The influence of religiosity on cryptocurrency users’ acceptance using search engines

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Abstract

Purpose – The potential growth in cryptocurrencies has raised serious ethical and religious issues leading to a new investment rethinking. This paper aims to identify the influence of religiosity on cryptocurrency acceptance through an extended technology acceptance model (TAM) model.

Design/methodology/approach – In the first phase, this research develops a conceptual model that extends the theory of the TAM by integrating the religiosity component. In the second phase, the proposed model is tested using search volume queries in daily frequencies from 01/01/2018 to 31/12/2022 and structural equation modeling (SEM).

Findings – The empirical results demonstrate a significant positive effect of religiosity on the intention to use cryptocurrency, the users’ perceived usefulness (PU) and ease of use (PEOU). Besides, the authors note that PEOU positively influences the intention. Furthermore, religiosity indirectly affects the intention through the PEOU and positively impacts the intention through the PU. In the same way, PEOU has a considerable indirect effect on the intention through PU.

Practical implications – This study has practical and theoretical contributions by providing insights into the cryptocurrency acceptance factors. In other words, it contributes to the literature by extending TAM models. Practically, it helps managers determine factors affecting the intention to use cryptocurrencies. Therefore, they can adjust their industry according to the suitable characteristics for creating successful projects.

Social implications – Identifying the effect of religiosity on cryptocurrency users’ choices and decisions has a social added value as it provides an understanding of the evolution of psychological variants.

Originality/value – The findings emphasize the importance of integrating big data to analyze users’ attitudes. Besides, most studies on cryptocurrency acceptance are investigated based on one kind of religion, such as Christianity or Islam. Nevertheless, this paper integrates the effect of five types of faith on the users’ intentions.

Keywords – Religiosity, Perceived usefulness (PU), Search volume queries, Perceived ease of use (PEOU), Intention

Paper type – Research paper

1. Introduction
The emergence of cryptocurrencies and the blockchain protocol have recently paid the attention of most scientists, practitioners and investors. Although they help lead and facilitate transactions, they have been considered disruptive technologies (Dotsika & Watkins, 2017). Blockchain technology has overcome weaknesses due to its durability, security, scalability and energy cost (Solberg Soilen & Benhayoun, 2022). As a blockchain-based technology, cryptocurrencies comprise a protocol, network and data combined to constitute a distributed
ledger technology system (Steinmetz, von Meduna, Ante, & Fiedler, 2021). Cryptocurrencies also include tokens which are native assets based on a specialized blockchain. Tokens are related to a blockchain and coexist with its original currency, but they fulfill no essential purpose in managing the distributed ledger technology system. Instead, they may be readily designed to fill specialized objectives in software systems, making them useful in various use situations (Zhao & Zhang, 2021). Several projects issued different tokens to fill in exchange for funding, leading them to a speculative form of assets (García-Monleón, Danvila-del-Valle, & Lara, 2021).

Cryptocurrencies were invented to conduct transactions and fill currency functions (Albayati, Kim, & Rho, 2020). Nevertheless, these assets find it challenging to perform this role. The currencies developed over the centuries verify at least one of the following characteristics in its three organized, hierarchical and ethical components. Bitcoin and the other cryptocurrency products that appeared in its wake do not have these attributes (Angel & McCabe, 2015), which could compromise the economic maintenance mission and financial stability, particularly inflation control, vested in central banks. These crypto-assets took an essential place in payment instruments, leaving the regulator with reduced means of action to control the money supply (Kiviat, 2015). As units of account, they are uncertain; as intermediaries of exchanges, they are imperfect; and as stores of value, they are risky. Limited, energy-intensive and without underlying assets are similar to speculative investments with volatile value (Ciaian, Rajcaniova, & Kancs, 2016). While cryptocurrency technologies trigger excitement for some users, it arouses criticism and opposition from others. These debates go beyond the mere situation and justify questioning their use. Initially, Bitcoin was considered a way to break free from the government, wondering whether this constitutes a new belief or a new rethinking issue. Libertarians favor reducing or even disappearing the state and taxes for free and voluntary cooperation between individuals. Thus, Bitcoin would allow it to break free from powerful, invasive and intrusive state structures, allowing users to create a space of unrestricted freedom.

Consequently, it would arouse political response to increasingly important disapproval of the liberal political model. Criticism is also related to the various scandals surrounding its use in illicit activities or objects such as drugs and weapons. Nevertheless, the Bitcoin denunciation is linked to the dizzying increase in its value in a few months and high volatility. These specific attributes of Bitcoin have raised several religious and ethical concerns (Pazaitis, De Filippi, & Kostakis, 2017).

According to the classic approach to money, the instrument of exchange is only recognized within a community because of each person’s legitimacy. The sociological theory of money goes further and considers that confidence in the exchange capacity of the money goes beyond the framework of interpersonal relationships. Modern coins no longer have any intrinsic or material value leading to continued trust or acceptance of the medium of exchange and its attractiveness as a store of value (Yelowitz et al., 2015). The approval they can inspire varies between investors who express different behaviors and ideologies. Therefore, it is crucial to investigate the contribution of religiosity in accepting cryptocurrency investments. Several works have explored the factors that can affect the acceptance of cryptocurrencies in general (Huang et al., 2023) and Bitcoin in particular. The acceptance of Bitcoin as a new digital innovation has been examined by several studies in various fields using many theories, such as the technology acceptance model (TAM) (Folkinshteyn & Lennon, 2016) and the unified theory of acceptance and use of technology (Venkatesh, Morris, Davis, & Davis, 2003). They validated the theoretical notions using surveys. However, survey data are not very useful for investigating cryptocurrency perception determinants for various reasons. Cryptocurrencies are complex, developing technologies that need the expertise of specialists.

Furthermore, questionnaire responses are primarily opaque and skewed, leading to biased observations (Hong & Page, 2004) and disregarding the heterogeneity in actors’ beliefs and
The exploration of big data in general and social media analysis has been proven to be of great importance in analyzing the perception of both investors and bank customers (Illia, Colleoni, & Meggiorin, 2021). Specifically, academic and scientific investigations have focused on detecting attention and consumer attitudes using search volume generated by Google Trends (Anastasiou, Bragoudakis, & Giannoulakis, 2021). The amount of information that must deal with is quickly growing, primarily due to the development of the information sector, particularly the World Wide Web and mobile Internet. To a certain extent, users can use the Internet to find the information they seek. Searchers find a quick and easy approach to locating the most relevant and interesting information, given the wide availability and proliferation of data. There is still no discussion on the usability of the information search process in detecting users’ perceptions. Thus, this study used a specific framework that enables search inquiries to analyze and discuss the personalized behavior of users. Despite the vast body of literature on the TAMs, there is a lack of studies on integrating religiosity in the acceptance of cryptocurrency models. Motivated by this literature gap, this work addressed this issue by identifying the acceptance of this technology through search volume queries as illustrated in Figure 1.

In fact, the significant influence of religiosity on the use of cryptocurrencies highlights the need for a nuanced and culturally sensitive approach to designing and promoting digital assets. Consequently, businesses and policymakers must understand their target audience’s cultural and religious values, which can help them develop effective marketing and outreach strategies and policies sensitive to the needs and values of different religious groups. In addition, religious individuals may lack understanding or awareness about the potential benefits and risks of using cryptocurrencies. Education and awareness campaigns could help individuals make informed decisions about using digital assets. Besides, addressing these concerns and promoting the ethical use of digital assets could help to build trust and confidence among religious individuals.

Furthermore, religious institutions could play a role in promoting the use of cryptocurrencies among their followers. Collaboration with religious leaders and

**Source(s):** Author’s work
institutions could help to build trust and awareness among religious individuals and could help to promote the ethical use of digital assets. Finally, specific spiritual needs or use cases may be addressed by designing cryptocurrencies.

This paper summarizes previous studies on cryptocurrency and blockchain acceptance and constructs in section 2 and derives the related hypothesis. The proposed methodology is detailed in section 3. The following section presents and discusses the results. Section 5 closes the research with a brief conclusion and implications.

2. Related theories, studies and hypotheses development

Janssen et al. (2015) outlined four primary lines of cryptocurrency research: technical, economic, regulatory and social science. Technical features of the study on Bitcoin dominate, while mining user behavior studies were the least explored. The prominence of cryptocurrencies in society is directly proportional to their level of acceptance. Some studies have looked at the status of cryptocurrency acceptance. They generally focused solely on Bitcoin using surveys and reviews based on the variants of the TAM. To a limited extent, the related studies analyze the consumers’ sociodemographic features and usage behavior by investigating surveys and interviews. This limitation has triggered our motivation to explore the effect of religiosity on the acceptance of cryptocurrencies. For this purpose, we proceed with our research by enumerating related theories and empirical investigations in this context, giving issues to extract the emanating research gaps and suggesting new contributions to our study.

Based on an extension of the TAM model, Yelowitz et al. (2015) studied Indonesian users’ perception of Bitcoin application through a conceptual model. In the same way, Albayati et al. (2020) investigated the acceptance of cryptocurrency use in financial transactions by customers. They demonstrated that the powerful constructs are the experience and the regulatory support in enhancing customers’ trust in blockchain and cryptocurrency applications. These results align with those of Mendoza-Tello, Mora, Pujol-López, and Lytras (2019), who have also investigated the strength of each TAM factor in defining the acceptance of cryptocurrency technology. Through a fuzzy analytical framework, Gupta, Gupta, Mathew, and Sama (2021) explored an extended model of the technology acceptance theory to prioritize the investors’ intentions. They revealed that social influence is the most impactful factor that drives the intention to use cryptocurrencies. Although these extended TAM models consistently determine user intention, responses are often biased. In other words, the answers may lack frankness and honesty for different reasons, including respect for socially acceptable and concern for protecting their Privacy. For these reasons, we propose using the search volume query data from Google Trends as the central database. In fact, these data were employed by Yelowitz and Wilson (2015) to identify the use of cryptocurrencies such as speculative matters, criminal acts by libertarians, or computer programming.

Other studies have focused on the influence of religiosity and culture on the intention to use innovative technologies (Abou-Youssef, Kortam, Abou-Aish, & El-Bassiouny, 2015; Dey, Balmer, Pandit, & Saren, 2018). Nevertheless, it is crucial to highlight the difference between religiosity and religion. Gauthier (2017) defines religion as a construction designed to provide dedicated lighting re-entering social facts capable of interpreting heuristics. However, religiosity refers to personal appropriations, behaviors, subjective meanings and experiential dimensions of religion (Bhuian, Sharma, Butt, & Ahmed, 2018). Singh, Sharma, Sharma, and Dwivedi (2021) have explored the concept of religiosity in the theory of planned behavior (TPB). The exploration of this construct has been widened by distinguishing between extrinsic and intrinsic religiosity in the context of planned behavior theory (Singh et al., 2021).

Nevertheless, the religiosity factor was quantified to study Christian religiosity (Yeung, 2019; Hayward, 2021). The interest in religiosity investigation with Google Trends has increased during the pandemic periods (Hayward, 2021). Consequently, this paper proposes
to study the factors that influence the intention of cryptocurrency applications through an extension of the TAM model using Google Trends and search query volumes. Accordingly, several studies have justified the effect of religiosity on user intention and behaviors (Bhuian et al., 2018; Graafland, 2017; Wang, Wang, Li, & Zhou, 2020).

Using the technology acceptance theory, Brossard, Scheufele, Kim, and Lewenstein (2009) have demonstrated that religiosity is negatively related to nanotechnology attitudes and intentions. Therefore, religiosity is employed as the first construct in the proposed model capable of formulating the first hypothesis of this research as follows:

\[ H1. \text{Religiosity has a significant influence on cryptocurrency users' intention} \]

The perceived usefulness (PU) is the second construct of the proposed model, and the fundamental factor in the TAM defined as the degree to which a consumer believes that the use of this new technology would improve his performance in a specific job (Davis, 1989). In this study, this second construct refers to users choosing to adopt cryptocurrency technology by enhancing their performance in use. In other words, the PU focuses on the cryptocurrency technology characteristics and how the user perceives the usefulness of these characteristics compared to other technologies. For this reason, we will study which features make cryptocurrencies more useful in transactions from the users’ viewpoints and opinions. The most significant characteristics of cryptocurrencies that may change the user perception of this technology’s usefulness are summarized in Table 1.

<table>
<thead>
<tr>
<th>Cryptocurrency characteristics</th>
<th>References</th>
<th>Factor loading</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shareability</td>
<td>Bitcoin is accessible and shareable, which chronologically records all digitally signed and non-reputable transactions as they occur, as well as programs allowing the automatic and conditional execution of certain transactions (Pazaitis et al., 2017)</td>
<td>0.947</td>
<td>10.268</td>
</tr>
<tr>
<td>Decentralization</td>
<td>Bitcoin operates in a decentralized manner, in other words, without any authority to issue, regulate or control it (regulators), and without intermediaries ensuring its transactions (Nguyen, Nguyen, Nguyen, &amp; Pham, 2019)</td>
<td>0.545</td>
<td>1.663</td>
</tr>
<tr>
<td>Privacy</td>
<td>Bitcoin makes it very easy to transfer value from anywhere and gives you control over your money. Such functions also involve significant security risks. At the same time, Bitcoin can offer a very high level of security if used correctly (Zaghoul et al., 2020)</td>
<td>0.456</td>
<td>1.474</td>
</tr>
<tr>
<td>Security</td>
<td>Zaghoul, Li, Mutka, and Ren (2020)</td>
<td>0.828</td>
<td>3.471</td>
</tr>
<tr>
<td>Scalability</td>
<td>Jacquet and Mans (2020)</td>
<td>0.639</td>
<td>1.996</td>
</tr>
<tr>
<td>Reliability</td>
<td>Nguyen et al. (2019)</td>
<td>0.395</td>
<td>1.413</td>
</tr>
<tr>
<td>Availability</td>
<td>Weber et al. (2017)</td>
<td>0.796</td>
<td>2.723</td>
</tr>
<tr>
<td>Authentication</td>
<td>Zaghoul et al. (2020)</td>
<td>0.201</td>
<td>1.153</td>
</tr>
<tr>
<td>Trust</td>
<td>Yelowitz et al. (2015)</td>
<td>0.927</td>
<td>8.578</td>
</tr>
<tr>
<td>Auditability</td>
<td>Vincent and Wilkins (2020)</td>
<td>0.475</td>
<td>1.854</td>
</tr>
<tr>
<td>Transparency</td>
<td>Steinmetz et al. (2021)</td>
<td>0.196</td>
<td>1.283</td>
</tr>
<tr>
<td>Fraud and corruption</td>
<td>Chong (2021)</td>
<td>0.490</td>
<td>1.453</td>
</tr>
<tr>
<td>Reduced cost</td>
<td>Schmidt and Wagner (2019)</td>
<td>0.956</td>
<td>13.635</td>
</tr>
<tr>
<td>Performance</td>
<td>Mnif and Jarboui (2021)</td>
<td>0.806</td>
<td>3.236</td>
</tr>
</tbody>
</table>

**Source(s):** Author’s work

Table 1. Cryptocurrency characteristics
Several academic studies have widely explored the interaction between PU, intention and religiosity (Davis, 1989; Graafland, 2017; Shaikh et al., 2020; Usman, Mulia, Chairy, & Widowati, 2020). Consequently, we propose to study these interrelations according to two hypotheses:

In the same way, Koeswandana and Sugino (2023) investigated the social and religious factors that impact individuals’ willingness to use cryptocurrency. For this purpose, they employed self-determination theory (SDT) and the TPB. By analyzing the data from 100 respondents, they found that Islamic financial literacy do not affect individuals’ willingness to use cryptocurrency. However, a positive correlation was found between individuals’ attitude and their intention to use cryptocurrency. They also showed that an individual’s level of religiosity and subjective norms could influence their attitude toward cryptocurrency use.

**H2.** Religiosity exerts an influence on the PU of cryptocurrency users’

**H3.** Religiosity has a considerable effect on the perceived ease of use (PEOU) of cryptocurrency users’

PEOU is the second crucial factor in the TAM, defined as the degree of used effort with this new technology (Davis, 1985). Accordingly, the proposed model identifies this factor as the degree to which an individual perceives cryptocurrency as an easy and effortless innovation to use (Davis, 1989).

In this context, Arli, van Esch, Bakpayev, and Laurence (2021) studied the importance of consumer knowledge of cryptocurrencies, trust in government and transaction speed in affecting consumers’ trust in cryptocurrencies. The study involved a cross-sectional online survey with 451 MTurk workers, who were given a small monetary incentive for their participation, and cryptocurrencies were used as the focal product category. The study found that consumers’ understanding and knowledge of cryptocurrencies play a vital role in their trust and investment in cryptocurrencies. The study also suggests that consumers are more likely to trust cryptocurrencies and their peer-to-peer transactions if they are regulated by their respective governments and take place via a central issuer.

The PEOU construct is revealed to affect PU significantly and intention to use cryptocurrency technology (Grover, Kar, Janssen, & Ilavarasan, 2019; Mnif, Lacombe, & Jarbouï, 2021; Mnif, Mouakhar, & Jarbouï, 2021). In the same context, the effect of religiosity on the PEOU is revealed and demonstrated by (Usman et al., 2020).

For this reason, we propose to test the following assumptions defined as:

**H4.** PEOU influence cryptocurrency’s PU.

**H5.** PEOU has an impact on cryptocurrency users’ intention.

**H6.** PU positively impact cryptocurrency users’ intention.

### 2.1 Methodology

The TAM is a widely used theoretical framework for studying the adoption and use of new technologies. It has been used in numerous studies across different contexts and industries to examine the factors influencing user acceptance of new technologies. Studying the influence of religiosity on the acceptance of cryptocurrencies can generate a better understanding of the underlying factors that shape religious individuals’ attitudes and behaviors toward using cryptocurrencies (Koeswandana & Sugino, 2023). The TAM focuses on two primary factors driving technology adoption: PU and ease of use. By examining these two factors in relation to religious beliefs and practices, we can identify how religiosity influences cryptocurrency adoption. Additionally, the TAM provides a structured approach to understanding the complex interactions between factors that influence technology adoption.
Nevertheless, partial least squares structural equation modeling (PLS-SEM) and search engines can be used to analyze religiosity’s influence on the acceptance of cryptocurrencies. PLS-SEM can be used to identify the strength and direction of relationships between variables and estimate the direct and indirect effects of variables on each other. In studying the influence of religiosity on the acceptance of cryptocurrencies, PLS-SEM can help identify the variables most strongly associated with these constructs and provide insights into the underlying relationships between them. Search engines can also be useful in analyzing the influence of religiosity on the acceptance of cryptocurrencies. By analyzing search engine data, researchers can gain insights into the types of queries individuals search for related to religiosity and cryptocurrencies. Additionally, search engine data can provide a real-time snapshot of the popularity of different search terms, allowing researchers to track changes in attitudes and behaviors over time. Therefore, using PLS-SEM to analyze the underlying relationships between religiosity, acceptance of cryptocurrencies and other relevant variables and combining this with search engine data, we can gain a more nuanced understanding of the factors that shape attitudes toward cryptocurrencies among religious groups. This study is conducted through a research paper using an hypothetico-deductive approach.

The TAM is still a viable model for researching the acceptance of technological advancements, and it has been used to investigate cryptocurrency perception (Albayati et al., 2020; Nuryyev et al., 2020; Mnif, Mouakhar et al., 2021). To quantify the constructs of the proposed model, we employ the Google Trends data, and the cryptocurrency prices (Bitcoin (BTC), Ethereum (ETH), Ripple (XRP) and Litecoin (LTC)) retrieved from the www.coinmarketcap.com website in weekly frequencies during the period post-pandemic outbreak (after 31/12/2019).

The sample size of the data is about 3646 observations of each variable. The data are extracted from the “Google Trends” database in daily frequencies from 01/01/2018 to 31/12/2022.

Google Labs provide the frequency with which a term has been typed in the Google search engine, with the possibility of visualizing this data by region and by language. In other words, Google Trends shows search trends for a keyword specific to an area or language. It acts as a sort of research frequency calculator.

There are some potential advantages of using Google Trends over interviews when exploring the relationship between religiosity and intention to use cryptocurrency. First, Google Trends provides a large and diverse data set covering various locations and periods which can help identify patterns and trends that may be difficult to detect through interviews, especially when dealing with large or dispersed populations. Second, Google Trends provides real-time data, which can help track changes in attitudes and behaviors over time, especially when studying a topic as dynamic as cryptocurrencies, where attitudes and perceptions can change rapidly in response to new developments and news events. Third, Google Trends data are anonymous, which can help reduce bias and social desirability effects that may be present in interviews. Individuals may be more likely to provide socially desirable answers in interviews, which can affect the validity and reliability of the data.

Google Trends offers four keyword research filters for better optimization. Specifically, it identifies searches by Category. Google Trends provides 25 categories of trend research in various fields and themes related to the keyword sought. In particular, religion with subcategories is capable of leading our analysis.

Consequently, we quantify the religiosity construct by introducing the term “cryptocurrency” and applying the religion category filter. The obtained measurement with Islam, Christianity, Judaism, Hinduism and Buddhism filters will constitute the corresponding items of the latent variable “religiosity”.

The influence of religiosity
The second construct is the PU associated with cryptocurrency characteristics (Mnif, Lacombe et al., 2021). Therefore, each attribute from Table 1 will constitute an item related to the PU variable. After that, we introduce each characteristic into Google Trends and retrieve the measurement of each term.

The next factor of the proposed model is the PEOU that corresponds to the use cases of cryptocurrencies, as identified by Grover et al. (2019). Therefore, as delimited by Steinmetz et al. (2021), each use case will constitute an item related to the PU variable. These items are payments, speculation, investment, criminal acts, concealment of activities, utility and services, financing and voting. Subsequently, we introduce each use case into Google Trends and retrieve the measurement of each term.

Finally, the intention of use is identified using the potential cryptocurrency with the highest trading volume and market capitalization, which are Bitcoin (BTC), Ethereum (ETH), Ripple (XRP), and Litecoin (LTC). Each corresponding price will constitute an item dealing with the intention variable.

3. Measurements validity and results

3.1 Measurement consistency

The empirical part of this research employs the PLS-SEM, a variance-based SEM, and the two-step approach to validate the proposed hypothesis as recommended by Marcoulides, Saunders, and Marcoulides (2016). This multivariate statistical approach is used in this research by applying SmartPLS 3.3 software. PLS enables the simultaneous evaluation of both the outer and inner models. Furthermore, PLS may comply with normality using the sophisticated predictive research model and provide a more flexible randomness requirement (Chen & Hung, 2016). Besides, we choose to use PLS-SEM because the statistical goal is prediction rather than theory confirmation (Hair, Risher, Sarstedt, & Ringle, 2019). Based on the steps indicated by Hair et al. (2019), we perform our analysis by checking each item’s factor loading, which should be greater than 0.5. As shown in Table 1, some items do not comply with this condition, leading to their removal from the model.

Consequently, the items authentication, audit, fraud, privacy, reliability and transparency related to the PU were dropped. Besides, three items related to the PEOU are deleted: vote, speculation and concealment of activities. In each construct, all standardized factor loadings of pointer variables were more than 0.5 and significant at 5%, matching the further investigation criteria (as shown in Table 1). Furthermore, we remove all items with a VIF value greater than 3.3 to avoid multicollinearity problems. In the second step, we focus on the discriminant and convergent validity of the selected measurements. The internal consistency of measurements is examined by calculating the alpha of Cronbach, the composite reliability. As reported in Table 2, all these constructs are greater than 0.7 and verify the internal consistency level (Bagozzi & Yi, 2012).

The convergent validity of measurement is assessed using the average variance extraction (AVE), which values should be higher than 0.5 as recommended by Hair et al. (2019). We ensure the discriminant validity for more robustness by verifying whether the squared root of each construct’s AVE value is greater than the correlation with other constructs (Fornell and Larcker, 1981), as detailed in Table 3.

3.2 Model estimation

We propose a conceptual model in Figure 2 and a multiple regression model by following Usman et al. (2020).
The multiple regression model can be formulated based on the empirical framework of Usman et al. (2020):

\[
\text{INT} = \alpha_0 + \alpha_1 \times \text{PEOU} + \alpha_2 \times \text{PU} + \alpha_3 \times \text{RELG} + \alpha_4 \times \text{RELIG} \times \text{PU} \\
+ \alpha_5 \times \text{RELIG} \times \text{PEOU} + \alpha_6 \times \text{PEOU} \times \text{PU} + \alpha_7 \times \text{RELIG} \times \text{PEOU} \times \text{PU}
\]

\[
\text{INT} = \alpha_0 - 0.457 \times \text{PEOU} + 0.531 \times \text{PU} + 0.664 \times \text{RELG} + 0.174 \times \text{RELIG} \times \text{PU} \\
+ 0.893 \times \text{RELIG} \times \text{PEOU} + 0.136 \times \text{PEOU} \times \text{PU} + 0.283 \times \text{RELIG} \times \text{PEOU} \times \text{PU}
\]

Where:

- INT: Intention to use cryptocurrencies.
- PEOU: Perceived ease of use
- PU: Perceived usefulness
- RELIG: Religiosity

To ensure the model coefficients from any bias, we proceed by verifying data for the thread of common method bias and multicollinearity issues, as few sources of information assessed all measures. For this purpose, we calculate each construct’s variance inflation ratio (VIF), which value should not exceed 0.5 (Hair et al., 2019). The empirical results show that the VIF value of all indicators in the model is less than 5, indicating non-collinearity.

To check the goodness of the model fit, we calculate the standardized root mean square residual (SRMR) and root mean square error of approximation (RMS) theta, which should be less than 0.08, and close to zero (0.12) (Henseler et al., 2014). The obtained SRMR and rms theta in this study are respectively 0.08 and 0.165, giving an acceptable level of model fit accuracy.

The path coefficients, significance levels and \( t \) values are examined using bootstrapping with 5,000 sub-samples. The empirical findings show that all path coefficients are significant, confirming that our hypotheses are valid (Table 4).

### Table 2. Measurement reliability and validity

<table>
<thead>
<tr>
<th>Construct</th>
<th>Number of items</th>
<th>Cronbach’s alpha</th>
<th>Composite reliability</th>
<th>Average variance extracted (AVE)</th>
<th>Loading factors estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>4</td>
<td>0.829</td>
<td>0.888</td>
<td>0.669</td>
<td>0.656–0.929*</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>6</td>
<td>0.826</td>
<td>0.875</td>
<td>0.544</td>
<td>0.572–0.839*</td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>5</td>
<td>0.884</td>
<td>0.918</td>
<td>0.696</td>
<td>0.575–0.948*</td>
</tr>
<tr>
<td>Religion</td>
<td>5</td>
<td>0.889</td>
<td>0.919</td>
<td>0.694</td>
<td>0.756–0.875*</td>
</tr>
</tbody>
</table>

**Note(s):** *All coefficients are significant at 5% level

**Source(s):** Author’s work

### Table 3. Fornell-Lacker validity measurement results

<table>
<thead>
<tr>
<th>Construct</th>
<th>Intention</th>
<th>Perceived usefulness</th>
<th>Perceived ease of use</th>
<th>Religion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intention</td>
<td>0.818</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>0.691</td>
<td>0.737</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>0.602</td>
<td>0.889</td>
<td>0.834</td>
<td>0.833</td>
</tr>
<tr>
<td>Religion</td>
<td>0.709</td>
<td>0.860</td>
<td>0.893</td>
<td>0.833</td>
</tr>
</tbody>
</table>

**Source(s):** Author’s work
Overall intention to use cryptocurrency is positively impacted by both religiosity and PU, with the former having a bigger influence. However, the PEOU has an unfavorable influence on intention. Nevertheless, religiosity exerts a considerable positive effect on respectively PEOU, intention and PU. These results align with previous studies on the effect of religiosity on PEOU and technology acceptance in periods of pandemics (Faturohman et al., 2021; Shuai, 2016).

Similarly, the PEOU has a moderate positive impact on the PU. The association between religiosity PEOU has the highest coefficient value. The findings also show that the structured...
model has explanatory power for intention \((R^2 = 0.561)\) and a considerable explanatory power for both \(PU\) \((R^2 = 0.811)\) and \(PEOU\) \((R^2 = 0.798)\), as shown in Figure 3.

Besides, the indirect effect and specific influence are examined for better path understanding, as expressed in Table 5.

Religion negatively impacts intention through \(PEOU\) and positively affects intention through \(PU\). Overall, religion has a positive effect on intention. These findings align with most studies that explored the indirect effects of religiosity through \(PU\) and \(PEOU\) (Usman et al., 2020).

Nevertheless, some use cases of cryptocurrencies such as criminality can discourage the users’ intentions through religious constraints.

3.3 Robustness check
The issue of endogeneity causes severe problems in all regression-based approaches, especially in PLS-SEM models. Endogeneity problems occur when an independent construct is omitted from the model and correlates with the dependent factor and one or more independent variables (Hair et al., 2019). Besides, endogeneity issues can occur when a

<table>
<thead>
<tr>
<th>Construct</th>
<th>Intention</th>
<th>PU</th>
<th>PEOU</th>
<th>Rel</th>
<th>Specific indirect effects</th>
<th>Intention</th>
<th>PU</th>
<th>PEOU</th>
<th>Rel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion</td>
<td>0.036</td>
<td>0.532</td>
<td>–</td>
<td>–</td>
<td>Religion (\rightarrow) PEOU (\rightarrow) Intention</td>
<td>–0.420</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>PEOU</td>
<td>0.316</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Religion (\rightarrow) PU (\rightarrow) Intention</td>
<td>0.174</td>
<td>0.531</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Intention</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Religion (\rightarrow) PEOU (\rightarrow) PU (\rightarrow) Intention</td>
<td>0.136</td>
<td>–0.154</td>
<td>0.596</td>
<td>–</td>
</tr>
</tbody>
</table>

Source(s): Author’s work

Table 5. Indirect, specific, and total effects
predictor construct is correlated with the error term of the dependent construct to which it is related (Sarstedt et al., 2020). In other words, when religion, PEOU, or PU constructs explain the intention and its error term, the model is misleading.

Gaussian copula approach is tested in Rstudio as implemented by (Huit et al., 2018). To perform this approach, we compute the Gaussian copula score by calculating the standardized composite scores of intention, PEOU, religion and PU, which should be insignificant ($p > 0.1$) to ensure the low critical level of endogeneity. Seven different models are estimated. In the first model, we include the copula of religion (intention $\sim$ religion + PU + PEOU + REL_star + 0). The copula REL_star is introduced as an independent variable that controls the correlation between religion and the error term in the regression. The coefficient of REL_star should not be significant. In the second, the copula of PU is introduced, while in the third one, the copula of PEOU is studied. In the fourth, fifth and sixth models, we involve copulas of religion and PU together, religion and PEOU and PU and PEOU, respectively. In the last model, copulas of religion, PU and PEOU are introduced as suggested by Huit et al. (2018). Table 6 reports the results and confirms that the proposed model does not suffer from endogeneity biases because all the estimated copulas are insignificant.

4. Conclusion
4.1 Discussion
This paper explores the influence of users’ perception of cryptocurrency technologies. TAM is adopted to the cryptocurrency context by introducing religiosity as an independent variable and studying its effect on the PU and PEOU. Search volume queries are retrieved from the Google Trends engine in the context of cryptocurrency worldwide and during the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>p-value</th>
<th>Value</th>
<th>p-value</th>
<th>Value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td>Religion</td>
<td>0.0027</td>
<td>0.0695*</td>
<td>0.0004</td>
<td>0.775</td>
<td>0.00054</td>
<td>0.715</td>
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<tr>
<td>PEOU</td>
<td>0.4247</td>
<td>0.013**</td>
<td>0.925</td>
<td>0.112</td>
<td>0.1174</td>
<td>0.462</td>
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<tr>
<td>PU</td>
<td>0.6905</td>
<td>0.0004**</td>
<td>0.8207</td>
<td>1.6e-06</td>
<td>1.0163</td>
<td>2.87e-05**</td>
</tr>
<tr>
<td>REL_star</td>
<td>0.4594</td>
<td>0.153</td>
<td>0.2807</td>
<td>0.146</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>PEOU_star</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>PU_star</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>0.2181</td>
<td>0.228</td>
</tr>
</tbody>
</table>

Table 6. Robustness check

**Note(s):** Significance levels: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘’

**Source(s):** Author’s work
period of the COVID-19 pandemic. Four constructs are used to predict the intention to use cryptocurrency technology: religion, PU and PEOU. The methodology is built on the PLS-SEM estimation model to check the validity of six hypotheses and test the conceptual model. For this purpose, inner and outer models’ reliability, validity and consistency are studied. The analysis showed that all constructs (religion, PEOU, PU and intention) are consistent and free of common bias and multicollinearity issues. Endogeneity problems are verified to give more accurate results.

The empirical findings showed that all path coefficients are significant, confirming that our hypotheses are valid. Overall, intention to use cryptocurrency is significantly influenced by religiosity, PU and PEOU, with the former having the biggest influence. More specifically, religiosity has a considerable effect on PU, PEOU and intention. These results present important implications as they indicate that the variant kinds of religion affect the overall intention to use cryptocurrencies. This makes sense because most religions usually focus on ethical issues and target social well-being and prosperity. In particular, investment and innovations are the most encouraging tools to develop more. However, these technologies should not harm social and environmental stability (Roiland, 2016; Raggiotto, Mason, & Moretti, 2018).

Furthermore, the intention is negatively influenced by PEOU. This result satisfies the expectations as the PEOU contains items that contradict morality and religiosity, such as the use of cryptocurrencies in criminal acts and speculation matters. This may explain the negative indirect effect between religiosity and intention through PEOU. These results align with those of Bukhari et al. (2019) and are in line with Bentzen (2021), who studied the impact of religiosity on user behavior during the COVID-19 pandemic. Similarly, the PEOU has a moderate positive impact on the PU. Most previous studies confirm these links (Davis, 1989; Grover et al., 2019; Alqaryouti, Siyam, Alkashri, & Shaalan, 2020), particularly during the COVID-19 pandemic (Faturohman et al., 2021). The association between religiosity PEOU has the highest coefficient value. This empirical finding is with high expectancy as religious rules and laws confirm or reject the transaction’s compliance or the technology by judging the case in which it is used (Shaikh et al., 2020). In the same way, the intention to use cryptocurrencies is positively affected by the PU, which aligns with several previous findings in the literature, such as Poustchi and Dehnert (2018), who explored the characteristics of digital transactions in retail banking. Besides, our results confirm those of Neuts, Romão, Van Leeuwen, and Nijkamp (2013), who found that electronic services characteristics positively influence consumer satisfaction in the travel industry.

4.2 Theoretical, managerial and practical implications

In this paper, several theoretical and managerial implications are observed.

From a theoretical perspective, this work has proposed and tested a conceptual model for identifying the impact of religion, PU and PEOU on users’ perception of cryptocurrency technologies. This is a unique contribution because previous studies investigating the relationships between the technology acceptance constructs rarely extend their model with religiosity. Even though the influence of religiosity is employed indirectly or through a moderating effect (Usman et al., 2020), this work investigates this effect by treating religiosity as an independent variable.

Besides, our results complement the literature by combining data from the Google Trends and cryptocurrency prices to identify four primary constructs related to an extended TAM model: PU, PEOU, intention and religion. Furthermore, we have extracted the characteristics of cryptocurrencies and their use cases from the literature to build the PU and PEOU, respectively.
The literature research suggests that cryptocurrency acceptance is ambiguous (Steinmetz et al., 2021). Integrating our findings on religiosity, PU, PEOU and intention with the literature is challenging because of the data design novelty and methods.

The third contribution of this research is illustrated in the extension of the analysis through multiple relationships and indirect impacts.

From a managerial perspective, this work presents several managerial implications. In fact, most cryptocurrencies have performed during the COVID-19 pandemic (Mnif, Jarboui, & Mouakhar, 2020) due to social distancing restrictions leading to the encouragement of digital transactions. Therefore, exploring the acceptance of cryptocurrencies through the PU and PEOU is substantial for these technology developers. Hence, managers in cryptocurrency projects should seek ways to ensure that users perceive their products as easy to use. Furthermore, in this research, we have identified the most notable characteristics that are more searched and familiar to users. Managers can, therefore, develop and improve these characteristics. This assumption requires further validation by another future investigation.

From a practical perspective, this research offers valuable instructions and guidelines for cryptocurrency users and politicians to enhance sustainability and protect social well-being from the threat of cryptocurrency use in criminal acts or immoral transactions. It also provides new, valuable information on the influence of religiosity on their acceptance. The results show that it plays a crucial role in influencing PU, PEOU and intention. Therefore, policymakers might recognize its importance and eliminate that religion-related prejudice (Li and Xu, 2020).

4.3 Recommendation for future perspectives
The impact of religiosity on cryptocurrency acceptance can be explored in greater detail by conducting a larger-scale survey. This could involve surveying individuals across different age groups, religious backgrounds and geographic regions to get a more comprehensive understanding of how religiosity influences cryptocurrency acceptance.

In addition, it may be useful to include additional variables in the analysis to understand the impact of religiosity on cryptocurrency acceptance such as education level, income and cultural background. Moreover, alternative methods can be used such as experiments or observational studies may provide a more robust understanding of the impact of religiosity on cryptocurrency acceptance. Cryptocurrency acceptance varies widely across different regions of the world, and religiosity also plays a significant role in shaping attitudes and behaviors in different cultures. Therefore, future research could explore how the impact of religiosity on cryptocurrency acceptance differs across different regions and cultures.

References


The influence of religiosity.


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