

Developing a crypto currency regulatory model: The case of Zimbabwe

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Abstract. The rise of crypto currency has prompted numerous calls for financial regulation. The study's objective was to identify regulatory concerns and their impact on regulation of crypto currency usage in Zimbabwe. A probability sampling method was used to pick 450 respondents from banks and regulatory institutions. Structured questionnaires were used to obtain data from the selected respondents. The primary elements impacting crypto currency regulation were identified using an ordinal logistic regression modelling technique. Money laundering, financial stability, consumer protection, monetary policy and tax evasion were found to be regulatory concerns that influences regulation of crypto currency usage in Zimbabwe. Based on these findings the author presented proposals such as incorporating Central Bank Digital Currency (CBDC) into applicable legislation and reaping the benefits of crypto currency through the issuance of CBDC.

Key words: *Crypto Currency, regulation, Central Bank Digital Currency (CBDC), Reserve Bank of Zimbabwe (RBZ)*

Introduction

In our daily lives, currency acts as an important medium of exchange for goods and services. The concept of currency has progressed from bartering through the use of coins, notes and now digital payment systems. The use of block chain to allow payments through the use of crypto currency is the most recent development. The most popular crypto currency is bit coin and it was used for the purpose of this research. Zimbabwe has faced financial crisis over the past two decades which has seen cash problems, particularly the choice of an appropriate money regime and periods of extraordinary money instability (Cipolla, 2013). Following this crises, the government has tried a number strategies which include replacing the ZWN by the third Zimbabwean dollar and suspending the Zimbabwean dollar with multi-currency regime (Exchangerates247.com, 2022). Despite the fact that these techniques have been adopted, Zimbabwe is still experiencing currency problems.

The use of virtual currencies also known as crypto currencies is growing both locally and globally. There are numerous virtual currencies in use, with Bitcoin being one of the most prominent (Mangudya, 2017). Crypto currency is growing more and more comparable to traditional currencies in general, however its applications is still limited (Langer, 2021). Different researchers such as (Austin Hill, 2018); (Joa Silva Piedadge, 2018); (Jacobs, 2018); (Schmidt, 2018); (Sansonetti, 2014) and (Pich et al, 2020) highlighted that crypto currency serves as a medium of exchange, digital means of payment and digital store of value. Countries such as El Salvador and Central African Republic uses crypto currency as an official currency (Al-Jazeera, 2022). As a result it is against this background that crypto currency can certainly be used as an alternative in the payment system.

Crypto currency however is well associated with a number of risks such as tax evasion, money laundering and wallet vulnerability (Arthur R. Bos, 2018). The Central bank of Zimbabwe cited risks caused by crypto currency trading such as theft, terrorism financing, tax avoidance and fraud (Techzim, 2018). As a result Zimbabwe prohibited the trading of all virtual currencies and have instructed private banks to shut the bank accounts of people exchanging in virtual currencies (Mangudya, 2018).

However, the Zimbabwe minister of finance Mthuli Ncube seems to have some positive perceptions when it comes to crypto currencies. Ncube urged the Reserve Bank of Zimbabwe to take up knowledgeable people in the sector and create regulation for crypto currencies (Mudzingwa, 2018). As a result, the focus of this research will be on filling this gap. The legal aspects of regulating crypto currencies from a central banking viewpoint are generally understudied in Zimbabwe and this research aims to close that gap.

Literature review

Theoretical perspectives of regulation

The concept of crypto currency

Crypto currency is a decentralized digital currency that was created in 2008 to facilitate peer-to-peer transactions without the participation of a bank (Cao, 2019). The term regulation has no clear definition. In this research, regulation will be defined as the utilization of legal tools to obtain social and economic policy objectives.

Public Interest Theory

The public interest hypothesis focuses on the ability of the general public to observe regulatory decision-makers. On the other hand, when key decision makers work without scrutiny, they are more likely to provide regulatory benefits to well-organized interest groups at the expense of the general public. The assumptions of the public interest theory are as follows: 1. the existence of a market failure 2. the assumption of a benevolent regulator or alternately, an efficient political process 3. the selection of effective regulatory institutions (Nhavira, 2014).

Private Interest Theory of Regulation

Private interest theories were created to explain the regulatory ineffectiveness and inefficiency. This theory was created mostly by political scientists after the public interest theory was discredited by empirical and theoretical studies. This idea assumes that regulation will eventually suit the interests of the industry in question. The empirical research began with the foundational contribution by (Stigler; Friedland, 1962), who demonstrated that regulation did not cut rates and price discrimination. Despite the fact that this research was eventually proven to be incorrect about the scale of the influence of regulation (Peltzman, 1993), it nonetheless provided an entirely new perspective on government regulation. The analysis should have revealed that regulation reduced prices by around a fourth, causing output to increase by more than half.

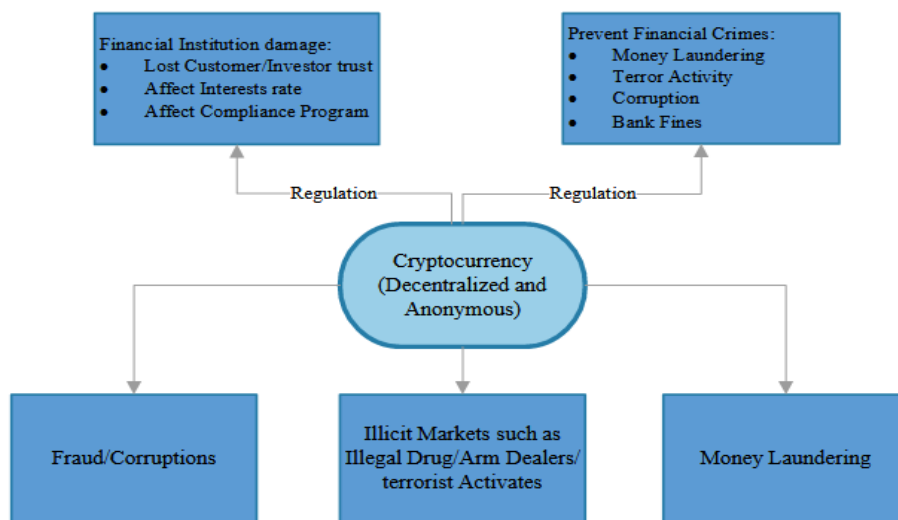
Buru's Theory of Regulation

Money laundering, corruption, the illicit market, illegal drug and arms dealings are among the financial crimes cited by Burrus (2018) as being facilitated by the decentralized and anonymous nature of crypto currency. As a result, it is used to pay transactions related with criminals wanting to conceal their unlawful cash and earnings. Furthermore, according to Burrus (2018), money laundering occurs as a result of drug and arms trafficking, allowing criminals to profit. Financial crimes are caused by a lack of suitable legislation, according to Burrus (2018).

Marian's Theory of Regulation

Marian's research has become increasingly interested in crypto currency regulation, stating that the high level of anonymity and decentralized nature of crypto currency has prompted illicit transfers, particularly money laundering, which has made it difficult for financial institutions to identify criminal activity. Because the "Know Your Customer" laws have hindered financial institutions ability to reduce fraudulent transaction there is need for a better and new intermediary regulation for crypto currency exchanges in banks. Marian (2015) went on to say that new legislation can help reduce crypto currency-related money laundering financial crimes since criminals will find it difficult to get around them.

Relationships between Cryptocurrency, Financial Crime, and Regulation



Note. Relationships between Cryptocurrency and Regulations

Figure 1. Relationships between Crypto currency and Regulation

The figure 1 above shows the relationship between crypto currency and regulations.

Empirical Review

Shirakawa (2019) employs a cross-sectional ordered probit model with institutional and macroeconomic data from multiple sources to examine how efficient regulatory institutions and de jure financial openness impact policymaker's mentalities toward pursuing further financial development through the use of crypto currency. The findings demonstrate that better governance institutions are linked to a less restrictive regulatory position on crypto currency, but that financial openness has no bearing. The findings also show that before new types of financial technology may be adopted, a certain degree of institutional quality may be necessary.

Furthermore, according to a study by Arner (2020), crypto currency stable coins offer greater threats to financial stability, monetary policy transmission, monetary sovereignty, consumer protection and investor protection. Furthermore, it was stated that foreign regulators are concerned about market manipulation, fraud and abusive consumer behaviour (IOSCO, 2020). According to a research by Feinstein (2012), regulation and legal compliance have been important challenges for crypto currencies from the outset. He claims that governments are still concerned about crypto currencies because they are mostly used for illicit purposes. Money laundering, terrorism financing, cyber security, consumer protection, investor protection and market manipulation are all serious problems with crypto currencies.

There has not been much investigation into how crypto-currencies are governed globally. In 2012, the ECB conducted a crypto-currency investigation and highlighted that the projected rise of digital currencies will need international cooperation in developing a common regulatory framework. (Bank,

2015). The study also found that while digital currencies offer a modest danger to price stability, it also proffers risks associated with criminal activity for the users. The French Virtual Currencies Working Group produced a document in 2014 that outlined the risks connected with the unregulated nature of digital currencies, as well as ideas for addressing these concerns (Currencies, Group, 2014). Three sources of risk were identified: the presence of unregulated participants, a lack of transparency and extraterritoriality. The Currencies and Group (2014) proposed that the use of crypto-currencies be controlled, regulation and cooperation be created and that industry knowledge be developed to better manage risk in order to mitigate these dangers.

Conceptual Framework

The research was guided by the Marian theory of regulation. Marian highlighted components that affects crypto currency regulation include corruption, consumer protection technology risk, market risk, liquidity risk and money laundering. The model hypothesized also include regulatory concerns highlighted by the Zimbabwean authorities such as fraud, theft, monetary protection and tax evasion.

The model proposed for the realization of this research is represented in Figure 2.

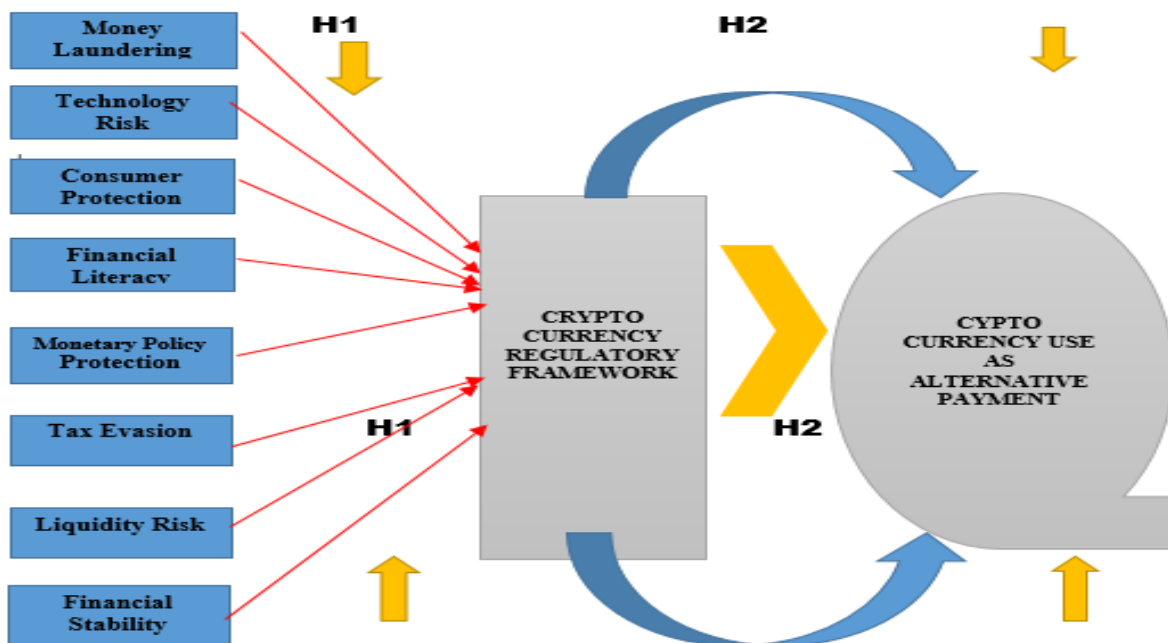


Figure 2: Proposed Model

Figure 2 above shows a conceptual framework with hypothesis as follows:

H₀: Regulatory concerns are key in crafting a model which regulates crypto currency usage as an alternative payment system in Zimbabwe

H₁: Regulatory concerns are not key in crafting a model which regulates crypto currency usage as an alternative payment system in Zimbabwe

H₀: A model can be developed which efficiently regulate crypto currency as an alternative payment system.

H₂: A model cannot be developed which efficiently regulates crypto currency as an alternative payment system.

Methodology and Instruments

The research took a quantitative approach in assessing the regulatory concerns that impact regulation of crypto currency usage as an alternative payment system in Zimbabwe. The elements that influence crypto currency regulation were modeled using an ordinal regression model. To analyze how regulatory concerns influence crypto currency regulation, a structured questionnaire was used to collect data. 1500 people were considered for participation. A probability sampling method was used to pick 450 respondents from banks and regulatory institutions including CBZ Bank, Stewart Bank, FBC Bank, POSB Bank, Reserve Bank of Zimbabwe, Ministry of Finance and the Securities Exchange Commission. 450 questionnaires were distributed, with 400 legitimate questionnaires responded and 50 spoiled and so ineffective for the study.

The Ordinal Logistic Regression Model was used to conduct the research. Ordinal logistic regression is a regression approach in which the dependent variable is measured at the ordinal level and one or more explanatory variables are provided which might be ordinal, continuous or categorical (Winship, 1994). The relationship that the researcher is attempting to establish is the impact of regulatory concerns on the regulation crypto currency usage as an alternative payment system in Zimbabwe.

Ordinal logistic regression Model

$$\text{logit } P((Y \leq j)) = \beta_j - \beta_j X_1 + \dots + \beta_j = pXp \dots \dots \dots (1)$$

This model makes use of cumulative probability up to a point, representing the whole range of ordinal categories.

Therefore, The cumulative probability of a response less than and equal to j is given as:

$$P(Y_i \geq j + 1) = \frac{\exp(\alpha_j + \beta_1 j X_{i1} + \dots + \beta_k j X_{ik})}{1 + \exp(\alpha_j + \beta_1 j X_{i1} + \dots + \beta_k j X_{ik})} \dots \dots \dots (2)$$

Where:

- Y is a variable that has not been seen.
- $P(Y \geq j+1)$ The cumulative probability of an occurrence is defined as $(Y \geq y_j)$;
- α_j is the constant term/intercepts in question
- B_k is the (p by 1)-dimensional vector of regression coefficients that corresponds to the xi covariates.
- X_{ij} is the parameter that describes how the independent variable X affects the dependent variable Y.

Dependent Variable

The crypto currency regulation is the dependent variable in this research because it assesses the level to which regulation of crypto currency usage is influenced by regulatory concerns, it is the result of regulatory concerns. In other words, let Y stand for the crypto currency regulation. Also, let Y be a categorical response, with higher values suggesting greater importance of a crypto currency regulation regime.

Then:

- Y = Crypto Currency Regulation
- 1 = low (1 -2 points)
- 2= medium (3 points)
- 3 – High (score 4-5 point)

Table 1: Dependent Variable Categories

CRYPTO CURRENCY REGULATION		
Not Important	Not Important or Slightly Important	Not Important, Slightly important or very important or extremely important
$\log \frac{P1}{p2 + p3 + p4}; 1$	$\log \frac{P1 + p2}{p3 + p4}; 2$	$\log \frac{P1 + p2 + p3}{p4}; 3$

The table above shows the dependent variable and its categorical odds.

Table 2. Dependent and independent variables

Variable Name	Valid Range	Variable Type
Crypto currency regulation	Low Medium High	Ordinal
Money laundering	not at all important Slightly important Important Extremely important	Categorical
Liquidity risk	not at all important Slightly important Important Extremely important	Categorical
Financial literacy	not at all important Slightly important Important Extremely important	Categorical
Consumer protection	not at all important Slightly important Important Extremely important	Categorical
Monetary policy protection	not at all important Slightly important Important Extremely important	Categorical
Technology risk	not at all important Slightly important Important Extremely important	Categorical
Tax evasion	not at all important Slightly important Important Extremely important	Categorical

Results

Goodness of Fit Test

Table 3: Goodness of Fit Test

Model	-2 log Likelihood	Chi-Square	df	Sig
Intercept Only	610,785			
Final	525,876	56,222	12	.0000

The likelihood ratio chi-square test was used to verify if there is no significance difference between the base line models to the final model of the substantial chi-square result (p.0005). The table above shows that money laundering, financial stability, consumer protection, monetary policy protection, tax evasion, liquidity risk, technology risk, market risk and financial literacy were significant. They fits better than the intercept only model. The p value is less than 0.05 therefore the null hypothesis was rejected in favor of the alternative hypothesis.

Pseudo R-Square Statistics

Table 4: Pseudo R-Square Statistics

Pseudo R-Square	
Cox and Snell	.766
Nagelkerke	.812
McFadden	.594

In the ordinal logistic regression model, the Cox and Snell, Nagelkerke and McFadden pseudo-R2 statistics were employed to quantify the variance explained by the independent variables. The current R2 values (Nagelkerke=.0.8123, Cox and Snell= 0.766, McFadden=0.594) suggest that the proportional variance explained by the independent variables on the dependent variable in the regression model are significant. Therefore money laundering, financial stability, consumer protection, monetary policy protection, tax evasion, liquidity risk, technology risk, market risk and financial literacy are most likely to be good indicators of crypto currency regulation.

Parameter Estimates of the Ordinal Logistic Regression Model

Figure 3: Parameter Estimates of the Ordinal Logistic Regression Model

		Value	Std.Error	t-value	p-value
	Mon_Laund	1.9198	0.76191	4.7393	0.00
	Liq_Ris	-1.3989	0.33404	0.1879	0.800
	Fin_Stab	1.3062	0.25916	4.6990	0.000
	Con_Prot	0.6156	0.12571	3.9623	0.000
	Mon_Pol	0.0581	0.24647	0.2498	0.000
	Tech_Ris	-1.3063	0.27894	4.8375	0.600
	Tax_Eva	1.8304	0.53941	3.3734	0.000
	Fin_Lit	-1.2069	0.1567	5.7455	0.700
1	2	1.7404	0.55954	3.4967	0.000
2	3	3.6874	0.58188	6.3088	0.000
3	4	5.2102	0.61365	8.7534	0.000

The figure 3 above shows that the most significant influence factor is the variable with the greatest coefficient that is less than the specified significance level of 0.05. Variables with $p < 0.05$ were found not to be significant and variables with $p > 0.05$, on the other hand, were determined to have no influence

on crypto currency regulation since $p > 0.05$. Mon_Laund (money laundering) is the first significant independent variable, with a coefficient of 1.9198 and a p-value of 0.0000 which is less than 0.05. Given that all other factors in the model remain constant, we may predict a 1.9198 rise in the ordered log probabilities of money laundering regulation for every unit increase in crypto currency trading. With a coefficient of 0.6156 and a p-value of 0.00 which less than 0.05 for Con Prot (consumer protection) was found to be significant. Financial stability, tax evasion and monetary policy protection were also revealed to be significant variables. Liquidity risk, technology risk and financial Literacy were shown to be insignificant variables with p-value s 0.800, 0.600 and 0.700 respectively.

Odd Ratios and Confidence Intervals.

Table 5: Odd Ratios and Confidence Intervals

Variable	Odd Ratio	Confidence Interval	
		2.5%	97.5%
Mon-Lau	4.1176871	2.1155767	7.859797972
Liq_Ris	0.2708420	0.1556667	0.4663431
Fin Stab	1.0598649	0.6672596	1.6878900
Con_Prot	3.678740	1.23673673	1.6826783
Tech_Ris	0.2208420	0.14363678	0.4663431
Tax_Eva	3.0598649	0.32675677	4.6878900
Fin_Lit	0.5138640	1.2321852	1.8660740

The table above shows the coefficient parameters converted to proportional odds ratios and associated 95 percent confidence intervals. The odds ratios were computed by exponentiation the coefficient parameters. The odds ratio for money laundering is 4.11 times higher than other variables moving from lower, medium to higher categories of regulation holding other variables constant. Furthermore, the odd ratio for tax evasion is 3.05 times higher than other variables moving from lower, medium to higher categories of regulation holding other variables constant. More so, the odd ratio for consumer protection is 3.67. This means that for one unit increase in crypto currency use, the chances of consumer protection odds to moves from the lower and middle categories to the high category are 3.67 times higher given that all of the other variables in the model are held constant. Lastly, the odd ratio for liquidity risk is less than one with a coefficient of 0.271. This moves in line with the parameter table coefficient which is negative . This means that odd ratio is 0.27 times lower going from the lower and middle categories to the high category assuming that all of the other variables in the model are held constant. Similarly, financial literacy and technology risk have odds ratios less than 1 and have the same implication

Discussion

The primary regulatory concerns affecting regulation of crypto currency usage were investigated using an ordinal logistic regression analysis. Crypto currency regulation was characterized in order of magnitude relevance, from not important to extremely important, as the dependent variable. The results of the ordinal logistic regression analysis revealed that the primary regulatory concerns affecting crypto currency regulation is a model containing money laundering, financial stability, consumer protection, monetary policy protection and tax evasion.

Money laundering, consumer protection and tax evasion are the factors with were found with the most explanatory power for crypto currency regulation. According to the findings, liquidity risk, technological risk and financial literacy had no discernible impact because they had coefficients with ($p > 0.05$). The findings are consistent with other studies that have shown these characteristics to be a source of concern in crypto currency regulation such as a study by (IOSCO, 2020); (Feinstein, 2021); (Madeng, 2019) and (Arner, 2020). They highlighted that money laundering, consumer protection, tax evasion and monetary policy protection affects crypto currency regulation. However , the findings also contradicts with a study by Kumar's (2012), particularly on the money laundering variable which

concluded that crypto currency money laundering has a negative impact on banks and the economy. These may be owing to the fact that money laundering has an impact on a variety of economic variables, including income loss, social costs, currency exchange rates, capital flows, interest rates, and economic instability and privatization risks. Furthermore, these results are consistent with a research conducted by Sadhaseevan (2019) who presented risks crypto currencies present to end-users and the financial system as a whole, he highlighted that crypto currency is affected by financial crimes such as money laundering.

In addition, the research found out that financial stability affects crypto currency regulation, however these results contradict with that of Sadhaseevan (2019) who concluded that crypto currencies do not present any substantial risk to the payment system and financial stability. Furthermore, consumer protection was also found to be significant. This could be because the majority of traditional financial investment market participants are institutional investors and individual investors and they cannot compete with institutional investors in terms of capital size, information consulting resources and information analytical capability. If crypto currency exchangers are not regulated, investors are left unprotected. As a result, there are no specific restrictions that protect them against financial injury or loss.

Some elements were not significant, particularly the risk of technology, liquidity risk and financial literacy. Technological risk was not considerable because the popularity of crypto-currencies has increased dramatically in recent years and more tools and knowledge resources have become available. Trading platforms may have provided operation interfaces comparable to conventional stock exchanges and performed extensive online and offline education and trainings for potential consumers. Liquidity risk was not significant because crypto currency may enable access to new capital and liquidity pools through tokenized old assets and new asset classes. Certain alternatives are accessible with crypto currency that are just not possible with fiat currency. Crypto currency for example, can enable real-time and accurate revenue sharing while increasing transparency to assist back-office reconciliation. In addition, the research discovered that financial knowledge does not affect crypto currency regulation. This is consistent with other researches such as (Lam, 2017) who states that those who are financially literate are less prone to make rash investments.

Conclusion

This study has taken a comprehensive look at regulators' concerns on the usage of crypto currency in Zimbabwe. The risks associated with crypto currencies are manifested in the regulatory dilemma, in which policymakers and lawmakers are wary of crypto currencies due to perceived risks. Money laundering, liquidity risk, financial stability, consumer protection, monetary policy protection, technology risk and tax evasion are the top risks cited by authorities in Zimbabwe. The researcher's goal was to evaluate the regulatory concerns that influence regulation of crypto currency usage in Zimbabwe. Structured questionnaires were used to obtain data from 400 respondents using probability sample procedure. Because the dependent variable is ordinal, an ordinal logistic regression was used in this research. The analyses' ordinal logistic regression model met all of the relevant assumptions. Initially, several criteria were regarded as possible predictors of crypto currency regulation. Money laundering, financial stability, consumer protection, monetary policy protection and tax evasion were shown to be the most significant variables which affect crypto currency usage regulation in Zimbabwe.

Recommendations

The recommendations made in this research were subjected to two basic premises. Specifically 1. not to obstruct the development or innovation of crypto currencies and block chain technology and 2. to remove hazards to the greatest extent practicable. Zimbabwean regulators worry about crypto currency risk therefore the author suggest they implement the Central Bank Digital Currency (CBDC) model. Central bank digital currencies are digital tokens issued by a central bank that are comparable to crypto money. They are pegged to the value of that country's fiat currency (Seth, 2022). They use the same underlying distributed ledger technology of crypto currencies. The CBDC will be the best solution for

the Zimbabwean scenario because its components and technology can regulate money laundering, financial stability, consumer protection, monetary policy protection and tax evasion. Zimbabwe through the Reserve Bank of Zimbabwe should issue Central Bank Digital Currencies (CBDC) because it uses the crypto currency innovation yet also eliminating regulators risk concerns.

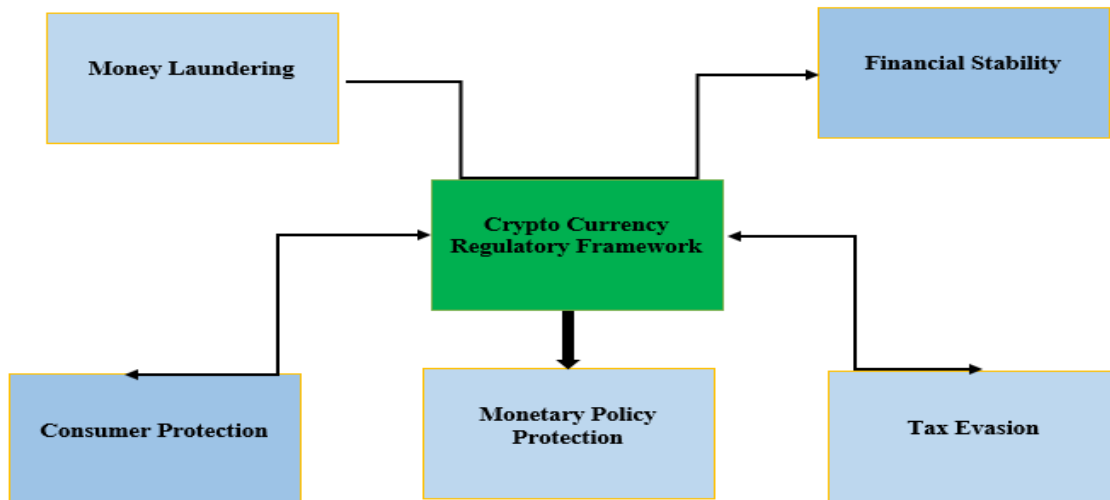


Figure 4: Crypto Currency Regulatory Framework for Zimbabwe

The figure above shows that primary regulatory concerns affecting crypto currency regulation in Zimbabwe is a model containing money laundering, financial stability, consumer protection, monetary policy protection and tax evasion. As a result, the research has provided foundations of regulatory model by identifying areas mostly regulators are concerned about. Therefore overall, the null hypothesis is not rejected and the researcher concluded that regulatory concerns are key in developing a regulatory framework and thus it is possible to develop a regulatory model.

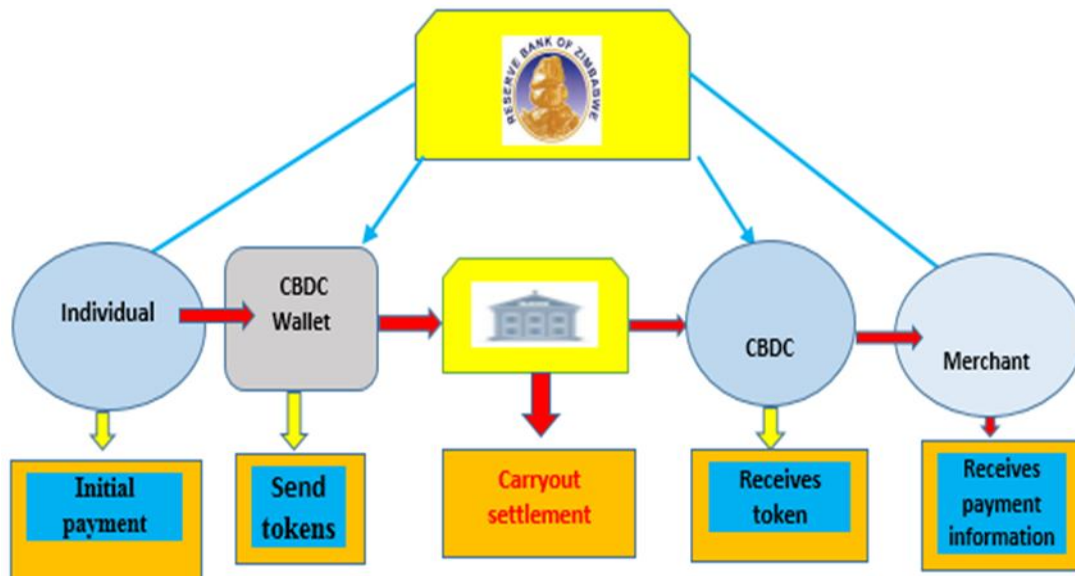


Figure 5: Central Bank Digital Currency: A model regulating Crypto Currency risk concerns

The figure above shows a model which regulates crypto currency risks such as Money laundering, financial stability, consumer protection, monetary policy protection and tax evasion.

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