

Figure 2.2. Global Crypto Adoption Index 2021 18

Figure 3.1. The TRA model 54

Figure 3.2. Original TPB model 55

Figure 3.3. TAM model 60

Figure 3.4. The UTAUT model 62

Figure 3.5. Research Model 64

Figure 4.1. Research Design 83

Figure 5.1. Gender of participants 95

Figure 5.2. Age of participants 96

Figure 5.3. Nationality of participants 97

Figure 5.4. Language of participants 97

Figure 5.5. Education level of participants 98

Figure 5.6. Participant´s region in Saudi Arabia 99

Figure 5.7. Distribution of attitude and privacy risk 104

Figure 5.8. Distribution of attitude and security risk 105

Figure 5.9. Distribution of Attitude and Financial Risk 106

Figure 5.10. Distribution of Attitude and Enjoyment 107

Figure 5.11. Distribution of Attitude and Perceived Usefulness 108

Figure 5.12. Distribution of attitude and personal innovativeness 109

Figure 5.13. Distribution of Intention to use and Subjective Norm 110

Figure 5.14. Distribution of Intention to useand Attitude 111

Figure 5.15. Distribution of Intention to use and Privacy Risk 112

Figure 5.16. Distribution of Intention to use and Security Risk 113
Figure 5.17. Intention to use and Financial Risk 114
Figure 5.18. Distribution of Intention to use and Personal Innovativeness 115
Figure 5.19. Distribution of Intention to use and Perceived Enjoyment..... 116
Figure 5.20. Distribution of Intention to use and Perceived Usefulness..... 117
Figure 5.21. Distribution of Intention to use and Subjective Norm..... 118
Figure 5.22. Scree plot 137
Figure 5.23. Preliminary initial CFA model (standardised estimates)..... 141
Figure 5.24. Initial CFA model (standardised estimates) 142
Figure 5.25. Research conceptual model 145
Figure 5.26. Final structural model (unstandardised estimates) 146
Figure 5.27. SEM with All factors (standardised estimates) 148
Figure 5.28. SEM with no security factor (standardised estimates) 148
Figure 5.29. SEM without perceived factors (standardised estimates)..... 149
Figure 6.1. Research Structural Model 154

List of Tables

Table 2.1. Summary of Recent Empirical Studies on Cryptocurrency Use 26

Table 3.1. Definition of Factors included in the Research Model 65

Table 3.2. Summary of Hypotheses 76

Table 4.1. Survey Items 84

Table 5.1. Demographic characteristics of respondents 94

Table 5.2. One-Sample Kolmogorov-Smirnov Test 102

Table 5.3. Relationship between Attitude and Privacy Risk 103

Table 5.4. Relationship between Attitude and Security Risk 104

Table 5.5. Relationship between Attitude and Financial Risk 106

Table 5.6. Relationship between Attitude and Perceived Enjoyment 107

Table 5.7. Relationship between Attitude and Perceived Usefulness 108

Table 5.8. Relationship between Attitude and Personal Innovativeness 109

Table 5.9. Relationship between Intention to use and Subjective Norm 110

Table 5.10. Relationship between Intention to use and Attitude 111

Table 5.11. Relationship between Intention to use and Privacy Risk 112

Table 5.12. Relationship between Intention to use and Security Risk 113

Table 5.13. Relationship between Intention to use and Financial Risk 114

Table 5.14. Relationship between Intention to use and Personal Innovativeness 115

Table 5.15. Relationship between Intention to use and Perceived Enjoyment 116

Table 5.16. Relationship between Intention to use and Perceived Usefulness 117

Table 5.17. Relationship between Intention to use and Subjective Norm 118

Table 5.18. Multicollinearity Intention to use 119

Table 5.19. Multicollinearity Attitude 119

Table 5.20. Descriptive statistics for Privacy Risk 121
Table 5.21. Descriptive statistics for Perceived Usefulness 123
Table 5.22. Descriptive statistics for Perceived Enjoyment 124
Table 5.23. Descriptive statistics for Personal Innovativeness 125
Table 5.24. Descriptive statistics for Attitude 126
Table 5.25. Descriptive statistics for Subjective Norm 127
Table 5.26. Descriptive statistics for Intention to use cryptocurrency 128
Table 5.27. Privacy Risk Item-total correlations 129
Table 5.28. Security Risk item-total correlations 130
Table 5.29. Financial risk Item-total correlations 131
Table 5.30. Perceived Enjoyment Item-total correlations 131
Table 5.31. Perceived Usefulness Item-total correlations 132
Table 5.32. Subjective Norm Item-total correlations 133
Table 5.33. Attitude Item-total correlations 133
Table 5.34. Intention to use cryptocurrency Item-total correlations 134
Table 5.35. Personal Innovativeness Item-total correlations 135
Table 5.36. Construct Reliability and Internal consistency 136
Table 5.37. Total Variance Explained 138
Table 5.38. Pattern matrix 139
Table 5.39. Modification indexes and covariates produced 142
Table 5.40. The regression estimates before and after the CMB 143
Table 5.41. Hierarchical models 146
Table 5.42. The standard model 150
Table 5.43. Mediation analysis 152