Digital Currency

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Digital currency has disrupted the financial industry since 2008 with its ability to offer peer-to-peer, faster, cheaper, more secure, more convenient, and efficient payment systems that can outpace traditional banking systems. Today, digital currencies are recognized as alternative methods of currency exchange and are used in many financial transactions, with people using digital currencies for profitable investment.

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1. Digital Currency

Digital currency has disrupted the financial industry since 2008 with its ability to offer peer-to-peer, faster, cheaper, more secure, more convenient, and efficient payment systems that can outpace traditional banking systems. Today, digital currencies are recognized as alternative methods of currency exchange and are used in many financial transactions, with people using digital currencies for profitable investment [1][2].

Digital currencies such as Bitcoin, Ethereum, and Ripple are emerging as new forms of money and currencies in general. Both digital and traditional currencies can be used to mediate exchanges, preserve asset value, and act as account control units [3][4]. Bitcoin was the first digital currency introduced in 2009. On 22 May 2010, two pizzas were purchased for 10,000 bitcoins for the first time. At that time, each Bitcoin was worth USD 0.0025. That day is known as “Bitcoin Pizza”, in which a real person paid 10,000 bitcoins to buy two pizzas worth approximately $25 [5]. In the second week of May 2021, the same 10,000 Bitcoins were worth more than 500 million dollars. The rise of digital currency has expanded into the business of digital wallets and currency exchange platforms and has introduced platforms that enable investors to trade digital currency [6].

Unlike Fiat currencies, digital currencies have no centralized reference. All transactions are validated by a network of volunteering nodes (miners) and are subsequently registered in the blockchain distribution office after a collective agreement [7]. The ultimate goal of digital currency is to become an alternative payment system that complements or competes with conventional payment systems. Regardless of whether such a goal is achievable, some digital currency performances have prompted competent authorities of some EU countries to grant licenses to digital currency exchange institutions.

Digital currency is an advanced innovation in the field of FinTech and is a universal connection point for many different services and technologies. This evolution has led to a series of public events worldwide [8]. The

fundamental cryptocurrency markets are similar to stock markets. However, analysis shows that the digital currency market is more fragile than the stock market, and it is now considered a high-risk financial market [8][9].

2. Digital Currency Exchanges

Digital currency exchanges are often targeted and compromised by cyber-attacks, leading to significant losses for depositors and closure of affected exchanges. These threats pose major risks to the lives of public blockchain ecosystems [10].

Digital currency exchanges allow users to buy and sell digital currency. Exchanges play a vital role in the digital currency ecosystem by providing a marketplace for trading, liquidity, and price discovery [11][12]. Many exchanges only offer digital currency trading services, while others support Fiats for digital currency transactions [13][14].

Similar to the stock market, people invest in digital currency exchanges to take advantage of digital currency price changes (if favorable). There are three types of digital currency exchange platforms: centralized exchanges (CEX) managed by a company or organization, decentralized exchanges (DEX) that provide an automated process for peer-to-peer transactions, or a combination of both CEX and DEX [15][16]. Hundreds of digital currency exchange platforms are emerging to facilitate the trading of digital assets as an essential ecosystem in trading platforms. In addition, the market attracts attackers. Many scam attacks on digital currency exchange platforms have resulted in significant financial losses [17].

Digital currency markets have remained attractive. Exchanges are primarily used for commercial profit. However, these trades face certain treatment from traders during their fluctuations and liquidity [9]. Digital currency trading on current digital exchange platforms is a trust-based process in which the parties involved in the exchange must have complete trust in the service provider. It has been proven several times that this trust can lead to fraud, theft of funds, or, for some reason, service providers simply disappear; other times, there may be hacks on platforms that voided digital assets [18][19].

3. Cryptocurrency

Cryptocurrencies have a history of poor security, and it is claimed that more than one-third of the exchanges were in jeopardy [20][21]. After being compromised, attackers can copy the exchange wallet (a set of private encryption keys) and steal all of its coins [22][23]. Unlike the regular banking system, all theft transactions through the Bitcoin network are irreversible [24]. Bitcoin market capitalization surpassed all other digital currencies in the market. However, its high monetary value makes it an attractive target for cyber-criminals. Hacking campaigns typically target the weakest points in the digital currency ecosystem. The weakest point in the Bitcoin ecosystem is the exchange operation system. As every exchange law violation potentially reduces the market value of Bitcoin by billions of dollars, this is a threat not only to exchanges, but also to the majority of Bitcoin owners [7]. Therefore, the effects of transaction volume and exchange size on the level of security breaches have also been examined.

The general public has no way of accessing sensitive information about the past security history of a digital exchange or its operational mechanism. A computer system that learns from the opinions of other professionals in the discipline (of digital currency trading) can help the public make informed decisions. This research focuses on providing such information through analytic modeling of human experts' opinions. This analytical model is discussed in the following section. A summary of the literature review in related fields is provided in **Table 1**.

Table 1. A Summary of Studies Conducted to Improve the Field of Digital Currencies and Exchanges.

Authors	Descriptions
Alzaatreh and Sulieman [23]	Providing a new location-scale distribution family to understand the distributional characteristics of digital currency return rates
Xia, et al. [17]	Reviewing existing payment protocols and introducing new payment protocols to enhance the exchange of basic payment information
Xia, et al. [17]	Identifying and describing scams in digital currency exchanges
Alonso-Monsalve, et al. [24]	Using convolutional neural network to classify digital exchange rates
Suga, et al. [25]	Checking the security status of digital currency exchanges and determining general management and security instructions
Jang and Lee [26]	Discovering the problems of IDEX and Bithumb exchanges and setting instructions for improving capabilities
Torres, et al. [18]	Determining the basic features of using mathematical modeling systems to predict digital currency rates
Shah, et al. [7]	Identifying pattern of an attack used to exploit Bitcoin currency platforms using an industrial standard to report information on cyber security breaches
Takahashi and Lakhani [27]	Investigating how to achieve the highest security and multi-layer security analysis for digital currency exchange service providers
Aras [28]	Providing analytical insights to help understand digital currency as a financial asset
Czapliński and Nazmutdinova [6]	Examining the efficiency of digital currency markets and examining Kraken, Bitfinex and Bitstamp exchanges
Shih, et al. [29]	Providing a decentralized transaction solution based on smart contracts on the Ethereum network to support users' trust in digital currency providers
Shah, et al. [7]	Examining the problems of digital currency platforms, problems of custody of customer assets and not abusing them
Kim and Lee [30]	Conducting vulnerability analysis of potential digital currency exchanges and users' walletsInvestigating market risk management methods despite the existence of Blockchain

Authors	Descriptions
Sohaib, et al. [31]	Investigating the inflexibility of price changes for 20 digital currency exchanges from 2013 to 2017
Johnson, et al. [32]	Providing an economic model to attract short-term motivations for digital currency exchanges with respect to security investments and transaction costs
McCorry, et al. [33]	Providing a secure theft mechanism to detect theft from exchanges and block withdrawals
Park, et al. [34]	Providing a method of price forecasting and studying the hidden behaviors of investors
Jay, et al. [35]	Identifying the drivers of competition in digital currency transactions
Li and Wang [36][15][37]	Determining the exchange rate of Bitcoin against the US dollar with the help of a combination of time series

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Digital currencies can also be traded as real currencies [38]. Traders can use digital currency exchange facilities to convert digital currencies into tangible and physical money, such as dollars, pounds, or euros [5][28]. The major risk at this stage is that hackers can block or tamper with money flow during conversions [39].

In the past, many people invested in stock markets to earn profits. The emergence of cryptocurrencies has allowed many investors to invest in digital currencies for profit [10][40].

4. Digital Currencies and Blockchain

Digital currencies based on blockchain technologies have difficulties dealing with alternative currencies [11][26]. Digital exchanges have emerged to make buying, selling, and trading digital currencies convenient. The exchange used an online platform that allowed the exchange of digital currencies from one to another based on their current market values. Similar to trading in traditional financial commodities, profit from digital currencies has become more convenient [41][42].

The essential nature of exchange is its ability to trade various digital currencies effectively and conveniently. The exchanges need to offer buying, selling, loss limit, and other typical trading services; therefore, buying and selling the user's digital currency can be convenient and automatic. With the continued expansion of digital currencies, some large exchanges attempted to provide more facilities, including security for users, margin trading capabilities, over-the-counter (OTC) trading, and futures trading.

Margin transactions are transactions in which the user can borrow money up to a certain multifold of her/his current capital, trade with more capital, and return the exchange money once the transaction is complete—either profit or loss. In the case of loss, the exchange may take his/her assets to compensate for the loss [9][40].

However, the OTC market does not have a central physical location. In this market, transactions are made directly between traders without exchange supervision [40]. OTC offices are popular for people who want to sell large

quantities of coins without resorting to exchanges. Currently, many digital currency exchanges offer OTC services.

In digital currency futures trading, the user buys an asset at its future price and deposits his/her money at a time of their choosing. Futures trading allows traders to predict the future asset prices. At the conclusion of a futures trade, both parties involved in the transaction will buy and sell goods and assets at an agreed price [6][8]. The total income of the exchanges is provided by the fees they receive for the services provided. Before registering on the cryptocurrency trade platform of any exchange, the user should research the security confidence of that exchange, previous security breach history (if any), costs and pricing, types of coins available in the exchange, and other factors.

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