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The Theory of Reasoned Action as a Basis for Investment in Cryptocurrency

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A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

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FACULTY COMMITTEE:

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Abstract

In the past decade and a half, emergent blockchain technology has gained widespread attention, especially in the past few years. For the most part, attention has been focused on cryptocurrencies, but non-fungible tokens (NFTs), that use similar technology, have been given attention as well. Many concerns about these technologies have arisen, particularly that of the environmental impacts associated with them. Utilizing the theory of reasoned action, diffusion of technology theory, and surveys conducted through Amazon Mechanical Turk, this research attempts to uncover if there is a link between the level of cryptocurrency knowledge that an individual possesses and the level of environmental concern that they have. Regression analysis allows me to ask if the level of technology knowledge regarding cryptocurrency, non-fungible tokens, and blockchain technologies that an individual possesses positively or negatively impacts the level of environmental concern that they have. Simple linear regression was used to analyze this data and found significant correlations between cryptocurrency knowledge and environmental concern with little to weak evidence for the variance that occurs. Research found that motivations surrounding decisions to invest in cryptocurrency was heavily based on the belief that it could be lucrative for the individual and also due to television commercials giving legitimacy to the technologies.

Cryptocurrencies have become a popular and increasingly visible new technology for individuals trying to remove themselves from government regulation, disrupt the economic sector, or to get rich quick, but most people would be hard-pressed to explain cryptocurrency, its origins on the blockchain, or other blockchain technologies that have emerged over time, such as non-fungible tokens. In the 2022 Super Bowl, four advertisements were touting the benefits of cryptocurrency to a public that may not be too familiar with the concept of them but are aware of success stories of people that were able to leverage their life savings into riches beyond what they could have imagined, and if there are commercials for cryptocurrency during the most watched (American) sporting event of the year, then there must be a bit of legitimacy to it right? Online spaces such as Reddit have several subreddits such as r/Cryptocurrency (4.8 million members), r/CryptoMoonShots (1.7 million members), and r/Cryptomarkets (.79 million members), while individual users on Twitter constantly proselytize for cryptocurrency. Even companies have begun to opt for initial coin offerings (ICOs) rather than initial public offerings (IPOs) due to the fervent enthusiasm seen in the online space. Cryptocurrency markets experienced a crash in mid-2022, but that hasn't stopped the fervor that online cryptocurrency advocates have for the technologies.

Proponents of cryptocurrency and blockchain technologies state the many possible benefits that come with the technology, both for individuals and for businesses. The decentralized structure of blockchain technologies is a major component since it allows for the sharing of data where no single entity or business is in charge of the data. Security is also another major feature of blockchain technology. Since data is stored across a network of computers, it makes it very difficult to hack. The blockchain also

creates a record of transactions with end-to-end encryption, which, in theory, minimizes fraud. Tokenization has been seen in cryptocurrency, but it is another benefit that proponents point to since tokenization can lead to assets being converted to digital tokens. These don't just have to be currency, but rather they can act as smart contracts that could change the way in which contracts are understood (Pratt, 2021).

Research Questions

Though these technologies may have multiple applications, they do carry with them the problems of major energy usage in the mining of cryptocurrencies and facilitation of transactions, as well as the extraction of resources needed to create the chips required for graphics processing units that are necessary for the mining of cryptocurrency, as well as concerns regarding laundering, usage of cryptocurrency in exchange for weapons, drug, or human trafficking, and a high level of volatility regarding the liquidity of cryptocurrency. Regarding this, I initially posed the following research question: does the level of technology knowledge regarding cryptocurrency, non-fungible tokens, and blockchain technologies that an individual possesses positively or negatively impact the level of environmental concern that they have? However, due to data gathered, I decided to narrow the research questions into more distinct areas. Following are the research questions that are explored as well as initial hypothesis regarding them.

RQ1: Is there a relationship between environmental concern and participation in cryptocurrency markets?

RQ2A: Is there a minimum level of cryptocurrency knowledge that is necessary for investing in cryptocurrencies?

RQ2B: Does a knowledge of cryptocurrency correlate with a knowledge of environmental concerns?

The Theory of Reasoned Action

The theory of reasoned action (Ajzen, 2012, p. 19; Bang et al., 2000, p. 453; Fishbein & Ajzen, 2010, p. 22) shows the framework of how background factors flow through beliefs, perceived norms and behavioral controls, and attitudes toward behaviors into intentions which leads to the performed behavior or actions of the individual. This research attempts to determine how the knowledge or beliefs that one person possesses (cryptocurrency, blockchain, and non-fungible token knowledge) can have an impact on that individual's performance or actions (in this case, the level of concern that they have for the environment). The theory of reasoned action explains that background factors flow through beliefs, perceived norms and behavioral controls, and attitudes towards behaviors into intentions which lead to the performed behavior or actions of the individual. This conceptual framework provides a roadmap to explaining why an individual would act in a certain way. In the case of this research, the theory of reasoned action is used to explore the background factors of cryptocurrency knowledge and environmental concern. This information is then used to explain why an individual would make the choice to invest in cryptocurrency or not. Background factors include individual and social factors as well as the level of information available to them.

To determine the amount of technology knowledge that individuals possessed, as well as their environmental concern, two surveys were conducted through Qualtrics and participants were sourced through Amazon Mechanical Turk (Amazon MTurk). The first survey was divided into four sections in which participants were asked to rate their

knowledge on cryptocurrency as well as its environmental impacts, their concern about the environment, their beliefs regarding the environment, and their willingness to adopt cryptocurrency. The second survey provided the participants with egoistic, altruistic, and biospheric concerns regarding the environment and asked them to rate their level of concern regarding these. Finally, the participants were asked to give demographic information. Results from the surveys were analyzed through simple and multiple linear regression in IBM SPSS to determine if there were significant correlations between data points.

Literature Review

Blockchain technologies such as cryptocurrencies and NFTs (non-fungible tokens) are new technologies that have been seeing widespread attention in the media and in online spaces in particular. The possibility of attaining wealth outside of their station has led to a neo-gold rush in which a new type of extraction industry has emerged in which intangible electronic coins are being mined to act as an ersatz currency for online transactions. However, just as with any extraction industry, a tradeoff with the environment must occur. Of course, people mining cryptocurrency and creating NFTs aren't blasting the side of a mountain to get coal or clearcutting forests for timber, but the processing power necessary to engage in these activities is extraordinary and should be accounted for. In addition to the energy inputs required for the cryptocurrency and NFT outputs, the computers used for mining require high-end graphics processing units (GPUs) that need rare Earth metals for their production.

This paper will explore blockchain technologies like cryptocurrencies and NFTs while examining their environmental impact. Using the reasoned action model, surveys

will be conducted to determine the knowledge that individuals possess towards blockchain technologies as well as the environmental concerns of individuals to determine the likeliness of adoption or rejection of said technologies. Understanding the concern of individuals toward the environment and the level of knowledge they have toward these technologies can help advocates better understand why these technologies are being adopted by people and how we advocate for better practices.

Blockchain Technologies

Cryptocurrency and blockchain-related technologies are relatively innovations that have caught the eye of many academics and people not involved in the academy. As this is the case, most literature that is available is less than a decade old, but the literature that has been published spans many academic fields and has been used commercially as well. Cryptocurrency are “tokens” that exist and are kept track of on a digital ledger, and different ledgers exist for different cryptocurrencies, while NFTs are assets such as .jpgs or .mp3s that determine ownership of the asset based on their location on a digital ledger and who has access to that location. Economists have been studying how cryptocurrency has been and will continue to disrupt the current financial institutions and create new social structures (Hayes, 2019). Artists have been using the blockchain to add a digital signature to their art (Bookout et al., 2019, Genc, 2021), and video game designers are creating digital items for use within their software. The precious gems industry has been linking their tangible gems to the intangible blockchain so that each gem can be sourced from the mine to the distributor to the vendor and finally to the customer, leading to a (hopefully) more ethical process (Calvão & Gronwald, 2019). Most important to this research, environmental activists and scholars have been examining the environmental

impact of blockchain technologies and cryptocurrency mining (Goodkind et al., 2020). Additionally, communications scholars are examining how cryptocurrency can affect individuals and organizations and bring about social change. This can lead to discoveries in which marginalized communities or people have been impacted directly or indirectly by the processes in which cryptocurrency is created and open up discussions about environmental justice.

Satashi Nakamoto (a pseudonym that could refer to a single person or a collective) launched Bitcoin in 2009 (Bookout et al, 2019) as a system that issues tokens that act as a medium-of-exchange. These tokens are accounted for on a collectively maintained digital ledger and are created when a network participant, more commonly known as a miner, transforms a bundle of proposed transactions of previously issued tokens in exchange for newly issued tokens (Pernice & Scott, 2021, p. 1). The current hegemonic monetary system that most financial systems and countries utilize for trade circulates currency in the form of physical and digital credits that are recognized under legal systems that assure value and are not linked to another commodity such as gold, otherwise known as fiat currencies. Fiat currency are government-issued and give central banks greater control over the economy due to their ability to limit the amount of money that is printed. Cryptocurrencies can act outside of the described hegemonic monetary system.

Early cryptocurrencies, on the other hand, can *act* as money, but according to Pernice & Scott (2021), it only contains the mental image of money, and even then, only to people that attribute value to them. The cryptocurrency is purchased with fiat currency based on the speculation that it will increase in value and then be able to be resold for fiat

currency. Due to the amount of speculation that surrounds cryptocurrencies, they are extremely volatile, meaning that the value attributed to them doesn't remain stable over an extended period of time (2021, pp. 2-3).

Modern cryptocurrencies can fulfill the purpose of a trading currency with the value of fiat currency, but they can also act as smart contracts (Efimova et al., 2019) rather than payment solutions. This ties a service to the cryptocurrency instead of a specific amount of money. Other cryptocurrencies have emerged, such as stablecoins, that have attempted to circumvent the volatility issue by tying the currency to fiat currency or other 'real-world' assets (Pernice & Scott, 2021, p. 5).

Non-fungible Tokens

Non-fungible tokens (NFTs) have emerged as a new way to create value on the blockchain in the past few years by allowing digital assets, such as art or music, to be minted (Citation needed). It is difficult to confirm when the first NFT project was conceived, but the earliest project on the Ethereum blockchain was initiated in August 2015 (White-Gomez, 2021). Recently, NFT projects have exploded in popularity with art projects such as "Bored Ape Yacht Club" (BAYC), animated projects like "Stoner Cats," and smaller, independent projects that are traded on platforms such as OpenSea. These projects have enlisted the aid of celebrities like Mila Kunis (Coinbase NFT, 2022), Paris Hilton and Jimmy Fallon (The Tonight Show, 2022) to promote them to the public, and even figures such as Kyle Rittenhouse have expressed interest in creating their own NFTs (Rittenhouse, 2022).

Celebrities engaging in cryptocurrency and NFTs, whether they believe in them or not (meaning that they are paid to influence others), can lead to a greater belief in the

legitimacy of the platform by the layperson. If an individual sees a person on late-night television promoting these technologies, then they will follow the reasoned action model, especially if they are someone that could be easily influenced by personalities that they identify with. In accordance with the model, perceived norms could be open to change, which would determine the behavioral controls that an individual possesses. An increased perception of legitimacy would also decrease the risk assessment of individuals as well. Unfortunately, many of these endorsements only focus on the apparent lucratiiveness of NFTs and rarely, if ever, give any information about the environmental impacts that are inherently attached to the minting of anything on blockchain technologies (Cunningham, 2022; Hajric, 2021). There has also been information shown that celebrities and influencers have been instructed to promote NFTs for the benefit of people that hold their contracts (Scott, 2022).

Who Holds the Bag at the End of the Day?

BAYC has been one of the leading NFT art projects that have emerged, and as such, the image of an ape has become the de facto face of NFTs, but there is a question as to how value is derived from what amounts to .jpegs and .gifs of pictures of apes. The project created a limited amount of art (10,000 pieces) created with an algorithm that randomized the assets that would appear on each ape (Bored Ape Yacht Club, 2021). For example, one ape could be shown smoking a cigarette while another could be wearing sunglasses. Value has been attributed by the community to how little certain assets appear in the collection of images. This has led to copycats like Lazy Lions (Lazy Lions, 2022) attempting to ape the success that BAYC has enjoyed, as well as others that have had varying amounts of legitimacy and success.

Some people believe that the value of these NFTs has been overexaggerated to increase their popularity, especially since they aren't particularly aesthetically pleasing. First, including celebrities to gain legitimacy has been a way to artificially increase value. Another way of artificially inflating the value of these NFTs has been to hold auctions in which the assets are traded between individuals at a much greater rate than what they are worth in a process known as wash trading (CME Group, n.d.; Mwanza, 2021). Additionally, crypto collectives have joined together to gain access to physical assets that are far beyond their individual ability to own. From here, they make plans to digitize the asset while destroying the physical property and claiming that they own the intellectual property.

An instance in which artificial inflation and wash trading occurred was in 2021 for an art book made in limited quantities relating to a proposed film adaptation of Frank Herbert's *Dune* directed by Alejandro Jodorowsky in the early 70s (Westenfeld, 2022). Owning a book does not entitle a person or a group to the intellectual property within it, but that did not stop the people that won the auction from telling others that their plans entailed that.¹ This isn't the only instance in which wash trading has occurred to increase the desirability of NFTs.

Whether the people that own the physical property believe that they own the intellectual property or not doesn't matter when considering the reasoned action model. If they can convince other people that they do, in fact, hold the rights and will be pursuing other projects related to it, then they can influence behavior to enrich themselves and

¹ Somehow, this intellectual property theft seems to keep happening within these communities (Ford, 2022) shows that an individual tried to create NFTs of *Magic: The Gathering* cards, the IP of Hasbro.

fund other projects in which they will continue their own actions. If this behavior leads to more people becoming invested in their projects, it reinforces the idea that their actions will lead to them acquiring more wealth.

Frye (2021) writes on the nature of art, or at least the collection of art, as a proxy for the collection of money. The collection of art can confer, or at least give the illusion of, power to an individual since it can act as a status symbol. NFTs, as art assets, can act the same way. If the projects above can sell the idea of an NFT as status or as a project that will have a return on investment, it makes it easier for a person to justify their involvement with those projects. However, in many instances, it has been shown that NFT creators only exist to promote a project, obtain funds, and then disappear into the ether, leaving investors high and dry (Carrel, 2022).

Environmental issues / Environmental Justice

Blockchain technologies have been documented to have a large carbon footprint. According to Li et al (2018):

With data analysis and experiments, this study estimated electricity for Monero mining as a case study. Monero mining may consume 645.62 GWh of electricity in the world in 2018 after the hard fork. If there is 4.7% mining activity happening in China, the consumption is at least 30.34 GWh, contributing a carbon emission of 19.12-19.42 thousand tons this year. (p. 167)

To provide context here, Monero is a blockchain that was popular in China prior to the banning of all cryptocurrencies in 2021. One GWh has the potential to provide electricity for around 750,000 homes in California (citation needed) which, if

extrapolated from the 30.34 GWh base of China would lead to the rate of consumption of 22,755,000 California houses in China alone.

The clearest instances in which environmental justice issues spring to mind are those of slow violence against the poor. The mining of metals needed to construct the graphics processing units that are required to conduct mining come from rare earth mines outside of the United States and have led to a global chip shortage (Seth, 2021).

Additionally, the input energy required for the output of cryptocurrency or NFTs has been shown to be a huge energy sink, leading to increased power usage and a greater carbon footprint. In the past, we have seen that the people that have been most impacted by these carbon footprints are marginalized communities, and we should not expect that these processes would shift the harm from the marginalized to the privileged any time soon.

Theoretical Basis – Theory of Reasoned Action

The reasoned action model (Ajzen, 2012, p. 19; Bang et al., 2000, p. 453; Fishbein & Ajzen, 2010, p. 22) shows the framework of how background factors flow through beliefs, perceived norms and behavioral controls, and attitudes toward behaviors into intentions which leads to the performed behavior or actions of the individual. This conceptual framework provides a roadmap to explain why an individual would act in a certain way. Background factors include individual and social factors as well as the level of information available to them. The example provided earlier in which a person is influenced whether to invest in blockchain technology includes individual and social factors and factors related to information that they receive. The individual may perceive a certain level of risk (individual background factor), but in seeing success stories from

others, they may choose to invest (social and information background factors). These background factors can influence the behavioral beliefs that influence attitudes and inform the individual's intent on whether to engage in certain behaviors.

According to Fishbein and Ajzen, humans have become increasingly aware that their behavior can have a great impact on both causing and alleviating the social problems that have impacted various sectors of society (2010, p. 1). Understanding the factors that influence behaviors can help us to design interventions that address problems in sectors such as health (Zhu & Yzer, 2019), renewable energy (Bang et al., 2000), news media and social networks (Hoewe & Sherrick, 2015; Karnowski et al., 2018; Kim et al., 2020), and others. Additionally, we may be able to understand why individuals invest in emergent technologies, particularly blockchain-based technology such as cryptocurrency and non-fungible tokens (NFTs), that have commanded a tremendous amount of public attention yet lack significant general knowledge and education.

The reasoned action model could be used by individuals if they should invest in, be against, or at the least hold an indifferent attitude towards blockchain technology. Indifference is an important point when considering blockchain technologies since it is such a new concept that the vast majority of people do not understand. Those that would like to propagate these technologies are relying upon the indifference or ignorance of others to ensure that it casts as wide of a web as possible. This is not to say that blockchain doesn't have its uses, such as in the tracing of precious gems from extraction to distribution (Everledger, n.d.), but rather that the projects that are presented right now are relying on the fact that the United States has not regulated cryptocurrency in any way and can extract as much money as possible from others.

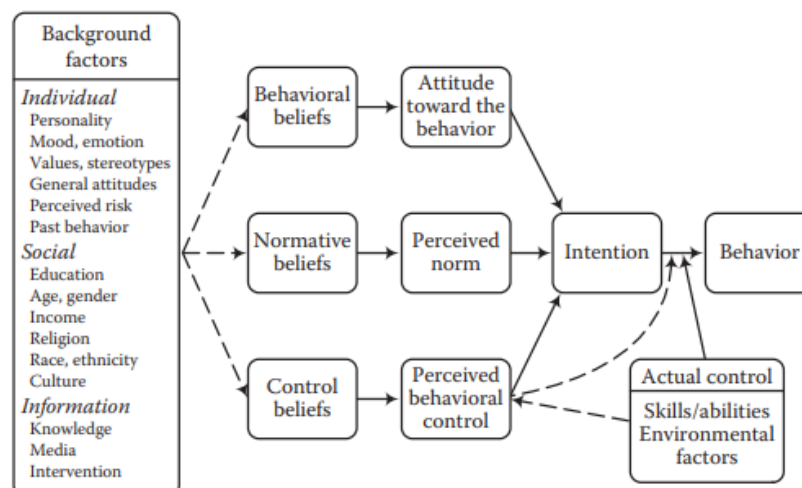


Figure 2.1 The Reasoned Action Model (Fishbein & Ajzen, 2010, p. 22)

What factors contribute to the adoption of these technologies, and which factors decide that an individual should dismiss them? Perdana et al. (2021) attribute the rise in adoption of blockchain-related technologies to the diffusion of technology. Blockchain technologies may have had humble beginnings, but as news outlets began coverage of the nascent technology, more and more people began to become aware of it (p. 1). The authors state that early Bitcoin use was seen negatively due to the association of it with illicit activities by the media. Still, over time positive and negative pieces were published (p. 2). Coverage of blockchain technologies was scant or primarily negative, but over time it gained more favorable coverage. People that may have been resistant to adoption may become late adopters of technology when given new information (p. 2).

The individual may base their decision on egoistic concerns, altruistic concerns, and biospheric concerns (Schultz, 2001, p. 327). Egoistic concerns are those that would involve the individual, such as their health, lifestyle, or future. Altruistic concerns are

concerned with all people, people in the individual's country, their children, and children of others. Biospheric concerns include plants, animals, birds, and marine life.

In explaining why there is low voter turnout and low participation in other political activities, Fishbein and Ajzen state that such factors as “alienation, (lack of) political involvement, and (low) political efficacy” contribute to this issue (2020, p. 1). Adoption or rejection of blockchain technologies may rely on factors that fall along the same lines. In terms of alienation (or integration), a person may hear about this new technology online or from a friend and become interested in it. Diffusion of technology theory would state that the media’s early coverage may have swayed the individual to be resistant to adoption. Still, this individual may become endeared to it by hearing about it being lucrative as an investment and reading about success stories propagated by users on social media websites such as Twitter and Reddit. In being told blockchain technology is a sure hit, this person may feel that they should invest in it, thus justifying their behavior and actions. Diffusion of technology shows the timeline from Bitcoin’s inception in 2008, to media coverage (alienation), to widespread awareness, to further adoption.

Group affirmation may be a factor as well when engaging with online communities. A shorthand language has been developed around cryptocurrency and NFTs, which can help make people feel like they are part of the in-group, reinforcing their current behavior. Terms such as *FOMO* (Fear of Missing Out), coined by entrepreneur Patrick McGinnis in 2003 (Knowles, 2016), are used to encourage people to not only invest in cryptocurrencies but to hold onto them and not sell so to not dilute the value of them as well. These online groups also tend not to have many dissenting voices since they are moderated out or voted down (Stromberg, 2013; Muchnik et al., 2013).

Platforms such as Reddit are designed to push popular opinions to the foreground, ensuring that minority opinions and dissent are not seen. The amount of engagement that subreddits produce also causes the algorithm to place them above other subreddits and put them in the trending category, which drives even further engagement. Conversely, this same individual could discover the environmental impacts of blockchain technologies, potentially on the same websites and decide that the potential wealth that they could accumulate is not worth the damage to the environment. Explanatory constructs of each domain will vary, at the very least, in the way that explain the emergent issues (Fishbein & Ajzen, 2010, p. 2). Group affirmation also holds true in the idea that certain far-right groups have been courted through in-jokes, dog whistles², and memes. The following Twitter thread explores how dog whistles have been used to engage with people who are perceptive to it. (Linnik, 2022).

The *QAnon Anonymous Podcast* has explored subcultures that are embraced by online communities where their opinions are nurtured and developed further. Kelly Weill, a guest on the podcast and a journalist that covers extremist movements and the internet, suggests that people join groups like The Flat Earth Society and QAnon because they believe that they provide them with esoteric knowledge which gives them a leg up over others. If this is true, then perhaps those that invest in cryptocurrency act in the same way, that somehow only they have the knowledge required to make vast amounts of money and everyone else is wrong. Weill also states that antagonism towards people

² A dogwhistle is a term that could clue an audience into something that only they can perceive. E.g., a typical person wouldn't understand the 1488 tattoo as anything but numbers, but people that are clued in would understand that 14 refers to Hitler's 14 words while 88 is the eighth letter of the alphabet, meaning HH which would further mean Heil Hitler (Wetts & Willer, 2019).

within these groups from people that believe in more mainstream and rational ideas tends to lead them to further embrace the ideas that they have adopted as many of them function on an us versus them mentality. Weill explains that people that have been deprogrammed from flat Earth theories say that one of their biggest fears was being made fun of after coming back to mainstream thought. This shows that while group affirmation is an important factor, oppositional dissent can go a long way to bolstering their opinions, especially when this dissent seems malicious (View et al, 2022). Perhaps the online discourse has emboldened those that have invested in cryptocurrencies and NFTs and any push against them further strengthens their convictions.

The reasoned action model can be utilized here in two separate ways: people that are invested in blockchain technologies and want to get other people to invest in it and those that are not invested in it and are attracted by the opportunities that are placed before them. Diffusion of technology has shown that as time goes on that coverage will become more diverse and this could impact the actions that people engage in.

Methods and Procedure

To determine the amount of knowledge that an individual has about blockchain technologies, surveys were conducted that asked questions concerning the level of knowledge that an individual has on the emergent technology. This survey was accompanied by another survey that was designed to determine the level of environmental concern (Cruz & Manata, 2020) that the individual possesses. Additionally, the survey asked what websites the individual frequents (Reddit, Twitter, news websites), what type of media they consume (podcast, traditional media), and if they have heard about cryptocurrency, non-fungible tokens, or other blockchain

associated technologies through these or other sources. The instruments that were created and used for the collection of data are available in the appendix.

Technology Knowledge Scale

Bang et al. (2000) developed a survey that explored several facets of knowledge about energy usage as well as environmental concern. This survey was modified to explore technology knowledge for cryptocurrency and blockchain technology. This survey also included questions pertaining to where they learned about cryptocurrency. Figure 3.1 shows Bang et al.'s. survey used to determine knowledge about renewable energy as well as environmental concerns.

Figure 3.1: Technology Knowledge and Environmental Concern Survey: Basis of Instrument One

	Cronbach Alpha
<i>Knowledge (3 items)</i>	0.76
How familiar are you with renewable energy sources?	
How familiar are you with wind-generated electricity?	
How knowledgeable are you about renewable energy?	
<i>Concern about the environment (6 items)</i>	0.87
How concerned are you about the environment (air, water, and land use)?	
How concerned are you about pollution?	
How concerned are you about water and air pollution in your city?	
How concerned are you about water usage in your city?	
How concerned are you about the environment when making purchases?	
The electric company should use less expensive energy even if the cheap energy may increase environmental pollution (reverse-scored item).	
<i>Beliefs (3 items)</i>	0.80
How important is the environment when considering renewable energy?	
How important is safety when considering renewable energy?	
How important is reliability when considering renewable energy?	
<i>Willingness to pay more for renewable energy (6 items)</i>	0.86
How willing would you be to use more expensive forms of energy to reduce pollution?	
How willing would you be to support a local project to generate energy with wind-powered devices?	
How willing would you be to pay more for your electric bill if you knew the cost paid for environmentally safe electricity?	
How willing would you be to support a fuel adjustment clause in your electric bill to subsidize the cost of developing wind-powered energy?	
How willing would you be to pay more now in exchange for possibly lower electric rates in the future?	
How willing would you be to pay more for wind-powered energy?	

Source: Bang et al. technology knowledge and environmental concern survey (2001, p. 459)

This survey was edited to fit the research that I had proposed. For example, the questions about renewable and wind energy knowledge were changed to ask about cryptocurrency, blockchain, and NFT knowledge. Concern about the environment stayed relatively the same, with some changes. The beliefs section was changed to ask more questions about the interaction between blockchain technologies and the environment. The “willingness to pay more for renewable energy” section was excised and replaced

with questions relating to profiting from blockchain technologies versus their environmental impact.

Environmental Concern Scale

Cruz and Manata (2020) analyzed many different environmental concern scales and their efficacy and validity in current research. They determined that the scale developed by Schultz (2001) has the highest fit to data of all instruments that were analyzed, is brief which is important in applied research, and that it is a good scale for the study of general environmental attitudes (p. 11). Cruz and Manata state that a limitation to their analysis of their samples is that they were gathered using mTurk, meaning that the data is not nationally representative. Should this research utilize mTurk as well, it will also not be nationally representative.

Schultz (2001) conducts his surveys by dividing his analysis into three factors that are based on the relative importance that a person places on themselves, other people, or plants and animals. These are egoistic concerns, altruistic concerns, and biospheric concerns (p. 327). In the study, Schultz embedded the survey about environmental concerns in a larger questionnaire. Shown below in Figure 2.2 is a survey based on ordinal data that Schultz used to determine environmental concern.

Figure 3.2: Environmental Motives Survey: Basis of Instrument Two

Measuring environmental motives: items in English

People around the world are generally concerned about environmental problems because of the consequences that result from harming nature. However, people differ in the consequences that concern them the most. Please rate each of the following items from 1 (not important) to 7 (supreme importance) in response to the question:

I am concerned about environmental problems because of the consequences for ____.

- | | | |
|---------------|----------------|-------------------------|
| — Plants | — Me | — People in my country* |
| — Marine life | — My lifestyle | — All people |
| — Birds | — My health | — Children |
| — Animals | — My future | — My children† |

*An alternative wording is 'People in the community'

†An alternative wording is 'Future generations.'

Source: Environmental motives survey (Schultz, 2001, p. 338)

Biospheric concerns are those that involve plants, marine life, birds, and animals; egoistic concerns are those that involve me, my lifestyle, my health, and my future; and altruistic concerns are those that involve people in my country, all people, children, and my children (me and my meaning the concern of those participating in the survey). Schultz' survey was based on a scale of one to seven, but for the purpose of this research the scale was modified to be one to ten.

When the survey was conducted, both instruments were included in the same survey, but when analysis was conducted regression of both instruments were kept separate. This was done to ensure that there wouldn't be any cross-contamination between the two data sets, even though both are on a ten-point scale and could potentially be used in analysis with one another.

Analysis of the data was based on the following research questions:

- **RQ1:** Is there a relationship between environmental concern and participation in cryptocurrency markets?
- **RQ2A:** Is there a minimum level of cryptocurrency knowledge that is necessary for investing in cryptocurrencies?
 - **RQ2B:** Does a knowledge of cryptocurrency correlate with a knowledge of environmental concerns?

Though the data set used for each research question is the same, different questions from within the survey(s) are used for each research question to provide the most appropriate analysis.

Analysis

Collection of data was completed through a survey created on Qualtrics and conducted through Amazon Mechanical Turk (Amazon MTurk). Respondents were provided a cash compensation for their participation within the survey. The survey consisted of questions relating to the level of environmental concern that the respondents had and the amount of knowledge that the respondents had in relation to cryptocurrency, NFTs, and blockchain technologies. The survey, as well as descriptive statistics are including in portions throughout this section, however the full descriptive statistics and the instruments used for the surveys can be found in the appendix.

Analysis of data began with data cleanup. The initial sample size was $N=326$, but this was reduced to $N=310$ after removing respondents without full responses to all questions or for answering a single number to all questions (example: all ones or all tens). Answering with a single response to all questions leads the researcher to believe that the respondent was simply clicking through the survey to complete the survey as quickly as

possible and gain access to compensation through Amazon MTurk and thus these responses should be removed from the dataset to provide the cleanest analysis possible.

The age of most respondents skewed younger, with 72.6% (N=225) of respondents being between 18-40. Additionally, most respondents were male (N=223) and Caucasian (N=242). Over half of the respondents had completed their bachelor's degree (N=162) and while there was a relatively even distribution of respondent's political alignment, the alignment "highly conservative" was the highest response by 29.4% of respondents (N=91).

Table 4.1.1

Demographic Characteristics of Participants

Baseline Characteristic	n	%
Gender		
Male	223	72
Female	89	28
Ethnicity		
African-American	25	12
Asian	32	10
Caucasian	242	78
Latino or Hispanic	15	5
Native American	16	5
Native Hawaiian or Pacific Islander	1	.3

Environmental Concern and Participation in Cryptocurrency Markets

- **RQ1:** Is there a relationship between environmental concern and participation in cryptocurrency markets?

Analysis on this research question began with determining which pieces of data would be used for linear regression analysis concerning the relationship between environmental concern and participation in cryptocurrency markets (willingness to adopt cryptocurrency). Data in this analysis are the responses that were provided by survey participants. Data regarding environmental concern is shown in Table 4.1.2 while data regarding participation in cryptocurrency markets is shown Table 4.1.3.

Table 4.1.2: Environmental Concern Descriptive Statistics

Independent Variable	Mean
Environmental Concern	6.51
Pollution Concern	6.59
Water and Air Pollution in City Concern	6.61
Concern for Environment When Making Purchases	6.34

Source: SPSS

The responses surrounding environmental concern questions showed that most respondents were slightly greater than moderately concerned about the environment. The questions asked regarding these descriptive statistics are listed below:

How concerned are you about the environment (air, water, and land use)?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about pollution?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about water and air pollution in your city?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about the environment when making purchases?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

Table 4.1.3: Willingness to Adopt Cryptocurrency Descriptive Statistics

Independent Variable	Mean
Willingness to Adopt if Damaging to Environment	5.27
Willingness to Adopt if Used by Friends or Family	5.89
Willingness to Adopt if Seen in a Commercial	5.48
Willingness to Adopt if it is Lucrative	6.51
Willingness to Adopt if Energy Bill Increased	5.37
Willingness to Adopt if Associated with Crime	5.35
Willingness to Adopt if Transactions are Simple	6.74

Source: SPSS

The responses surrounding participation in cryptocurrency markets (willingness to adopt cryptocurrency) questions showed that most respondents were slightly greater than moderately concerned about the environment. The highest responses regarding willingness to adopt cryptocurrency surrounding the questions asking if the individual would be willing to adopt cryptocurrency if it was lucrative and if transactions involving cryptocurrency were simple. The lowest level of adoption responses surrounded questions regarding if cryptocurrency is damaging to the environment and if cryptocurrency could be connected to criminal activity. The questions asked regarding these descriptive statistics are listed below:

How willing would you be to adopt or use cryptocurrency if it was damaging to the environment?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if a friend or family member adopted it or used it?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you saw a commercial for it?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you believed that it was lucrative (you can make a lot of money with it)?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if it caused your energy bill to increase?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you heard that it could be associated with crime?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if ordinary transactions were simple and easy to complete?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

Analysis was conducted by conducting bivariate correlations in IBM SPSS.

Bivariate correlations allowed the researcher to determine the existence of a relationship between variables. This was followed by linear regression analysis in IBM SPSS using items from Table 4.1.2 as the independent variable and items from Table 4.1.3 as the dependent variable(s). The independent variable was run as one item while the dependent variables were run as multiple items against the independent variable. Bivariate correlation was determined with each independent variable correlated with the dependent variables.

In bivariate correlation, the Pearson correlation number indicates whether the relationship between two variables is positive or negative, where -1 indicates a perfectly negative linear correlation between two variables, 0 indicates no linear correlation between two variables, and 1 indicates a perfectly positive linear correlation between two variables. The Pearson correlation number is represented as r . The significance of the data, shown as “Sig. (2- tailed)” in the charts, determines if a correlation is statistically significant and is the p -value. A p -value less than or equal to .005 is determined to be statistically significant. Reporting of bivariate correlations will be reported as “ r (degrees of freedom) = the r statistic, $p = p$ value.” For example, the correlation between “Environmental Concern” and “Willingness to Adopt if Damaging to the Environment” would be reported as $r(308) = .249, p = .000$ and would be expressed as “among those that participated in the survey, their environmental concern was slightly positively correlated with their willingness to adopt cryptocurrency if they knew that it was damaging to the environment. Degrees of freedom are typically 2 less than N , so for the case of this study, degrees of freedom will be 308 throughout. Output of the bivariate correlation appears below:

Bivariate Correlations: RQ1

Table 4.1.4: Environmental Concern Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
Environmental Concern	---	.249*	.300*	.358*	.437*	.263*	.175*	.379*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple
* indicates significance

Source: SPSS

Within the first set of bivariate correlations, it was found that all items showed significant correlation with the variable of “Environmental Concern.” The greatest positive relationship that existed within this set was with the “willingness to adopt if lucrative,” with an equation of $r(308) = .437, p = .000$. “Willingness to adopt if associated with crime” had the lowest positive relationship, with an equation of $r(308) = .175, p = .000$.

Table 4.1.5: Pollution Concern Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
Pollution Concern	---	.190*	.381*	.350*	.484*	.231*	.199*	.414*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple
* indicates significance

Source: SPSS

In the next set of bivariate correlations, it was found that all items showed significant correlation with the variable of “Pollution Concern.” The greatest positive relationship that existed within this set was once again with the variable “willingness to adopt if lucrative,” with an equation of $r(308) = .484, p = .000$. “Willingness to adopt if damaging to the environment” had the lowest positive relationship, with an equation of $r(308) = .190, p = .000$, however the r for “willingness to adopt if associated with crime” was $r = .199$.

Table 4.1.6: Water and Air Pollution in City Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
Water and Air Pollution in City Concern	---	.340*	.439*	.469*	.453*	.380*	.340*	.476*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple
 * indicates significance
 Source: SPSS

In the third set of bivariate correlations, it was found that all items showed significant correlation with the variable of “Water and Air Pollution in City Concern.” The greatest positive relationship that existed within this set was with the variable “willingness to adopt if transactions are simple,” with an equation of $r(308) = .476, p = .000$. “Willingness to adopt if damaging to the environment” and “willingness to adopt if associated with crime” both had the lowest positive relationships, with an equation of $r(308) = .340, p = .000$.

Table 4.1.7: Concern for Environment When Making Purchases Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
Concern for Environment When Making Purchases	---	.400 *	.449*	.539*	.360*	.525*	.447*	.375*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple
* indicates significance

Source: SPSS

In the final set of bivariate correlations, it was found that all items showed significant correlation with the variable of “Concern for environment when making purchases.” The greatest positive relationship that existed within this set was with the variable “willingness to adopt if seen in a commercial,” with an equation of $r(308) = .539, p = .000$. “Willingness to adopt if lucrative” had the lowest positive relationship, with an equation of $r(308) = .360, p = .000$. Following bivariate correlation is linear regression analysis.

Linear Regression Analysis: RQ1

Linear regression analysis of the data points involved in research question one follows. This section will describe how the output of the data will be reported throughout the rest of the analysis section. First, each analysis will be completed separately in which the R^2 will be reported, followed by whether the model is a significant predictor of the outcome variable using the results of ANOVA for regression and then beta values for the predictors and significance of their contribution to the model. The r^2 indicates the proportion of variance for the independent variable that is explained by the dependent

variables, where a low r^2 explains a little of the variance and a high r^2 explains a great amount of the variance. R^2 of .25 is a weak explanation of variance, .50 is a moderate level of explanation of variance, and .75 is a high level of explanation of variance. The beta value indicates the amount of change in the dependent variable that would cause a unit of change in the independent variable while all other variables remain unchanged.

Table 4.1.8, Environmental Concern against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.06	20.42	.25*
...if used by friends or family	.09	30.55	.30*
...if seen in a commercial	.13	45.28	.36*
...if it is lucrative	.19	72.73	.44*
...if energy bill increased	.07	22.93	.26*
...if associated with crime	.03	9.69	.17*
...if transactions are simple	.14	51.58	.38*

**indicates statistical significance*

The output provided by the data for “Environmental Concern against Dependent Variables, Willingness to Adopt” indicates that there is a significant correlation between “Environmental Concern” and all dependent variables involving the willingness to adopt cryptocurrency. While all variables are statistically significant, r^2 for all variables are low, meaning that there is little explanation for the variance occurring within the correlation. The greatest level of explanation for variance is in the variable “willingness to adopt if it is lucrative” with an r^2 of .19.

Table 4.1.9, Pollution Concern against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.04	11.55	.19*
...if used by friends or family	.14	52.19	.38*
...if seen in a commercial	.12	43.06	.35*
...if it is lucrative	.23	94.41	.48*
...if energy bill increased	.05	17.36	.23*
...if associated with crime	.04	12.71	.20*
...if transactions are simple	.17	63.70	.41*

**indicates statistical significance*

The output provided by the data for “Pollution Concern against Dependent Variables, Willingness to Adopt” indicates that there is a significant correlation between “Pollution Concern” and all dependent variables involving the willingness to adopt cryptocurrency. While all variables are statistically significant, r^2 for all variables are low. The greatest level of explanation for variance is in the variable “willingness to adopt if it is lucrative” with an r^2 of .23.

Table 4.1.10, Water and Air Pollution in City Concern against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.12	40.23	.34*
...if used by friends or family	.19	73.58	.44*
...if seen in a commercial	.22	86.95	.47*
...if it is lucrative	.20	79.59	.45*
...if energy bill increased	.14	51.87	.38*
...if associated with crime	.11	40.32	.34*
...if transactions are simple	.22	90.34	.48*

**indicates statistical significance*

The output provided by the data for “Water and Air Pollution in City Concern against Dependent Variables, Willingness to Adopt” indicates that there is a significant correlation between “Water and Air Pollution in City Concern” and all dependent variables involving the willingness to adopt cryptocurrency. While all variables are statistically significant, r^2 for all variables are low. The greatest level of explanation for variance is in the variable “willingness to adopt if seen in a commercial” with an r^2 of .22.

Table 4.1.11, Concern for Environment When Making Purchases against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.16	58.77	.40*
...if used by friends or family	.20	77.67	.45*
...if seen in a commercial	.29	126.30	.54*
...if it is lucrative	.13	45.96	.36*
...if energy bill increased	.27	117.35	.53*
...if associated with crime	.20	76.90	.45*
...if transactions are simple	.14	50.33	.37*

**indicates statistical significance*

The output provided by the data for “Concern for Environment When Making Purchases against Dependent Variables” indicates that there is a significant correlation between “Concern for Environment When Making Purchases” and all dependent variables involving the willingness to adopt cryptocurrency. While all variables are statistically significant, r^2 for all variables are low. The greatest level of explanation for variance is in the variable “willingness to adopt if seen in a commercial” with an r^2 of .29.

Cryptocurrency Knowledge and Investment in Cryptocurrencies

- **RQ2A:** Is there a minimum level of cryptocurrency knowledge that is necessary for investing in cryptocurrencies?
 - **RQ2B:** Does a knowledge of cryptocurrency correlate with a knowledge of environmental concerns?

Analysis on this research question began with determining which pieces of data would be used for linear regression analysis concerning the relationship between the level of cryptocurrency knowledge that an individual possesses and the possibility that they would invest in cryptocurrency. Data in this analysis are the responses that were provided by survey participants. Data regarding the level of cryptocurrency knowledge is shown in Table 4.3.1. This set of data utilized the data in Table 4.1.3 in conjunction with the data in Table 4.2.1 for research question 2A. Analysis of research question 2B utilized the data in Table 4.1.2 in conjunction with the data in Table 4.2.1 for research question 2B.

Table 4.2.1: Cryptocurrency and Associated Technologies Familiarity Descriptive Statistics

Independent Variable	Mean
Cryptocurrency Familiarity	6.51
Blockchain Familiarity	6.59
NFT Familiarity	6.61

Source: SPSS

The responses surrounding cryptocurrency familiarity questions showed that most respondents were slightly greater than moderately knowledgeable about cryptocurrency. Additionally, participants responded that they were also moderately knowledgeable about blockchain technologies and non-fungible tokens, though more people were more familiar with cryptocurrency. The questions asked regarding these descriptive statistics are listed below:

How familiar are you with cryptocurrency?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How familiar are you with blockchain technologies?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How familiar are you with non-fungible tokens (NFTs)?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

Bivariate Correlations: RQ2A

Table 4.2.2: Cryptocurrency Familiarity and Willingness to Adopt Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
1. Cryptocurrency Familiarity	---	.536*	.539*	.512*	.538*	.436*	.460*	.499*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple

* indicates statistical significance

Source: SPSS

Within the first set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “Cryptocurrency Familiarity.” The greatest positive relationship that existed within this set was with the variable “willingness to adopt if used by friends or family,” with an equation of $r(308) = .539, p = .000$. “Willingness to adopt if energy bill increased” had the lowest positive relationship, with an equation of $r(308) = .436, p = .000$.

Table 4.2.3: Blockchain Familiarity and Willingness to Adopt Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
1. Blockchain Familiarity	---	.563*	.591*	.620*	.466*	.556*	.583*	.511*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple

* indicates statistical significance

Source: SPSS

Within the second set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “Blockchain Familiarity.” The greatest positive relationship that existed within this set was with the variable “willingness to adopt if seen in a commercial,” with an equation of $r(308) = .620, p = .000$. “Willingness to adopt if transactions are simple” had the lowest positive relationship, with an equation of $r(308) = .511, p = .000$.

Table 4.2.4: NFT Familiarity and Willingness to Adopt Bivariate Correlation

Variable	1	2	3	4	5	6	7	8
1. NFT Familiarity	---	.570*	.549*	.636*	.394*	.588*	.581*	.444*

Note: Each number corresponds to the following variables: 2. Willingness to Adopt if Damaging to the Environment, 3. Willingness to Adopt if Used by Friends or Family, 4. Willingness to Adopt if Seen in a Commercial, 5. Willingness to Adopt if it is Lucrative, 6. Willingness to Adopt if Energy Bill Increased 7. Willingness to Adopt if Associated with Crime, 8. Willingness to Adopt if Transactions are Simple
* indicates statistical significance

Source: SPSS

In the final set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “NFT Familiarity.” The greatest positive relationship that existed within this set was with the variable “willingness to adopt if seen in a commercial,” with an equation of $r(308) = .636, p = .000$. “Willingness to adopt if lucrative” had the lowest positive relationship, with an equation of $r(308) = .394, p = .000$.

Linear Regression Analysis: RQ2A

Table 4.2.5, Cryptocurrency Familiarity against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.29	124.05	.54*
...if used by friends or family	.29	126.03	.54*
...if seen in a commercial	.26	109.40	.51*
...if it is lucrative	.29	125.54	.54*
...if energy bill increased	.19	72.10	.44*
...if associated with crime	.21	82.47	.46*
...if transactions are simple	.25	102.22	.50*

**indicates statistical significance*

The output provided by the data for “Cryptocurrency Familiarity against Dependent Variables” indicates that there is a significant correlation between “Cryptocurrency Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. While all variables are statistically significant, r^2 for all variables are low. The greatest level of explanation for variance is in the variables “willingness to adopt if damaging to the environment,” “willingness to adopt if used by friends or family,” and “willingness to adopt if it is lucrative” with an r^2 of .29. In this data set, five items break the threshold to signify weak explanation of variance.

Table 4.2.6, Blockchain Familiarity against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.32	143.13	.56*
...if used by friends or family	.35	165.17	.59*
...if seen in a commercial	.38	192.09	.62*
...if it is lucrative	.21	85.59	.47*
...if energy bill increased	.31	137.86	.56*
...if associated with crime	.34	158.77	.17*
...if transactions are simple	.26	109.05	.51*

**indicates statistical significance*

The output provided by the data for “Blockchain Familiarity against Dependent Variables” indicates that there is a significant correlation between “Blockchain Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. The greatest level of explanation for variance is in the variable “willingness to adopt if seen in a commercial” with an r^2 of .38. In this data set, six items break the threshold to signify weak explanation of variance.

Table 4.2.7, NFT Familiarity against Dependent Variables, Willingness to Adopt

Dependent Variable	r^2	ANOVA	Beta Values
...if damaging to environment	.32	148.09	.57*
...if used by friends or family	.30	132.85	.55*
...if seen in a commercial	.40	209.23	.64*
...if it is lucrative	.16	56.55	.29*
...if energy bill increased	.35	162.37	.59*
...if associated with crime	.34	156.85	.58*
...if transactions are simple	.20	75.60	.44*

**indicates statistical significance*

The output provided by the data for “NFT Familiarity against Dependent Variables” indicates that there is a significant correlation between “NFT Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. The greatest level of explanation for variance is in the variable “willingness to adopt if seen in a commercial” with an r^2 of .40. In this data set, five items break the threshold to signify weak explanation of variance.

Bivariate Correlations: RQ2B

Table 4.2.8: Cryptocurrency Familiarity and Environmental Concern Bivariate Correlation

Variable	1	2	3	4	5
1. Cryptocurrency Familiarity	---	.539*	.534*	.573*	.512*

Note: Each number corresponds to the following variables: 2. Environmental Concern, 3. Pollution Concern, 4. Water and Air Pollution in City Concern, 5. Concern for Environment When Making Purchases
 * indicates statistical significance
 Source: SPSS

Within the first set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “Cryptocurrency Familiarity.” The greatest positive relationship that existed within this set was with “environmental concern” with an equation of $r(308) = .539, p = .000$. “Concern for environment when making purchases” had the lowest positive relationship, with an equation of $r(308) = .512, p = .000$.

Table 4.2.9: Blockchain Familiarity and Environmental Concern Bivariate Correlation

Variable	1	2	3	4	5
1. Blockchain Familiarity	---	.417*	.480*	.522*	.549*

Note: Each number corresponds to the following variables: 2. Environmental Concern, 3. Pollution Concern, 4. Water and Air Pollution in City Concern, 5. Concern for Environment When Making Purchases
 * indicates statistical significance
 Source: SPSS

Within the second set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “Blockchain Familiarity.” The greatest positive relationship that existed within this set was with the

variable “concern for environment when making purchases,” with an equation of $r(308) = .549, p = .000$. “Environmental concern” had the lowest positive relationship, with an equation of $r(308) = .417, p = .000$.

Table 4.2.10: NFT Familiarity and Environmental Concern Bivariate Correlation

Variable	1	2	3	4	5
1. NFT Familiarity	---	.387*	.404*	.533*	.538*

Note: Each number corresponds to the following variables: 2. Environmental Concern, 3. Pollution Concern, 4. Water and Air Pollution in City Concern, 5. Concern for Environment When Making Purchases
 * indicates statistical significance
 Source: SPSS

In the final set of bivariate correlations, it was found that all items showed positive relationships as well as significant correlation with the variable of “NFT Familiarity.” The greatest positive relationship that existed within this set was with the variable “concern for environment when making purchases,” with an equation of $r(308) = .538, p = .000$. “Environmental concern” had the lowest positive relationship, with an equation of $r(308) = .387, p = .000$.

Linear Regression Analysis: RQ2B

Table 4.2.11, Cryptocurrency Familiarity against Dependent Variables, Environmental Concern

Dependent Variable	r^2	ANOVA	Beta Values
Environmental Concern	.29	126.30	.54*
Pollution Concern	.28	122.73	.53*
Water and Air Pollution in City Concern	.33	150.19	.57*
Concern for Environment When Making Purchases	.26	109.55	.51*

**indicates statistical significance*

The output provided by the data for “Cryptocurrency Familiarity against Dependent Variables” indicates that there is a significant correlation between “Cryptocurrency Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. The greatest level of explanation for variance is in the variable “water and air pollution in city concern” with an r^2 of .33. In this data set, all four items break the threshold to signify weak explanation of variance.

Table 4.2.12, Blockchain Familiarity against Dependent Variables, Environmental Concern

Dependent Variable	r^2	ANOVA	Beta Values
Environmental Concern	.17	64.90	.42*
Pollution Concern	.23	92.27	.48*
Water and Air Pollution in City Concern	.27	115.60	.52*
Concern for Environment When Making Purchases	.30	132.55	.55*

**indicates statistical significance*

The output provided by the data for “Blockchain Familiarity against Dependent Variables” indicates that there is a significant correlation between “Blockchain Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. The greatest level of explanation for variance is in the variable “concern for environment when making purchases” with an r^2 of .30. In this data set, two items break the threshold to signify weak explanation of variance.

Table 4.2.13, NFT Familiarity against Dependent Variables, Environmental Concern

Dependent Variable	r^2	ANOVA	Beta Values
Environmental Concern	.15	54.19	.39*
Pollution Concern	.16	59.93	.40*
Water and Air Pollution in City Concern	.28	122.06	.53*
Concern for Environment When Making Purchases	.29	125.30	.54

**indicates statistical significance*

The output provided by the data for “NFT Familiarity against Dependent Variables” indicates that there is a significant correlation between “NFT Familiarity” and all dependent variables involving the willingness to adopt cryptocurrency. The greatest level of explanation for variance is in the variable “concern for environment when making purchases” with an r^2 of .29. In this data set, two items break the threshold to signify weak explanation of variance.

Discussion

The purpose of this discussion is to relate the findings in the analysis to the theory of reasoned action (Ajzen, 2012; Bang et al., 2000; Fishbein & Ajzen, 2010). Once again, the theory of reasoned action is a framework that explores how people’s decisions can be influenced or potentially be manipulated by beliefs, perceived norms, and behavioral controls. In the case of this research, the theory of reasoned action was used to provide a frame that could be used to determine why an individual may invest in cryptocurrency, even when provided with information that it is damaging to the environment.

As described in the literature review, the background factors that flow into beliefs in the reasoned action model by Fishbein and Ajzen (2010) are divided into individual, social, and informational background factors. Individual background factors include personality, mood, emotion, values, stereotypes, general attitudes, perceived risk, and past behaviors. Social background factors include education, age, gender, income, religion, race, ethnicity, and culture. Finally, information background factors include knowledge, media, and intervention. Not all background factors are necessary to be present to influence beliefs, but many different factors can be present and interact with each other to influence the beliefs of the individual(s) in question.

After background factors flow into beliefs, these are funneled into attitudes, perceived norms, and perceived behavioral controls, which in turn all flow into intentions of the individual, which influences their final behaviors, given that their skills and abilities, as well as environmental factors, allow them to act in that way.

Discussion of the research questions shall examine the data sets for each variable, paying particular attention to dependent variables that have higher r^2 as well as dependent variables that consistently have relatively higher r^2 against the independent variables involved with each research question.

RQ1

In examining if there is a relationship between environmental concern (independent variable) and participation in cryptocurrency markets (dependent variables) by utilizing linear regression, it was found that the dependent variable of “willingness to adopt cryptocurrency if it is lucrative” had the highest r^2 against two of four independent variables used to explore this research question. “Willingness to adopt if seen in a commercial” had the highest r^2 against the other two independent variables. These dependent variables also showed moderate positive relationships with each of the independent variables.

The theory of reasoned action would utilize the information that is given to individuals that may increase their willingness to adopt cryptocurrency. In the case of willingness to adopt cryptocurrency if it is lucrative, background factors such as social media (a background factor that encompasses both social and information factors) can influence how beliefs are formed, leading to intentions that then regulate behavior.

Additionally, individuals can be more greatly influenced to adopt cryptocurrency due to the belief that it is lucrative if a large number of people vouching for its value on spaces such as Twitter on accounts such as @coinbase. On the opposite side of many people claiming that cryptocurrency has value, an individual may be influenced by a voice that they consider to be a trusted voice, like a celebrity. A person who initially may not have had any interest in investing in cryptocurrency (and, by extension, NFTs) but did enjoy the points that actress Brie Larson made in her speech at the Crystal + Lucy Awards in 2018 (Bitran, 2018) stating that there should be more women and people of color as film critics may suddenly become interested in these blockchain technologies if their viewpoints align with Larson's.

The same points could be made about the dependent variable of "willingness to adopt if seen in a commercial." Stephanie Chan of Sensor Tower (2022) claims that cryptocurrency exchanges such as Coinbase, eToro, and FTX experienced an increase of 279 percent in cryptocurrency app installations after the 2022 Super Bowl that featured advertisements that pushed cryptocurrency. Individuals may believe that the stage of the Super Bowl gives a level of legitimacy to the idea that cryptocurrency is safe and lucrative. Some of these Super Bowl commercials featured celebrities as well. Actor and producer Larry David and athlete LeBron James appeared in cryptocurrency spots during the Super Bowl, ensuring that the messaging behind cryptocurrency would be able to impact as many demographics as possible.

RQ2A

In examining if there is a minimum level of cryptocurrency knowledge (independent variable) that is necessary for investing in cryptocurrencies (dependent

variables) by utilizing linear regression, it was found that the dependent variable of it was found that the dependent variable of “willingness to adopt cryptocurrency if seen in a commercial” had the highest r^2 against two of three independent variables used to explore this research question.

Since the variable of “willingness to adopt cryptocurrency if seen in a commercial” appears with the greatest r^2 in multiple variables in this research question, it can be inferred that commercials for cryptocurrency increase the knowledge of cryptocurrency that individuals possess, or more likely, increase the knowledge of cryptocurrency that individuals *believe* that they possess. The theory of reasoned action would state that the input of the commercials (as an information factor as it could be considered media) flows into the behavioral beliefs of the individual and thus their attitudes and potentially their knowledge, forming their intentions and ultimately their behavior to invest in cryptocurrency. The individual background factors of mood, emotions, and perceived risk could potentially be seen as knowledge regarding cryptocurrency.

RQ2B

In examining if there is a relationship between knowledge of cryptocurrency (independent variable) and knowledge of environmental concerns (dependent variables) by utilizing linear regression, it was found that the dependent variable of “water and air pollution concern” had the highest r^2 against two of three independent variables used to explore this research question. Interestingly, the variable of “environmental concern” had the lowest r^2 against two out of three independent variables. This is surprising since the researcher had considered that the concept of environmental concern evoked a general

concern that would encompass all other concern factors, but that did not appear to be the case when analyzing the data.

In the case of this research question, the theory of reasoned action would act in a different way than the previous research questions. Rather than giving a reason as to why an individual would invest in cryptocurrency, the theory of reasoned action now provides a model of how knowledge regarding cryptocurrency, blockchain technologies, and NFTs influences the attitudes that individuals have toward the environment and pollution that occurs as a result of processes surrounding these technologies. The concept of familiarity with these technologies needs to be explored in greater depth, however, as familiarity with the technologies could have different meanings from person to person.

The theory of reasoned action would explain that since there is a positive correlation associated with the independent variables and the dependent variable of “water and air pollution concern,” that as individuals gain more knowledge of cryptocurrency, blockchain technologies, and NFTs that their concern over pollution increases. However, the data does not provide an analysis about whether there is a breaking point where people *will not* invest in cryptocurrency due to their environmental concern. We understand that people may be concerned for the environment and about pollution, but that concern does not negate the possibility that they may still invest in cryptocurrency if there is enough incentive for them to do so since the perceived risk is an individual background factor in the theory of reasoned action.

Discussion of Significance of Variables

As stated previously, all dependent variables, when tested with their corresponding independent variables, were found to be statistically significant, but due to the r^2 that were analyzed for them, they didn't necessarily fully explain why there was a correspondence between the variables. This issue could potentially be alleviated by conducting multiple regression analysis rather than linear regression analysis. This would allow for multiple dependent variables to be tested against a single independent variable at once, determining if multiple variables would be able to answer for the level of variance that was seen.

Volatility of Markets

Further research is needed to uncover why people seem to continue to invest in cryptocurrencies and NFTs since the crypto-market crash of early 2022 occurred. A hypothesis of the researcher is a combination of sunk-cost fallacy, group buy-in/belief, confirmation bias, and a belief in the most vocal proponents of cryptocurrency to not lead the majority of the group away. The sunk cost fallacy would apply to individuals who had invested in cryptocurrency and NFTs that lost money when the crypto-markets crashed and, rather than getting out when they had the opportunity, instead decided to double down and continue to invest, or as cryptocurrency advocates would say, "to buy the dip." Buying the dip is an economic term that means investors decide to buy a stock (or a coin or NFT) at a point where it has dropped a certain percentage from its most recent high. This is further confounded by the people that are most visible in the cryptocurrency scene, using language like "HODL (hold on for dear life)" to tell other people not to sell their own assets and to weather through the storm that is occurring. Confirmation bias

could also be a factor to people continuing to invest in cryptocurrency after the collapse since an individual may see a success story occur and imagine that they too will achieve the same level of success as others.

It is also the researcher's hypothesis that NFTs have continued to be minted since the cryptocurrency crash because the people in control of most minted NFTs believe there is still a market that can be capitalized upon. Based upon these previous hypotheses, the researcher believes that the major advocates for cryptocurrency and NFTs are taking advantage of economically driven people to invest in cryptocurrency with the promise of a solid investment, with only those at the top of the scheme truly profiting.

Areas Overlooked by the Theory of Reasoned Action

The theory of reasoned action can provide some ideas as to why people may act in certain ways, but an idea of what may occur doesn't always tell us what actions an individual will take when presented with a choice. Even when presented with all the information that would lead a person to act in their best interests, they may instead engage in behaviors that are actively damaging to them. The theory of reasoned action also assumes that people have the opportunities and resources to engage in the behavior that their intentions would imply.

The theory of reasoned action is a linear framework, meaning that it only views the intentions of the individual at one moment in time. It doesn't consider that the opinions and background factors that influenced the individual can change, thus making it very difficult to determine exactly how a person will act at any given moment. In addition, there is no way to accurately determine when someone's intentions are made

and when they act on those intentions and behavior occurs. Finally, since our understanding of the actions that people take and what led to those decisions is based on self-reporting from the individual, it can also be difficult to have a full grasp on the background factors that actually did influence behavior, especially as more time elapses from the moment that the behavior occurs to the point that the behavior is reported.

Limitations of Methods

In addition to self-reporting being a limitation to the theory of reasoned action, it is believed that self-reporting can be an issue that arises when conducting surveys online. The data harvested through Amazon MTurk is accurate regarding receiving actual raw data, but the responses could vary wildly. This is an instance in which the instrument is sound, but the measurements can change from person to person, potentially skewing the data analysis. A potential way to alleviate these concerns in the future is to conduct surveys in which quantitative questions are asked alongside qualitative questions. The quantitative questions could remain similar to the questions used in the instruments for this research, while the qualitative questions could provide the researcher with an actual idea of the level of knowledge an individual possesses on specific questions. Based on the answers for the qualitative questions, the researcher could potentially add a modifier to the quantitative responses that more accurately depicts the level of knowledge that respondents have on a specific issue.

The instruments also did not include any questions asking the participants if they were invested in cryptocurrency. This is an important oversight to consider since those that are invested in cryptocurrency may have an interest to provide as many positive answers as possible about cryptocurrency in a particular light. Having a question asking

about the participant's investment in cryptocurrency would allow the researcher to segregate the populations and explore how the different responded to the questions. Understanding how many participants are invested in cryptocurrency can also open up other doors to research questions that were not possible in this particular study.

Cryptocurrency, Blockchain Technologies, and NFTs in the Field of Communication

As stated previously, the technologies discussed and analyzed throughout this paper are relatively new and many people do not fully grasp an understanding of them, including communication advocates who may wish to convey to others the issues that have been brought up, but may find it difficult to do so. With the analyses provided, along with the more plain-worded explanation of the analyses, I hope that others will be able to see ways in which they can communicate to others the issues that are associated with this technology while educating them on the technologies themselves so that they may speak more eloquently and speak in a way that talks down to the people that they are attempting to advocate to.

Additionally, if there were participants within the data set that were not being entirely truthful about their responses due to personal reasons, including if they are invested in cryptocurrency themselves or have an overinflated sense of what their level of knowledge is, then it would behoove communicators to know that some of the people that they may be advocating to may be hostile to them because of their own involvement.

New strategies for engagement will have to be developed as well since usage of cryptocurrency, blockchain technologies, and NFTs are completely voluntary, meaning that advocacy may need to occur on a legislative level as well as on a community or

individual level to achieve desired results. For example, there have been many campaigns that have asked people to examine their environmental footprint in terms of the amount of plastic that they use. This is far easier to do on an individual and community level since plastics are a tangible item that can be held and seen. Advocates have campaigned to degrees of success for individuals to minimize the amount of plastics they use through many different factors, including no longer using single-use plastics, lowering the amount of plastic waste in products, or using alternative packaging materials. With cryptocurrency, blockchain technologies, and NFTs, it is far harder to see the results of the level of pollution that is caused by them since it is already very difficult to get individuals to understand the scale of climate change, at least in the United States since it is often downplayed or outright ignored by U.S. media outlets. Also, consumers have the option of other products that don't use plastic, whereas consumers that partake in cryptocurrencies only really have the choice if they are only participating in markets or actively mining cryptocurrencies and creating NFTs. Below are suggestions for advocates based on this research.

- Advocating to individuals
 - It is likely far more effective to advocate to people in person rather than in an online space that can be corrupted by provocateurs, people that do not believe that these technologies are environmentally damaging, people are aware of the damage and downplay the effects due to their involvement, or a combination of the above.
 - When advocating in online spaces, do not engage with trolls or provocateurs. This will distract you from your messaging and

ultimately weaken it, as online personas will point to it as a way that you are unable to conduct themselves.

- Advocating to the community
 - At this point, I have no suggestions about advocating to a community as cryptocurrency usage is typically individual, though there are mining collectives. It would be difficult to advocate to these collectives, however, since they are highly invested in the technologies.
- Advocating for legislation
 - This may be the most effective way to advocate for communicators since it is possible that this avenue could lead to actual regulation of technologies.
 - Explaining the amount of unregulated money in the markets may be the most effective way to bring about legislation, but the advocate can focus on the crime aspects as well (laundering, drug trade, exploitation of minors).
 - A difficulty within this approach is that legislators may be hesitant to regulate the technology as it could negatively impact some of their constituents, leading to a decrease in their vote share if running for reelection. Due to this issue, the advocate must envision ways in which cryptocurrency regulation can occur with the least harm to those already invested in it while decreasing as much damage to the

environment as possible. This is incredibly similar to the issues that climate change advocates face and the roadblocks presented to them.

Implications for Communicators Outside of Environmental Advocacy

Media communicators could take a deeper look at the implications of research question one, in which it was found that the greatest r^2 for each of the independent variables were the dependent variables of “willingness to adopt if seen a commercial” and “willingness to adopt if lucrative.” Media communicators could analyze these commercials to determine their effectiveness and what elements within them are most effective. Is it the celebrities in the commercial that get people to invest in cryptocurrency? Is it because of the promise of wealth? Could there even be commercials that tout a new cryptocurrency that make claims that it is less environmentally damaging than other cryptocurrencies that could soften the opinion of some people and eventually bring them around to invest?

Health communicators could examine the data to determine new ways to advocate to people not only about their physical health but their mental health as well. It is possible that online advocates for cryptocurrency target individuals that do not have a great deal going on for them in the way of upward social momentum, as well as those that have a limited social group that could warn them of potential exploitation. The online cryptocurrency advocates could promise a great deal of wealth to these people without fear of retribution due to the relative anonymity of online spaces. These advocates could further be protected by the rabid fanbase of cryptocurrency that can be seen in spaces such as Reddit and Twitter.

Communicators that focus on extremism should also be aware of the impacts of cryptocurrency. Cryptocurrency has been used to fund reactionary firebrands such as Alex Jones and his program Infowars. In mid-2022, Jones received a cryptocurrency gift of about 8 million dollars after he declared bankruptcy in multiple holding companies due to the depositions that he was facing for defamation involving the families of children that were murdered at Sandy Hook Elementary School in Newtown, CT, in 2012 (Hayden & Squire, 2022). The relative anonymity of cryptocurrency transactions has made it incredibly difficult to determine the source of funding of Alex Jones. The cryptocurrency market volatility has also made it difficult for the plaintiffs (in this and other cases) to determine the proper amount of damages that Jones is liable for.

Conclusions and Future Implications

While cryptocurrency, blockchain technologies, and NFTs seem to be in a bit of the lull as of the writing of this paper, it is the researcher's opinion that these technologies will continue to exist as long as enough people ascribe value to them. Because of this, environmental advocates must continue to try and understand why people continue to invest in a technology that is so damaging to the environment, especially when climate change is predicted to have greater and greater negative effects throughout the biosphere.

The theory of reasoned action provides a framework that can help to explain certain aspects of why people may invest in cryptocurrency and related technologies, but due to its limitations, should not be expected to accurately predict if a person will invest in cryptocurrency. The model used throughout this paper is simply a model, and humans

are, at the end of the day, unpredictable and can act in ways that the model doesn't, or can't, account for.

The research found that there are significant correlations between environmental concern and willingness to invest in cryptocurrency, willingness to invest in cryptocurrency and cryptocurrency knowledge, and environmental concern and cryptocurrency knowledge. The explanation for these correlations is weak at best, based on the data that was analyzed. However, weak explanation for variance is still an explanation and should be better refined to more concisely determine the questions that should be asked and the methods that should be used to approach the research.

It is very possible that as the technology advances, that cryptocurrency and the associated technologies could begin to leave a less significant environmental footprint and other, more tangible, uses of the technologies could begin to emerge that would be beneficial for many people. The term "a rising tide lifts all boats" comes to mind when thinking about the benefit of technology, but we must be careful that the rising tide is actually occurring, and not an effect of the melting of icebergs due to the melting of icebergs from increased CO² emissions as a byproduct of cryptocurrency mining and NFT minting.

Appendix

Instruments Used for Surveys on Amazon Mechanical Turk

Instrument One: Technology Knowledge

Knowledge (4 items)

How familiar are you with cryptocurrency?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How familiar are you with blockchain technologies?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How familiar are you with non-fungible tokens (NFTs)?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How familiar are you with the environmental impacts of cryptocurrency mining?

(Scale of 1-10, with 1 being not familiar at all and 10 being very familiar)

How knowledgeable are you about the energy costs and resources required for cryptocurrency mining?

(Scale of 1-10, with 1 being not knowledgeable at all and 10 being very knowledgeable)

How knowledgeable are you about energy requirements for cryptocurrency transactions?

(Scale of 1-10, with 1 being not knowledgeable at all and 10 being very knowledgeable)

Concern (5 items)

How concerned are you about the environment (air, water, and land use)?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about pollution?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about water and air pollution in your city?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

How concerned are you about the environment when making purchases?

(Scale of 1-10, with 1 being not concerned at all and 10 being very concerned)

The government should regulate cryptocurrency if its creation is damaging the environment

(Scale of 1-10, with 1 being that government should not regulate cryptocurrency at all and 10 being that government should have full regulation over cryptocurrency)

Beliefs (3 items)

How important is it to you that pollution can disproportionately impact different groups of people?

(Scale of 1-10, with 1 being not important at all and 10 being very important)

How important is it to you that people in your community treat the environment with respect (minimizing pollution)?

(Scale of 1-10, with 1 being not important at all and 10 being very important)

How important is personal health to you when considering environmental pollution?

(Scale of 1-10, with 1 being not important at all and 10 being very important)

Willingness to adopt cryptocurrency

How willing would you be to adopt or use cryptocurrency if it was damaging to the environment?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if a friend or family member adopted it or used it?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you saw a commercial for it?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you believed that it was lucrative (you can make a lot of money with it)?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if it caused your energy bill to increase?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if you heard that it could be associated with crime?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

How willing would you be to adopt or use cryptocurrency if ordinary transactions were simple and easy to complete?

(Scale of 1-10, with 1 being not willing at all and 10 being very willing)

Instrument Two: Environmental Concern

People around the world are generally concerned about environmental problems because of the consequences that result from harming nature. However, people differ in the

consequences that concern them the most. Please rate each of the following items from 1 (not important) to 10 (supreme importance) in response to the question:

I am concerned about environmental problems because of the consequences for:

Plants		Marine life		Birds		Animals	
Me		My lifestyle		My health		My future	
People in my country		All people		Children		My children	

Section 3 (Demographic Information)

What gender do you identify as?

- Male
- Female
- _____ (Short answer space)
- Prefer not to answer

What is your age?

- 18-30
- 30-40
- 40-50
- 50-60
- 60-70
- 70+

Please identify your ethnicity

- African-American
- Asian
- Caucasian
- Latino or Hispanic
- Native American
- Native Hawaiian or Pacific Islander
- Two or more
- Other/unknown
- Prefer not to say

What is the highest degree or level of education you have completed?

- Some high school
- High school
- Bachelor's degree
- Master's degree
- Ph.D. or higher
- Trade school
- Prefer not to say

How would you describe your political alignment?

- Very conservative
- Somewhat conservative
- Centrist
- Somewhat liberal
- Very liberal

Where have you heard about cryptocurrency, non-fungible tokens, or blockchain technologies from?

- Print media (newspaper, magazine)
- Television
- Radio
- Podcast
- Internet news sources
- Internet social media (Facebook, Reddit, Twitter)
- Friend or family member

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