Determinants of consumers' willingness to use cryptocurrency as a form of payment in retail

Applied Research Project

submitted by

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Executive Summary

The outbreak of the COVID-19 pandemic has significantly increased the number of online shopping transactions and cryptocurrency has been used as payment in some of these transactions. Some retail consumers are opposed to the use of cryptocurrency and some retail consumers want to be able to use cryptocurrency as payment in retail payments. Woolworths hired Insight, the management consulting firm, to help Woolworths executives find out whether it will increase or decrease Woolworths's revenue if Woolworths starts accepting cryptocurrency as payment.

Insight conducted its research in South Africa. Research participants answered the research questions by completing questionnaires online via the Qualtrics website. People of all ages shop at Woolworths, but for ethical reasons, Insight's research only took the responses of adult research participants (people aged 18 and over) into consideration.

The research approach of this consultancy report is quantitative research. The target population consists of South African adults. This consultancy report gathers data by using questionnaires with close-ended 7-point Likert scale questions. The reliability of this research is measured by Cronbach's alpha score. The validity of this research is determined with exploratory factor analysis, which is conducted with IBM SPSS Software. The statistical processes that are used to analyse data include multiple regression analysis, correlation analysis, t-tests and ANOVAs. The dependent variables are Gender, Age, Environmental ethics, Ethics regarding criminal activity, Technology proficiency and Customer Equity. The dependent variable is Willingness to use cryptocurrency as payment. Money, time, common method variance and common method bias are limitations of this consultancy report. The anonymity of respondents is respected. This consultancy report takes the responses of respondents who have given informed consent into consideration.

This consultancy report found that even though there will be some retail consumers who are opposed to the use of cryptocurrency as payments in retail because of their environmental ethics, there are many more consumers who want to be able to use of cryptocurrency as payments in retail because of the convenience of cryptocurrency payments, the lower transaction costs of cryptocurrency payments and

the reduced risk of exposure to credit card fraud and identity theft when making cryptocurrency payments.

Based on the results of Insight's research, Insight recommends that Woolworths should allow its customers to use cryptocurrency as a form of payment because it would increase Woolworths's market share and increase Woolworths's revenue.

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1.Introduction

1.1. Background of the Consultancy Report

Blockchain is an online peer-to-peer network that acts as a distributed, decentralised, public online ledger that records cryptocurrency transactions for many different types of cryptocurrencies. Blockchain currently has many applications in non-financial and financial industries, but bitcoin was the first application of blockchain technology (Bellavitis, DaSilva, Martino & Wang, 2020; Iansiti & Lakhani, 2017).

Bitcoin is the most prominent cryptocurrency (a digital asset that functions as an online currency/medium of exchange) and it was created in 2008 by Satoshi Nakamoto (Bellavitis et al., 2020). It was the first cryptocurrency to achieve prominence and in 2008, Nakamoto published a paper online that introduced the concept of bitcoin to the world. Since Nakamoto did not submit this paper to an academic journal, his/her/their true identity remains unknown. Nakamoto's famous paper was published a few months before blockchain and bitcoin technology became available to the general public and it stated that bitcoin could facilitate direct transactions or payments between two transacting parties without the need for a third party (e.g. commercial banks and credit card companies) to act as a facilitator/central authority (Bellavitis et al., 2020).

After the creation of bitcoin, there have been many other cryptocurrencies created and there are currently over 4000 cryptocurrencies (Bele, 2021). The increasing popularity and use of cryptocurrencies has convinced some businesspeople that they should start accepting cryptocurrencies as a form of payment, but some businesspeople are still not convinced that accepting cryptocurrencies as payment is a good idea (Anser, Iqbal, Luqman, Pitafi, Rasheed & Zaigham, 2020).

Insight is a South African management consulting firm that has been hired by Woolworths (a major South African retailer) to find out whether it will increase Woolworths's revenue if Woolworths starts accepting cryptocurrency as payment.

1.2. Research Context

Insight's research is conducted in South Africa. Some research participants answer the research questions by completing questionnaires online via the Qualtrics website and other research participants answer the research questions by completing questionnaires that are printed on paper.

The research takes the willingness of members of South Africa's general public to use cryptocurrency as a form of payment into consideration because some consumers that buy their groceries from more affordable retailers may be willing to start buying their groceries from Woolworths (Woolworths targets middle-to-upper income South Africans) if Woolworths starts accepting cryptocurrency as payment (for various reasons) (BusinessTech, 2020).

People of all ages shop at Woolworths, but for ethical reasons, Insight's research only takes the responses of adult research participants (people aged 18 and over) into consideration.

1.3. Research Problem

Since the outbreak of the COVID-19 pandemic, the number of people shopping online has increased significantly because of lockdown restrictions enforced by governments all over the world. Even after some lockdown restrictions have been lifted, many people don't want to go to public spaces such as restaurants and grocery retailers because that increases their risk of COVID-19 infection and many people don't want to handle cash because that increases their risk of COVID-19 infection. These are 2 more reasons for the significant increase in the number of people shopping online (Koyuncu & Öztürk, 2021).

Commercial banks and credit card companies charge retail consumers for facilitating online payments and these charges gradually add up. The outbreak of the COVID-19 pandemic has caused the most

severe global economic recession since the Great Depression, so retail consumers are generally more eager to decrease their bank charges/transaction costs when shopping (online and offline) (Mukabi & Vu, 2019). When Equifax (one of the largest credit card bureaus in the United States of America) was hacked in 2017, the personal data of more than 147 million people was stolen. Some of this personal data included millions of credit card numbers. This exposed millions of people to the risk of identity theft and credit card fraud (Berghel, 2017). The risk of cybercrime is higher now than ever before (Ali, 2019). Retail consumers who want to make online payments without the risk of being a victim of credit card fraud/identity theft and without having to pay bank charges and credit card transaction fees can use cryptocurrency to make payments instead because cryptocurrency allows people to make payments anonymously (this decreases the risk of identity theft and credit card fraud) and cryptocurrency enables people to pay for their goods without incurring bank charges. Cryptocurrency transaction fees are much lower than bank charges and credit card transaction costs. Paying with cryptocurrency is a cheaper, quicker and easier way to make payments locally and internationally (Mukabi & Vu, 2019).

Even though Woolworths targets middle-to-upper income South Africans and sells certain items at slightly higher prices, the amount of money that retail consumers could save by buying certain goods with cryptocurrency from Woolworths (and avoiding bank charges/credit card transaction costs in the process) may decrease the total amount that they would have to pay when paying for their goods. Some retail consumers may also be willing to stop buying from more affordable retailers and start buying from Woolworths when they realise that paying with cryptocurrency means that they won't have to carry any cash or cards when they go to buy their groceries.

This consultancy report aims to answer the following high-level research questions:

- How do demographics affect South African retail consumers' willingness to use cryptocurrency as a form of payment?
- How do personal ethics affect South African retail consumers' willingness to use cryptocurrency as a form of payment?
- How does technology proficiency affect South African retail consumers' willingness to use cryptocurrency as a form of payment?

- How does customer equity affect South African retail consumers' willingness to use cryptocurrency as a form of payment?

1.4. Significance of the Consultancy Report

This consultancy report provides Woolworths with valuable insight into whether it would increase its revenue by allowing its customers to use cryptocurrency as a form of payment.

This consultancy report analyses whether South African retail consumers of varying demographics and with different ethical dispositions, levels of technological proficiency and customer equity are more likely to increase their monthly spending at Woolworths or decrease their monthly spending at Woolworths if Woolworths starts accepting cryptocurrency as a form of payment.

The data from consultancy reports that are available online about this subject matter is mostly focused on international retail consumers and does not focus enough on South African retail consumers specifically. The vast majority of the most recent data that is available online about this subject matter is also from 2019 and 2020 (e.g. the Global Digital Report 2019); this consultancy report takes 2021 data into consideration (Kemp, 2019). These are the major reasons why this consultancy report is very useful to Woolworths.

Accepting cryptocurrency as a form of payment may increase or decrease Woolworths's market share in the short term and the long term. The conclusions of this consultancy report help Woolworths executives decide whether Woolworths should allow its customers to use cryptocurrency as a form of payment or not.

2. Literature Review & Hypotheses

2.1. The Effect of Cryptocurrencies on the Natural Environment

One of the major existential threats that the world's population is facing is climate change and any activity that significantly increases carbon emissions makes the climate crisis worse. Cryptocurrency/bitcoin mining has been identified as an activity that significantly increases carbon emissions (Badea & Mungiu-Pupazăn, 2021).

"Bitcoin mining is a decentralized computational process, where transactions are verified and added to the public ledger, known as the blockchain" (Küfeoğlu & Özkuran, 2019, p. 101273). Bitcoin is created by bitcoin mining and there are several other cryptocurrencies that are created by cryptocurrency mining e.g. Ethereum and Ravencoin (Cui, Li, Li & Wu, 2019). In December 2017, the amount of electrical energy consumed by bitcoin mining reached a maximum of 14.8 gigawatts. To put that into perspective, the installed capacity (maximum output of electricity that a power plant can produce) in Denmark was approximately 14 gigawatts and the installed capacity in Finland was approximately 16 gigawatts. Both of these countries have very high standards of living and very cold temperatures, so they both have extraordinarily high installed capacity. In June 2018, the amount of electrical energy consumed by bitcoin mining reached a maximum of 50.24 terawatts, which is approximately 50 240 gigawatts (Küfeoğlu & Özkuran, 2019). In 2017, bitcoin mining consumed approximately as much electrical energy as the entire nation of Austria (another cold country with generally high living standards) (Hiam, Hiam-Galvez & Prescott, 2020). The fact that cryptocurrency mining consumes such a gargantuan amount of energy means that cryptocurrency mining increases global carbon emissions significantly; therefore, cryptocurrency mining makes global warming and the climate crisis worse. Most of the electricity used for cryptocurrency mining is not generated in an environmentally friendly way and the opportunity cost of this electricity is too high because it could be used for more ethical humanitarian reasons (Blandin, Dek, Eisermann, Njoki, Pieters, Taylor & Wu, 2020).

Bitcoin alone had a market capitalisation of US$1.086 trillion on the 21st of February in 2021 (Taskinsoy, 2021). Proponents of cryptocurrency argue that even though cryptocurrency mining consumes vast quantities of electrical energy, it creates over a trillion dollars in value for millions of people all over the world. Many of these people do not have access to traditional payment systems/networks. Since the Venezuelan economy is experiencing hyperinflation, many poor Venezuelans have been able to earn money to survive by mining bitcoin (Venezuela has very low electricity costs because of government subsidies) and using it to pay for medicine and food. This is one example of how cryptocurrency has been able to help people living in countries with unstable economies and monetary systems (England & Fratrik, 2018).

Advocates of cryptocurrency also argue that approximately 39% of international bitcoin mining uses renewable energy (mostly hydroelectric energy) and that percentage is increasing (Blandin et al., 2020).

Based on the literature concerning the effect of cryptocurrencies on the natural environment, the following hypothesis is posited regarding the relationship between retail consumers' environmental ethics and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 1

H_0: There is no significant and positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

2.2. The Use of Cryptocurrencies in Criminal Activity

Another ethical objection that many people have with regard to cryptocurrency is that it is used as a form of payment/currency in several different types of criminal activities. These criminal activities include drug trafficking, weapons trafficking, tax evasion, money laundering, Ponzi schemes and ransomware attacks (Cao & Kethineni, 2020; Higbee, 2018).

In 2014, Trendon Shavers (a citizen of the United States of America) was convicted of running a Ponzi scheme that defrauded investors out of over US$7 million in bitcoin. Shaver solicited investors using an online bitcoin forum and various online chatrooms. He was supposed to trade and manage their bitcoin investments by using a market arbitrage strategy that would give them a 7% return on their investments. Instead of doing this, he used the bitcoin he received from old investors to pay new investors and he converted some of the bitcoin into U.S. dollars for his personal use (Cao & Kethineni, 2020).

Using cryptocurrency, criminals can anonymously make and receive payments for illegal drugs and illegal weapons. One of the largest online marketplaces where transactions involving the sale and purchase of illegal drugs and illegal weapons were conducted was Silk Road. Silk Road operated from 2011 until 2013. By the time the FBI (a law enforcement agency in the United States of America) shut down Silk Road in 2013, Silk Road had processed illegal transactions that were cumulatively worth over US$1 billion (Cao & Kethineni, 2020). The main cryptocurrency used to transact on Silk Road was bitcoin, but after Silk Road was shut down by the FBI, there were other online marketplaces like Hansa and AlphaBay that allowed criminals to anonymously make and receive payment for illegal drugs and illegal weapons using bitcoin and other cryptocurrencies such as Ethereum and Monero (Cao & Kethineni, 2020).

Cryptocurrencies are used for tax evasion because people and companies can anonymously make and receive local and international payments for goods and services without involving third parties such as a bank or the government. The government will not be able to tax these transactions unless the parties involved in these transactions voluntarily report the transactions to the government (Marian, 2014).

Cryptocurrency is used for money laundering because criminals can buy cryptocurrencies with “dirty” money (money from illegal activity) and then sell the cryptocurrencies to get “clean” money (money that appears to come from the sale of cryptocurrencies instead of illegal activity). Criminals can also sell cryptocurrencies received from illegal transactions online (“dirty” money) for cash (“clean” money that appears to come from the sale of cryptocurrencies instead of illegal transactions online) (Cao & Kethineni, 2020).

Cybercriminals send emails with seemingly mundane/standard attachments (e.g. a PDF file or a Microsoft Word document) or links to people; once people click on these links or download these attachments, the cybercriminals gain access to the their networks. Once a cybercriminal has gained access to someone’s network, the cybercriminal can siphon that person’s data, encrypt it and then demand that the person pays a ransom for its decryption. If the person does not pay the ransom, then they will not be able to get access to that data again. This is whole process/crime is called a ransomware attack (Higbee, 2018). When cybercriminals conduct ransomware attacks, many of them demand that the ransom be paid in cryptocurrencies because that allows them to accept payments anonymously since cryptocurrencies are not linked to specific bank accounts or addresses (this makes it easier for the cybercriminals to get away with the money received from ransomware attacks) (Higbee, 2018).

Since cryptocurrencies exist online, hackers and cybercriminals can steal cryptocurrencies through hacking. Africrypt is a South African investment company that invests in bitcoin on behalf of its investors. In April 2021, Africrypt was hacked; as a result, Africrypt and its investors lost approximately R54 billion worth of bitcoin (Ryan, 2021).

“Chainalysis is a leading provider of investigation and compliance software that enables government agencies and private businesses to detect and prevent cryptocurrency crime and money laundering” (Chainalysis, 2021; Finextra, 2021). Proponents of cryptocurrencies argue that Chainalysis helps banks and regulators/governments to prevent and solve crimes involving cryptocurrencies. They also argue

that the types of software that prevent and solve crimes involving cryptocurrencies are improving (Dupuis & Gleason, 2020).

People who believe that cryptocurrencies are used in most or many cybercrimes are misinformed because cryptocurrencies are used in a very small (almost negligible) percentage of cybercrimes (Butler, 2019; Lennon,2021). Chainalysis's 2021 report indicated that only 2.1% of total cryptocurrency transaction volume in 2019 represented criminal activity and that percentage decreased to 0.34% in 2020 (Lennon, 2021).

Based on the literature concerning the use of cryptocurrencies in criminal activity, the following hypothesis is posited regarding the relationship between retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 2

H_0: There is no significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment.

2.3. The Use of Cryptocurrencies by People of Certain Demographics

In January 2019, the percentage of internet users worldwide (aged 16-64) who reported owning any type of cryptocurrency was 5.5% (Kemp, 2019). In January 2019, the percentage of internet users in South Africa (aged 16-64) who reported owning any type of cryptocurrency was 10.7% (Kemp, 2019). This means that the percentage of South African internet users who own cryptocurrency is almost twice

the percentage of global internet users who own cryptocurrency. South Africa has a relatively high number of cryptocurrency owners compared to the rest of the world.

In January 2021, the percentage of internet users worldwide (aged 16-64) who bought something online via any device (e.g. PC/laptop/smartphone) was 76.8% (Kemp, 2021). In January 2021, the percentage of internet users in South Africa (aged 16-64) who bought something online via any device was 57.7% (Kemp, 2021). This means that the percentage of South African internet users who make online payments is significantly less than the percentage of global internet users who make online payments. South Africa has a relatively low number of people who make online payments compared to the rest of the world.

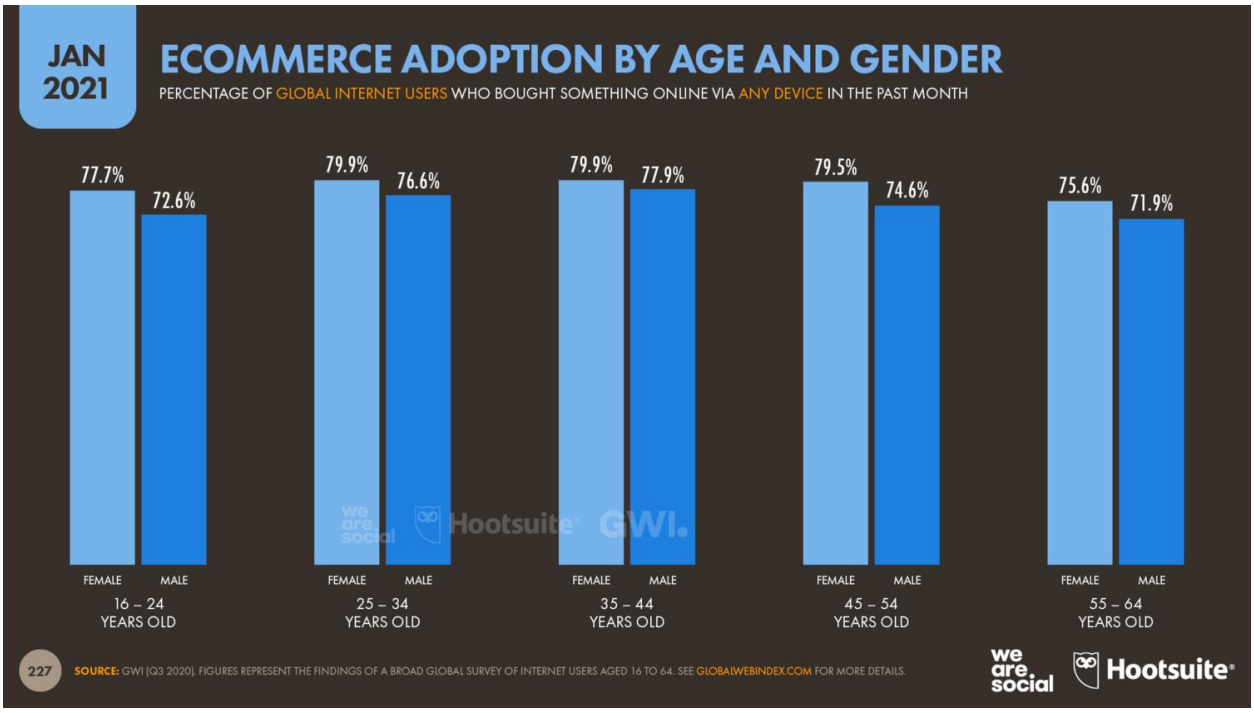

Figure 1: Graph of Global Ecommerce Adoption by Age and Gender (Kemp, 2021)

Figure 1 indicates that males generally make fewer online payments than females and older people (people over the age of 54) make fewer online payments than younger people (people aged 54 and younger) (Kemp, 2021).

Based on the literature concerning the use of cryptocurrencies by people of certain demographics, the following hypothesis is posited regarding the relationship between retail consumers' gender and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 3

H_0: There is no significant and positive relationship between the gender of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the gender of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

Based on the literature concerning the use of cryptocurrencies by people of certain demographics, the following hypothesis is posited regarding the relationship between retail consumers' age and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 4

H_0: There is no significant and positive relationship between the age of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the age of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.

2.4. The Technological Proficiency Required to Make Cryptocurrency Payments

Before acquiring cryptocurrency, the first thing one needs to do is choose one's cryptocurrency wallet. A cryptocurrency wallet is a hardware device (e.g. a USB flash drive) or a software programme that stores cryptocurrency (e.g. Luno) (Galov, 2021). Having a cryptocurrency wallet also allows someone to receive cryptocurrency payments and to make cryptocurrency payments. Once someone has chosen the type of cryptocurrency wallet that he/she wants, he/she can set up a cryptocurrency wallet online. There are many free cryptocurrency wallets available online (Exodus is a good cryptocurrency wallet for first-time cryptocurrency buyers) and they can be accessed via smartphones, PCs, laptops and other mobile devices (e.g. iPads) (Galov, 2021).

Once someone has set up his/her cryptocurrency wallet, he/she can buy cryptocurrency online from various cryptocurrency exchanges (Coinbase is a popular cryptocurrency exchange). A person can pay for cryptocurrency with his/her credit card details or debit card details; he/she will also need to provide the cryptocurrency exchange with his/her cryptocurrency wallet address (details) and once all this is done, the transaction (cryptocurrency purchase) is complete. The entire transaction should not take longer than a few minutes (Galov, 2021).

To make a cryptocurrency payment, the purchaser must copy the details of the seller's cryptocurrency wallet, paste them into a designated field on the purchaser's cryptocurrency wallet, type in the right amount of cryptocurrency payable in the payment box/field and then click on "send". The transaction should be complete in less than a minute (Galov, 2021).

An even simpler way to make cryptocurrency payments is by scanning a Quick Response code (QR code). This can be done by people who use a software programme like Luno as their cryptocurrency wallet. A Luno user making a cryptocurrency payment can sign into his/her Luno account, select "Wallets" from the menu, select the cryptocurrency wallet that he/she wants to pay from, select "send" and then select the QR code icon on the top right part of his/her smartphone screen (Luno, 2021). The person making the cryptocurrency payment then needs to scan the seller's QR code, enter the amount that the

purchaser wants to pay to the seller, review the details of the payment and then confirm the payment. After all this is done, the cryptocurrency payment is complete and this whole process should not take longer than a minute (Luno, 2021).

Making cryptocurrency payments is easy for people who know how to use smartphones and/or PCs and/or laptops for online payments (DeVries, 2016). In the 2020 study, "Cryptocurrency Usage Impact on Perceived Benefits and Users' Behaviour" (conducted in Dubai), 68% of respondents said that cryptocurrency is easy to use and 68% of respondents said that learning how to use cryptocurrency is easy (Alqaryouti, Alkashri, Shaalan & Siyam, 2019).

Based on the literature concerning the technology proficiency required to make cryptocurrency payments, the following hypothesis is posited regarding the relationship between retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 5

H_0: There is no significant and positive relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment.

2.5. The Effect of Cryptocurrencies on Customer Equity

When retailers allow consumers to make payments with cryptocurrency, it increases customer equity for some consumers because it allows the retail consumers to make payments with lower transaction costs (Gäthke, Marder, Murdy, Nazifi & Shabani, 2021).

The ability to make cryptocurrency payments also increases customer equity for some consumers because it allows retail consumers to make payments without the risk of being victims of credit card fraud/identity theft (Mukabi & Vu, 2019). The convenience of some cryptocurrency payments (simply scanning a QR code and not having to carry a wallet) increases customer equity too (Luno, 2021).

When retailers allow consumers to make cryptocurrency payments, it decreases customer equity for some consumers because some consumers are opposed to the use of cryptocurrency because of the effect of cryptocurrency mining on the natural environment and some consumers are opposed to the use of cryptocurrency because of its use in criminal activity (Badea & Mungiu-Pupazăn, 2021; Cao & Kethineni, 2020).

Many retail consumers prefer to use cryptocurrency for investment purposes instead of using it as a medium of exchange (Gäthke et al., 2021).

Based on the literature concerning the relationship between retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment, the following hypothesis is posited regarding the relationship between retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment:

Hypothesis 6

H_0: There is no significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment.

Ha: There is a significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment.

2.6. Reasons for Using Cryptocurrency as a Form of Payment

In the 2020 study, "Cryptocurrency Usage Impact on Perceived Benefits and Users' Behaviour", respondents were asked what their reasons for using cryptocurrency as a form of payment were (Alqaryouti et al., 2019).

76% of respondents said they make cryptocurrency payments because they have lower transaction costs (Alqaryouti et al., 2019).

70% of respondents said they make cryptocurrency payments because they are more secure than credit/debit card payments (Alqaryouti et al., 2019).

70% of respondents said they make cryptocurrency payments because they are more convenient than other types of payments (Alqaryouti et al., 2019).

2.7. Summary of Hypotheses

In this research model, the independent variables are gender of retail consumers, age of retail consumers, personal ethics of retail consumers, technology proficiency of retail consumers and customer equity of retail consumers. Retail consumers' willingness to use cryptocurrency as a form of payment is the dependent variable.

Hypothesis	Key References
Hypothesis 1	Badea & Mungiu-Pupazăn (2021) Küfeoğlu & Özkuran (2019) Cui, Li, Li & Wu (2019) Hiam, Hiam-Galvez & Prescott (2020) Taskinsoy (2021) England & Fratrik (2018) Blandin, Dek, Eisermann, Njoki, Pieters, Taylor & Wu (2020)
Hypothesis 2	Cao & Kethineni (2020) Higbee (2018) Marian (2014)

	Ryan (2021) Chainalysis (2021) Finextra (2021) Dupuis & Gleason (2020) Butler (2019) Lennon (2021)
Hypothesis 3	Kemp (2021)
Hypothesis 4	Kemp (2021)
Hypothesis 5	Galov (2021) Luno (2021) Alqaryouti, Alkashri, Shaalan & Siyam (2019)
Hypothesis 6	Alqaryouti, Alkashri, Shaalan & Siyam (2019) Gäthke, Marder, Murdy, Nazifi & Shabani (2021) Mukabi & Vu (2019) Luno (2021)

	Badea & Mungiu-Pupazăn (2021) Cao & Kethineni (2020)

Figure 2: Summary of Hypotheses

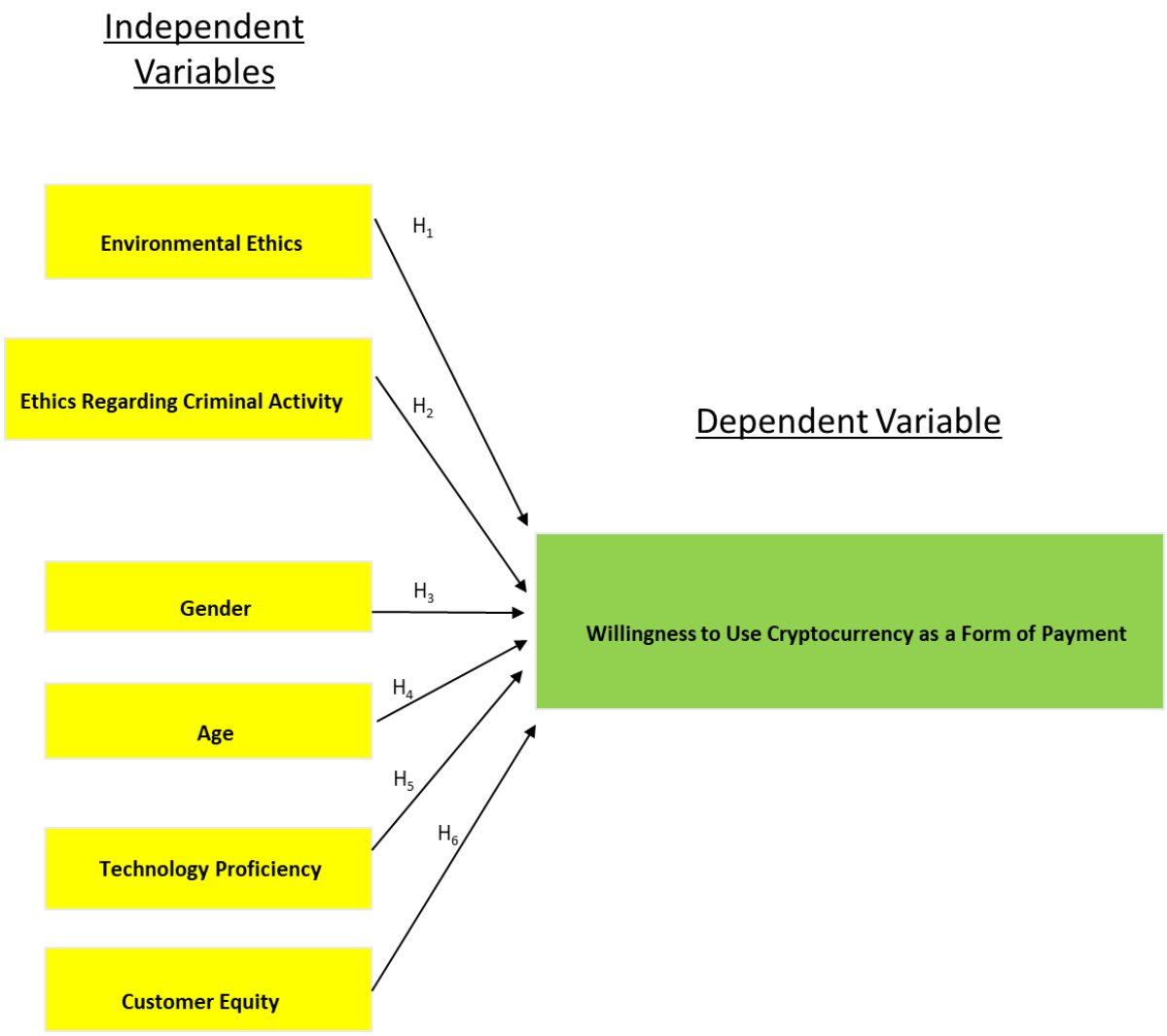

Figure 3: Research Model

2.8. Analysis of Previous Consulting Engagements and Interventions

CryptoRefills is “a company that sells vouchers and gift cards in exchange for cryptocurrency” (Cointelegraph, 2021, p. 1). CryptoRefills has its headquarters in Amsterdam in the Netherlands (CryptoRefills, 2022). Cointelegraph Consulting is a consulting division of Cointelegraph, which “produces institutional-level reports on blockchain solutions, case studies and in-depth analyses” (Cointelegraph, 2022, p. 1). Cointelegraph has its headquarters in New York in the United States of America (Crunchbase, 2022).

In 2021, CryptoRefills had a consulting engagement with Cointelegraph Consulting in which they collaborated to conduct research on “consumer adoption of cryptocurrencies for purchasing goods and services” (Rolfe, 2021, p.1). The title of the consultancy report compiled by Cointelegraph Consulting and CryptoRefills was, “Cryptocurrencies in Retail: Consumer Adoption Report 2021” (Rolfe, 2021, p. 1). The consultancy report found that out of 290 respondents (retail consumers), 67.3% said that cryptocurrency is a good way to buy services and products and 61.8% said that paying with cryptocurrency is better than paying with other payment methods (e.g. credit cards and debit cards) (CryptoRefills, 2021; Rolfe, 2021). The consultancy report clearly found that most retail consumers are willing to use cryptocurrency as a form of payment in retail.

In 2021, PayPal had a consulting engagement with Deloitte in which they collaborated to conduct research on “overall attitudes and investments in adoption of digital currency payment systems” (Deloitte, 2021, p. 3). The title of the consultancy report compiled by Deloitte and PayPal was, “Merchants getting ready for crypto” (Deloitte, 2021, p. 1). The consultancy report found that 64% of retail consumers have “significant interest in using digital currencies for payments” (Deloitte, 2021, p. 5). The consultancy report also found that 32% of retail consumers have moderate interest in “using digital currencies for payments” and 2% of retail consumers have minimal interest in “using digital currencies for payments” (Deloitte, 2021, p. 5). The consultancy report found that the vast majority (98%) of retail consumers are willing (to varying extents) to use cryptocurrency as a form of payment in retail.

3. Research Methodology

3.1. Research Paradigm and Approach

The research for this consultancy report relies on primary sources of data because the research collects and analyses data collected from printed and online questionnaires completed by human respondents. The research paradigm of this consultancy report is positivism, which posits that knowledge creation should be based on what can be assessed and observed (Bhattacherjee, 2012). This consultancy report assesses the willingness of respondents to use cryptocurrency as a form of payment with a questionnaire.

Epistemology refers to how people decide what counts as attestable knowledge (Guba & Lincoln, 1994). The epistemology of this consultancy report is determined by referring to peer reviewed journals and the demographics, personal ethics, technological proficiency and customer equity of the research respondents.

Ontology refers to how people understand the reality of the Earth (Guba & Lincoln, 1994). The ontology of this research report is determined by referring to the responses to the questions on the questionnaire.

Axiology is how researchers decide what counts as ethical value (Sarantakos, 1998). The axiology of this consultancy report is determined by referring to peer reviewed journals.

The research approach of this consultancy report is quantitative research, which incorporates the collection and analysis of quantitative data (Creswell, 1999). This consultancy report takes into consideration the responses to close-ended Likert scale questions. This is an example of quantitative data.

3.2. Research Design

The research design of this consultancy report is cross-sectional research. It is cross-sectional research because a dependent variable and several independent variables are measured by many questionnaires at the same point in time. Questionnaires are very useful when conducting cross-sectional research because they capture many variables, they have external validity and they allow researchers to study research problems with multiple theories (Bhattacherjee, 2012).

3.3. Target Population

The target population consists of South African adults; there are approximately 36 550 000 adults in South Africa (Statista, 2020). Any South Africans who are at least 18 years old and who are also the main purchasers of monthly groceries in their respective households are eligible to participate in the research.

3.4. Sampling Technique

This consultancy report uses a “non-probability sampling” sampling design. This is because all the South African retail consumers who are under the age of 18 are not able participate in the research conducted for this consultancy report. The type of non-probability sampling technique utilised in this research is snowball sampling because after identifying some respondents that are eligible to participate in this research, they are asked to recommend participation in this research to other South African retail consumers who are aged 18 and over (Bhattacherjee, 2012).

3.5. Data Collection Strategy

Data for this consultancy report is collected from online questionnaires on the website, Qualtrics. Paper-based questionnaires are also used to collect data. The response rates for the paper-based questionnaires can usually be expected to be approximately 23% higher than the response rates for the online questionnaires, but because of the social distancing being widely practiced by South Africans to prevent the spread of the unprecedented COVID-19 virus, the response rates of the online questionnaires are expected to be higher (Nulty, 2008). The minimum sample size is 150 respondents.

3.6. Data Collection Methods

Questions that offer respondents a limited set of answers are close-ended questions (Hlebec, Manfreda, Reja & Vehovar, 2003). This consultancy report gathers data by using questionnaires with close-ended 7-point Likert scale questions. Likert scale questions offer respondents a set of statements/responses that they must choose from to show their level of agreement with a statement or to answer a question (Chandel, Joshi, Kale & Pal, 2015).

3.7. Data Quality Control

Cronbach's alpha score measures the reliability of a test/scale. The reliability of this research is measured by Cronbach's alpha score. The Cronbach's alpha score of this research must be equal to 0.7 or more in order for this research to be reliable (the highest possible Cronbach's alpha score is 1 and the lowest possible Cronbach's alpha score is 0) (Dennick & Tavakol, 2011).

Data can be analysed with exploratory factor analysis and hypotheses can be tested with exploratory factor analysis (Pearce & Yong, 2013). The validity of this research is determined with exploratory factor analysis. The exploratory factor analysis is conducted with IBM SPSS Software ("IBM SPSS Statistics

28.0.0.0"); this is a statistical software that enables users to conduct statistical analysis. The research has validity if exploratory factor analysis finds that all the factors that this research uses to measure South African retail consumers' willingness to use cryptocurrency as a form of payment effectively measure South African retail consumers' willingness to use cryptocurrency as a form of payment.

3.8. Data Analysis

Multiple regression analysis is a range of statistical processes that allows researchers to calculate the relationships between independent variables and dependent variables (Edwards, 1985). This consultancy report uses multiple regression analysis with a 95% confidence interval to test the hypotheses of the research and to test the relationships between variables. Several examples of the statistical processes that are used to analyse data include correlation analysis, t-tests and ANOVAs.

The regression model of the data is as follows:

$$y= \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \varepsilon$$

This is when:

β_1 = Effect of Environmental Ethics

β_2 = Effect of Ethics Regarding Criminal Activity

β_3 = Effect of Gender

β_4 = Effect of Age

β_5 = Effect of Technology Proficiency

β_6 = Effect of Customer Equity

y = Willingness to Use Cryptocurrency as a Form of Payment

ε = Error Term

3.9. Limitations of the Consultancy Report

Money and time are both limitations of this consultancy report because the research has a limited time in which to be conducted and a limited budget.

Variance caused by the measurement method instead of a variable of interest is called common method variance. The research in this consultancy report has common method variance because it only uses one method to collect and measure data (one questionnaire). Common method bias is caused by common method variance. Common method bias is a limitation of this consultancy report's research (Lee, MacKenzie & Podsakoff, 2003).

Insight could also have more variables in the construct to improve its alpha value.

3.10. Ethical Considerations

This consultancy report takes the responses of respondents who have given informed consent into consideration.

Respondents answer questions anonymously so the anonymity, confidentiality and privacy of respondents is respected. Respondents do not have to give their names; respondents are assigned a number that is based on the questionnaire that they completed. Insight fulfils its responsibility to be sensitive to human dignity.

Formal permission has been obtained from the University of the Witwatersrand administration to send the questionnaire to University of the Witwatersrand students via email and to distribute the paper-based questionnaire on the campus of the University of the Witwatersrand.

3.11. Evaluation of Traditional Consulting Methods

The traditional consulting method that Insight used to conduct its research and write this consultancy report comprised of the following steps (Sieff, 2022):

1. Define the problem
2. Identify the required data
3. Collect the data
4. Analyse the data
5. State recommendations
6. Present the complete consultancy report

The consulting method above was effective because Insight successfully implemented this consulting method to write this consultancy report. Even though this traditional consulting method was effective, Insight consultants still identified an opportunity to innovate this traditional consulting method. Since the outbreak of the COVID-19 virus, people are generally more reluctant to physically handle objects that they do not absolutely have to physically handle (e.g. pen and paper). Insight consultants believe that is the reason why 100% of the respondents who participated in this research opted to complete the online questionnaire as opposed to the paper-based questionnaires. That is why Insight consultants believe that management consultants who want to conduct research in the present day and in the near future (for as long as COVID-19 is a threat to public health) should focus more on getting questionnaire responses online as opposed to questionnaire responses from paper-based questionnaires.

4. Results

4.1. Introduction

The results of Insight's research include inferential statistics and descriptive statistics. The results analyse the relationship of each dependent variable with the independent variable, which is retail consumers' willingness to use cryptocurrency as payment.

4.2. Presentation of Results

4.2.1. Descriptive Statistics

The total sample size of this research was 186 respondents. Exploratory analysis was conducted to check the adequacy of data with respect to the research questions and hypotheses. Non-value-adding identifiers of respondents were removed from the dataset; these include email addresses of respondents, IP addresses of respondents and start and end dates of respondents' times taken to complete the questionnaire.

4.2.2. Demographic Profile of Respondents

4.2.2.1. Gender

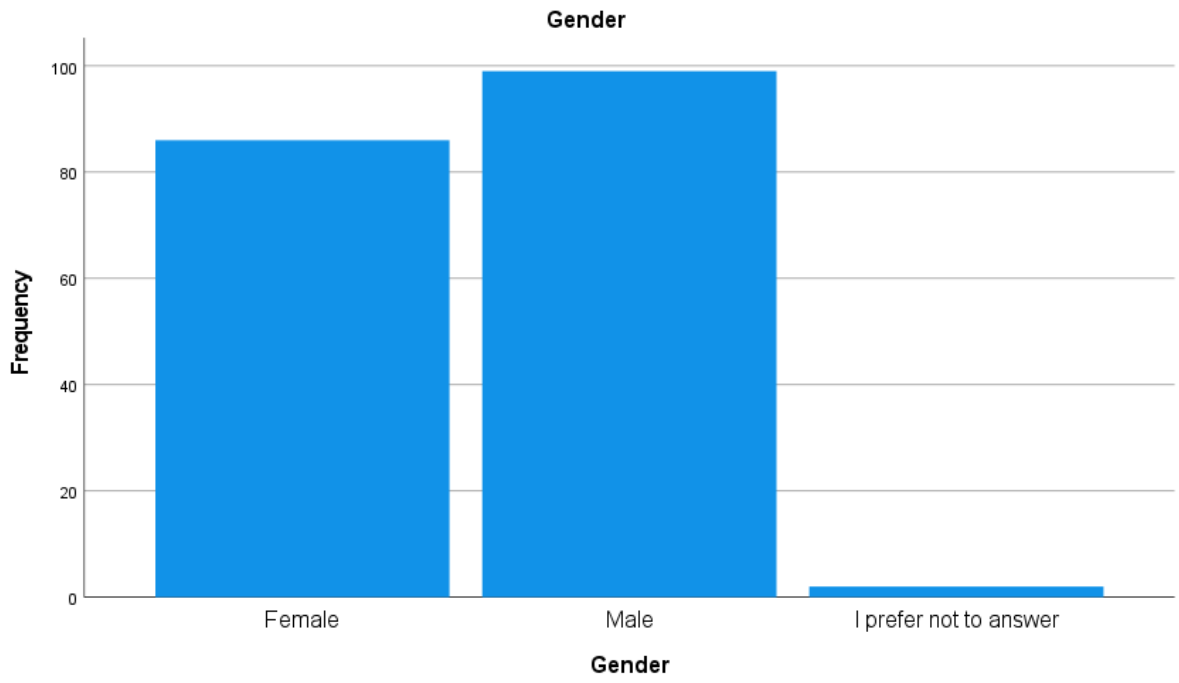

Figure 4: Bar Graph of Gender of Respondents

Figure 4 indicates that there were a few more male respondents (52.7%) than female respondents (45.7%) and that 1.1% of respondents preferred not to state what their gender is.

4.2.2.2. Age

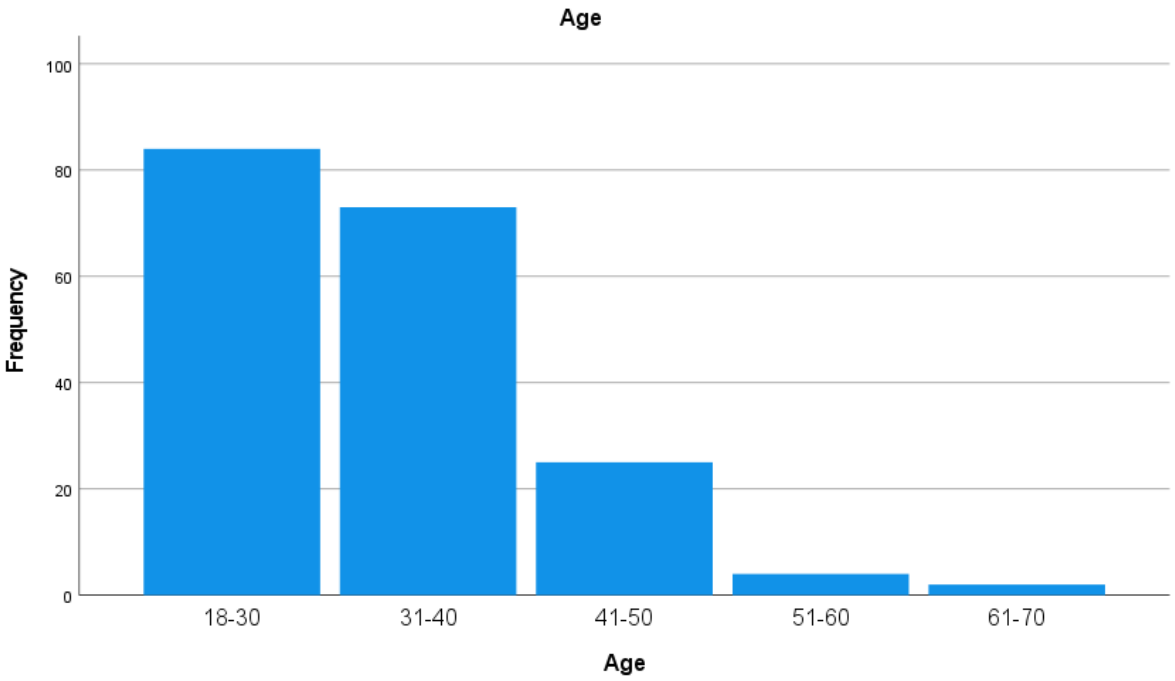

Figure 5: Bar Graph of Age of Respondents

The modal age group for the dataset of 186 respondents was the age group of 18- to 30-year-olds. 44.7% of the respondents were in this age group. Figure 5 indicates a steadily decreasing frequency as the age ranges increase. 83.5% of all the respondents were under the age of 40, which indicates that the respondents were generally young.

4.2.2.3. Crosstabulations

To analyse the relationships between variables of interest, Insight conducted a series of crosstabulation analyses. This indicated the distribution of responses for a given variable with respect to another. These distributions were not necessarily apparent when doing single variable frequency analysis.

4.2.2.3.1. Age vs Gender

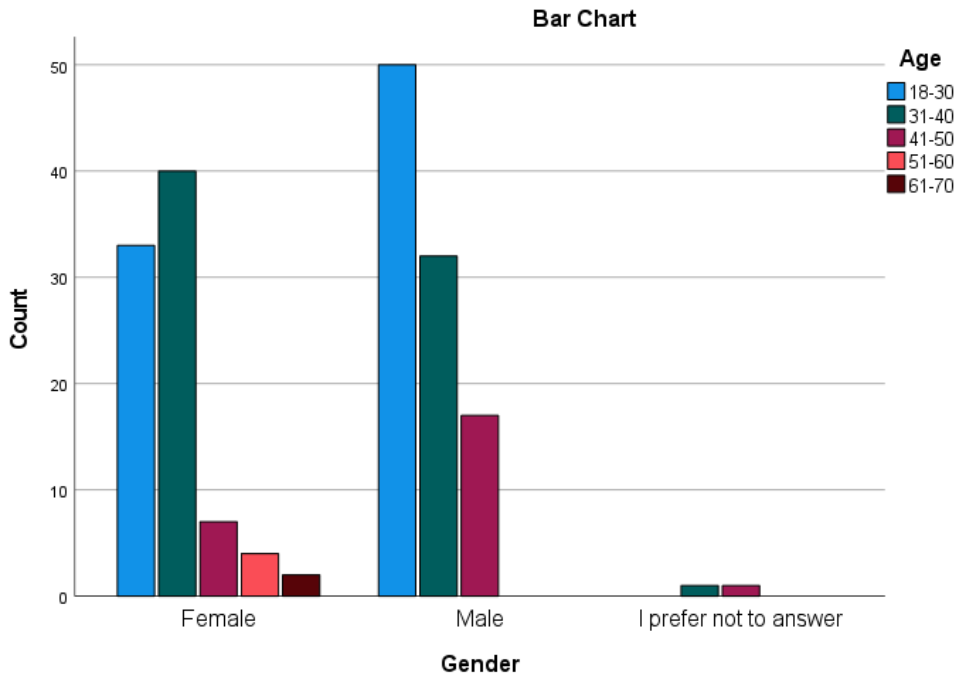

Figure 6: Bar Graph of Crosstabulation of Age vs Gender

Figure 6 indicates that males and females exhibited a steadily decreasing frequency in terms of age. The modal age groups for males and females were 18-30 and 31-40 respectively. Using the mode as a measure of central tendency, Insight found that on average, male respondents were younger than female respondents.

4.2.2.3.2. Gender vs Cryptocurrency Payment

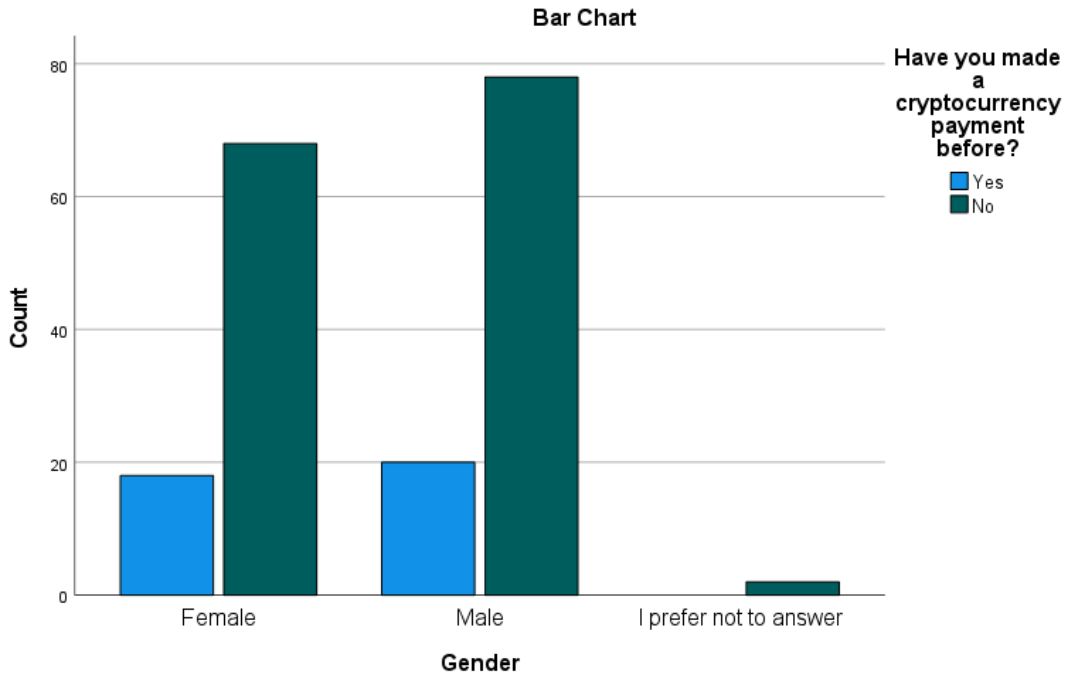

Figure 7: Bar Graph of Crosstabulation of Gender vs Cryptocurrency Payment

Figure 7 indicates that cryptocurrency payments are still not mainstream in South Africa yet. This can be deduced from the distribution of respondents segmented by gender according to whether they have made a payment using cryptocurrency before.

Figure 7 indicates that only 18 out of 86 female respondents have made a cryptocurrency payment before. This means that the majority of female respondents (79.07%) have never made a cryptocurrency payment before.

Figure 7 indicates that only 20 out of 98 male respondents have made a cryptocurrency payment before. This means that the majority of male respondents (79.59%) have never made a cryptocurrency payment before.

Proportionally, there was no significant difference between males and females with respect to whether they have made a cryptocurrency payment before.

4.2.2.3.3. Gender vs Online Payment

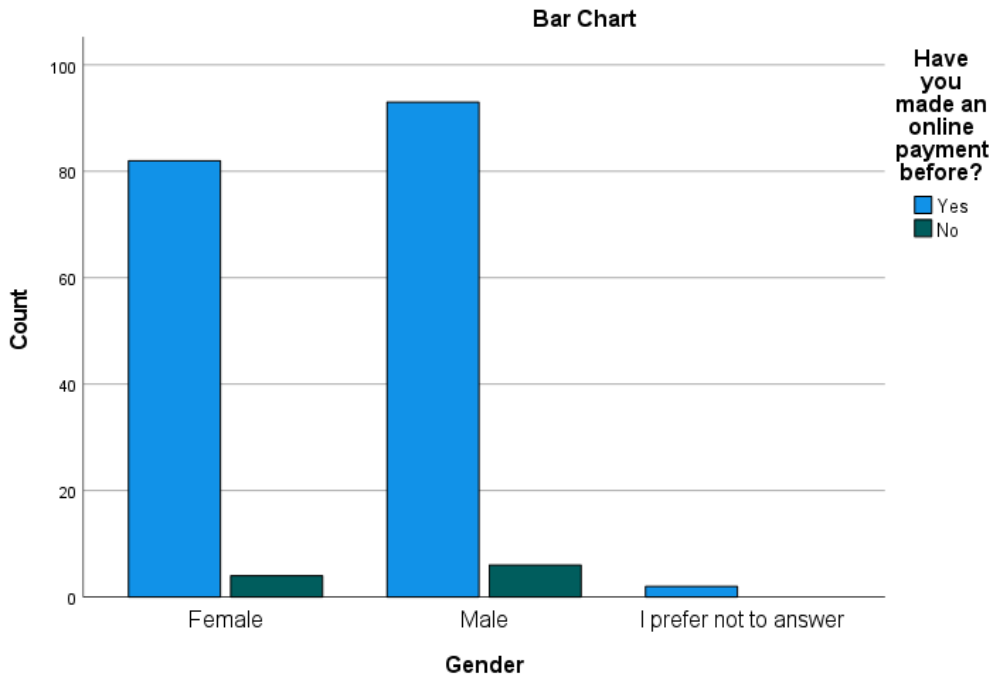

Figure 8: Bar Graph of Crosstabulation of Gender vs Online Payment

Figure 8 shows that the majority of males (93.93%) and females (93.35%) have made online payments before. This indicates that online payments have gained mainstream acceptance. Overall, 177 of the 186 respondents have made online payments.

Proportionally, there was no marked difference between males and females in terms of making online payments.

4.2.2.3.4. Age vs Cryptocurrency Payment

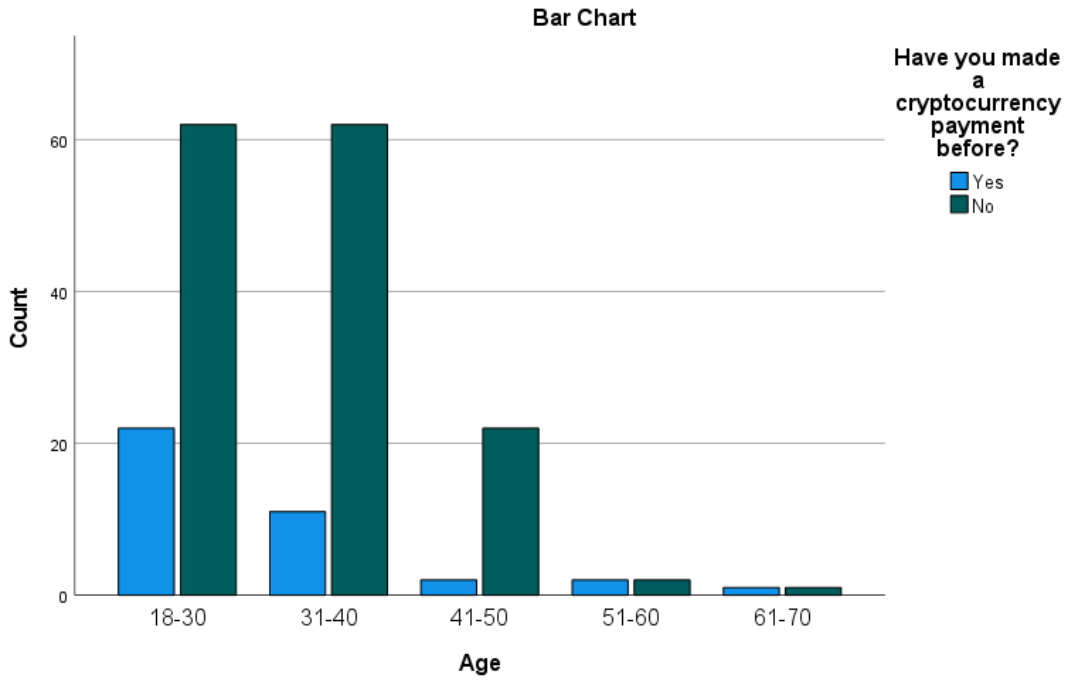

Figure 9: Bar Graph of Crosstabulation of Age vs Cryptocurrency Payment

Figure 9 indicates that a larger proportion of young retail consumers (aged 18-40) have made cryptocurrency payments compared to older retail consumers (aged 41-70). This can be seen by the distribution of respondents segmented by age group.

Out of 84 respondents in the 18-30 age group, 22 of them have made a cryptocurrency payment before. This constitutes 35.48% of this age group, which is double the rate of adoption by the 31-40 age group, which is 17.74%.

Only 9.09% of the respondents in the 41-50 age group have made cryptocurrency payments before and 50% of the people over the age of 50 have made cryptocurrency payments before although they only comprise 6 respondents.

4.2.2.3.5. Age vs Online Payment

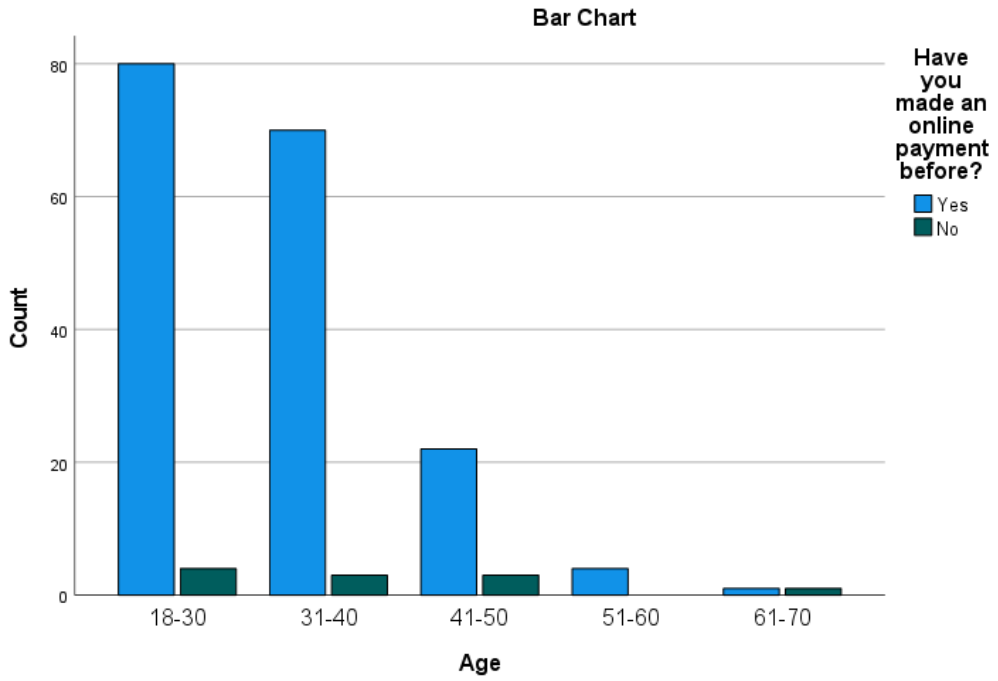

Figure 10: Bar Graph of Crosstabulation of Age vs Online Payment

Figure 10 indicates that 95.24% of the respondents in the 18-30 age group have made online payments before. 95.89% of respondents aged 31-40, 88% of respondents aged 41-50 and 100% of respondents aged 51-60 have made online payments before. This indicates that online payments have gained mainstream acceptance.

4.2.3. Exploratory Factor Analysis

To test the measurement model, Insight used exploratory factor analysis to ascertain whether the constructs are optimally structured with the most pertinent variables. This is done by ensuring that variables that belong to the same construct are as close to each other as possible while variables that do

not belong to the same construct should be as far apart as possible. These two terms are called internal consistency and discriminant validity of constructs.

Using principal components analysis (PCA), Insight managed to reduce the dimension of the variables into four constructs.

There are 6 steps that must be completed to conduct PCA. These 6 steps include (Hlahatsi, 2020; Weiers, 2011):

1. Extraction of the aggregated variables
2. Determine the number of meaningful components that must be retained
3. Rotation to a final solution
4. Interpret the rotated solution
5. Compute component-based scores or component scores
6. Report the results of the remaining number of variables

The suitability of the PCA has to be checked before using the results of the analysis to ensure that the efficacy of the method is ascertained.

One of the main conditions for the use of PCA is the positive definiteness of the correlation matrix of the variables. This is indicated by a non-zero positive determinant of the matrix. For Insight's analysis, the determinant was positive definite with a value of 0.006 (as seen in Table 1 below).

Correlation Matrix[a]

a. Determinant = .006

Table 1: The Positive Definiteness of the Correlation Matrix

The overall Kaiser-Meyer-Olkin (KMO) measure was 0.738 (as seen in Table 2 below), which is above the minimum recommended KMO measure of 0.7.

Bartlett's Test of Sphericity was statistically significant with a p-value = <0.001 (as seen in Table 2), which is less than 0.05. This indicates that the data was appropriate for exploratory factor analysis when using the PCA algorithm (Hlahatsi, 2020).

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.738
Bartlett's Test of Sphericity	Approx. Chi-Square	894.613
	df	91
	Sig.	<,001

Table 2: Keyser-Meyer-Olkin and Bartlett's Test

Table 3 below shows the "Total Variance Explained" distribution among the constructs. It can be seen that four constructs emerged with eigenvalues greater than the threshold of 1.00.
The four constructs explained 63.26% of the variance in the data.

The results also show that constructs 1;2;3 and 4 contributed 21.10%; 20.18%; 12.62% and 9.36% respectively.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.285	23.461	23.461	3.285	23.461	23.461	2.953	21.096	21.096
2	2.733	19.520	42.981	2.733	19.520	42.981	2.826	20.183	41.279
3	1.603	11.453	54.434	1.603	11.453	54.434	1.767	12.620	53.899
4	1.236	8.827	63.262	1.236	8.827	63.262	1.311	9.362	63.262
5	.945	6.748	70.010						
6	.904	6.459	76.468						
7	.690	4.926	81.395						
8	.591	4.218	85.613						
9	.459	3.278	88.891						
10	.431	3.080	91.970						
11	.368	2.626	94.597						
12	.327	2.336	96.932						
13	.261	1.864	98.797						
14	.168	1.203	100.000						

Extraction Method: Principal Component Analysis.

Table 3: Total Variance Explained

4.2.3.1. Total Variance Explained

4.2.3.1.1. Scree Plot

Figure 11 below shows the Scree Plot of the PCA output, which serves as a graphic representation of the distribution of eigenvalues of the constructs. It can be seen from the scree plot that only four constructs had an eigenvalue not less than 1.00.

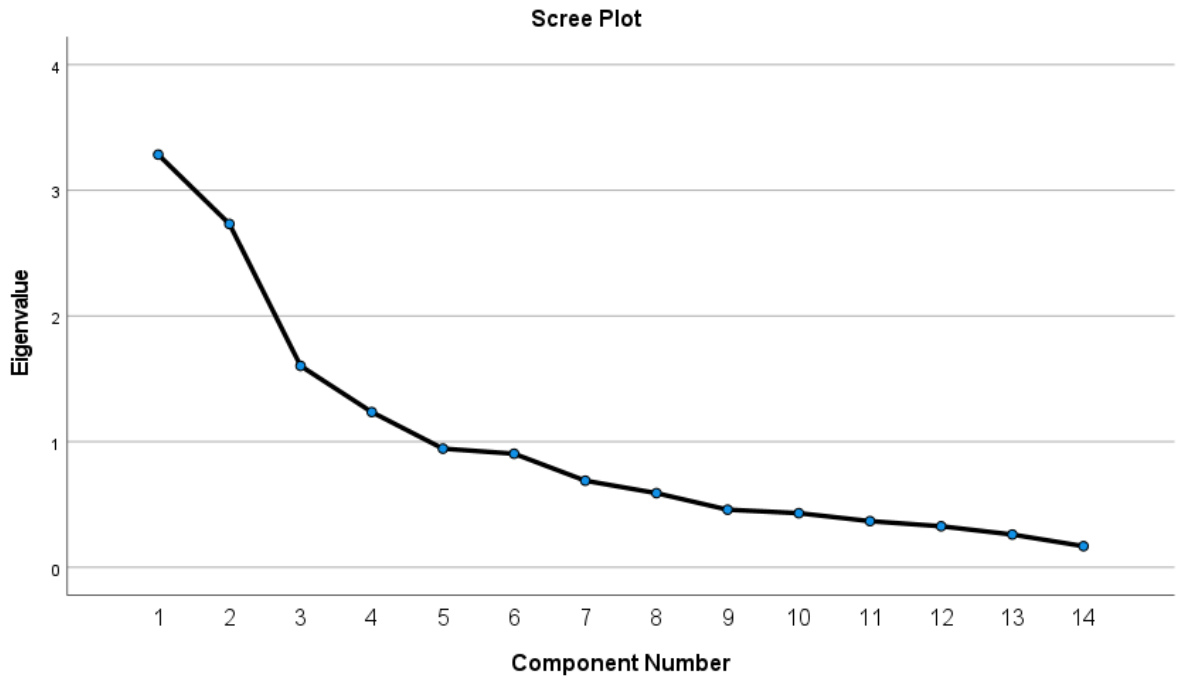

Figure 11: Scree Plot

4.2.3.1.2. Rotated Component Matrix

Table 4 below shows the "Rotated Component Matrix" that is composed of four constructs. In order of their contribution to the variance explained, the four constructs are:

- Environmental ethics
- Ethics regarding criminal activity
- Customer equity
- Technology proficiency

Each column in the rotated component matrix represents a construct and the contributing variables are listed in the first column.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Cryptocurrency mining significantly increases global carbon emissions	.914			
Cryptocurrency mining makes the climate crisis worse.	.859			
Cryptocurrency mining consumes far too much electrical energy.	.811			
Cryptocurrency mining is one of the worst modern threats to the natural environment.	.796			

Most people/businesses who accept cryptocurrency payments are criminals.	.859		
Cryptocurrency is only useful to hackers and cybercriminals.	.847		
Cryptocurrency is only useful to tax evaders and money launderers.	.813		
Cryptocurrency is used as currency in most modern illegal transactions.	.696		
An important benefit of cryptocurrency payments is the convenience of being able to pay by scanning a QR code with my smartphone.		.820	
An important benefit of cryptocurrency payments is the reduced risk of exposure to credit card fraud and identity theft.		.728	
An important benefit of cryptocurrency payments is the ability to make payments with much lower transaction costs.		.660	
I am proficient enough in the use of smartphones, PCs, laptops and the internet to make online payments.			.758

Have you made an online payment before?	.668
Have you made a cryptocurrency payment before?	.329

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Table 4: Rotated Component Matrix

4.2.4. Construct Reliability

To determine whether the constructs generated by the PCA are internally consistent, Insight used the Cronbach's Alpha method for testing reliability.

By definition, reliability is a measure of the extent to which the same results are obtained under the same experimental conditions after many trials.

Cronbach's alpha is a measure of the validity and reliability of the set of questions regarding the construct (Field, 2013). The internal consistency is important to ensure that Insight's research can be replicated independent of Insight.

The internal consistency measures that are acceptable are shown in the table below (Table 5).

$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 < \alpha$	Unacceptable

Source: (Field, 2013; Weiers, 2011).

Table 5: Internal Consistency Measures (Field, 2013; Weiers, 2011)

4.2.4.1. Environmental Ethics

Table 6 below shows that the Cronbach's alpha for environmental ethics was 0.873, which is greater than the accepted minimum for internal consistency of 0.7. Therefore, Insight concludes that the variables that the construct is constituted of adequately contribute to it (Hlahatsi, 2020).

Reliability Statistics

Cronbach's Alpha	N of Items
.873	4

Table 6: Cronbach's Alpha for Environmental Ethics

4.2.4.2. Ethics Regarding Criminal Activity

Table 7 below shows that Cronbach's alpha for ethics regarding criminal activity was 0.821, which is greater than the accepted minimum for internal consistency of 0.7. Therefore, Insight concludes that the variables that the construct is constituted of adequately contribute to it (Hlahatsi, 2020) .

Reliability Statistics

Cronbach's Alpha	N of Items
.821	4

Table 7: Cronbach's Alpha for Ethics Regarding Criminal Activity

4.2.4.3. Technology Proficiency

Table 8 below shows that Cronbach's alpha for Technology Proficiency was 0.201, which is way below the recommended minimum for internal consistency of 0.7. Therefore, Insight concludes that the variables that the construct is constituted of do not adequately contribute to it, thus they are not usable in the research (Hlahatsi, 2020).

Reliability Statistics

Cronbach's Alpha	N of Items
.201	3

Table 8: Cronbach's Alpha for Technology Proficiency

4.2.4.4. Customer Equity

Table 9 below shows that Cronbach's alpha for customer equity was 0.619, which is slightly below the recommended minimum for internal consistency of 0.7, but it still can be used as shown in Table 5 for internal consistency measures. Therefore, the researcher can conclude that the variables that the construct is constituted of adequately contribute to it (Hlahatsi, 2020).

Reliability Statistics

Cronbach's Alpha	N of Items
.619	3

Table 9: Cronbach's Alpha for Customer Equity

4.3. Inferential Statistics

4.3.1. Hypothesis Test for Hypotheses 1 to 6

Null Hypothesis:

Environmental ethics, Ethics regarding criminal activity, Consumer equity, Age and Gender of retail consumers have no influence on their willingness to use cryptocurrency as a form of payment.

Alternate Hypothesis:

Environmental ethics, Ethics regarding criminal activity, Consumer equity, Age and Gender of retail consumers have no influence on their willingness to use cryptocurrency as a form of payment.

Assumptions of Binary Logistic Regression

In order to use binary logistic regression for analysis, certain assumptions have to be met. Therefore, Insight checked the efficacy of the data for this analysis. The four assumptions are the following:

1. The dependent variable (willingness to use cryptocurrency as a form of payment) has two states (No =0 and Yes=0) and it is nominal (Laerd Statistics, 2013).
2. The binary logistic regressions has more than one independent variable, which are either categorical or continuous (Hlahatsi, 2020; Laerd Statistics, 2013).
3. Observations are independent, and the dependent variable has exhaustive and mutually exclusive categories; "Yes"=1 and "No"=0. (Hlahatsi, 2020; Laerd Statistics, 2013).
4. There is a linear relationship between the logit transformation of the dependent variable and the continuous independent variables (Hlahatsi, 2020; Laerd Statistics, 2013).

Since none of the assumptions are violated by the data, Insight proceeded with the binary logistic regression analysis.

4.3.1.1. Variance Explained

The "Model Summary" in Table 10 below shows the pseudo-R-squared values; these are measures of the variation in the dependent variable that can be explained by the regression model. It shows the Negalkerke R Square and Cox & Snell R Square values (Hlahatsi, 2020; Field,2013).

The dependent variable's variance that's explained by the binary logistic regression model is between 26.3% and 41.4% as shown by the Negalkerke R Square and Cox & Snell R Square values. The Negalkerke R Square value is a modification of the Cox & Snell R Square, which serves as a better measure to report on (Hlahatsi, 2020; Field, 2013).

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	128.168[a]	.263	.414

a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 10: Model Summary

4.3.1.2. Category Prediction

Insight used the binary logistic regression to predict the "Willingness to use cryptocurrency as payment" probability.

If the "Willingness to use cryptocurrency as payment" probability is greater than or equal to 0.5, SPSS classifies it as occurring. Occurrence implies that a respondent is willing to use cryptocurrency as payment. This is a classification problem using probabilistic predictive methods (Field, 2013).

The "Classification Table" in Table 11 below shows the performance of the binary logistic regression in classifying respondents against the actual classification (Laerd Statistics, 2013).

Classification Table[a]

			Predicted		
			Willingness		Percentage
	Observed		No	Yes	Correct
Step 1	Willingness	No	15	22	40.5
		Yes	6	139	95.9
	Overall Percentage				84.6

a. The cut value is .500

Table 11: Classification Table

Table 11 above gives the following information:

1. The negative predictive value, which is the total number of cases predicted not to have the characteristic compared to the percentage of correctly predicted cases that do not have the observed characteristic (Hlahatsi, 2020; Laerd Statistics, 2013).
2. The percentage accuracy of classification, which shows the percentage/proportion of cases that can be classified as Unwilling (0) or Willing (1) with the independent variables added i.e., Gender, Age, Environmental ethics, Ethics regarding criminal activity and Consumer equity (Hlahatsi, 2020; Laerd Statistics, 2013).
3. The positive predictive value: the total number of cases to have the characteristic compared to the percentage of correctly predicted cases that had the observed characteristic (Hlahatsi, 2020; Laerd Statistics, 2013).
4. Specificity: the percentage of cases that did not have the observed characteristic (true negatives) (Hlahatsi, 2020; Laerd Statistics, 2013).
5. Sensitivity**:** the percentage of cases that had the observed characteristic (true positives) (Hlahatsi, 2020; Laerd Statistics, 2013).

4.3.1.3. Variables in the Equation

The "Variables in the Equation" table shown in Table 12 is a table of coefficients or weightings of every one of the independent variables. The coefficients represent the contribution of each of the independent variables to the statistical model. The respective statistical significance of each variable is also shown in the table (Hlahatsi, 2020).

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age			1.929	4	.749	
	Age(1)	-.300	.499	.361	1	.548	.741
	Age(2)	-.714	.690	1.069	1	.301	.490
	Age(3)	-1.417	1.412	1.008	1	.315	.242
	Age(4)	19.884	27217.568	.000	1	.999	431871804.515
	Environmental Ethics	-.112	.151	.546	1	.460	.894
	Criminal Ethics	-.801	.194	17.126	1	<,001	.449
	Consumer Equity	1.140	.288	15.657	1	<,001	3.126
	Gender			1.949	2	.377	
	Gender(1)	.658	.471	1.949	1	.163	1.931
	Gender(2)	-21.219	28114.672	.000	1	.999	.000
	Constant	-.901	1.490	.365	1	.546	.406

a. Variable(s) entered on step 1: Age, Environmental Ethics, Criminal Ethics, Consumer Equity, Gender.

Table 12: Variation in the Equation

The output displayed in Table 12 above indicates that every one of the independent variables affects whether a respondent is willing to use cryptocurrency as payment or not, but not all of them were statistically significant.

Ethics regarding criminal activity and Consumer equity are both statistically significant with p-values <0.001. The constant/intercept is not statistically significant (Hlahatsi, 2020; Laerd Statistics, 2013).

4.3.1.4. Hosmer and Lemeshow Test

The Hosmer and Lemeshow test is a test for goodness of fit for binary logistic regression. The goodness of fit test shows how well the data fits the model (Hlahatsi, 2020). The test calculates if the observed event rates match the expected event rates in the population groups. The "Sig." value is 0.234 (as seen in Table 13 below), which indicates that the regression model fits the data well.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	10.461	8	.234

Table 13: Hosmer and Lemeshow Test

4.3.1.5. Summary of Hypothesis Test for Hypotheses 1 to 6

A logistic regression analysis was conducted to determine the effect of Gender, Age, Environmental ethics, Ethics regarding criminal activity, Technology proficiency and Customer Equity on Willingness to use cryptocurrency as payment.

The logistic regression model was found to be statistically significant because $\chi 2(8) = 10.461$ and $p < .05$. The logistic regression model explained 41.4% (see Nagelkerke R^2 in Table 10) of the variance in "Willingness to use cryptocurrency as payment" status and correctly classified 84.6% of cases.

- Increasing "Ethics regarding criminal activity" is associated with a decreased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 0.449
- Increasing "Customer equity" is associated with an increased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 3.126

Hypothesis	Conclusion of Hypothesis Test
H_0: There is no significant and positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.	Accept null hypothesis
H_0: There is no significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment.	Reject null hypothesis
H_0: There is no significant and positive relationship between the gender of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the gender of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.	Accept null hypothesis
H_0: There is no significant and positive relationship between the age of retail consumers	Accept null hypothesis

and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the age of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.	
H_0: There is no significant and positive relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment.	Accept null hypothesis
H_0: There is no significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment. Ha: There is a significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment.	Reject null hypothesis

Figure 12: Conclusions of Hypothesis Tests 1 to 6

4.3.2. The Effect on Woolworths's Revenue

To determine whether accepting cryptocurrency as payment would increase Woolworths's total revenue, Insight conducted a dependent t-test (called the paired-samples t-test in SPSS Statistics) to compare the mean of the percentages of consumers' monthly expenditure at Woolworths with the introduction of cryptocurrency payments compared to the mean of the percentages of consumers' monthly expenditure at Woolworths without the introduction of cryptocurrency payments.

Null hypothesis:

There is no difference between the percentage (%) of consumers' total monthly grocery spend at Woolworths before the introduction of cryptocurrency payments and after the introduction of cryptocurrency payments.

Alternate hypothesis:

There is a difference between the percentage (%) of consumers' total monthly grocery spend at Woolworths before the introduction of cryptocurrency payments and after the introduction of cryptocurrency payments.

Assumptions:

In order to use the dependent t-test, Insight checked if the data satisfied the following assumptions:

1. The dependent variable should be measured on a continuous scale – Passed
2. The independent variable should consist of two related groups – Passed
3. There should be no significant outliers in the differences between the two related groups – Passed
4. The distribution of the differences in the dependent variable between the two related groups should be approximately normally distributed – Passed

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Woolworths – What percentage (%) of your total monthly grocery spent is spent at each of these major South African retailers?	32.28	149	28.056	2.298
	Woolworths – If I could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft, this is how much of my total grocery spend (%) I would spend at each of these major retailers.	41.86	149	30.787	2.522

Table 14: Paired Samples Statistics

Table 14 above shows the descriptive statistics for the variables. The mean for the percentage expenditure at Woolies without the cryptocurrency payment option is 32.28 with a standard deviation of 28.06 whilst the mean for percentage expenditure at Woolies with the cryptocurrency payment option is 41.86 with a standard deviation of 30.79.

This shows that there is an increase in the mean percentage expenditure with the introduction of cryptocurrency payments. Insight now has to investigate whether this increase is statistically significant.

Paired Samples Correlations

				Significance	
			Correlation	One-Sided	Two-Sided
		N	n	p	p
Pair 1	Woolworths - What percentage (%) of your total monthly grocery spent is spent at each of these major South African retailers? & Woolworths - If I could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft, this is how much of my total grocery spend (%) I would spend at each of these major retailers.	149	.723	<,001	<,001

Table 15: Paired Samples Correlation

Table 15 above shows the Pearson correlation coefficient of 0.723 between the two groups (Woolworths consumers before Woolworths starts accepting cryptocurrency payments and Woolworths consumers after Woolworths starts accepting cryptocurrency payments). This figure shows that correlation between the groups is high as expected since it is the same respondents in both groups. The correlation is statistically significant for both one-tailed and two-tailed tests with each having $p < 0.001$.

Paired Samples Test

		Paired Differences					t	df	Significance	
					95% Confidence Interval of the Difference					
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			One-Sided p	Two-Sided p
Pair 1	Woolworths - What percentage (%) of your total monthly grocery spent is spent at each of these major South African retailers? - Woolworths - If I could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft, this is how much of my total grocery spend (%) I would spend at each of these major retailers.	-9.584	22.041	1.806	-13.152	-6.016	-5.308	148	<,001	<,001

Table 16: Paired Samples Test

The Paired Sample Test (seen in Table 16 above) shows the results of the dependent t-test.

The mean difference (between before Woolworths starts accepting cryptocurrency payments and after Woolworths starts accepting cryptocurrency payments) is -9.584 and a standard deviation of 22.041, which indicates an increase in the average percentage of grocery spend at Woolworths after Woolworths starts accepting cryptocurrency as payment.

The two-tailed p-value is less than 0.001 so the mean difference between the grocery spend before Woolworths starts accepting cryptocurrency payments and the grocery spend after Woolworths starts accepting cryptocurrency payments is statistically significant.

So $t(148) = 5.308$, $p<0.05$. Due to the means of the two groups and the direction of the t-value, Insight accepts the alternative hypothesis and conclude that there is a statistically significant improvement in the percentage of retail consumers' expenditure at Woolworths after the introduction of cryptocurrency payments from 32.28+/-28.06% to 41.86+/-30.79% ($p<0.05$) at a 95% confidence interval.

4.3.2.1. The Effect on Woolworths Consumers

4.3.2.1.1. Before Woolworths Accepts Cryptocurrency Payments

Woolworths's target market is middle to high income retail consumers who spend R4000 or more (above R3999) on monthly groceries. Insight refers to these consumers as "high spenders". Insight refers to consumers who spend less than R4000 (R3999 or less) on monthly groceries as "low spenders"

To determine whether there is a statistically significant difference between the percentage of monthly grocery spend that high spenders spend at Woolworths before Woolworths starts accepting cryptocurrency payments and the percentage of monthly grocery spend that low spenders spend at Woolworths before Woolworths starts accepting cryptocurrency payments, Insight used the independent-samples t-test to compare the mean percentage of monthly grocery spend that high spenders spend at Woolworths before Woolworths starts accepting cryptocurrency payments to the

mean percentage of monthly grocery spend that low spenders spend at Woolworths before Woolworths starts accepting cryptocurrency payments.

The dependent variable was the percentage of monthly expenditure and the independent variable was the total amount spent monthly.

Null hypothesis:

The percentage (%) of customers' total monthly grocery spend at Woolworths without the introduction of cryptocurrency payments does not differ based on the amount spent monthly.

Alternate hypothesis:

The percentage (%) of customers' total monthly grocery spend at Woolworths without the introduction of cryptocurrency payments differs based on the amount spent monthly.

Group Statistics

	Monthly_Spend_Groceries	N	Mean	Std. Deviation	Std. Error Mean
Woolworths – What percentage (%) of your total monthly grocery spent is spent at each of these major South African retailers?	Low Spenders	104	26.18	26.699	2.618
	High Spenders	68	39.10	27.684	3.357

Table 17: Group Statistics 1

Table 17 above provides useful descriptive statistics for the two groups being compared. It can be seen that the 104 low spenders had a mean of 26.18 and standard deviation of 26.70% while the 68 high spenders had a mean of 39.10 and a standard deviation of 27.68%

This indicates that the high spenders use a bigger proportion of their monthly groceries budget to buy groceries from Woolworths.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Significance				95% Confidence Interval of the Difference
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Woolworths - What percentage (%) of your total monthly grocery spent is spent at each of these major South African retailers?	Equal variances assumed	1.296	.257	-3.058	170	.001	.003	-12.920	4.225	-21.261	-4.580
	Equal variances not assumed			-3.035	139.669	.001	.003	-12.920	4.257	-21.337	-4.503

Table 18: Independent Samples Test 1

Table 17 above indicates that the group means are statistically different because the two-sided p-values have values of 0.003 which is less than 0.05.

Based on the results above, Insight accepts the alternative hypothesis and concludes that high spenders have a statistically significant higher percentage of customers' total monthly grocery spend at Woolworths without the introduction of cryptocurrency payments when compared to low spenders.

4.3.2.1.2. After Woolworths Accepts Cryptocurrency Payments

To determine whether there is a statistically significant difference between the percentage of monthly grocery spend that high spenders spend at Woolworths after Woolworths starts accepting cryptocurrency payments and the percentage of monthly grocery spend that low spenders spend at Woolworths after Woolworths starts accepting cryptocurrency payments, Insight used the independent-samples t-test to compare the mean percentage of monthly grocery spend that high spenders spend at Woolworths after Woolworths starts accepting cryptocurrency payments to the mean percentage of monthly grocery spend that low spenders spend at Woolworths after Woolworths starts accepting cryptocurrency payments.

The dependent variable was the percentage of monthly expenditure and the independent variable was the total amount spent monthly.

Null hypothesis:

The percentage (%) of customers' total monthly grocery spend at Woolworths after the introduction of cryptocurrency payments does not differ based on the amount spent monthly.

Alternate hypothesis:

The percentage (%) of customers' total monthly grocery spend at Woolworths after the introduction of cryptocurrency payments differs based on the amount spent monthly.

Group Statistics

	Monthly_Spend_Groceries	N	Mean	Std. Deviation	Std. Error Mean
Woolworths - If I could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft, this is how much of my total grocery spend (%) I would spend at each of these major retailers.	Low Spenders	93	39.82	32.255	3.345
	High Spenders	66	46.18	29.675	3.653

Table 19: Group Statistics 2

Table 19 above provides useful descriptive statistics for the two groups being compared. It can be seen that the 93 low spenders had a mean of 39.82 and standard deviation of 32.26% while the 66 high spenders had a mean of 46.18 and a standard deviation of 29.68%

This indicates that the high spenders use a bigger proportion of their monthly groceries budget to buy groceries from Woolworths.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Significance				95% Confidence Interval of the Difference
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Woolworths - If I could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft, this is how much of my total grocery spend (%) I would spend at each of these major retailers.	Equal variances assumed	.162	.688	-1.267	157	.104	.207	-6.365	5.024	-16.287	3.558
	Equal variances not assumed			-1.285	146.786	.100	.201	-6.365	4.953	-16.152	3.423

Table 20: Independent Samples Test 2

Table 20 above indicates that the group means are not statistically different because the two-sided p-values have value of 0.207 for equal variances assumed and 0.201 for equal variances not assumed, which are both greater than 0.05.

Based on the results above, Insight accepts the null hypothesis and concludes that high spenders do not have a statistically significant higher percentage of customers' total monthly grocery spend at Woolworths after the introduction of cryptocurrency payments when compared to low spenders.

4.3.2.2. Before and After Woolworths Accepts Cryptocurrency Payments

To determine whether there is a statistically significant difference between Woolworths's revenue before Woolworths starts accepting crypto and Woolworths's revenue after it starts accepting crypto currency payments, Insight used the independent-samples t-test to compare the means between low spenders and high spenders of the percentage of customers' total monthly grocery spend at Woolworths with or without the introduction of cryptocurrency payments.

Null hypothesis:

There is no statistically significant difference between the percentage of customers' total monthly grocery spend at Woolworths before accepting cryptocurrency payments and the percentage of customers' total monthly grocery spend at Woolworths after accepting cryptocurrency payments

Alternate hypothesis:

There is a statistically significant difference between the percentage of customers' total monthly grocery spend at Woolworths before accepting cryptocurrency payments and the percentage of customers' total monthly grocery spend at Woolworths after accepting cryptocurrency payments

The dependent variable was the percentage monthly expenditure difference between monthly Woolworths expenditure before accepting cryptocurrency payments and monthly Woolworths expenditure after accepting cryptocurrency payments. The independent variable was the total amount spent monthly.

Group Statistics

	Monthly_Spend_Groceries	N	Mean	Std. Deviation	Std. Error Mean
Monthly Percentage Spend Difference	Low Spenders	88	-12.5227	25.24955	2.69161
	High Spenders	61	-5.3443	15.58727	1.99574

Table 21: Group Statistics 3

Table 21 above provides useful descriptive statistics for the two groups being compared. It can be seen that the 88 low spenders had a mean of -12.523 and standard deviation of 25.25% while the 61 high spenders had a mean of -5.344 and a standard deviation of 15.59%.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance				95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Monthly Percentage Spend Difference	Equal variances assumed	8.500	.004	-1.974	147	.025	.050	-7.17846	3.63674	-14.36552	.00859
	Equal variances not assumed			-2.142	145.284	.017	.034	-7.17846	3.35079	-13.80105	-.55588

Table 22: Independent Samples Test 3

The monthly percentage spend difference between Woolworths's revenue before and after accepting cryptocurrency payments is only statistically significant when equal variances are not assumed at a 95% confidence interval. That is when Insight accepts the alternative hypothesis that there is a statistically significant difference between the percentage of customers' total monthly grocery spend at Woolworths before accepting cryptocurrency payments and the percentage of customers' total monthly grocery spend at Woolworths after accepting cryptocurrency payments.

5. Discussion of Results

95.16% of South African retail consumers have made online payments before with no significant difference between retail consumers of different genders or ages.

20.43% of South African retail consumers have made cryptocurrency payments before with no significant difference between retail consumers of different genders. A larger proportion of retail consumers younger than 40 have made cryptocurrency payments compared to older retail consumers over the age of 40.

The independent variables that did not have a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment were "Age", "Gender", "Environmental ethics" and "Technology proficiency".

Literature from other research found that males generally make fewer online payments than females and older people (people over the age of 54) make fewer online payments than younger people (people aged 54 and younger) (Kemp, 2021). Insight's research found that Age and Gender do not have a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment.

Literature from other research found that some people are opposed to the mining and use of cryptocurrency as payment because cryptocurrency mining makes global warming and the climate crisis worse (Blandin, Dek, Eisermann, Njoki, Pieters, Taylor & Wu, 2020). Literature from other research also found that some people support the mining and use of cryptocurrency because even though cryptocurrency mining uses very large quantities of energy, cryptocurrency has been able to help people living in countries with unstable economies and unstable monetary systems to pay for vital products like medicine and food (England & Fratrik, 2018). Other academic literature also found that advocates of cryptocurrency also argue that approximately 39% of international bitcoin mining uses renewable

energy (mostly hydroelectric energy) and that percentage is increasing (Blandin et al., 2020). Insight's research found that Environmental ethics do not have a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment.

Literature from other research found that 68% of respondents said that cryptocurrency is easy to use and 68% of respondents said that learning how to use cryptocurrency is easy (Alqaryouti, Alkashri, Shaalan & Siyam, 2019). Other academic literature found that making cryptocurrency payments is easy for people who know how to use smartphones and/or PCs and/or laptops for online payments (DeVries, 2016). Insight's research found that Technology proficiency does not have a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment.

The only independent variables that had a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment were "Ethics regarding criminal activity" and "Customer equity". Customer equity was the independent variable that had the most significant effect on retail consumers' willingness to use cryptocurrency as a form of payment because increasing "Ethics regarding criminal activity" was associated with a decreased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 0.449, while increasing "Customer equity" was associated with an increased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 3.126.

Literature from other research found that an ethical objection that many people have with regard to cryptocurrency is that it is used as a form of payment/currency in several different types of criminal activities (Cao & Kethineni, 2020; Higbee, 2018). Other academic literature found that people who believe that cryptocurrencies are used in most or many cybercrimes are misinformed because cryptocurrencies are used in a very small percentage of cybercrimes (0.34% in 2020) (Butler, 2019; Lennon,2021). Insight's research found that Ethics regarding criminal activity have a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment.

Literature from other research found that the ability to make cryptocurrency payments increases customer equity for some consumers because it allows retail consumers to make payments with lower

transaction costs and without the risk of being victims of credit card fraud/identity theft (Gäthke, Marder, Murdy, Nazifi & Shabani, 2021; Mukabi & Vu, 2019). Additional literature also found that the convenience of some cryptocurrency payments (simply scanning a QR code and not having to carry a wallet) increases customer equity too (Luno, 2021). Other academic literature found that many retail consumers prefer to use cryptocurrency for investment purposes instead of using it as a medium of exchange (Gäthke et al., 2021). Insight's research found that Customer equity has a statistically significant effect on retail consumers' willingness to use cryptocurrency as a form of payment.

Before Woolworths starts accepting cryptocurrency payments, high spenders have a statistically significant higher percentage of customers' total monthly grocery spend at Woolworths when compared to low spenders. This was expected because Woolworths's target market is comprised of middle-to-upper income retail consumers.

After Woolworths starts accepting cryptocurrency payments, high spenders do not have a statistically significant higher percentage of customers' total monthly grocery spend at Woolworths when compared to low spenders. This is because many high spenders would spend more of their monthly grocery spend at Woolworths after Woolworths started accepting cryptocurrency payments and many low spenders would also spend more of their monthly grocery spend at Woolworths after Woolworths started accepting cryptocurrency payments. This is also proven by "Independent Samples Test 3" (seen in Table 22), which indicated that there is a statistically significant difference between the percentage of customers' total monthly grocery spend at Woolworths before accepting cryptocurrency payments and the percentage of customers' total monthly grocery spend at Woolworths after accepting cryptocurrency payments.

6. Conclusion

Most South African retail consumers have never made a cryptocurrency payment before, but almost all South African retail consumers have made an online payment before. Insight's research indicates that it is easy for someone who knows how to make an online payment to learn how to make a cryptocurrency payment.

Customer equity was the independent variable that had the most significant effect on retail consumers' willingness to use cryptocurrency as a form of payment because increasing "Ethics regarding criminal activity" was associated with a decreased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 0.449, while increasing "Customer equity" was associated with an increased likelihood of "Willingness to use cryptocurrency as payment" by a factor of 3.126. This proves that even though some South African retail consumers are opposed to the idea of using cryptocurrency for payment in retail because of the use of cryptocurrency as currency in some criminal transactions, there are also some South African retail consumers who want to be able to use cryptocurrency as payment in retail so that they can make payments more conveniently, incur lower transaction costs and reduce their risk of exposure to credit card fraud and identity theft; these factors all increase customer equity. Insight's research indicates that South African retail consumers are much more receptive to the idea of cryptocurrency payments in retail than they are opposed to the idea of cryptocurrency payments in retail.

Insight's research indicates that many South African retail consumers would spend more of their monthly grocery budget on Woolworths's groceries if Woolworths started accepting cryptocurrency payments. Insight's research also indicates that Woolworths would significantly increase its revenue if it started accepting cryptocurrency payments.

Even though there will be some retail consumers who are opposed to the use of cryptocurrency as payments in retail because of their environmental ethics, there are many more consumers who want to be able to use of cryptocurrency as payments in retail because of the convenience of cryptocurrency

payments, the lower transaction costs of cryptocurrency payments and the reduced risk of exposure to credit card fraud and identity theft when making cryptocurrency payments.

Based on the results of Insight's research, Insight recommends that Woolworths should allow its customers to use cryptocurrency as a form of payment because it would increase Woolworths's market share and increase Woolworths's revenue.

6.1. Financial Model of the Recommendations

In order for Woolworths to allow its customers to use cryptocurrency as a form of payment, Woolworths needs to set up a cryptocurrency wallet and print a unique QR code sticker to place at each till in Woolworths stores. Woolworths customers will pay for their goods by scanning the QR code custom sticker with their phones or by directly transferring their cryptocurrency payments to Woolworths's cryptocurrency wallet via their phones.

Since setting up a cryptocurrency wallet is free, the only costs that Woolworths will incur to start accepting cryptocurrency payments is the cost of the QR code custom stickers that must be placed at each till in Woolworths stores. The Woolworths store at Dainfern Square in Dainfern in Johannesburg has 15 tills. Assuming that the average Woolworths store has 15 tills, Woolworths has to pay for 15 QR code custom stickers for each Woolworths store. Each "20 cm x 22 cm" QR code custom sticker costs R39 (TenStickers, 2022). Therefore, the total cost of 15 QR code custom stickers for each store will be R585. Woolworths has 719 stores in South Africa (Woolworths, 2021). Therefore, the total cost of QR code custom stickers for all Woolworths stores in South Africa will be R420 615.

The benefits of accepting a cryptocurrency wallet are expressed by the regression equation derived from Insight's research. The equation is:

$y = \beta_0 + \beta_2 x_2 + \beta_6 x_6$

This is when:

β_0=Constant=0.406

β_2 = Effect of Ethics Regarding Criminal Activity= -0.449

β_6 = Effect of Customer Equity= 3.126

y = Willingness to Use Cryptocurrency as a Form of Payment

Therefore, the equation that can be used to express how much y (Woolworths customers' willingness to use cryptocurrency as a form of payment) increases for every unit increase in x is:

$y = 0.406 – 0.449x + 3.126x$

$= 0.406 – 0.449(1) + 3.126(1)$

$= 0.406 – 0.449 + 3.126$

$= 3.083$

Therefore, every R1 that Woolworths spends on allowing its customers to use cryptocurrency as a form of payment is expected to generate revenue of R3.08.

Therefore, if Woolworths spends R420 615 on setting up everything necessary to start accepting cryptocurrency as a form of payment, Woolworths can expect to increase its revenue by R1 296 756.05. This means that Woolworths would make a profit of R876 141.05. Increasing revenue and increasing profit are the benefits of accepting cryptocurrency as a form of payment.

Revenue (R)	R1 296 756,05
Investment cost (R)	R420 615,00
Profit (R)	R876 141,05

Figure 13: Financial Model of the Recommendations

6.2. Recommended Topic for Academic Research

After completing this consultancy report, Insight consultants believe that a topic that needs to be researched is whether the use of cryptocurrency for payment is considered to be halal (acceptable in Islamic law) or haram (forbidden in Islamic law) by South African Muslim people (Halal Monitoring Committee, 2022). An online search of this topic reveals that it currently very controversial in the international Muslim community. The Alliance of Inclusive Muslims (AIMS) is "a collective of progressive Muslims across all nationality, race and sectarian affiliation" (Alliance of Inclusive Muslims, 2022a, p. 1). The AIMS website states that "there are some rules that consider crypto halal while others consider the crypto haram." (Alliance of Inclusive Muslims, 2022b, p. 1).

1% to 2% of south Africa's total population is Muslim, so it would be reasonable to assume that approximately 1% to 2% of Woolworths's customers are Muslim people (Anadolu Agency, 2022). 1% to 2% of Woolworths's annual revenue (at the end of Woolworths's 2021 financial year ended 27 June 2021) is approximately R859 000 000 to R1 718 000 000 (Woolworths Holdings Limited, 2022). It would be very useful to Woolworths to find out whether most South African Muslims consider the use of cryptocurrency for payment to be halal or haram because if Woolworths starts accepting cryptocurrency payments, Woolworths may lose some/all of its revenue from Muslim customers if South African Muslims consider the use of cryptocurrency for payment to be haram or Woolworths may be able to increase its revenue after an increase in the number of its Muslim customers if South African Muslims consider the use of cryptocurrency for payment to be halal.

7. Appendices

7.1. Consistency Matrix

Consistency Matrix					
Determinants of consumers' willingness to use cryptocurrency as a form of paymentin retail					
Research Objective	**Literature Review**	**Hypotheses**	**Source of data**	**Type of data**	**Analysis**
To ascertain whether the respondent's environmental ethics have a significant influence on the respondent's willingness to use cryptocurrency as a form of payment.	Badea & Mungiu-Pupazăn (2021) Küfeoğlu & Özkuran (2019) Cui, Li, Li & Wu (2019) Hiam, Hiam-Galvez & Prescott (2020)	***Hypothesis 1*** *H_0: There is no significant and positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.* *Ha: There is a significant and*	Question 1, Question 2, Question 3, Question 4, Question 15, Question 17 and Question 18	Ordinal	Multiple regression analysis

	Taskinsoy (2021) England & Fratrik (2018) Blandin, Dek, Eisermann, Njoki, Pieters, Taylor & Wu (2020)	*positive relationship between the environmental ethics of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.*			
To ascertain whether the respondent's ethics regarding criminal activity have a significant influence on the respondent's willingness to use cryptocurrency	Cao & Kethineni (2020) Higbee (2018) Marian (2014) Ryan (2021) Chainalysis (2021)	***Hypothesis 2*** *H_0: There is no significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to*	Question 5, Question 6, Question 7, Question 8, Question 15, Question 17 and Question 18	Ordinal	Multiple regression analysis

as a form of payment.	Finextra (2021) Dupuis & Gleason (2020) Butler (2019) Lennon (2021)	*use cryptocurrency as a form of payment.* *Ha: There is a significant and positive relationship between the retail consumers' ethics regarding criminal activity and retail consumers' willingness to use cryptocurrency as a form of payment.*			
To ascertain whether gender has a significant influence on the respondent's willingness to	Kemp (2021)	***Hypothesis 3*** *H_0: There is no significant and positive relationship between the gender of*	Question 15, Question 17, Question 18 and Question 19	Ordinal	Multiple regression analysis

use cryptocurrency as a form of payment.		*retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.* *Ha: There is a significant and positive relationship between the gender of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.*			
To ascertain whether age has a significant influence on	Kemp (2021)	***Hypothesis 4*** *H_0: There is no significant and positive*	Question 15, Question 17, Question 18 and Question 20	Ordinal	Multiple regression analysis

the respondent's willingness to use cryptocurrency as a form of payment.		*relationship between the age of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.* *Ha: There is a significant and positive relationship between the age of retail consumers and retail consumers' willingness to use cryptocurrency as a form of payment.*			
To ascertain whether the research participant's proficiency in	Galov (2021) Luno (2021)	***Hypothesis 5*** *H_0: There is no significant and positive*	Question 9, Question 10, Question 11, Question 15, Question 17	Ordinal	Multiple regression analysis

the use of smartphones, PCs, laptops and the internet has a significant influence on the respondent's willingness to use cryptocurrency as a form of payment.	Alqaryouti, Alkashri, Shaalan & Siyam (2019)	*relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment.* *Ha: There is a significant and positive relationship between the retail consumers' technology proficiency and retail consumers' willingness to use cryptocurrency as a form of payment.*	and Question 18		

To ascertain if or how the research participant's total monthly grocery spending allocation would change if the research participant could make cryptocurrency payments at Woolworths with no bank charges and a reduced risk of exposure to credit card fraud and identity theft.	Alqaryouti, Alkashri, Shaalan & Siyam (2019) Gäthke, Marder, Murdy, Nazifi & Shabani (2021) Mukabi & Vu (2019) Luno (2021) Badea & Mungiu-Pupazăn (2021) Cao & Kethineni (2020)	***Hypothesis 6*** *H_0: There is no significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use cryptocurrency as a form of payment.* *Ha: There is a significant and positive relationship between the retail consumers' customer equity and retail consumers' willingness to use*	Question 12, Question 13, Question 14, Question 15, Question 16, Question 17 and Question 18	Ordinal	Multiple regression analysis

		cryptocurrency as a form of payment.			

7.2. Participant Information Sheet

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Dear Sir / Madam

My name is Myezo Potelwa and I am a Master's student in Business Administration at the University of the Witwatersrand, Johannesburg. As part of my studies, I have to undertake a research project, and I am investigating the willingness of South African retail consumers to use cryptocurrency as a form of payment under the supervision of Mr. Neale Penman. The aim of this research project is to find out how certain factors affect South African retail consumers' willingness to use cryptocurrency as a form of payment.

As part of this project, I would like to invite you to take part in answering a questionnaire This activity will involve multiple choice questions and will take around 2 minutes.

There will be no personal costs to you if you participate in this project, You will not receive any direct benefits from participation but there are no disadvantages or penalties if you do not choose to participate or if you withdraw from the study. You may withdraw at any time or not answer any question if you do not want to. The questionnaire will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a number to represent your participation in my final research report. If you experience any distress or discomfort at any point in this process, we will dispose of the questionnaire or resume another time. If you need some support or counselling services following the questionnaire, these are available free of charge at the University of the Witwatersrand Counselling and Careers Development Unit (CCDU). The phone number for the University of the Witwatersrand CCDU counselling service is +27(0) 11 717 1000.

If you have any questions during or afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report. If you wish to receive a summary of this report, I will be happy to send it to you. The data collected from this research project will be stored in a password-protected personal computer and will be kept for 1 year. If you have any concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrec-medical.researchoffice@wits.ac.za

Yours sincerely,
Myezo Potelwa

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