CRYPTOCURRENCIES IN RETAIL

Consumer Adoption Report I 2022

"Global market research on perception, preference, and experience of cryptocurrency shoppers."









CryptoRefills LABS

Cryptocurrencies in Retail
Consumer Adoption Report 2022
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EXECUTIVE SUMMARY

This report presents the outcomes of the first and largest research project regarding the consumer use of Bitcoin and other cryptocurrencies for retail shopping and associated payments. The research reveals the demographics of crypto-consumers, their current experiences, their perception of crypto-shopping, and the market-wise adoption of crypto-payments. The report presents quantitative and qualitative insights into who these consumers are and why they use Bitcoin (and other cryptocurrencies) as a means of paying for goods and services. As well as how satisfied they are with their experiences so far. By combining the information gathered from our survey (conducted with 290 unique participants) and our business/transaction data, we observed that paying for goods and services with cryptocurrency is in demand and considered useful by users even with the current technical and business challenges. New solutions, although still fragmented, are being offered to crypto shoppers to overcome the current challenges and improve the overall shopping experience. While we feel quite confident in saying that shopping with cryptocurrencies is still in its infancy, it is growing and evolving at an incredible pace and is likely here to stay.

KEY FINDINGS

After careful analysis of the collected data, there were a number of important findings:

1. Crypto-consumers are scattered all over the world. Although they have varying demographic features and socioeconomic backgrounds, there are some prevalent patterns to be identified: being a male younger than 35, being from a lower-middle-income country, earning less than $20,000 annually, and being self-employed are all widespread features, if not stereotypical. As many as half of the crypto-consumers live in lower-middle-income countries, one-sixth come from the most struggling economies, and a significant minority is migrants living in developed economies with tight budgets. For most of these crypto-consumers, participating in the global digital economy is only possible through the use of cryptocurrencies.

2. Crypto-consumer population can actually be divided into 7 distinct segments according to their enthusiasm for crypto, annual income, employment type, crypto-shopping habits, spending patterns, exposure to blockchain, and other features. The community is led by a small group of wealthy enthusiasts from developed markets and followed by larger groups, including high-income employees who do crypto-shopping discretionarily and individuals trying to escape poverty through minor freelance tasks which earn them crypto.

3. Despite its higher fees and longer processing times, two-thirds of crypto-consumers favor Bitcoin over other currencies, as 65% of them claim they have some Bitcoin. Yet, 34.5% of crypto-consumers have some Ether, the second-most popular crypto; Nevertheless, more than half have at least one stablecoin (with 32% having USDT).Other currencies (e.g., Litecoin, Dash) may be favored by fewer people today, but thanks to their high speeds and low transaction costs, they are more popular for shopping. Generally, the cryptocurrencies that crypto-consumers use for shopping today are not necessarily the ones that they would prefer to shop with. This may drive adoption for faster blockchains and scalability solutions for the most favored currencies (e.g., BTC, ETH, and stablecoins), or, as shopping with cryptocurrencies increases, users may start changing their preferences towards currencies that deliver the best shopping experience.

4. Scalability methods and alternative networks are viable solutions to many issues faced during crypto-shopping (e.g., speed, cost, etc.), yet their current recognition and adoption are quite limited. The Lightning Network is the first scalability network available to users for shopping, and it serves the most favored coin by shoppers (i.e., Bitcoin). However, it is still too early to decide whether we will see massive adoption of such technologies or if they will stay marginal.

5. Most crypto-consumers believe that crypto-shopping has outstanding potential and will be more common in the future. Also, 81.2% of crypto-consumers claim that they will buy something with cryptocurrency in the next 6 months. Furthermore, 62.2% claim that they will do crypto-shopping within the next month, showing that crypto-consumers are making a habit out of crypto-shopping.

6. Store or product unavailability is the most common concern among crypto-consumers (40.5%).Nearly half of the crypto-consumers prefer, or fall back on indirect shopping via gift cards, vouchers, or coupons. This appears to be a neat solution to access stores or products that are currently unavailable for direct crypto-shopping (e.g., due to marketing strategies or company policies). The unavailability of a crypto-payments option for most renowned brands and stores likely explains why crypto-consumers consolidate their crypto-shopping activities at one-stop shops (such as CryptoRefills) that can satisfy a variety of customers' needs via gift cards. Crypto-consumers believe that high transaction fees (35.3%), frauds/scams (23.3%), long processing delays (21%), and price volatility (19.7%) are the current barriers preventing the mass adoption of crypto-shopping. delays (21%), and price volatility (19.7%) are the current barriers preventing the mass adoption of crypto-shopping.

7. Crypto-shopping is not just another fancy payment method, rather, it is a decent solution for many social, economic, and technical issues. This includes, but is not limited to: the financial inclusion of un-or-underbanked people who survive by completing minor online tasks or owning a small business, avoiding excessive or rigid regulations, mitigating privacy concerns, preventing losses from buy/sell spreads for people already earning crypto-money, and enabling cheaper and faster alternatives to current remittance methods.

WHAT CHANGED IN 1 YEAR?

1. Transaction fees ceased to be the biggest concern in crypto-shopping. Being surpassed by the scarcity of stores accepting crypto and the unavailability of desired products.

2. The dominance of Bitcoin among cryptocurrencies used in shopping has weakened significantly due to cheaper and faster alternatives. The same applies to Ethereum.

3. Stablecoins are now supported and preferred by many more crypto-consumers. The increased availability and adoption of alternative networks and layer-2 protocols have also boosted stablecoin usage.

4. Europe and Central Asia showed tremendous growth in their number of crypto-consumers.

5. The total number of crypto-consumers has increased by at least 20%.

Cite this research as;

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ABOUT THIS REPORT

The first and largest research project considering the consumer use of Bitcoin and other cryptocurrencies for shopping and payments. Quantitative and qualitative insights into who these consumers are and why they use Bitcoin and other cryptocurrencies as a means to pay for goods and services.

Our research is limited to cases where the end-user (i.e., consumer) pays for goods and services using only blockchain technology. In other words, we are not covering hybrid payment technologies such as debit cards funded by cryptocurrencies or credit cards backed by crypto assets. This does not mean that we do not see these as promising services which could possibly compete with pure blockchain payments. In fact, such hybrid services do overcome some of the complexities of the user experience we will see in our research. However, hybrid payment systems (e.g., Swipe, Nexo, and Binance cards, etc.) must also rely on traditional infrastructure (MasterCard, Visa, etc.); therefore, we will consider them out of the scope of our research for the moment. We may consider including them in future studies.

We believe this research to be insightful and useful for professionals operating within the crypto and blockchain industry, as well as for professionals of the general financial industry, regulators, and retailers. Ultimately, only by understanding what users really need can we deliver the optimal technical and business solutions.

Support Our Research

We joined the blockchain industry in 2018, later than many other players. We quickly learned that this industry is all about (its) community: “join for greed, stay for the revolution”. In 2020, while reviewing our data and the surveys we used to improve our product, we realized that there was so much value in this information, we could not keep it only for ourselves. Regardless of being hesitant at first, we still decided to publicly share our knowledge as we believe it can be beneficial to our industry. Despite this report being distributed free of charge, a lot of hard work was put into it, so please consider purchasing one (or more) digital license or donating to us!



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FOREWORDS

This year, we have significantly extended the depth of our research to gain a deeper understanding of the demographics, needs, and preferences of the users. In fact, in our 2022 edition, we include a multivariate statistical methodology (k-prototypes cluster analysis) for the first time ever. The output of this analysis sheds new light and meaning on the data we collected this year as well as on the interpretations made in our 2021 report.

In our 2021 report, we described crypto-shoppers as belonging to two broad groups. The first group contains crypto-shoppers from more emerging and fragile economies, who used crypto for financial inclusion and as a defense against local currency debasement or other issues. In the second group, we reported crypto-shoppers that were from advanced markets, comprised of sophisticated, young, and usually highly educated and high-spending crypto enthusiasts. This interpretation from the 2021 report is not incorrect but could be an oversimplistic generalization with respect to the new information we can infer from our recent cluster analysis.

The new analysis identifies seven crypto-shopper clusters. We describe these clusters in detail to understand who the shoppers are in each group, and what technical, economic, social, and psychological factors drive them to use cryptocurrency for buying goods. For example, we will find out that some users are leading and influencing crypto-shopping behaviors, some are imitating or being influenced, some are into crypto just for greed or the "gamble", and many are using crypto as a tool of last resort. Interestingly, we learn that these segments are not the same in size or in spending power, and that within the same geographies, we may have shoppers from two or more clusters. We also analyze our data in relation to the clusters to reveal the preferences of each group, for example, in terms of specific currencies, product categories, or shopping habits.

Our mission is to lead on two specific aspects of crypto shopping and payments:
1. Technological and business innovation and
2. Research and education.

Our yearly report is a key output of the latter and a key driver of ideas for the first. For example, our research last year identified the need for fast and low-fee stablecoin payments. As a result, we developed our platform in a way to be the first shop in the world to accept stablecoin payments via Ethereum Layer-2s like Polygon and fast finality blockchains like Avalanche. Despite the potential use of our research by direct or indirect competitors, we believe that our data is very useful for the growth of our industry and for educating businesses, institutions, and regulators. For this reason, we aim to keep our research as widely available and free to the extent to which is possible.

The effort required to maintain our research program and enhance it as we did this year is high and impacts all areas of our company and team. To make our research program sustainable, we will adopt a hybrid free/premium model. A "light" version of our report will be available for free on our website. The full version of the research, which includes the Cluster Analysis, will be available for purchase via the Cointelegraph Research terminal or through our website. In our pledge to educate in this space, we will also make our full version available for free to students, academia, researchers, developers, professionals, and startups that can prove they do not have the necessary resources to purchase the full copy.

We hope you enjoy the data and our findings as much as we did. We'd also like to give a special thanks to Umut and the team that put this together, as well as to our partners.

Massimiliano Silenzi
CEO of Cryptorefills



CRYPTO-GLOSSARY

The field of blockchain and crypto-currency technologies is very new and still under comprehensive development. Hence, it is not uncommon for users and developers throughout the world to use various terms for different concepts. For the sake of consistency, we will now explain the following terminology used in the report:

Crypto-consumers (or crypto-shoppers) are customers who purchase digital items (except for cryptoassets), physical goods, or services of any kind by means of crypto-shopping.

Crypto-shopping is a form of online shopping where the price of the purchased goods or services are paid in terms of crypto-assets, instead of fiat money or other commodities.

Crypto-shops (or crypto-stores) are (mostly, but not necessarily) online stores that accept payments from customers using crypto-assets.

Crypto-assets are a digital and decentralized means of storing value. They are created via cryptographic methods and may assume the form of currencies, coins, tickets, non-fungible tokens (NFT), securities, bonds, etc. Note that not all crypto-assets can be used as digital money.

Cryptocurrencies constitute a large subset of crypto-assets that can be exchanged between users and used for trading or commerce purposes. Cryptocurrencies are sometimes referred to as “crypto-money” or shortly, “crypto”.

Crypto-exchanges (or cryptocurrency exchanges) are web platforms (usually with mobile apps) that allow people to buy, sell, store, exchange, and invest in various cryptocurrencies.

Crypto-commerce is an umbrella term for commercial activities (including crypto-shopping) that are achieved through sending and receiving crypto-assets.

Dapp is a portmanteau of “distributed applications”, which are designed to run, at least partly, on a blockchain network.

Lightning Network is a special “layer-2” payment protocol that operates on the Bitcoin blockchain. It aims to accelerate the transactions among participating nodes and present itself as a solution to the scalability problem. It features a peer-to-peer mechanism for making payments on a network of bidirectional payment channels without delegating the custody of funds.

Non-fungible Token (NFT) is a type of crypto-asset with distinctive identification numbers/codes making each individual token a unique asset.

Stablecoin is a special class of cryptocurrencies, characterized by their exchange value being pegged to the exact value of another (non-crypto) asset, like a fiat currency (e.g., US Dollar) or a precious metal (e.g., gold).



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1. INTRODUCTION

1.1 Introducing blockchain payments

Blockchain payments are what make crypto-shopping possible. For the readers less knowledgeable about blockchain technology and the associated payments, we will now provide a short framework to use as a reference for understanding the scope of this research.

Figure 1 illustrates a sample of the step-by-step user experience of a blockchain-based purchase (a.k.a., crypto-shopping).

1. The user is shown the product that they want to purchase with a price in the selected cryptocurrency. The price of goods and services in a cryptocurrency is usually calculated on the fly by converting the related fiat price to the selected cryptocurrency price.
2. Once the order is complete, the user is shown a payment page with the payment instructions. This will include the recipient wallet address of the merchant and the amount to be transferred. Usually, the user is given a short time frame (e.g., 15 minutes) to initiate the payment due to the volatility of the cryptocurrency rates and the risk of exchange loss for the merchant.
3. The user then opens his/her crypto wallet and inserts the required amount and address of the merchant. Later, he/she authorizes the transfer of the cryptocurrency.
4. As soon as the merchant detects that the payment has been initiated by the user, they will often inform the user that the payment is being processed.
5. When the merchant deems that sufficient confirmations have taken place on the blockchain, they will confirm the completion of the transaction and authorize the delivery of the product or service to the user.

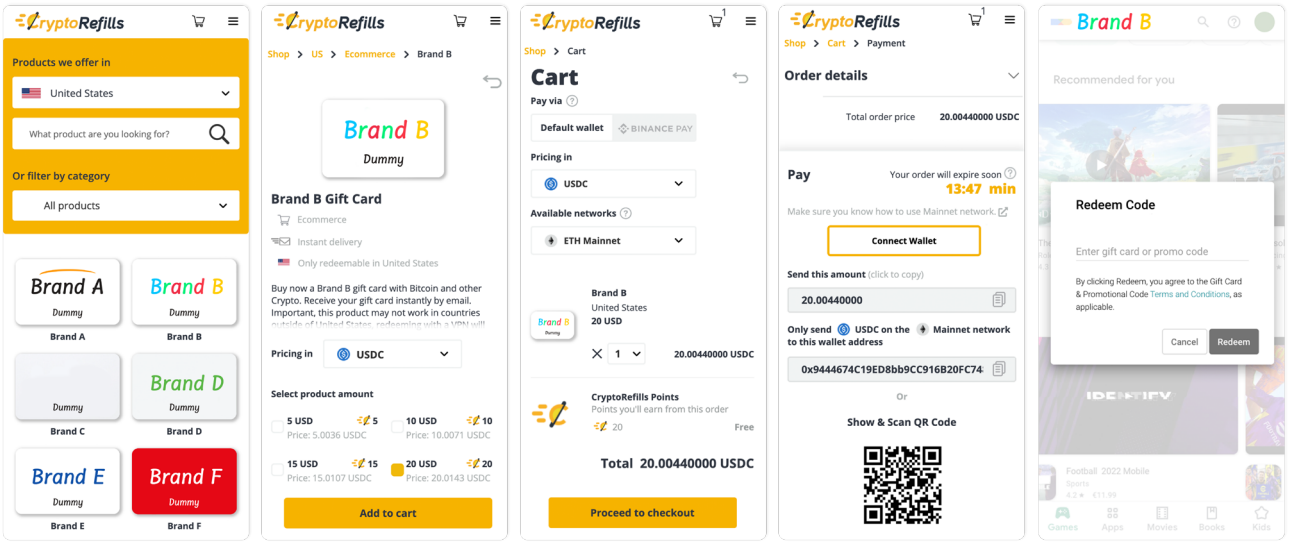


Figure 1: An example indirect (i.e., via gift card) crypto-shopping procedure, shown step-by-step.

1.2 Centralized vs. decentralized payments

The consumer experience within a blockchain payment system is very different from traditional digital payments, as illustrated in the example provided in Figure 1 above. It is beyond the scope of this report to provide a detailed and exhaustive explanation of how blockchain payments work and why they are different from the current "centralized" digital payments. So, we present here only a brief overview of the functionality of blockchain payments, as well as what makes them so special and different.

In a centralized payment system, the user gives a "confirmation" to an organization (i.e., a central authority) that will authorize the payment or transfer of a certain amount on behalf of the user; the amount authorized will then be transferred to the recipient's account through another central authority (e.g., a bank or credit institution). The user generally gives such confirmation by typing credit card details or logging in with a PIN code and/or submitting two-factor authentication (2FA) codes. When the processor is sure that the user wants to proceed with the transaction, they will inform other "centralized authorities" (e.g., banks, acquiring banks, e-money providers, credit institutions, etc.) to proceed and charge the user with the amount of the transaction by deducting it from the balance of the bank account or charging it to the credit card balance.

Blockchain-based payments (in their most common form) are written on a decentralized ledger. This means that every single transfer of value occurring between two different accounts (i.e., public addresses or wallets) is recorded on a single ledger, which works by broadcasting each transaction to the rest of the network and waiting for the blockchain network to confirm the validity of the transaction. There are a few noteworthy technological and business-related aspects of such uses of decentralization within the most common blockchain networks for payment purposes:

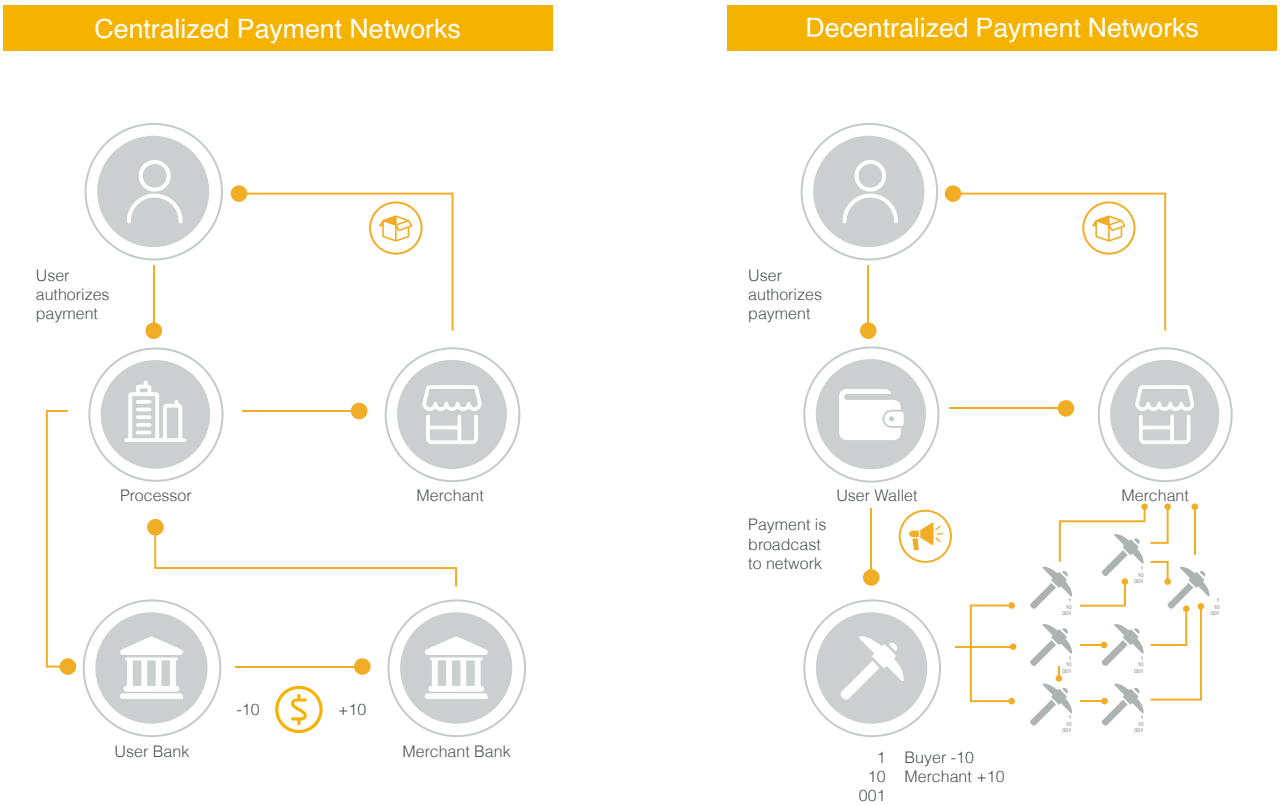


Figure 2: The difference between the procedures of centralized and decentralized payments.

Authorization: : The user (i.e., the consumer) is responsible for the payment authorization. That makes it the consumer's responsibility to:

- Set the correct amount of currency for the payment to be made,
- Provide the correct address of the recipient of the payment or transfer,
- Authorize the payment by creating a payment transaction and broadcasting it to the network (unless a centralized authority is holding the funds for the consumer, such as a custodian or an exchange).

Confirmation: In order for the payment to be correctly processed on the network, the consumer must (generally):

- Pay a certain amount of network fees to reward the nodes which confirm the validity of the transaction,
- Wait a varying amount of time in order for a certain amount of nodes to confirm the validity of the transaction.

Exchange: Currently, the most widely adopted cryptocurrencies for making purchases (Bitcoin, Litecoin, Ether, etc.) are "volatile" in terms of their fiat values, and their prices (i.e., exchange rates) fluctuate with respect to the USD, EUR, or other fiat currencies. This may bring a wide array of implications both on the consumer's and the merchant's sides, ranging across pricing transparency, exchange rate losses/gains, accounting, and taxation.



1.3 Decoupling currencies from protocols

It may be confusing at first, but blockchain protocols and cryptocurrencies are two very different things, even when they have the same name. For example, the words "Bitcoin", "Litecoin", or "Dash" may refer to the cryptocurrency, as well as the underlying protocol that operates how the currency functions. A Bitcoin could be moved between two wallets by using the Bitcoin protocol. Some blockchains have adopted a different name for their native currency, for example, Ether (ETH) for the Ethereum network or Avax for the Avalanche network. When referring to the currency, the abbreviation is often used (BTC, LTC, XRP, FTM, etc.) rather than the protocol name.

Some networks support not only their native currencies but also other tokens or cryptocurrencies. For example, the Ethereum network supports most stablecoins, such as the widely adopted USDT, USDC, and DAI. Other blockchain networks such as Avalanche and Fantom (and layer-2s such as Arbitrum, as we will see further on) support different tokens as well, including stablecoins.

To make a similarity with traditional payments, the blockchain protocol (e.g., Bitcoin, Ethereum) is like the payment network (e.g., SWIFT, Maestro), while the tokens (Bitcoin, ETH, USDC, USDT) are the currency (US Dollar, Japanese Yen, etc.). To a certain extent, it is possible to transfer cryptocurrencies across different networks and protocols, just like we wire money between two accounts and then withdraw it into cash or use it on PayPal.

We highlight this conceptual difference between protocols and currencies as it is important for the less blockchain-savvy reader to understand some of the implications in terms of user preferences. Specifically, the way a certain crypto-currency is used may vary depending on the underlying protocol being used. I makes little sense to buy 5 USD worth of product using the Bitcoin main protocol (running on the main network, called mainnet), sustaining up to double or more the amount in processing fees and waiting minutes, if not hours, for the confirmation. However, it could make sense to make this small purchase in Bitcoin using the Lightning network (close to zero fees, immediate transaction). In the end, either network may be preferred based on a user's use case or potential savings. A similar example could be made for the use of stablecoins, which have substantial fees across the Ethereum network (v1) but can be transferred with close-to-zero fees and immediate confirmation across other blockchains; this means that Ethereum (v1) could be less preferable for small purchases made with stablecoins.

1.4 Understanding scalability

Mass adoption of blockchain-based payments requires the system to be scalable and cheap for both merchants and customers. For example, Visa claims it can handle 65,000 transactions per second[1]. In contrast, it is estimated that the Bitcoin network can handle between 3.3 to 7 transactions per second[2]. This is due to the fact that the (on-chain) transaction processing capacity of the Bitcoin network is by the block size limit of 1 megabyte and the average block creation time of 10 minutes. The original Ethereum mainnet (v1), which is not only used for its native ETH token but also for other ERC-20 tokens (including all major stablecoins), supports about 15 transactions per second.

Furthermore, as explained earlier, it is not only about the capacity, but the costs that must be reasonable too. Most blockchain networks apply fees that are not in any way related to the size of the transaction being processed. In 2022 (up to July 31st), the daily average transaction fees on the Bitcoin network varied between $0.93 and $4.99. These figures are also not the highest recorded on the Bitcoin Network. In 2021, we saw the highest daily average fees reach $62.78 in a moment of strong congestion of the network. This year (up to July 31, 2022), the on-chain Ethereum (v.1) Network's daily average fees varied between $1.65 and $196.68 for ETH transactions. The cost of Ethereum was much higher when transferring stablecoins due to the gas required for using the smart contract of the ERC-20 tokens.

Overall, scalability, capacity, speed, and costs, are well-known issues. And through the years, different approaches and related solutions have emerged. Each solution has its characteristics or possible downsides. Some solutions are considered less secure, while some are less or not at all decentralized, and others not secure, practical, or easy to use. It is out of the scope of this research and introduction to explain the detailed mechanisms of such technical matters, or even take a position as to the benefits vs. the downsides of proof-of-stake versus proof-of-work, the actual security, or decentralization of specific protocols. There is a huge variety of opinions and no unanimous consensus on such topics (even though we may have our views). However, it is important that the reader understands that the scalability and price issue is definitely a topic that will also influence decisions on the consumer side. Therefore, we list below some of the approaches taken to improve the scalability of blockchain payments.



1.5 Layer-2 and alternative blockchains

Very broadly speaking, there are two main ways to achieve blockchain scalability. The first way sees some technical modification of the original protocol (for example, increasing the block size or changing some aspect of the proofing mechanism), or it can mean developing an entirely new protocol. This may result in the evolution of a blockchain, such as the current evolution into proof-of-stake by Ethereum, it can mean one blockchain branching into separate blockchains (see the numerous forks that generated Ethereum Classic, Bitcoin Cash, etc.), or in the development of entirely new blockchain projects.

The second approach to scalability is commonly referred to as "layer-2" or "sidechain" solutions. Again, in very simplistic terms, the way this works is to "lock funds" on the original blockchain, then perform the transactions on a different, more scalable network before settling and unlocking the updated balances on the original blockchain (either periodically or upon request by one or more parties). For example, Lightning Network is Bitcoin's "layer-2", while Optimism or Arbitrum One could be considered Ethereum layer-2 solutions. The first approach (blockchain evolutions) and this second approach may also be combined, for example, sidechains that also function on the new Ethereum 2.0.

Again, with the risk of a non-consistent categorization, surely a non-exhaustive list, and without any judgment on the technological or financial model, let alone security, decentralization, and regulation implications, the following are some scalability solutions and technologies available that we discuss in our research:



Lightning Network It is a Bitcoin Layer-2 protocol featuring a peer-to-peer payment system via bidirectional channels. To use the Lightning Network, a channel is opened by committing funds into the underlying bitcoin network, then, any amount of transfers can be made via the network channels updating the balances across each channel (and without updating the funds on the original network). Closing the channel will result in broadcasting the settlement transaction that will distribute the channel funds to the underlying Bitcoin ledger. The use of the Lightning Network requires a Lightning-enabled wallet and the opening of a channel towards the merchant/recipient or a channel that can indirectly reach the merchant/recipient (well connected) via the peer-to-peer channels.

Alternative Blockchains/Native Tokens These primarily evolve from the Bitcoin protocol and include protocols such as Litecoin and Dash, which are used for the transfer of their native tokens only (LTC and DASH). The average transaction costs for both LTC and DASH were less than $0.01 throughout 2022 (up to July 31). Transactions are processed within seconds on both networks.

Alternative or Fast Finality Blockchains Supporting Multiple Tokens These are blockchains, often conceived for use in DeFi or other purposes that support tokens besides their native token, including stablecoins, that are quite scalable and cheap to use. Examples of such blockchains are: Avalanche (confirmations less than 1 second, the average cost per transaction in 2022 is less than $1), Fantom, Tron, Solana, and many others.

Ethereum Layer-2 An Ethereum layer-2 blockchain regularly communicates with Ethereum by submitting bundles of transactions to layer-1. It takes the transactional burden away from layer-1 by posting finalized proofs back to layer-1. This is achieved, depending on the layer-2 protocol, via different technologies such as Zero Knowledge roll-ups. Some popular layer-2s include Optimism and Arbitrum.

2 DEMOGRAPHICS

Crypto-shopping is definitely a global phenomenon. Yet the interest in paying for goods and services with cryptocurrencies varies remarkably among people from different regions, age groups, and backgrounds. There are also common habits and observable shopping/spending patterns. So, understanding who participates in crypto-shopping and to what extent is vital for getting benefits from the crypto markets, especially for businesses and investors. First things first, crypto-consumers do not constitute a uniform group of customer segments, it is in fact the opposite. They have a wide range of backgrounds, such as countries of residency, age, education, income, occupation, and others. This section introduces the fundamental demographic features of crypto-consumers and reveals who they are in a broader sense.

2.1 Geography

Cryptocurrencies have become so popular that it is not surprising anymore that there are cryptoconsumers in nearly every single country and region of the world; even in the most remote microstates and territories whose classifications as countries are highly debatable. The distribution of crypto-consumers across those regions, however, varies remarkably depending on social and economic factors. One such factor, beyond any doubt, is immigration status, regardless of the region and other parameters. So, being an immigrant (i.e., living in a country other than one's country of origin for any reason) is vastly prominent among crypto-consumers. As our research reveals, 17.2% of cryptoconsumers are migrants of any kind (e.g., legal immigrants, expats, digital nomads, asylums-seekers, etc.), as shown in Figure 3.



The latest statistics from the United Nations state that the overall share of migrants among the world's population is merely around 3.6% as of 2020[3]; which lets us deduce the outcome that the migrants have a much stronger interest than non-migrants in shopping online using cryptocurrencies. Also, there has been a slight increase in the share of migrants in one year as it was 3.5% in 2019[4]. That interest is possibly driven by the opportunity of making easier and cheaper international remittances through cryptocurrencies. This is very important for immigrant communities, considering that they are highly likely to send money to families left behind and bring their savings with them when emigrating, both of which be costly with "traditional" international money transfers. From our data, migration figures reveal that within the migrant population there are also wealthy segments, likely white-collar expats working in hi-tech industries, just like blockchain, as well as digital nomads, often freelancing to create content. Tightly related to the aforementioned is that those people tend to set up and operate international businesses through their connections in both countries. Long story short, they have reasons, and whatever the reason may be, crypto transfers and shopping provide them with more value than traditional systems.

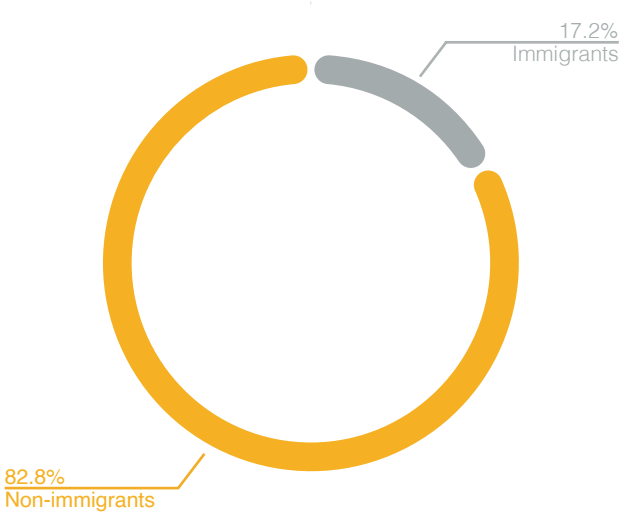


Figure 3: Share of migrants among the crypto-consumers.

The regional breakdown of the country of residence of crypto-consumers is given in Figure 4 (using the World Bank's definitions). The Europe and Central Asia region now hosts the largest percentage of crypto-consumers, with one in every four living in that region. This indicates tremendous growth since last year, as the region was only in second place with a little less than one-fifth in 2021[5]. The increasing immigrant population in continental Europe may be one of the driving forces. South Asia (i.e., India and surrounding countries), last year's leading region, is now in second place with 20.7% of crypto-consumers. Sub-Saharan Africa is in third place with 13.6%, yet it is followed by East Asia and the Pacific with 10.9%.

When comparing those crypto-consumer ratios with the ratio of the given regions' population to the World's total population, we can see that Europe and Central Asia is the most overrepresented region, followed by the Middle East and North Africa. Those regions have higher crypto-consumer ratios than their share in the World's population. On the other hand, East Asia and Pacific (where 30.2% of the World lives) is the most underrepresented region, possibly due to effective regulations, political embargoes, and access restrictions on many web services provided by the "West" in China, North Korea, etc. Language barriers might also be a limitation of our research for certain regions as the survey was carried out in English (see the research methodology section for more information).

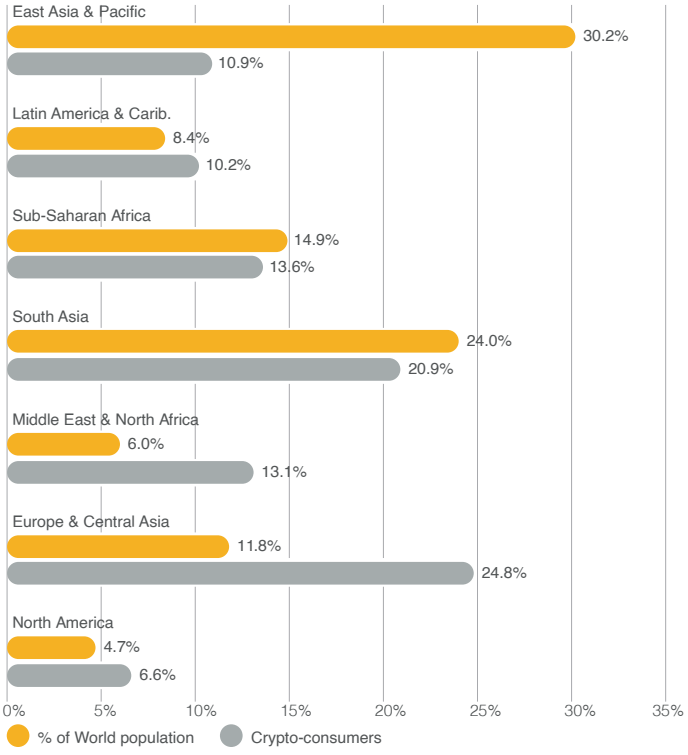


Figure 4: Breakdown of crypto-consumers per world regions.

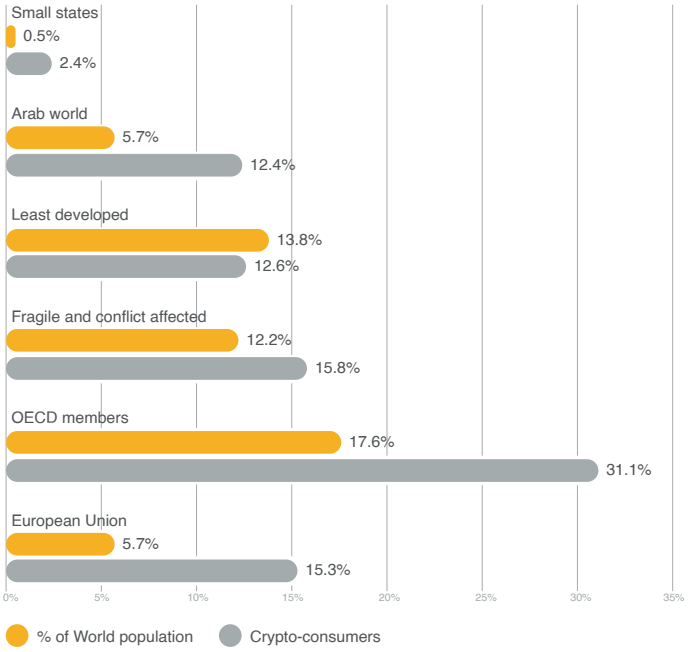


Figure 5: Breakdown of crypto-consumers per various country groupings.

The share of crypto-consumers from the Middle East and North Africa, South America, as well as North America regions, is worth noting since the rates in these regions are higher than their populations' share. This indicates significant interest from these regions. In Sub-Saharan Africa, however, there has been a sharp but unexplained decline since last year, which might just have been induced by the relative increase in other regions.

Furthermore, as shown in Figure 5, the OECD member states account for 30.1% of all cryptoconsumers, which is a result of a more than ten percent increase in just one year. The European Union accounts for 15.3% of crypto-shoppers. Arguably, the restrictive measures against the COVID-19 pandemic, the increasing popularity of online services, and remote working might have boosted the adoption in the developed world. Contrarily, underdeveloped countries experience decreases in cryptoshopping rates. In 2022, only 12.6% of shoppers are from the least developed countries (again as defined by World Bank[6]). There is a sharp decrease, as that rate was as high as 20.1% in 2021. Likewise, 15.8% are from the fragile and conflict-affected economies (was 17.9%). Moreover, the Arab World has 12.4% of the shoppers and 2.4% are from what is classified as the small states (i.e., mostly island states in the ocean and some continental ones). As an outcome, there is strong interest in using cryptocurrencies as a means for shopping both in developed economies and in less developed economies, although the rates fluctuate with the global economic situation.

Figure 6 shows the breakdown of the country of residence of crypto-consumers according to the countries' wealth classes (as defined by the World Bank[6]). Consistent with earlier data, the ratio of crypto-consumers living in high-income countries has risen to 32.8% from 30.1% since last year. Upper-middle-income countries account for 17.5%, lower-middle-income countries account for 44.8%, and low-income countries account for 4.9%. Interest from high-income and lower-middle-income countries is dominating the chart, although the main motivations behind this common interest are most likely different, as this report reveals later.

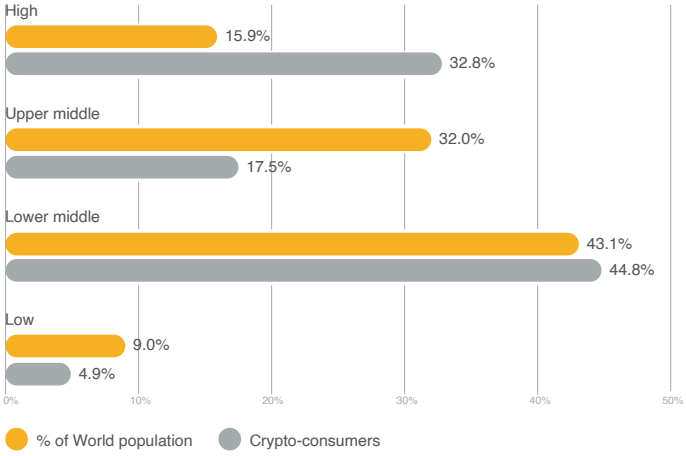


Figure 6: Breakdown of crypto-consumers per country income level.



2.2 Personal

The diversity among crypto-consumers also applies to their personal features. Crypto-consumers' personal features are analyzed by their age, gender, education, and socioeconomic parameters. Yet, the median crypto-consumer appears to be a 25 to 34 years old, male, holding at least a high school degree and being employed at a workplace where he is not an owner, with an annual income between $5,000 to $10,000. Last year, the median crypto-consumer (having the same characteristics) was self-employed (or an entrepreneur) with an annual income between $10,000 to $20,000. We now observe more interest from employees with lower incomes, likely the result of stronger adoption also by less sophisticated and tech-savvy users.

2.2.1 Age

Age is another important factor defining consumer behaviors and perceptions, as well as what they buy and how much they buy. The average age of crypto-consumers is found to be 32.1 (winsorized with 0.2% upperlimit to eliminate outliers), whereas the global median age in 2021 was estimated to be 31 by the UN[5]. The result looks on par with the world's population average. However, please note that crypto-consumer ages start from 15. Children younger than 15 are not shopping with crypto (due to various reasons, including that it may be illegal in some jurisdictions). Yet, about 26.6% of the world's population is reported to be under the age of 15[6].

Figure 7 shows the distribution of the age groups of crypto-consumers. Generation Z (roughly ages 15 to 24) constitute 27.2% of crypto-consumers, slightly less than last year; while young adults of Generation Y (ages 25 to 34), also called millennials, are the largest group with a share of 42.6%, even larger than it was in last year. Generation X (ages 35 to 44) has a share of 21.3%. 5.4% are 45 to 54 years old, and only 3.4% are older than 55. Young peoples' interest in crypto-shopping is highly prominent, which is not surprising. Moreover, research shows that their interest in crypto-shopping (as a share of all age groups) appears to be even higher than their interest in non-crypto online shopping (from the report[10]). Hence, excluding children below 15, the world's mean age becomes roughly around 39.5 (estimated between 37.1 and 41.7). Therefore, it can be said that crypto-consumers are considerably younger, on average.

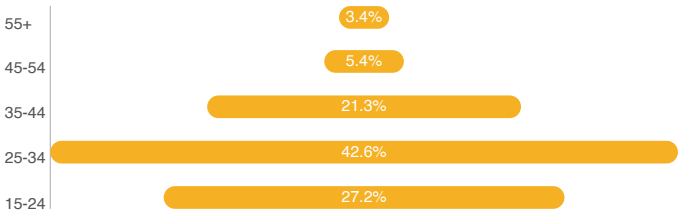


Figure 7: Breakdown of crypto-consumers per age groups.

"Young adults of Gen-Y and Gen-Z find it easier to buy products and services using cryptocurrencies. However, older people find crypto-shopping more difficult as age increases."

2.2.2 Gender

It is most unfortunate that there is no gender equality among the crypto-shoppers. A whopping 93.2% of crypto-consumers are male, whereas only 6.8% are female, as shown in Figure 8. Shoppers who reported non-binary genders are negligibly small (< 0.1%). The gender gap between men and women has increased within the last year. This does not mean that there are now fewer women in the markets, but the ratio is becoming smaller. Also, females' interest in crypto-currency trading and exchanging is already known to be lower than that of males[16], but the situation is even more unbalanced when it comes to shopping with cryptocurrencies. Such a vast difference needs further research to be justified. One theory is that cryptocurrency investments and trading involve high risks, but women tend to take and tolerate less risk in their investments when compared to men[7].

Other potential reasons may include women's lower rate of literacy, less economic freedom, lower participation in STEM education[18], and limited access to businesses, especially in underdeveloped regions (e.g., low-income countries, conflict-affected territories, etc.).



"Females' interest in using cryptocurrencies as a means of making payments for shopping is as low as 6.8% and hasn't increased compared to the previous year."

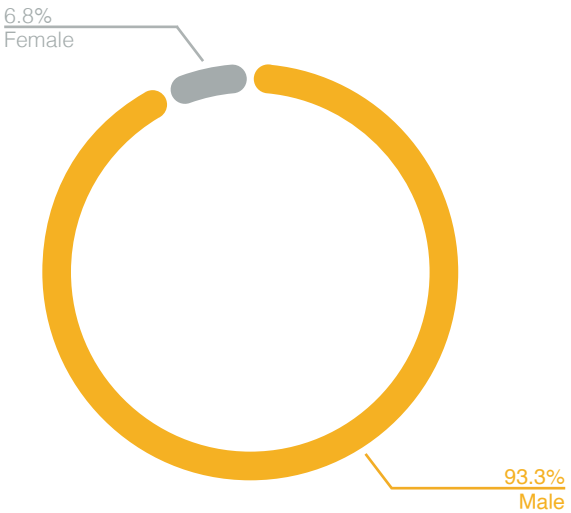


Figure 8: Gender distribution among crypto-consumers.

2.3 Socioeconomic indicators

Socioeconomic indicators of crypto-consumers uncover particular social and economic features, such as income or education. Despite the diverse background of crypto-consumers, it is possible to find meaningful patterns that describe the majority or certain groupings.

2.3.1 Education

The median education level of crypto-consumers is a high school degree, the same as last year. As of 2010, the world population aged 15 and over had an average schooling period of 7.8 years, which roughly corresponds to a secondary (middle) school degree. Thus, crypto-consumers are generally more educated than the world average, which implies that the tendency to shop with crypto increases as the education level increases. Potential drivers may include higher internet literacy, better knowledge of the English language, and more diverse shopping needs of higher educated people.

While 9.7% of the world's entire population above the age of 15 have no schooling at all[15], among crypto-consumers this is only 3.1%. 11.4% have completed a primary or secondary school, 31.7% have completed a high school, 24.7% have obtained a bachelor's degree, and 14.6% have a post-grad degree. The detailed breakdown is given in Figure 9. Overall, this is slightly higher than the last year's stats. On the other hand, filtering out shoppers that are younger than 24 years old may uncover more insights. Among adults who are 24 or older, the average level of education increases even more. Among them, the share of consumers with no schooling reduces to 2.2% and the share with a degree higher than a high school degree increases as well. When talking about crypto-consumers older than 24, the share of bachelor's degree holders is 26.9%, master's degree holders constitut 15.5%, and Ph.D. holders account for 1.9%; meaning that one in every six holds a post-grad degree (provided that they are old enough).



"The median education level among crypto-consumers is equivalent to a high school degree, whereas more than a quarter hold a university degree."

Outcomes of our research suggest that the higher the education levels are, the higher the possibility of participating in crypto-shopping, although the correlation is not simply linear. First, using cryptocurrencies requires people to be familiar with some basic (arguably even more than basic) computer and internet skills and a foreign language (which is English for many). Second, people with higher education are more likely to be exposed to blockchain-related projects in their work and studies, which may eventually be motivating for wider adoption in daily life. Last but not least, higher education levels are globally associated with lower unemployment rates.

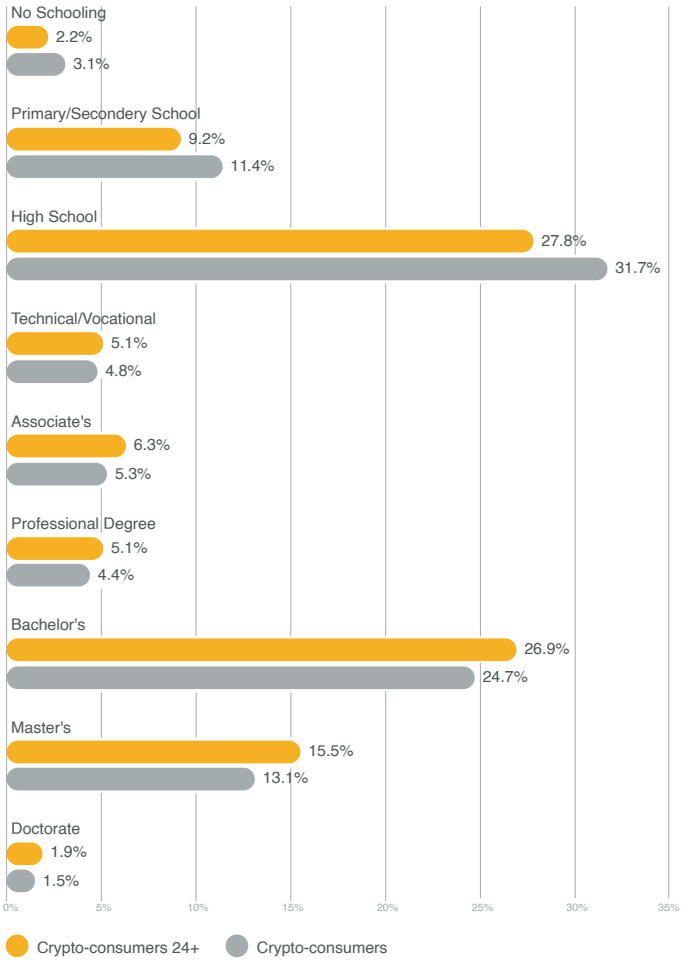


Figure 9: Share of the education level of crypto-consumers, as of latest completed degree.

2.3.2 Occupation

In the 2021 report, we saw that independent workers (i.e., self-employed) constitute the largest share of crypto-consumers per their employment type. It was not surprising back then as there were a large amount of "gig" workers among crypto-shoppers. However, things may have changed since last year because consumers who are employed somewhere (e.g., in an SME, company, institution or government body, etc.) are now the largest group with a part-time/full-time combined rate of 44.3%, among which 33.9% are full-time workers and 10.4% are part-time workers. Self-employed (except investors) now constitute a quarter of all crypto-shoppers, with a small decrease from last year. The share of students (with no real work) decreased from one-fifth to 16.2%. Yet the rate of entrepreneurs/investors dropped to 5.6%, which demonstrates a sharp decline. When considered together with the increase in the share of employed people, that may be an indicator of how quickly crypto-shopping is becoming less marginal and more of an everyday activity. Lastly, 7% of crypto-consumers are unemployed, and a mere 1.2% are retired.

Given the increasing interest from employed workers, the combined share of 31.3% accounting from independent workers, entrepreneurs, and investors has dropped significantly from the previous year (41.8%). This is because they are doing business with crypto, either directly earning their revenues in one of the crypto-currencies or providing services using blockchain technologies. Throughout the world, the average rate of self-employed individuals is 47.9%. While it is only 12.4% in high-income economies, the rate of self-employed individuals is as high as 81.9% in low-income countries[11]. As of 2022, 20.2% of crypto-consumers from highincome countries reported to be self-employed, entrepreneurs or investors; this ratio is as high as 35% in low-income countries and 37.4% in lower-middleincome countries. The data provided above justifies our findings and is also consistent with our income and region-based breakdowns given in Figures 12 and 6.

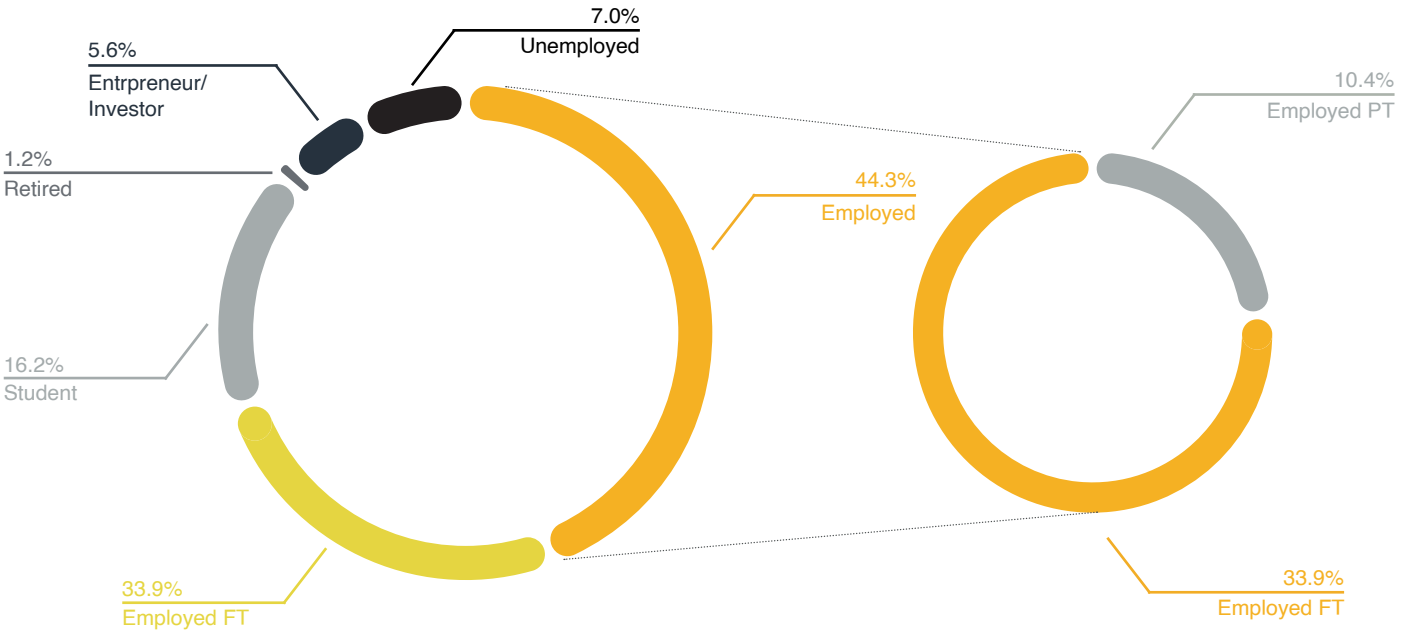


Figure 10: Employment types of crypto-consumers.

Excluding the students, retired, and unemployed, the top five most common sectors among crypto-consumers are software (12.2%), education (9%), finance (8.3%), computer/electronics (8%), and IT services (6.7%). They are followed by the construction (6.7%) and arts/entertainment (6.4%) industries. Anything hi-tech still dominates the list, yet finance has risen to third place with a 33% percent growth. Another jump was made by the arts sector, possibly induced by the increasing popularity of NFTs. The remarkable presence of education may be due to academics and students who chose education as their sector. It is also possible that education sector employees are more likely to study and learn new technologies. The interest from construction, education, and hospitality sectors is nearly the same as last year and needs further elaboration to see if there is something beyond personal interests. The fragmentation of crypto-consumers across many industries may point out the probability that people in those sectors make or accept payments in cryptocurrencies. These sectors host large numbers of self-employed people and people involved in independent side hustles. The detailed breakdown of the crypto-consumers' employment sectors is provided in Figure 11.



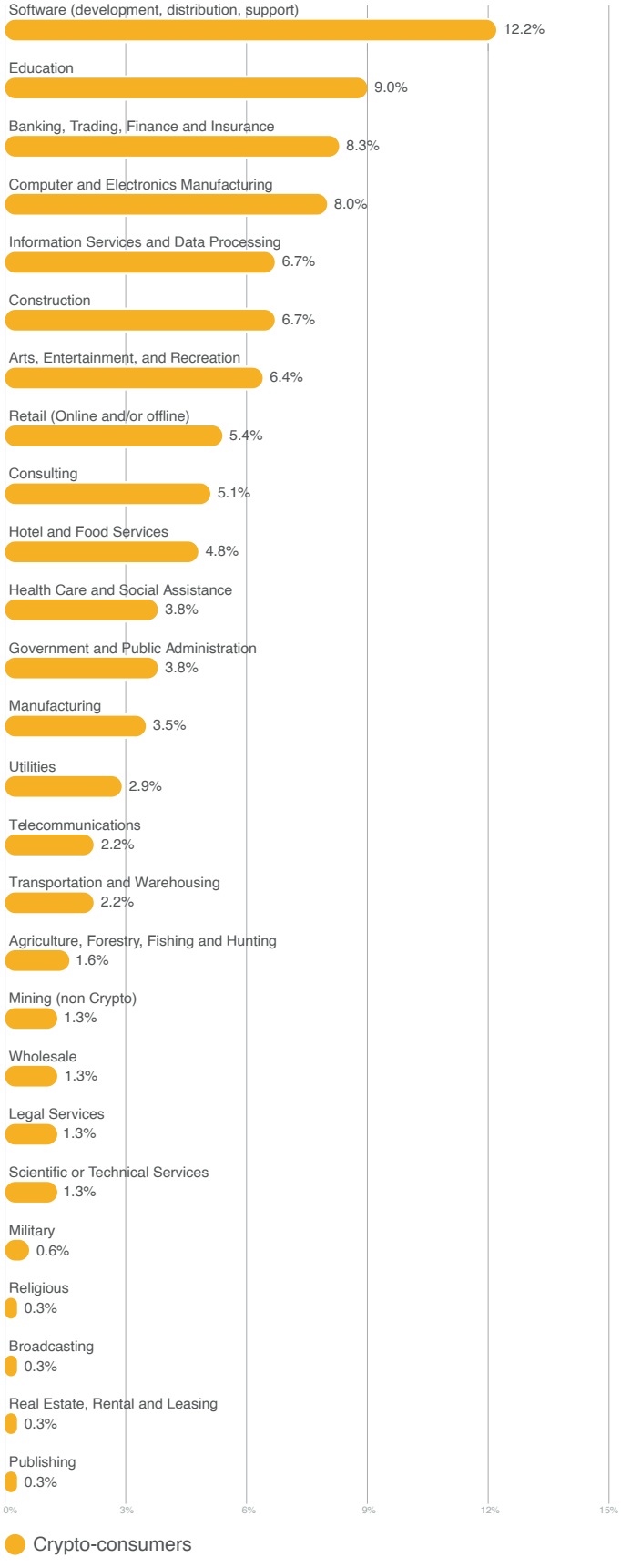


Figure 11: Breakdown of crypto-consumers per the sectors they are working in.

2.3.3 Income

Another handy indicator for understanding consumer interest and potential spending in the retail markets is the income levels of customers. The income spectrum of crypto-consumers is very broad. A crypto-consumer's annual income may be anything between literally zero and a seven-figure number. There are many crypto-consumers at all income levels, but their distribution is vastly uneven. From the data illustrated in Figure 12, we see that 37.7% have an annual income of less than just $5,000, and another 15% make between $5,000 and $10,000 a year. This means that cryptoshopping is widely used among low-income consumers, who constitute more than half of the community (please note, our definition of low-income here does not follow any standard). This ratio increased by more than ten percent within one year (was 46.1%). Nevertheless, the literature[8] suggests that 53.6% of the world's entire adult population earns less than $10,000 as of 2019. Therefore, the share of low-income crypto-consumers has reached global levels.

Earlier sections revealed that the share of crypto-consumers from lower-income countries declined; rather, the share from higher-income countries increased. Now, we see that the share of poorer individuals has increased as well. Even though this may seem to contradict at first glance, it does not; in fact, the data tells us that the number of lower-income consumers living in higher-income countries has risen significantly, which is an interesting socioeconomic phenomenon. Economic struggles caused by the COVID-19 pandemic, unemployment, and rising inflation in the developed economies may have promoted earning or investing in cryptocurrencies, which might have eventually boosted crypto-shopping. On the other hand, in underdeveloped economies, people living in extreme poverty still struggle to get access to enabling technologies, such as modern computers, broadband internet services, mobile devices, etc.

The combined data suggests that obtaining cryptocurrencies through modest freelance jobs or minor online tasks is most common among low-income crypto-consumers, as more than half of them practice that. They also have more interest in affiliation and loyalty programs. Those factors indicate that crypto-shopping still has an important role in low-income people's everyday lives (provided that they have sufficient infrastructure) since it may be a matter of survival for some. More details on this topic will be discussed in later sections.

According to the data we collected, one in every eight crypto-consumers earn between $10,000 and $19,999. This is the third-largest income group in the study. Nearly 30% earn between $20,000 and $99,999 a year. According to the above-mentioned study[8], 34% of the world's adult population earns between $10,000 and $99,999; this is observed at 42.1% among the crypto-consumers, a much larger rate than the global average. Thus, we can conclude that middle and high-income consumers have a higher interest in crypto-shopping, whereas only 5.2% of crypto-consumers (lower than the global rate) have an annual income above $100,000. Likewise, only 2% make more than $200,000, while less than 0.2% are millionaires.

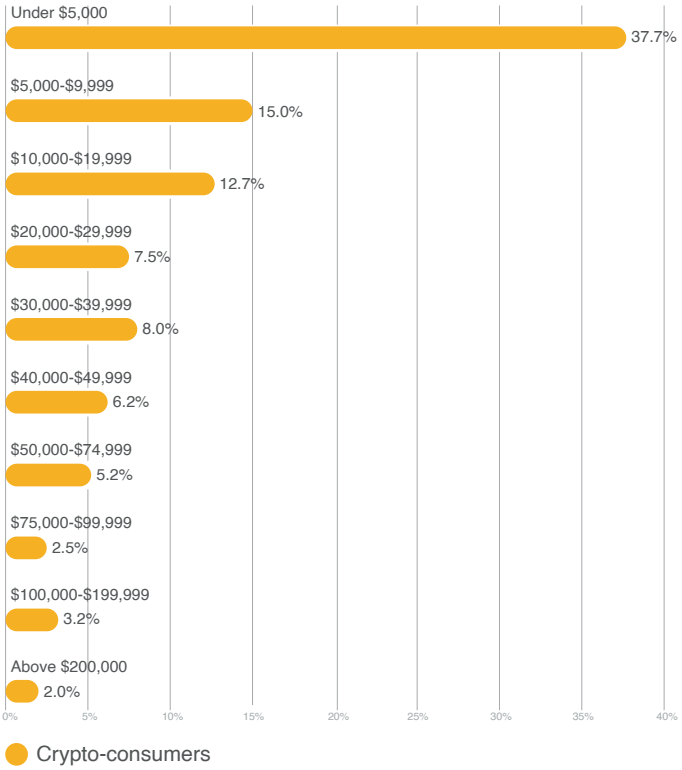


Figure 12: Breakdown of crypto-consumers per their annual income levels.



3 PERCEPTION & ATTITUDE

In order for the crypto-industry to provide more value to customers and, of course, to get the most out of the market, it is essential to comprehend crypto-consumers' thoughts about the usage of cryptocurrency for shopping. Consumers' perspectives are largely based on their personal requirements and experiences, but there are additional considerations, including society's viewpoint and the legality of utilizing cryptocurrency.

3.1 Ease of use

Any technology that serves customers as its end users will benefit greatly from a well-established ease of use attribute. Cryptocurrencies and blockchain technology rely on extremely intricate mechanisms (especially in their backgrounds). So, one may assume that employing them would be exceedingly challenging. However, this is not exactly the case. As shown in Figure 13, nearly twothirds of all crypto-consumers already find cryptoshopping easy to perform, while only one-fifth find it challenging to pay with cryptocurrencies. Possible reasons for such adaptation may include the high proportion of younger users, innovators, and open-minded individuals among crypto-consumers. This indicator seems to be unchanged since last year.

Nearly two-thirds of crypto-consumers are confident about how to buy what they need through cryptoshopping, while 17.7% are not. A slight decrease in such confidence is observable from last year. Cryptoconsumers may be unable to satisfy the variety of their purchase needs via crypto-shopping, require assistance during the process, or have difficulties in using tools, wallets, and websites. Only 46.2% know where to find stores that accept cryptocurrencies. This indicates a huge business opportunity for enterprises and entrepreneurs, since more than half of crypto-shoppers are willing to buy goods and services but are unable to find stores that accept their cryptocurrencies. This is also a clear opportunity for stores that do not accept cryptocurrencies at all (or the ones that accept only a few options) to address an underserved demand. Likewise, stores that do accept cryptocurrencies must inform their current and potential customers about the payment option to increase their sales and market penetration. Even more worrying is the fact that only 40.4% of crypto-consumers think it is easy to find stores that are reliable and safe among the ones accepting crypto. Also, considering that the demand is underserved, this is likely a further indication that some crypto-consumers are afraid of falling prey to scams by resorting to purchasing from unreliable or lesser-known stores. We believe that stores accepting cryptocurrency will perform better if they can address the reliability and safety concerns of crypto-shoppers. Especially in the case of smaller businesses and e-commerce brands offering crypto-payments, it is important to offer the best possible crypto-payments experience and build a reputation through reviews, forums, or by partnering with well-known brands in the crypto community.



"Two-thirds of crypto-consumers find it easy to buy goods and services by paying in cryptocurrencies."

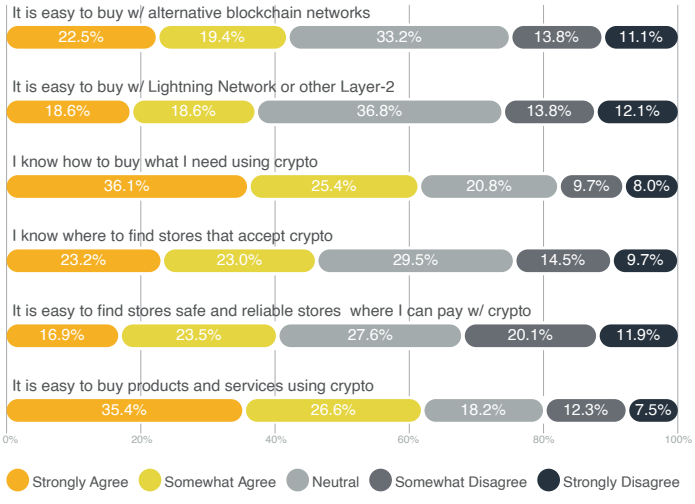


Figure 13: Crypto-consumers' agreement with the statements related to ease of use.

Furthermore, 62% find it easy to make payments using cryptocurrencies in general, while exactly one-fifth are experiencing serious difficulties. Over the past years, stores and payment processors have already adopted significant improvements to ensure an easier crypto-payment experience, but there is still room for more user-friendly processes as the number of alternative currencies and blockchain networks increases. Accordingly, 41.9% of crypto-consumers find it easy to make their payments over alternative blockchains, and 37.2% find using the Lightning Network easy as duck soup.

Other findings in this report indicate that most crypto-shoppers make repeating purchases using cryptocurrency. It is likely that the prevalence of "young" and "innovative" segments along with the improvements made in user experiences so far, combined with the repeating purchase habits that make the consumers get used to the newer systems, explain why more than 60% of consumers find a payment system that is quite more complex than a simple credit card transaction easy to use. Nevertheless, we still see an opportunity regarding developing easy-to-use payment applications or interfaces to address the needs of the 40% that are having a hard time with crypto-payments, as emerging alternatives bring their own learning curves into the field as a downside. More on the customer segmentation can be found in the cluster analysis section later.



3.2 Usefulness

Crypto-shopping cannot be a prevalent form of shopping unless it is useful to consumers. Nonetheless, Figure 14 proves that cryptoconsumers generally see value in crypto-shopping, to a large extent. Fortunately, two-thirds explicitly find it useful to buy goods and services via cryptocurrencies. The five-point decrease since last year may be caused by the large fluctuations observed in crypto prices recently. Anyway, that viewpoint also means that crypto-shopping satisfies some needs, and therefore, it can be preferred over other forms of shopping as long as such needs exist. Two-thirds of crypto-consumers already perceive cryptocurrency as a means for payments and purchases, whereas the remaining one-third may see them as an occasional method or a backup case when other means for paying are not available or more costly. This is quite remarkable for different reasons. First of all, this shows that the majority of crypto-shoppers have transitioned to admit paying with cryptocurrencies as a new method for making payments and purchases. Many in the crypto community (as we will also discuss later) recognize the "store of value" properties of Bitcoin, the most popular cryptocurrency; but they also point out the strong limitations of Bitcoin's "means of exchange" properties. Yet, despite all such limitations, it is apparent that crypto-shoppers also associate a "means of exchange" property to manycryptocurrencies, including but not limited to Bitcoin, especially through layer-2 networks like the Lightning Network.

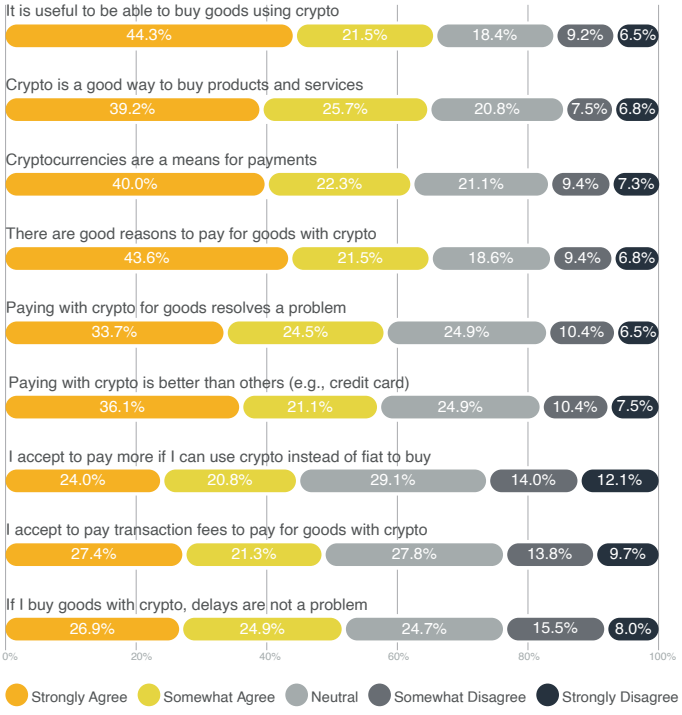


Figure 14: Crypto-consumers' agreement with the statements related to usefulness.

"The majority of crypto-consumers see cryptocurrencies as a new payment standard."

A whopping two-thirds of crypto-shoppers suggest that there are good reasons to pay for goods and services with cryptocurrencies, whereas 58.2% claim that crypto-shopping resolves at least one certain problem that they are facing when trying to use other methods (even if they can use other methods), which is a significant rate. 64.9% find crypto-shopping as a good way to buy products and services, while only 14.3% disagree. Those who disagree may give a little hint about the ones who are forced to use cryptocurrencies as they are also crypto-shoppers themsleves. Nevertheless, 57.2% already find paying with cryptocurrencies better than other options (e.g., credit cards, transfers, cheques, mail orders, etc.), which is very remarkable although slightly lower than last year. As previously mentioned, this is likely due to the large value fluctuations that all cryprocurrencies experienced recently.

"For 58.2% of crypto-consumers, the option of shopping with cryptocurrencies resolves at least one certain problem, while 57.2% find it better than other payment options."

Many cryptocurrency users accept paying transaction fees, commissions, and processing delays because they believe that using cryptocurrencies to purchase products and services offers them incomparable advantages. As Figure 14 shows, more than half of crypto-consumers can easily tolerate waiting for the transaction delays in exchange for getting the option of buying things with cryptocurrencies. Likewise, 44.8% accept paying transaction fees when buying goods and services with cryptocurrencies. The latter, however, has dropped around ten points since last year. This is most likely caused by the emergence of cheaper and more convenient payment schemes, including cryptocurrencies with much cheaper transaction costs (e.g., Litecoin, Dash, etc.) and alternative networks that virtually do not charge for transfers. The introduction of alternatives made paying non-negligible costs for purchases a little less acceptable. What is more is that 44.8% of crypto-consumers understand that accepting cryptocurrencies can be a burden for stores, and therefore are willing to pay more (besides the transaction fees) for the goods and services when sold in cryptocurrencies. These results are extremely positive for the crypto-commerce industries since they show that customers perceive cryptocurrencies as much more than just another form of money. Being able to pay in crypto may aid individuals in overcoming difficulties and achieving significant advantages.

Furthermore, the combined data suggests something even more interesting. The crypto-consumers that find it useful to pay for goods and services with cryptocurrencies are willing to pay more to do this, and they are willing to be patient about the issues and complexities. So, it can be concluded that we are still in a very early phase of adoption. We have observed that innovative users, in order to satisfy their needs, are willing to overcome hurdles, costs, and complexities.



"More than half of crypto-consumers are willing to pay fees and wait for delays as long as they can shop with cryptocurrencies."

3.3 Social norm

Most people's habits are influenced by their community, either through pressure or support. As a result, societal perceptions of crypto-shopping are just as significant as customers' own perceptions. Additionally, if a person is marginalized, excluded from, or just unable to access financial services (i.e., being unbanked or underbanked), they may be forced to turn to cryptocurrencies.

Figure 15 shows that 36.3% of cryptocurrency users believe that individuals who use cryptocurrencies to pay for products and services are well or somewhat respected in their society. While slightly less than a quarter of respondents disagree with this statement and 40.9%, are unsure (i.e., neutral) about it, making them the largest group. Declines in both positive and negative opinions, as well as the increase of indifferent opinions since last year, may be an indicator that society is beginning to normalize crypto-shopping.

Some respondents may perceive some sort of social stigma when using cryptocurrencies to shop or perform other activities because of numerous influential government and financial institution representatives frequently painting Bitcoin and other cryptocurrencies negatively (i.e., highlighting their use for illegal activities). However, the majority of cryptocurrency buyers continue to use their cryptocurrency to make purchases. Additionally, when more major corporations, well-known brands, and reputable institutions begin to accept cryptocurrency payments, social acceptance ought to rise, which can only be good for the industry's adoption in general. In fact, the situation is quite optimistic as El Salvador and the Central African Republic declared Bitcoin as their legal tender[9], accelerating legal recognition of cryptocurrencies and crypto transactions.

By the way, a third of crypto-shoppers claimed that they know many others who are also crypto-shoppers, whereas 36.3% claimed to not know anyone else or know only a few people who use cryptocurrenciesto buy goods and services. Less than half of the crypto-

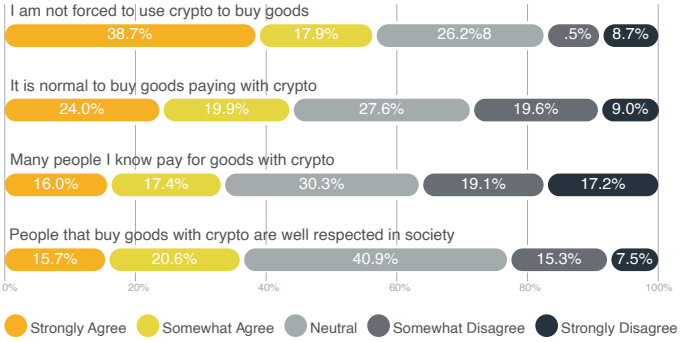


Figure 15: Crypto-consumers' agreement with the statements related to social norms.

consumers think that it is normal to buy goods and services by paying with cryptocurrencies, whereas 28.6% see the same as abnormal, unusual, or exceptional. On that note, 66.6% declare that they are not forced to use cryptocurrencies to buy goods and services; among the rest, 17.2% claim that they are forced (for whatever reason) to buy at least some of the goods and services they need via crypto-shopping, with another 26.2% that indicated a neutral stance, which is a noteworthy ratio as they may also be forced on some or rare occasions. The share of cryptoshoppers who are clearly forced to exercise crypto-shopping may not have access to other means of online payment systems and/or banking services.

The findings are highly instructive. To draw judgments about a number of issues, though, is still premature. For example, using cryptocurrencies can be seen as very normal in an open society (such as one in a developed country), but there may not be many advantages to doing so. In contrast, cryptocurrencies may have more advantages in a more conservative society where they are viewed as a social stigma or at least inappropriate to some extent. It is evident that some individuals must, nevertheless, rely on cryptocurrencies in order to maintain their daily existence and companies.

3.4 Confidence

How confident crypto-consumers feel during (and after) crypto-shopping is very important since it is another indicator of how likely they will be to continue buying goods and services using cryptocurrencies in the future (even if there are conjectural alternatives). Likewise, if people who are forced to resort to cryptoshopping feel confident and get sufficient benefits from it, they may continue falling back on it even if other options become available. As shown in Figure 16, 55.5% feel safe and secure to a large degree when shopping with their favorite cryptocurrencies, which means that while a majority do not concern about potential frauds, 17.9% still have some safety concerns. One possible reason may be the lack of mechanisms for addressing disputes, and another may be the irrecoverability of (mistaken) transactions. The advantages of cryptocurrency could potentially present some difficulties. Since trust is a crucial component of commerce, these issues need to be resolved for the market to expand healthily.

59.3% of crypto-consumers feel that their privacy is protected to a satisfactory degree when buying goods and services with the cryptocurrencies of their choice. While 16.6% suspect that their privacy may be at some sort of risk, only 7.7% are sure about the existence of severe risk (but continue doing cryptoshopping becauseit has benefits or it is the only available option).

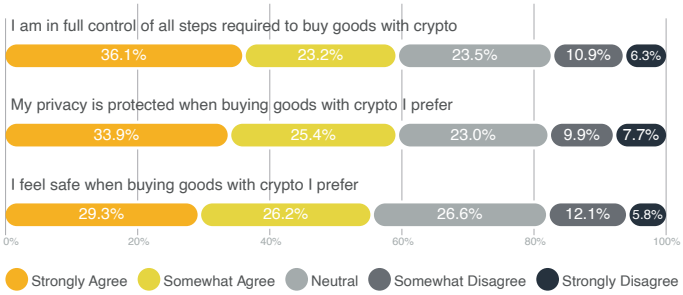


Figure 16: Crypto-consumers' agreement with the statements related to confidence.

Overall, 59.3% think that they are in full control of all steps required to purchase goods and services using cryptocurrencies, 23.5% are not sure, and another 17.2% think that they are
not in control of parts of the transactions or processes. Therefore, we can conclude that a significant majority of crypto-consumers feel confident about doing crypto-shopping, although actions must be taken in order to persuade others. Lastly, when compared to 2021 data, we generally observed declines in both positive and negative answers regarding consumer confidence, but there is a remarkable increase in neutral and indifferent answers. We predict that the growth in the crypto-shopping economy is largely driven by the first-timers, the ones who are new to the field and who are less experienced in crypto.



"60.3% crypto-consumers feel safe when shopping with cryptocurrencies."

4. EXPOSURE & ADOPTION

The popularity and market share of crypto-shopping do not solely depend on the consumers' opinions. Availability of stores or products and adoption by businesses are also complementary factors.

4.1 Personal adoption

To determine how long consumers have had direct exposure to cryptocurrencies and crypto-related matters, we ask them when they purchased their first coin. Although individuals might potentially be familiar with cryptocurrencies without purchasing any, this is still a very good sign of exposure.

Interpreting the chart in Figure 17, it is easy to see that cryptocurrencies have become more and more popular each year. An ever-increasing pattern is observable since the decline recorded in 2018. 2020 and especially 2021 (the data from 2022 must be considered as incomplete since the survey was concluded in 2022/Q2) appear to have been magnificent for crypto adoption. Nearly half of the crypto-shoppers today have joined the crypto community (by obtaining their first coins) in the last two and a half years (since 2020). One-fifth of current shoppers become crypto-owners solely in 2021. This was a record-high since cryptocurrencies' (i.e., Bitcoin's) public launch in 2009. The slight decline in 2018 may be due to the large price drops recorded in that year, which were caused by the great recession that happened in that same period. 2017 appears to be a massive milestone for cryptocurrencies since there was a remarkable increase in the share of new buyers when compared to the previous years, but its ratio was surpassed in 2019 and the years after. The steepness of the curve in the cumulative ratio indicator shows how the process of obtaining one's first crypto has picked up speed.

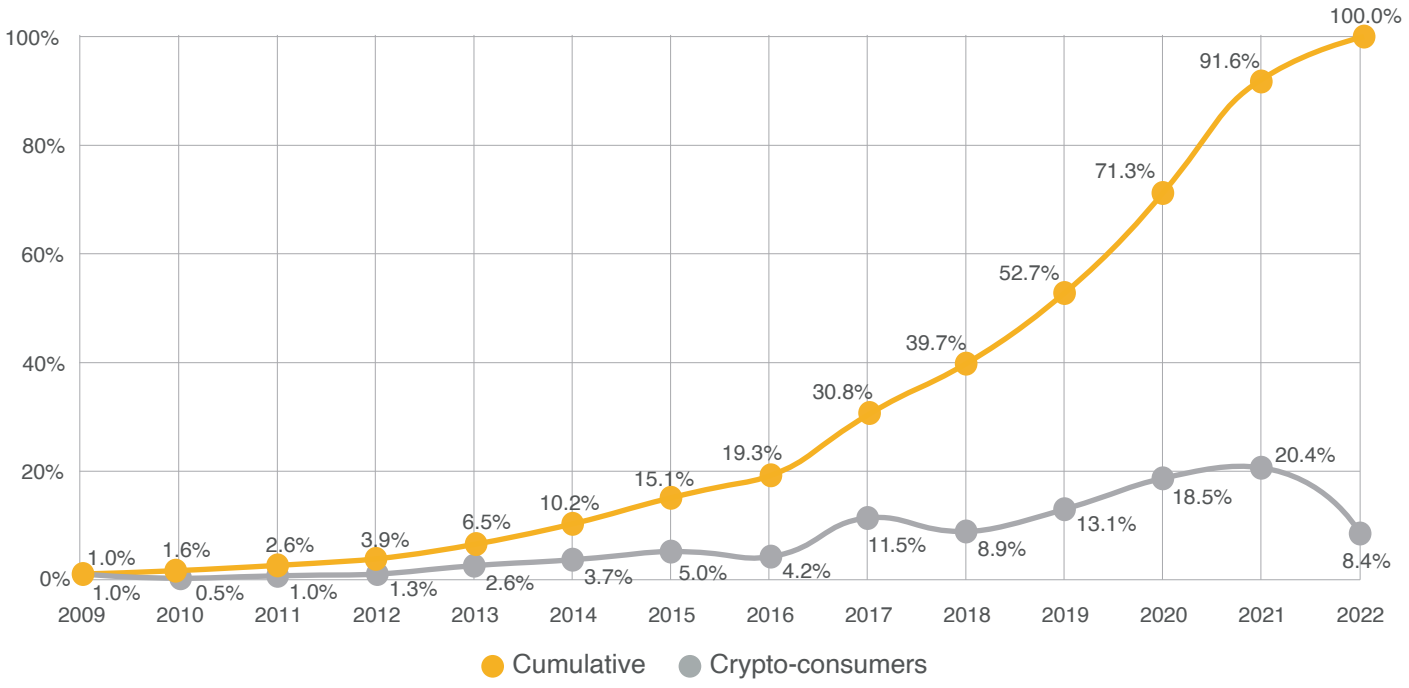
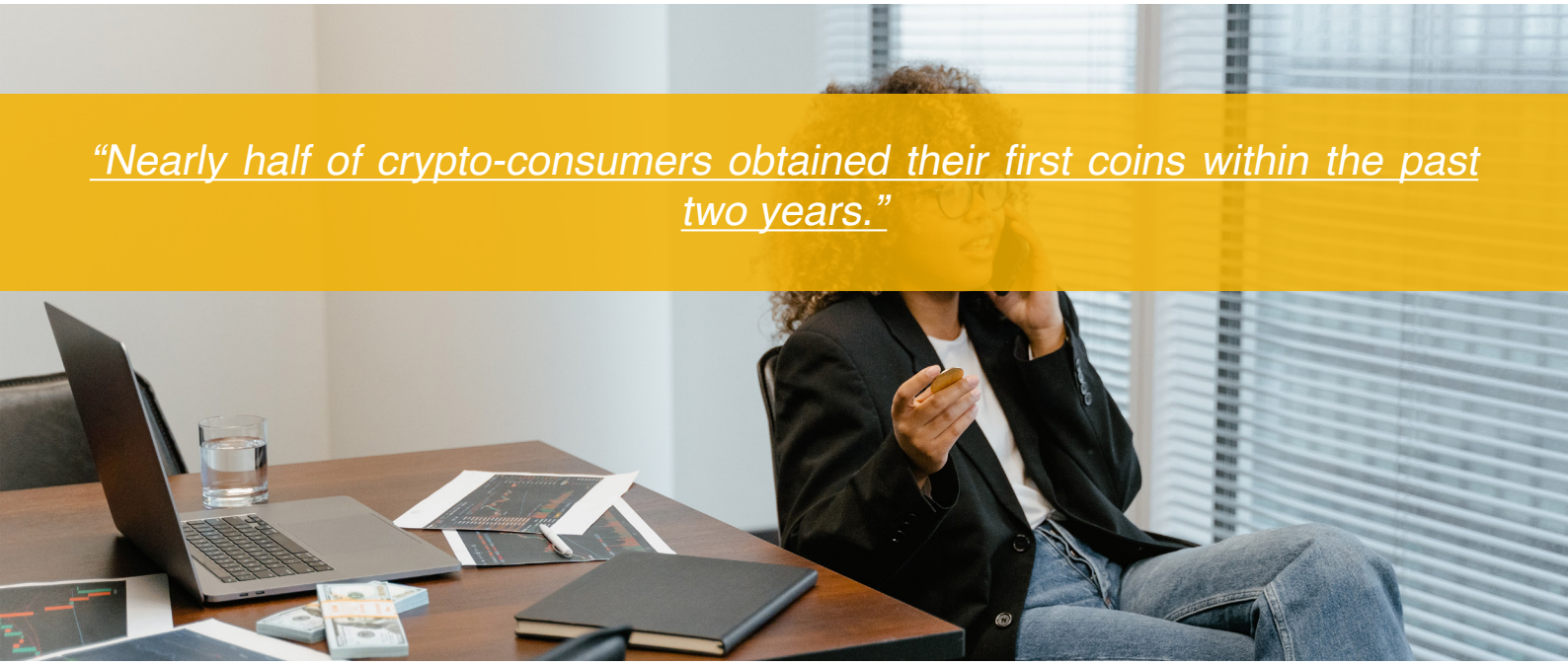


Figure 17: The year of first ever purchase of crypto among crypto-consumers.

Interestingly, only slightly less than a third of current crypto-consumers had some crypto-currency before 2017, and only one-sixth had some before 2015. Also, considering that one-fifth of crypto-consumers bought their first crypto-money in 2020 and immediately started crypto-shopping, there is surely no need to be a "crypto-veteran" to use cryptocurrencies to shop. On the other hand, 1% of crypto-consumers claim that they already had cryptocurrency (in this case, Bitcoin) since its initial launch. This share was over 2% last year, which concludes that the inclusion of less experienced shoppers increased this year (this statement is on par with our data showing confidence levels in crypto-shopping). In general, the trends in Figure 17 are pretty consistent with the market capitalization of Bitcoin by year[14]. As of the publication of this report, all indications show that this growth trend will continue despite the huge price volatility all the cryptocurrencies experience.



"Nearly half of crypto-consumers obtained their first coins within the past two years."

4.2 Business adoption

Exposure to cryptocurrencies is not necessarily a matter of personal preference; it may also be necessary for commercial purposes. Figure 18 shows that 54.8% of crypto-consumers are exposed to blockchain technologies (by any means, including cryptocurrencies), which is a significant number and slightly higher than the statistics from the previous year. Therefore, it can be concluded that individuals who are exposed to blockchain technologies for professional reasons also exhibit an extraordinary propensity to purchase cryptocurrencies. Combining this information with the other data from our analysis demonstrates that a significant portion of crypto-consumers include innovators and business owners, and that crypto-shopping can be seen as a logical extension of their lifestyles.



Figure 18: Share of crypto-consumers that are exposed to blockchain as a part of their work.

Please note that the data provided in Figure 18 also includes the self-employed (who represent a large percentage of crypto-consumers). If the company or institution crypto-consumers work for (excluding their own businesses) are to some extent involved with cryptocurrencies (e.g., research, investment, payments, etc.), then this provides some mandatory exposure and may inspire individuals to buy crypto on their own behalf. From Figure 19, a quarter of the crypto-consumers state that their company/institution practices crypto-currency trading at varying volumes, while 29.1% state that their company/institution executes or takes part in blockchain-based projects (other than crypto trading); meanwhile, 14.5% of respondents claim that their organization/company engages in NFTs (either by minting or trading). Blockchain technologies and cryptocurrencies are introduced to nearly half of bitcoin consumers at work. Except for the NFT figures, which were just added in this edition, the data appears to be quite consistent with that of the previous year.

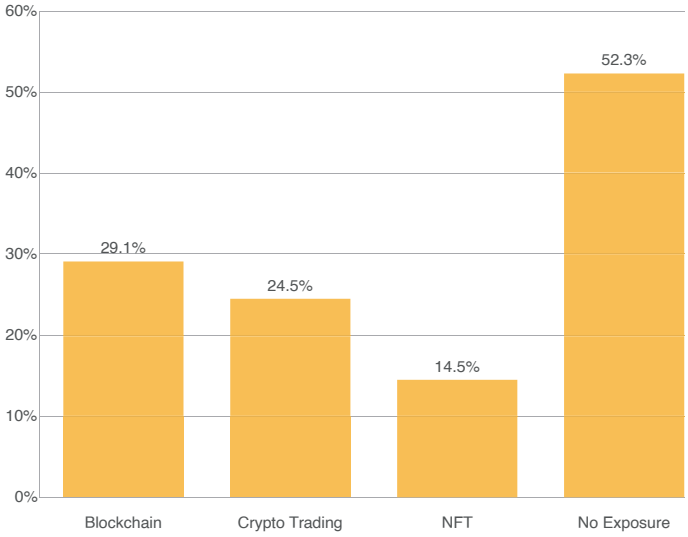


Figure 19: Share of crypto-consumers' companies that are involved in blockchain or crypto-currency.

34.2% of cryptocurrency users say that their business or institution already accepts payments in at least one cryptocurrency (was 44.8% percent last year). Of the remaining 65.8%, a whopping 36.9% believe that their company or institution may eventually accept cryptocurrency payments even though it does not today.

Even if they formerly did, 4.4% of respondents said they no longer accept cryptocurrency payments. More investigation is required to determine why they stopped accepting crypto-payments. Last but not least, 24.4% said that their organization or institution would probably never consider such payments at all.

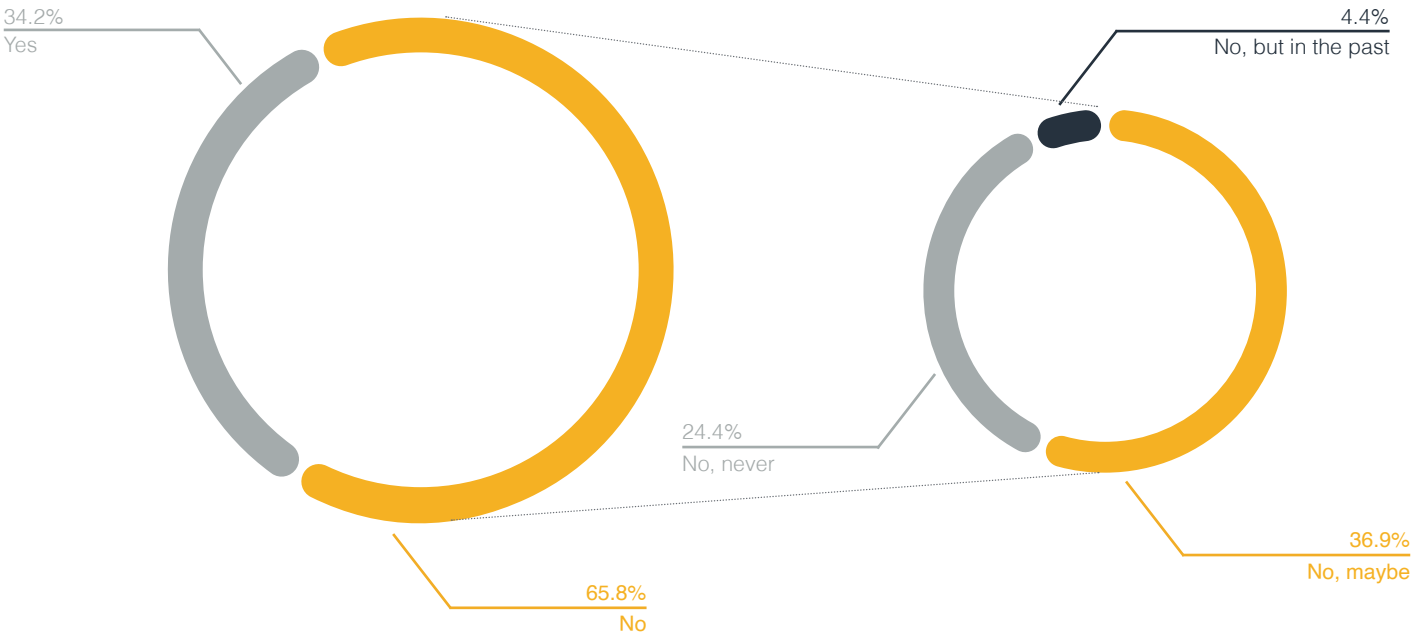


Figure 20: Share of crypto-consumers' companies that accept payments in cryptocurrencies.

5. PREFERENCES & BEHAVIORS

Consumers that use cryptocurrency have some unique preferences and tendencies when it comes to their purchasing and spending behaviors. However, these habits can vary based on factors including gender, age, income, and occupation.

5.1 Portfolio

The current snapshot of their portfolio may help us better understand the main preferences of cryptoconsumers and how (well or poorly) they optimize their crypto-shopping experience in conjunction with other goals, like convenience and investments.

5.1.1 Cryptourrencies

The total number of cryptocurrencies circulating in the public markets reached 10400 as of February 2022, which was around 4500 exactly 1 year ago[15]. Nevertheless, the top 10 currencies (by their market capitalization) dominate 82.1% of the entire market and the top 20 dominate 88.3%. This distribution of coin preferences is even more out of balance among crypto-consumers. However, although it is still the most popular choice, Bitcoin's popularity among crypto-consumers is decreasing substantially. Bitcoin ownership rates dropped from 79% to 65% in just one year, which is huge. It might be surprising for the majority, but this exit is totally understandable. Because, when it comes to shopping with crypto, Bitcoin suffered, especially in 2022, high volatility with respect to fiat currencies (used for pricing real-world products and services). Bitcoin also requires the use of the Lightning Network to avoid high fees and to transact immediately, which usually sees adoption in the more techsavvy segments. Likewise, the share of cryptoconsumers who solely own Bitcoin and nothing else halved, dropping from 16% to 8.1% in 2022. Bitcoin is still dominant, widespread, and the most common means for crypto-payments by a large margin. In the 2021 report, we have shared a prediction that Bitcoin's usage rate in crypto-shopping will decline in time due to cheaper and faster alternatives, this is even more convincing looking at the current direction.

The second most popular cryptocurrency among shoppers is still Ether (ETH), with an ownership percentage of 34.5% (was 54.5% in 2021). Its widespread adoption is also declining, possibly due to the same reason as Bitcon's: very high transaction costs (please note the survey was concluded before the Ethereum merge). The technological advancements it brought, such as smart contracts and its use in DeFi, as well as the wide community support for the Ethereum network, made it popular, but not so useful in payments. Furthermore, despite its high percentage of ownership, our transaction data shows that its use in shopping is very limited. Tether USD (USDT), on the other hand, has jumped to third

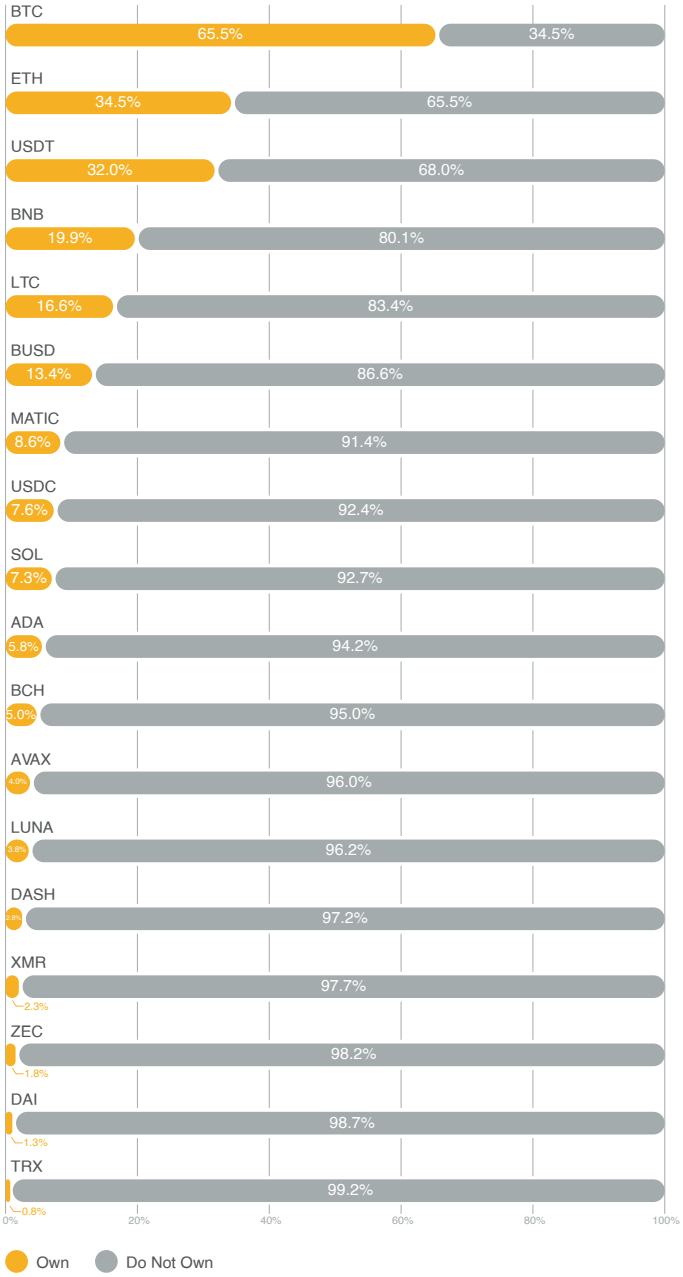


Figure 21: Most popular cryptocurrencies among crypto-shoppers.

place with an ownership rate of 32%. This is a huge improvement since last year, as USDT, USDC, and BUSD combined could not even reach 15% in 2021. More stablecoins are discussed in the next section.

Another spectacular upturn was Binance Coin (BNB), as one-fifth of all crypto-shoppers have it in their wallets. Its popularity possibly relies on two factors: first, it is very cheap and fast to make transactions using BNB over the Binance Smart Chain, and second, Binance is the biggest crypto-exchange by transaction volume (and still growing). Last year's third-most popular choice, Litecoin (LTC), has now became the fifth with a rate of 16.6% (was 31.2%). In fact, considering that LTC is only at the 21st place per market capitalization[14], it can be said that it is exclusively popular among the crypto-consumers. The sixth currency is another stablecoin, BUSD with (13.4%). The list goes on with MATIC, USDC, SOL, ADA, as shown in Figure 21.

The up-to-date data mostly read positively as the diversity of cryptocurrency options is broadening, and the markets are becoming more inclusive for people with different needs. At the same time, we observe an arguable tendency towards centralized bodies in this essentially decentralized world of crypto as fiatpegged stablecoins, centralized crypto exchanges, and their quasi-centralized coins gain more recognition. That must be due to some needs that the crypto users abstain from satisfying via other means and definitely require further attention from the developers and investors.



"Bitcoin is still the most popular crypto-currency among crypto-consumers, but it loses ground pretty rapidly.

5.1.2 Stablecoins and fiat currencies

Stablecoins have recently gained incredible popularity, and it is understandable to a large extent; the value they store is totally protected from the extreme price volatilities that other cryptocurrencies experience, which was particularly bothersome throughout the first quarter of 2022. As the popularity of stablecoins increased, it became necessary to extend our analysis to undercover more about them. Figure 22 reveals that 81.4% of all crypto-shoppers have transacted (e.g., sent, received, made payments, etc.) with any of the stablecoins at least once, which is a significant ratio. From Figure 23 showing the full list of preferred stablecoins, USDT is the number one stablecoin, with two-thirds of stablecoin-owning crypto-shoppers having it in their wallets. The second one is BUSD, with one-third of stablecoin owner crypto-shoppers using it. BUSD is the US Dollar-pegged stablecoin issued by Binance. Unlike USDT and other ERC-20 tokens that run on Ethereum networks, BUSD can be transacted with high speeds and low fees across the Binance Smart Chain (BSC, a proof of stake blockchain) network, which is a huge advantage. Binance offers merchants an off-chain payments API called Binance Pay which allows Binance users to pay merchants directly with the crypto held in their accounts. This may also explain its popularity. Yet, the success of coins issued by crypto-exchanges can be strongly tied to the success of the exchanges themselves.

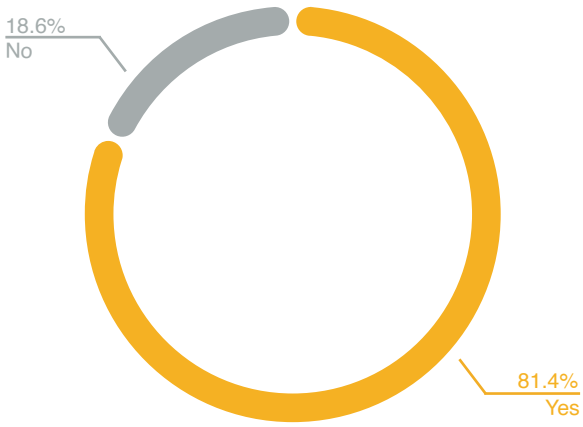


Figure 22: Share of crypto-consumers who have transacted with stablecoins at least once.

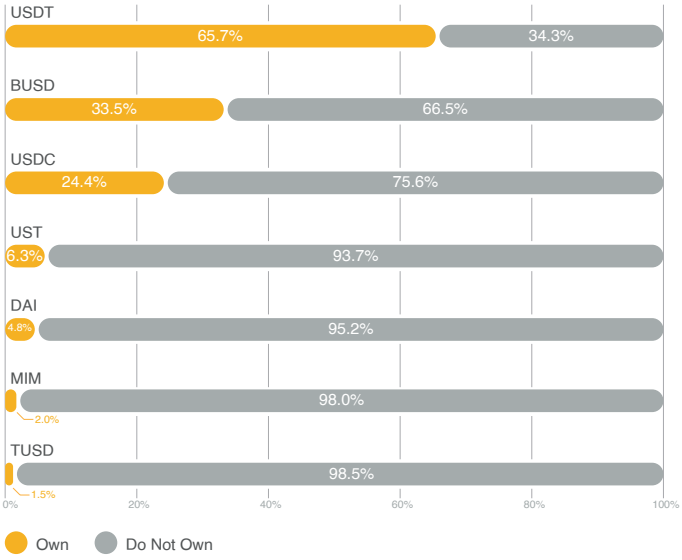


Figure 23: Stablecoin ownership rates among crypto-consumers.

A quarter of stablecoin users have USDC in their pocket. USDC is more popular than BUSD among crypto owners about three times; however, it is currently less popular when it comes to cryptoshoppers, likely due to the off-chain payment options enabled by Binance. As faster blockchains and layer-2s see stronger adoption and as Circle, the issuer of USDC, increases its partnerships (e.g., Circle just partnered with Apple Pay), we will likely see an increase in USDC shopping as well. The rest of the stablecoins have much lower ownership ratios, at least for now. As discussed later in Section 5.4, only a little more than half of the stablecoin-using crypto-consumers have used layer-2 networks to make their stablecoin transactions. However, should we see layer-2 or faster, more scalable blockchains increasingly adopted and depending on a variety of factors, for example, macroeconomic conditions or regulations, we may see the adoption of other forms of stablecoins, such as locally pegged currencies (e.g., the Euro Coin launched in June 2022 by Circle) or gold-pegged cryptocurrencies.

Stablecoins may offer protection against large fluctuations in the crypto-markets. However, the recent incident that occurred with Terra USD (UST), the US Dollar-pegged stablecoin issued by Terra, was disastrous. The value of 1 UST dropped to literally zero very quickly. Our survey was completed before the downfall, and 6.3% of crypto-consumers were using UST by the beginning of Q2, 2022, so they might have been affected. On May 9th, UST was

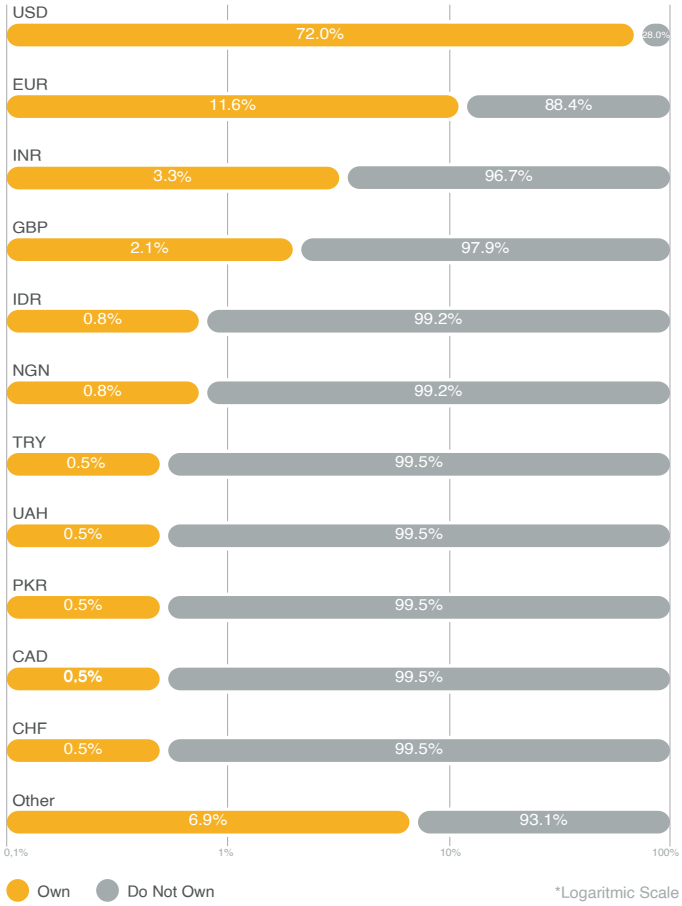


Figure 24: Crypto-consumers' main fiat currency preference for buying/ selling crypto.

de-pegged from USD and was renamed as TerraClassic USD (USTC).

Another brand-new piece of research included in this year's report is the prevalence of fiat currencies. Since the birth of cryptocurrencies, USD is still the unofficial universal fiat currency in the crypto markets. As of Q1 2022, three-quarters of all cryptoconsumers buy and sell crypto using US Dollars. Its seat in the first place may not be overtaken any time soon, but its dominance is expected to decrease, considering the non-USD stablecoins and the overall crypto-growth in the emerging markets. The second place belongs to the Euro (EUR) with 11.6%, in the fourth place there is the Indian Rupee (INR) with 3.3%, and the GBP is the fifth choice with 2.1%. All other fiat currencies are used by less than 1% each, and less than 10% combined. The entire ranking is given in Figure 24.

5.1.3 Size of crypto holdings

The total volume of cryptocurrencies (including the cash equivalent value of non-currency crypto assets) that crypto-consumers hold, as well as the share of those crypto-assets to their total net worth, are very important indicators of the adoption and prevalence of a crypto-driven economy. Crypto-assets currently constitute a small portion of the entire holdings for most crypto-consumers; however, Figure 25 reveals that the situation seems quite optimistic, as slightly more than one-tenth of crypto-consumers already have more than half of their entire net worth in the form of crypto-assets. Another one-tenth have crypto holdings somewhere between 20% to 50% of their portfolio, and another one-tenth have 10% to 20% of their net worth in crypto. On the other hand, nearly half of crypto-shoppers have less than 5% of their net worth in crypto, while a quarter has less than 1%.

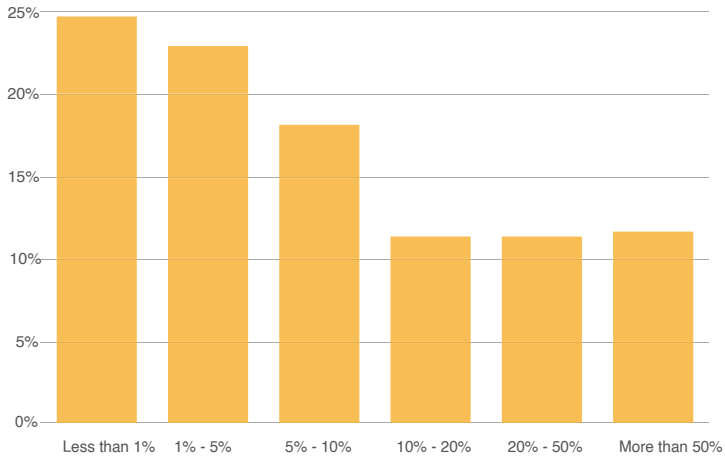


Figure 25: Ratio of crypto-consumers' crypto-holdings to their total net worth.

When it comes to the total volume (and value) of held crypto-assets, we see in Figure 26 that nearly a third of crypto-consumers have less than 100 USD worth of crypto. This may point to two factors: first, many crypto-shoppers have very tight budgets and can only obtain small amounts of crypto at a time, and second, some crypto-shoppers spend their crypto (e.g., on shopping) right after obtaining them and do not hold nor invest in crypto-assets other than for shopping purposes. More than a quarter of crypto-consumers have 100 to 1,000 USD, nearly 15% have 1000 to 5000 USD, approximately a quarter have more than 5000 USD, and notably, around 5% have more than 100,000 USD worth of crypto-assets in their portfolio.

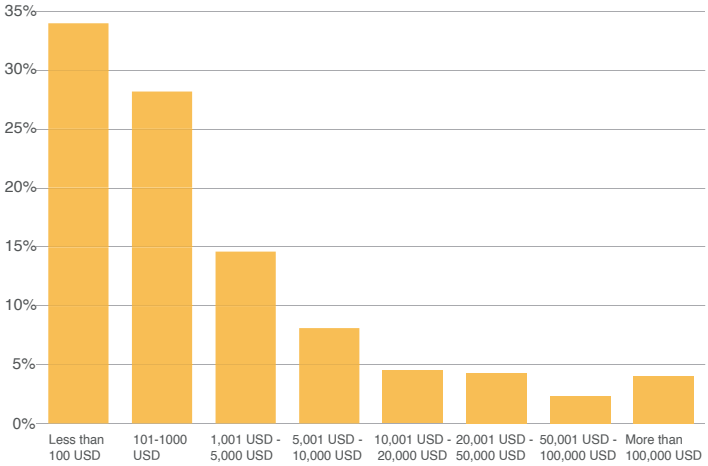


Figure 26: Total cash-equivalent value of crypto-consumers' crypto-holdings.



5.2 Means for obtaining crypto

Among crypto-consumers, the most common method for obtaining cryptocurrency is apparently buying it (i.e., investment) through any channel, as 78.3% do buy crypto-currency, which is a major hike from 2021's 64.8%. The second-most common way of obtaining crypto is now getting them via affiliation or loyalty programs (which was third last year) with 69.3%. Nevertheless, 41.3% of crypto-consumers earn some sort of income in cryptocurrencies in exchange for accomplishing minor freelance jobs that they find online. Cryptocurrency mining is standing steady in fourth place as a way for obtaining crypto, as a quarter of crypto-consumers mine on a regular basis. 12.6% get (non-salary) payments from their customers in cryptocurrencies within their own businesses, while another 12.1% get their salaries or allowances in a crypto-currency. Giving crypto-money as a gift is not uncommon either, 11.1% have received some amount of crypto-money as a gift. See Figure 27 for more details.

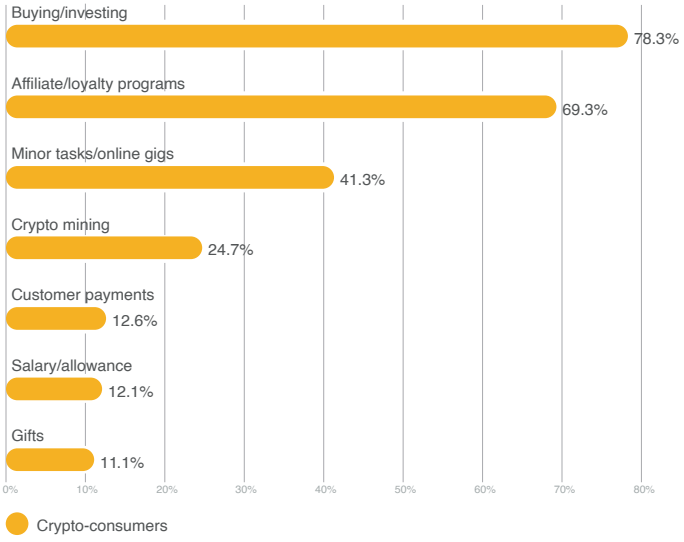


Figure 27: Main methods for obtaining crypto-currency.

Our research has revealed some relations between crypto-consumers' income levels and their preferred methods of obtaining cryptocurrencies. As charted in Figure 28, the means of coin acquisition changes with the individuals' annual income levels, although there are little linear correlations. In this section, the cryptoconsumers are divided into four income groups: very low (<$5,000), low ($5,000-$9,999), middle ($10,000-$49,999), and high (≤$50,000). Please note that the group "very low" did not exist in the 2021 report. For all groups, the top three methods for obtaining crypto are buying, affiliate programs, and minor online tasks (gigs) with changing orders. Affiliate and/or loyalty programs, interestingly, have become much more widespread since last year, nevertheless, there is an inverse correlation between the crypto-consumers' income and their tendency to use such affiliation programs.

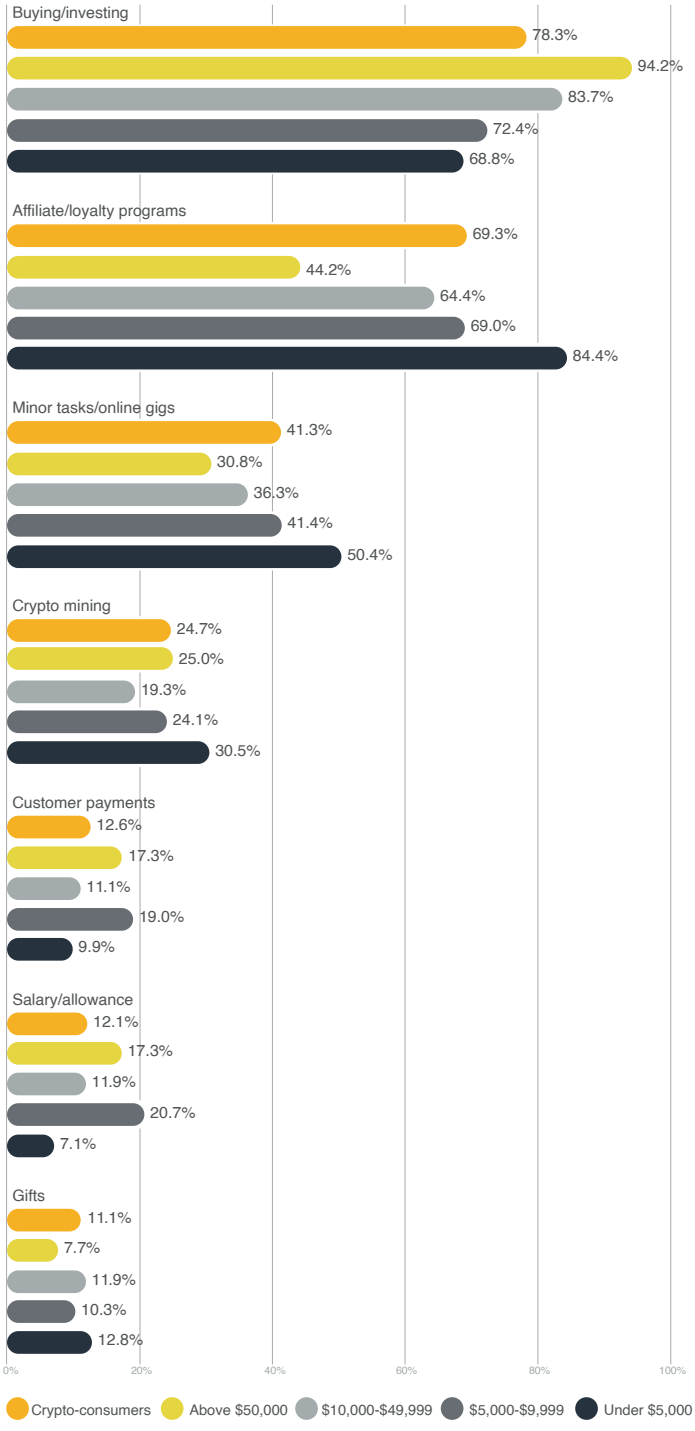


Figure 28: Main methods for obtaining cryptocurrencies by income level.

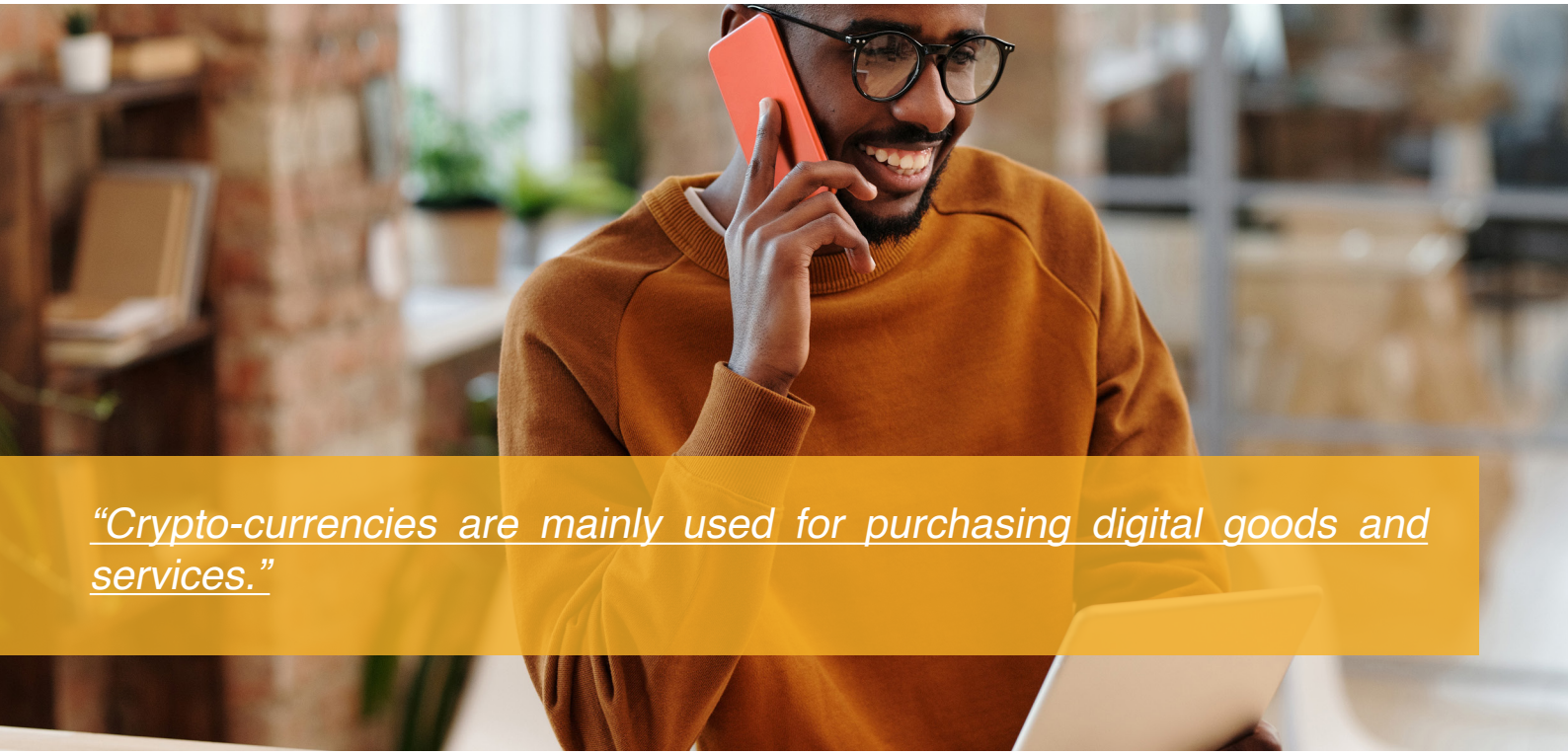
In fact, the very-low-income group is the only group that favors it with a percentage higher than the crypto-consumers' average. In contrast to that, there is a positive correlation found between the consumer's income and their preference of directly buying or investing in crypto-assets.

"As crypto-consumers' income increases, their likelihood of buying crypto-assets increases and using affiliation programs decreases."

The consumers in the high-income group buy crypto the most (94.2%) among all groups (last year, they were the least with 64.8%). Moreover, they are the second in getting customer payments in crypto (17.3%), salaries paid in crypto (17.3%), and also the second in mining crypto (25%). Contrarily, they have the least interest in minor tasks and online gigs (30.8%) and in affiliation programs (44.2%). By the look of things, they operate larger and steadier businesses that earn crypto or provide long terms services to get paid in crypto, rather than running after smaller online tasks like surveys or gigs. Mining, on the other hand, is not as prevalent as it was in 2021, possibly due to it being less profitable recently. A major driver of mining is the crypto prices, hence why large fluctuations and sharp decreases may inhibit mining for a while.

The consumers in the middle-income group benefit from a variety of means for obtaining their crypto, yet they tend to buy more as they are the secondmost buyers of crypto, following the high-income group. They are the lowest in mining (19.3%), and second-lowest in having customer payments (11.1%) and crypto salaries (11.9%). The consumers included in the low-income group are leading in earning crypto through customer payments (19%) and also in crypto salaries (20.7%). They are seemingly conducting steadier (mostly online) businesses that cannot be called minor tasks or gigs but are still on a smaller (or personal) scale. The ones in the verylow-income group are leading in affiliate/loyalty programs (84.4%), minor tasks and gigs (50.4%), mining (30.5%), and getting crypto gifts (12.8%). Having said that, they have the least interest in directly buying crypto (68.8%) and are the least in earning crypto from salaries (7.1%) or from customer payments (9.9%). They tend to lean towards methods that do not involve out-of-pocket expenses and investments, maybe a minor exception of mining (considering they do it on a small scale).

Almost a quarter of all crypto-consumers do not buy or invest in crypto-money at all, and this ratio hits as high as one-third among the lowest-income segment. Although those ratios have decreased significantly in one year, in a nutshell, cryptocurrencies used by crypto-shoppers are not always acquired through purchases or investments, but rather through some type of compensation for work, activities, loyalty promotion, etc. Thus, for the vast majority of crypto-shoppers, cryptocurrencies are already a component of a circular economic system in which they are in some way earned and spent, making them a suitable medium of exchange.



"Crypto-currencies are mainly used for purchasing digital goods and services."

5.3 Goods & services

Cryptocurrency buyers are inevitably restricted to the products and services provided by businesses. Nevertheless, our research indicates that cryptoconsumers buy a wide range of goods and services. With some categories appearing to generate more interest than others. First of all, there is no doubt that digital goods and services are favored over physical ones. Mobile network top-ups (incl. data and airtime) are the most popular product category since 45.4% of crypto-consumers buy them. Game credits, digital items used in games, and bonus content (e.g., from online game stores, platform portals, company websites, etc.) are the second most popular choice with a vast 43.7%. Digital entertainment (e.g., video-on-demand sites, entertainment portal subscriptions, movie and music providers, etc.) is in third place with 32.9%. It is the only category in the top five whose shares has increased. Digital entertainment is followed by mobile apps (e.g., from application stores) with a tiny margin (32.7%). The fifth category is computer software (excl. mobile apps) and cloud/internet services (e.g., hosting, domain, VPN, etc.) with 21.2%. The rest is as follows: hardware and electronics (e.g., laptop, TV, computer parts, etc.) with 20%, foods and beverage (incl. delivery) with 18%, travel and hospitality (e.g., tours, hotels, etc.) with 14.1%, online gambling (incl. betting) with 12.2%, fashion (e.g., clothing, apparel, accessories, etc.) with 12.2%, online publications and paid content (e.g., e-books, online magazines, newspaper portals, library/ content subscriptions, etc.) with 11.2%, pharmacy (e.g., health, cosmetics, beauty, supplements, etc.) with 5.6%, printed publications (e.g., books, magazines, newspapers, etc.) with 5.1%, and a few others (including cash-outs, donations to charity, open-source/crowdfunding projects, etc.). The full list provided in Figure 29 shows that the rankings have only minor changes since last year. The most evident take-away is the broadening diversity of bought products and services. On the other hand, our data also shows that consumer preferences for purchased goods and services vary by gender, income level, and employment type.

The things that men buy significantly more than women include digital entertainment, mobile apps, all kinds of publications, and anything related to gaming, whereas women tend to buy more fashion, pharmacy/beauty products, travel, and foods. Unlike 2021, surprisingly this year, women spend more on hardware and electronics. Cellular provider top-ups, software/cloud services, and gambling are drawing more or less equal interest from both gender groups. The complete ranking and ratios are given in Figure 29. Here we have to note that, currently, just less than one-tenth of crypto-consumers are women; therefore, when the number of female crypto-consumers

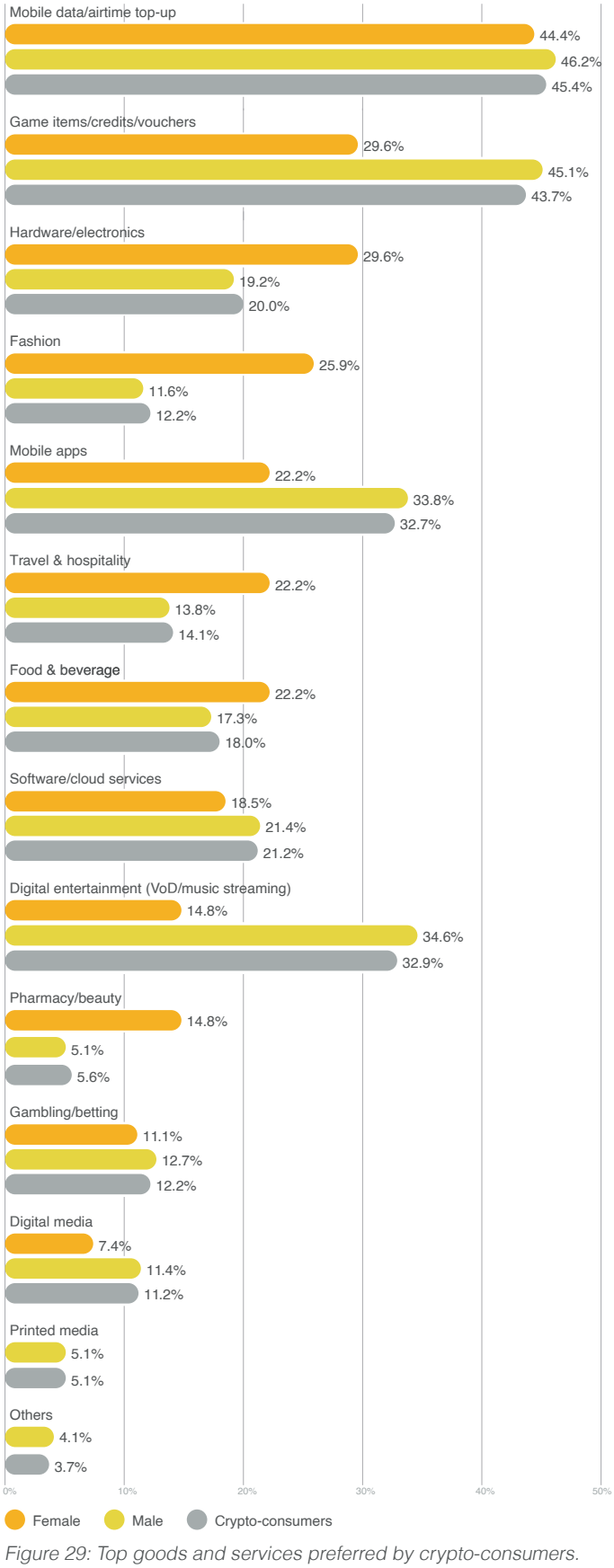


Figure 29: Top goods and services preferred by crypto-consumers.

increases, the ratios may be subject to change as the stats would be more mature.

Another element that affects purchasing preferences is income levels. As seen in Figure 30, the frequency of shopping for specific items directly correlates with the consumers' yearly income. The high-income (>$50,000) crypto-consumers' top 3 purchases are game credits (44.2%), software and cloud services (42.3%) with a large increase from last year, and digital entertainment (36.5%). Mobile top-ups (30.8%) could not make it into the top three this year. Besides, the high-income tend to buy more hardware/electronics, fashion, and travel, when compared to the other income groups. The difference is very sharp, especially in software and fashion. From another perspective, they tend to buy a little more physical goods and services than the others, but the difference is not as big as it was in 2021.

The middle-income ($10,000-$50,000) consumers' top 3 consists of game credits (46%), mobile top-ups (38%), and digital entertainment (30.8%). They are the leading group for in-game credits/items and food categories. They have a mixed and balanced product range containing both digital and physical goods (although digital goods are prominent). The low-income consumers' top 3 include game mobile top-ups and data (55.9%), mobile apps (37.3%), and digital entertainment (35.6%) together with game credits/items (also 35.6%). They tend to prefer digital goods and services more than physical ones. Although the general picture is similar, there are differences in the very low-income group. Their top 3 consists of mobile top-ups and data (54.7%), game credits/items (44.7%), and digital entertainment (38.7%). Interestingly, the very low-income group's product preferences ranking is the same as the global ranking. Their interest in physical goods and products seems to have increased since 2021 but is still somewhat lower than other groups.

We put forward three highly probable reasons for the tendency to buy digital items more than physical goods and services, especially among lowerincome groups. First, many physical goods and services (e.g., hardware, travel, etc.) have higher prices than many digital goods, so they may be less affordable for low-income consumers. Second, most physical goods are indivisible (or have a minimum amount) in terms of quantity, so that, while it is possible to buy varying amounts of game credits or mobile top-ups, it is not possible to order half hardware. Last but not least, most physical goods and services either require shipping of goods to the physical presence of the consumer or require the consumer to go and get the goods or services; hence, these options may not be available to the locations where low-income consumers densely reside (i.e., low-income countries).

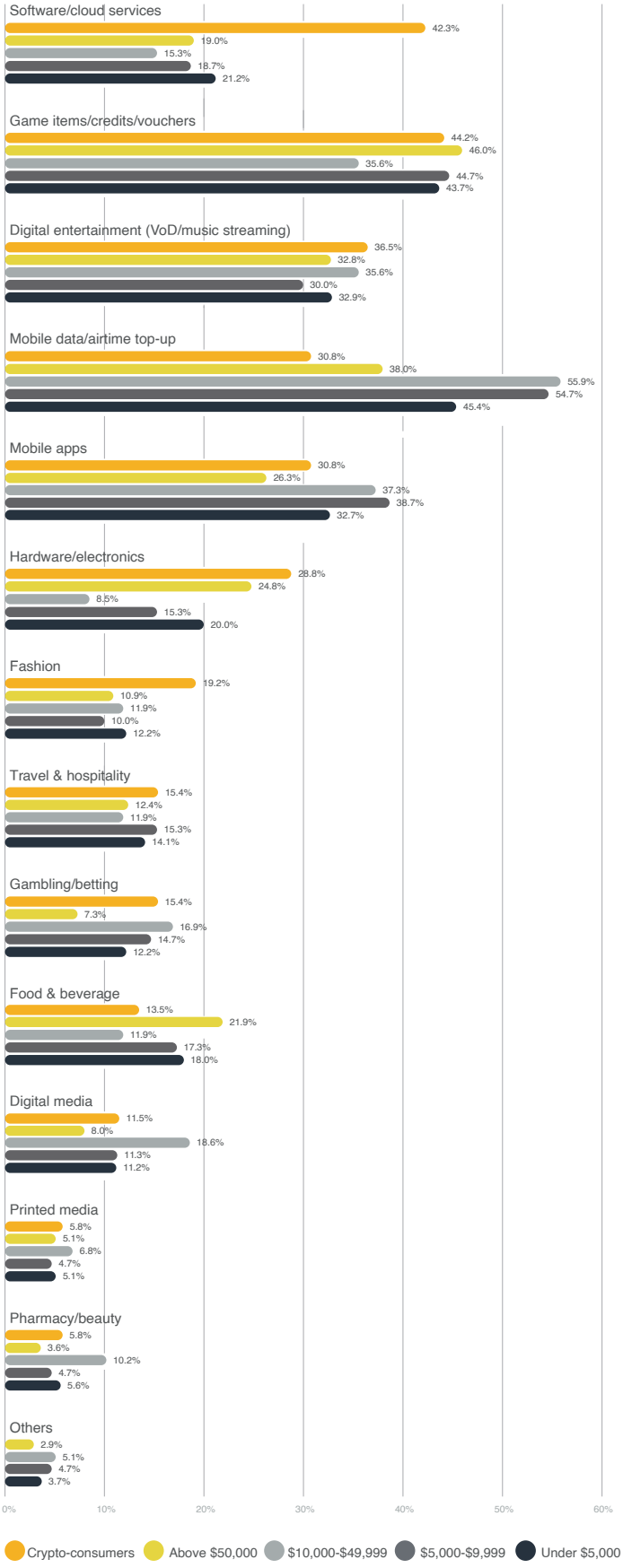


Figure 30: Top goods and services per crypto-consumers' income.

The popularity of purchased goods is also subject to change according to the employment type of the consumers, as illustrated in 31. Self-employed, entrepreneurs and investors have the widest range of purchased products and services. Among different items they buy, mobile top-ups (52.4%, dropped from 69.4%), game credits (47.6%), and digital entertainment (37.1%) constitute their top 3 choices. Mobile apps is no longer in their top 3. They even buy from most categories more than the other groups as a sign of the diversity in purchases. The employees' (both full-time and part-time) and retired consumers' top 3 items are mobile top-ups (42%), game credits (39.9%),), and digital entertainment (35.1%), mobile apps is no longer in the top 3 here, too. Although in their top 3, their interest in mobile top-ups and game credits is significantly lower than the other groups. The students and unemployed consumers spend remarkably less on physical goods and services, and they make purchases within a narrower range of goods. Moreover, they do not lead any of the categories with the only exception of game credits/items. Yet, their top 3 is game credits/ items (47.9), mobile top-ups (43.6%), and mobile apps (35.1%). Considering that they are the youngest group, their purchase characteristics, especially the high interest in game credits and items are understandable. A contradicting fact would be their remarkable disinterest in digital entertainment services as they are the least interested group in that rapidly growing category, possibly due to it being a somewhat luxury expenditure.

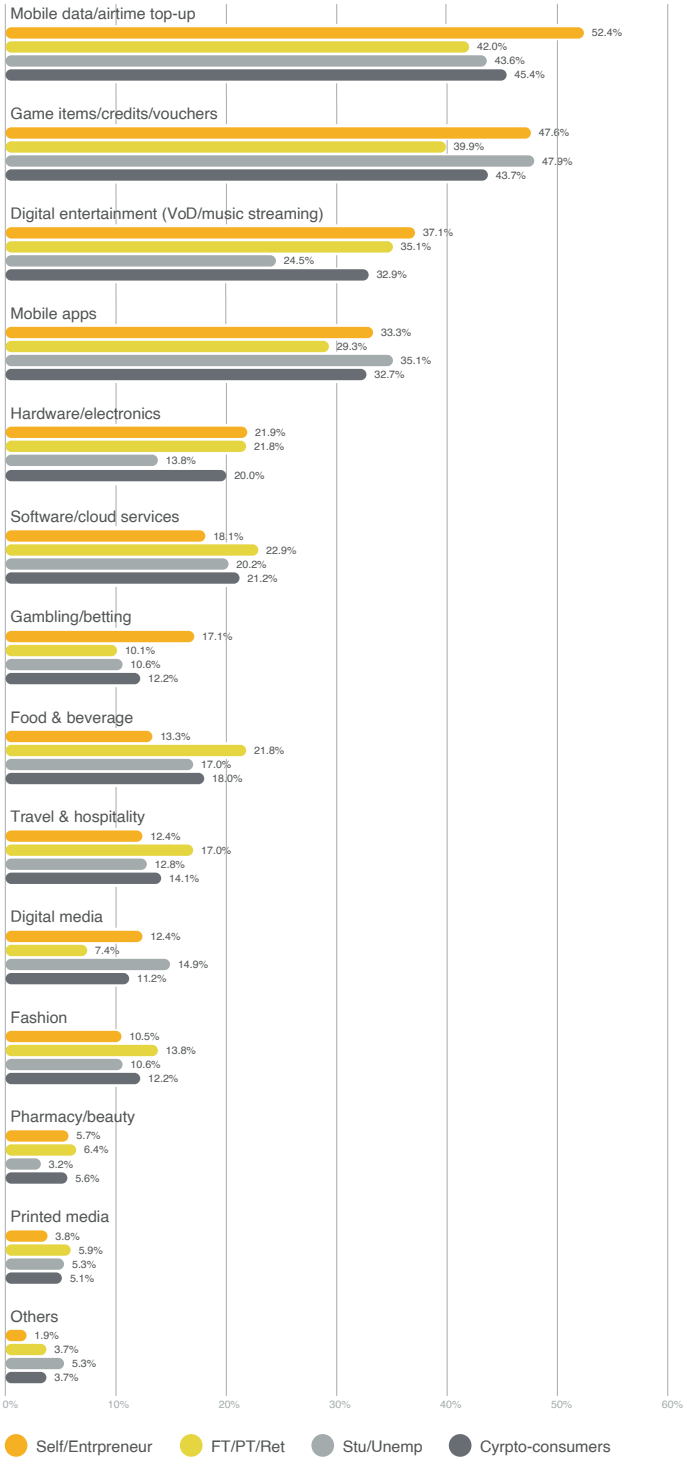


Figure 31: Top goods and services per crypto-consumers' occupation.

Among the goods and services that are bought by paying in crypto, only 56.9% of them are directly bought from the stores that are selling those products. The remaining 43.1% (was 40.6% in 2021) of the purchases are indirect, meaning that consumers first buy relevant gift cards, vouchers, or e-credits with their crypto-money through the websites providing such services, and then they spend their credits in the stores where they want to shop. As shown in Figure 32, direct purchases are still more common among crypto-consumers. This may be to avoid commissions and implicit costs that appear when buying gift cards first. However, a slight increase is also observed in the use of gift cards when compared to the last year's data. Although it stays at a small scale, this increase is showing us two facts: first, it is convenient enough to use gift cards when shopping, and second, the availability of stores that accept crypto is still too limited, so consumers cannot find stores to directly pay with their crypto.

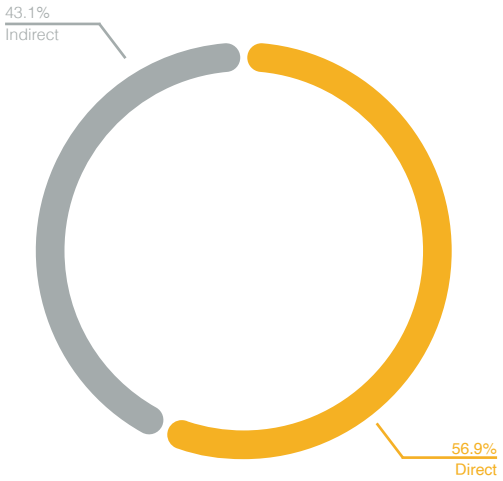


Figure 32: Share of purchases made either direct or indirect (i.e., via gift cards or vouchers).

5.4 Lightning Network and layer-2

The Lightning Network is a "layer-2" payment protocol. It is designed to be layered on top of the "main" Bitcoin network as a scalability solution to enable faster and cheaper transactions. The Lightning Network can be thought of as a peer-to-peer system for making micro-payments of cryptocurrency. Transactions occurring on the Lightning Network are processed "off-chain" through a network of bidirectional payment channels. Users wishing to pay with the Lightning Network must first open a payment channel by committing a transaction to the underlying (layer-1) blockchain. Once a channel is open, users can make and/or receive any number of payments. Every transaction on the Lightning Network updates the distribution of funds on the channels but not on the underlying blockchain; therefore, it is "off-chain". Only the final settlement transaction, which is made by closing the channel, will redistribute the funds to the underlying blockchain according to the transactions that occurred on the Lighting Network.

Although available to Litecoin and technically for other blockchains that are associated with the Bitcoin network, the Lightning Network's use today is mainly prevalent in (if not exclusive to) Bitcoin. Therefore, for the purpose of this report, when we refer to the Lightning Network, we are referring to this technology applied to the Bitcoin network and the transfer of Bitcoin cryptocurrency. Nevertheless, there are now many other layer-2 solutions tailored for various blockchain networks other than Bitcoin's.

For a crypto-consumer to pay with Bitcoin via Lightning, the user must:

1. Obtain a "Lightning-enabled" Bitcoin wallet,
2. Connect the wallet to a "Lightning node" (this is automatic in the newer generation of Lighting wallets)
3. Open and fund a Lightning channel (the store's channel or a well-connected channel that can reach the store).

So, despite being immediate, the complexity of crypto-shopping (which is already found to be too high by some crypto-consumers) further increases with the use of Lightning Network.

From Figure 33, 42.1% of the crypto-consumers are already knowledgeable about the Lightning Network to a remarkable extent. That is a 10 percent increase in one year, as this ratio was 38.3% in the 2021 report. More than half (54.4%, was 49.3% last year) of the crypto-consumers claim to have sent or received crypto-currency through the Lightning Network at least once, and most (52.8%, was 46.9% last year) of the crypto-consumers have used it for shopping purposes.

The share of Lightning Network users has risen visibly. That is a good sign for the adoption of crypto-shopping as the consumers are discovering and favoring a solution that makes it faster and cheaper instead of giving up or accepting things as they are. The share of consumers who tried using the Lightning Network is significantly larger than those who are knowledgeable about it, so the crypto-consumers are indeed open to trying new technologies that promise some benefits, even without understanding the technology "under the hood" they are using in detail.

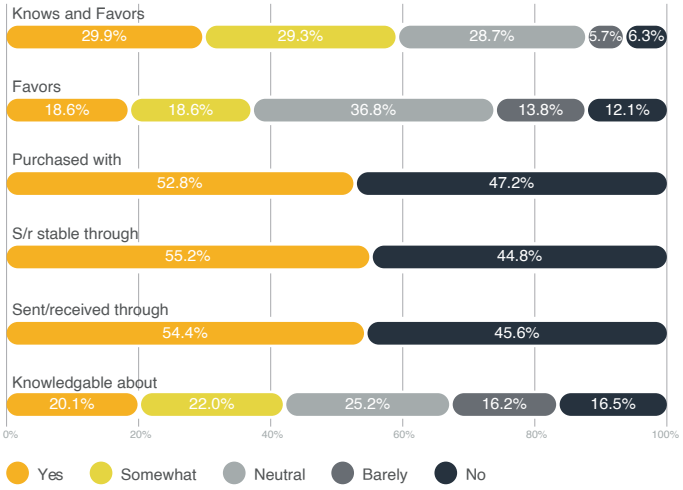


Figure 33: Crypto-consumers' attitude towards the Lightning Network. Share of crypto-consumers who are...

Layer-2 solutions and alternative blockchain networks can also be used to transact with stablecoins. Such systems may enable cheaper and faster payments, just as the Lightning Network brought to Bitcoin payments. This is a very important opportunity because transferring stablecoins, especially the ERC-20 tokens, on their native networks (like the Ethereum network), is usually very costly. As the demand for stablecoins increases, it would an on-target shot to take advantage of the lower costs offered by the layer-2 networks when using stablecoins. Indeed, as Figure 34 reads, 55.2% of the crypto-consumers who have used layer-2 networks at least once have sent or received a stablecoin through a layer-2 network at least once, which is a substantial ratio. So, we may expect an increase in the use of stablecoins in crypto-shopping in the near future, as consumers have already found methods for making it cheaper and faster this way.

59.2% of crypto-consumers who are knowledgeable about the Lightning Network claim that they favor it as a payment option when offered. What is more interesting is that all other things being equal, as many as half of the crypto-consumers stated that they would favor one store

over another if it accepted payments via the Lightning Network. Even more significant is the fact that this percentage is as high as 69.7% among the ones who are knowledgeable about the Lightning Network, whereas only 12% are knowledgeable and intentionally avoid using it for whatever reason. Furthermore, Lightning Network and other layer-2 users make crypto-shopping more frequent than the general crypto-consumer population (more on this in the next section).

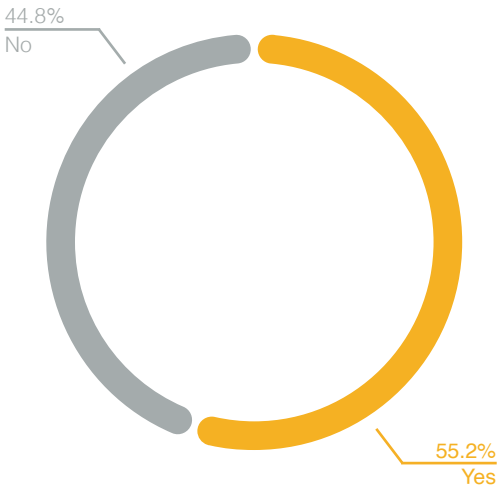


Figure 34: Share of crypto-consumers transacted with a stablecoin through a layer-2 network, among all consumers using layer-2.

Last year, in early 2021, we observed that only a tiny fraction (1.9%) of the total purchases and as low as %2.8 of Bitcoin payments made via our platform were processed through the Lightning Network, although the crypto-consumers reported deep interest in Lightning Network as a payment option. This year, on the other hand, we see an outstanding increase in the preference for the Lightning Network, especially as a share of the Bitcoin payments. This is well illustrated in Figure 35. According to our analytics, in July 2021, payments made over the Lightning Network constituted as little as 3.7% of all purchases and 8% among Bitcoin payments (per the number of orders, not volume). However, in June 2022, this rate vastly increased to 9.1% of all purchases and to 33.6% among Bitcoin payments. In other words, one-third of all payments that were directly made with Bitcoin (excluding third-party payment processors, like Binance Pay) were sent through the Lightning Network, which is a huge improvement when compared to the last year's data mentioned earlier. The rise in the use of other layer-2 solutions is also worth mentioning.

In lieu of the good news, data from our infrastructure, as well as from various actors in the sector, show that Lightning Network transactions are still a small portion of all Bitcoin transfers, even in the stores which offer it. Hence, it may be logical to think that there are still some demotivating factors and/or barriers to access that inhibit adoption. These may include technical issues, such as not having the skills or the know-how to set up Lightning wallets and channels correctly, but also economic reasons, such as committing (prepaying) funds on a Lightning channel. Yet, we are highly optimistic about those potential barriers considering the improvement seen in Figure 35.

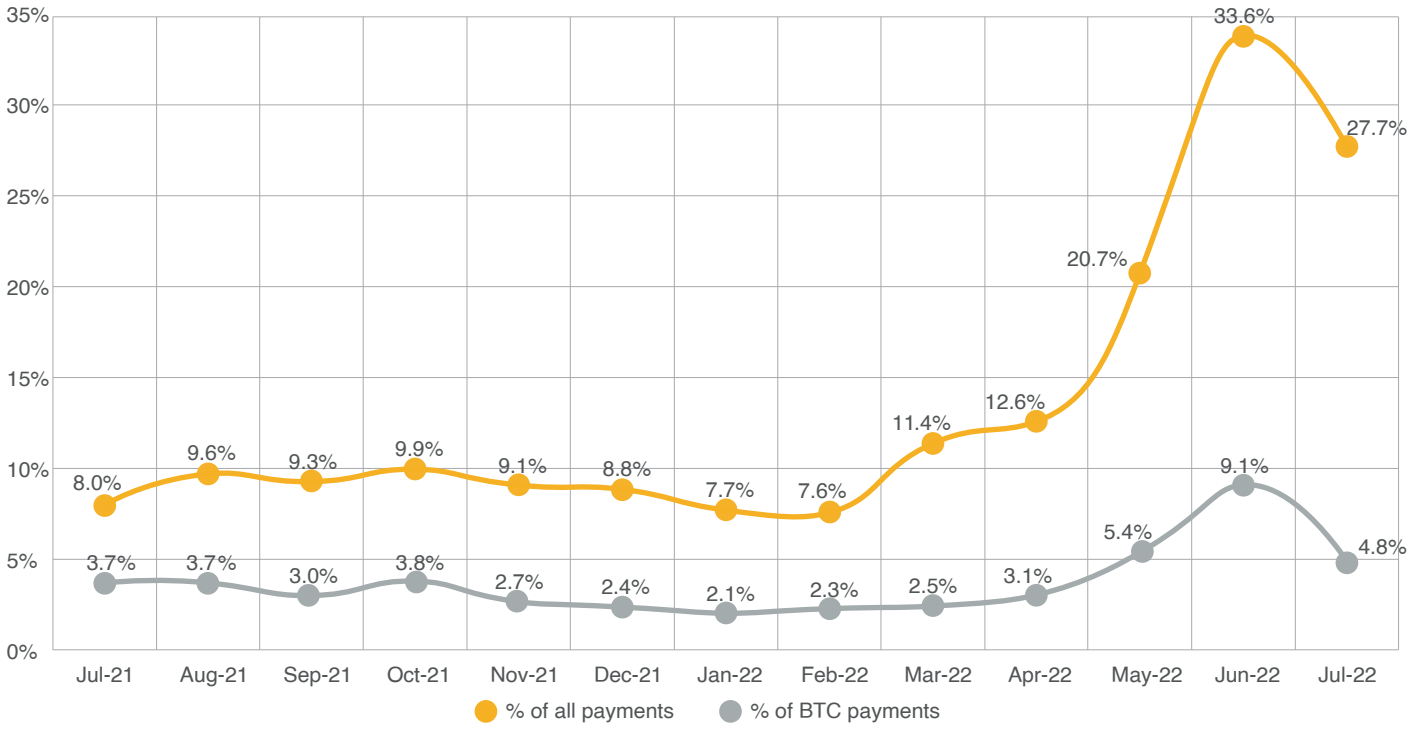


Figure 35: Payments made via Lightning Network as a share of all orders and BTC payments.

5.5 Recurrence

Recurrence and frequency of shopping activities are crucial for income streams from both the retailers' and providers' viewpoints because they show how loyal the customers are. Fortunately, crypto buyers frequently make repeat transactions.

As revealed in Figure 36, 12.5% of cryptoconsumers make daily purchases using cryptocurrencies, and 26.5% make weekly purchases. Hence, 39% of all crypto-consumers shop at least once a week by paying in crypto. Those rates remained mostly unchanged since last year. Additionally, another 44.3% (was 34.1% in 2021) buy goods and services every month or so. 12.2% of cryptoconsumers do crypto-shopping once (or less than a few times) a year. 4.4% of them do it even less frequently than once a year, very rarely, or tried once and did not continue. The ones who perform cryptoshopping on a yearly basis or rarely make up 16.6% when combined. This ratio was as high as 25.4% last year. That big decrease means that the shopping frequency of cryptocurrency shoppers has increased a lot. So it is not only that the number of crypto-shoppers has increased, but also how frequently they shop which is increasing as well.

Those stats are substantial as they show that crypto-shopping, for 83.4% (was 75% in 2021) of those who have made a purchase with a cryptocurrency, becomes a habit (if not the norm) rather than staying as a rare occurrence. Therefore, it is also interesting to elaborate on what periodical buyers purchase. Data suggests that crypto-consumers who shop frequently (i.e., daily or weekly) prefer digital goods and services over physical ones slightly more (up to 7% depending on the category).

On another note, the frequency of transfers (non-shopping-related send, receive, or exchanges) is higher than that of purchases among crypto-shoppers, as 21.9% make crypto transfers on a daily basis and another 33% make them on a weekly basis. Buying cryptocurrency is also done slightly more frequently than crypto-shopping. Those findings can be expected due to the high interest in using crypto-assets for investment and financial purposes. Details can be obtained from Figure 36.

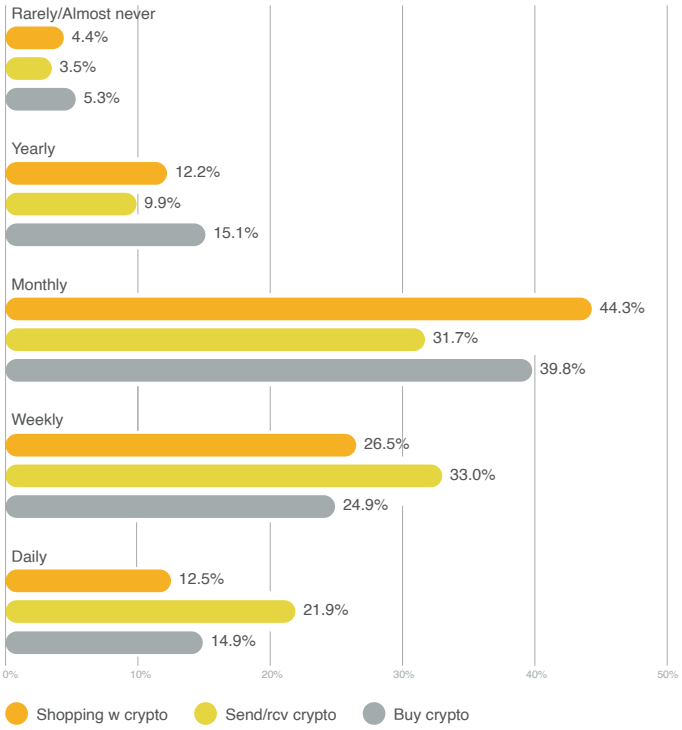
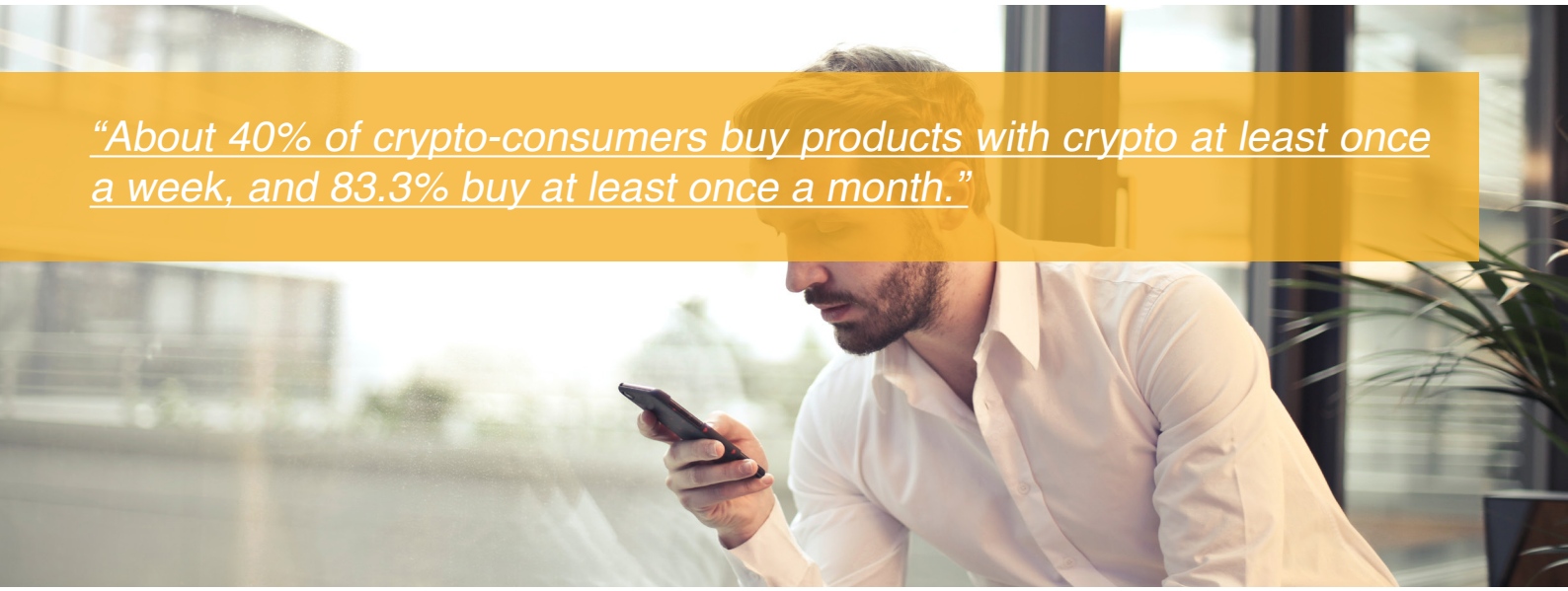


Figure 36: Crypto-consumers' frequency of making purchases and transfers (incl. exchanges) with cryptocurrencies.



"About 40% of crypto-consumers buy products with crypto at least once a week, and 83.3% buy at least once a month."

The crypto-consumers who have used the Lightning Network at least once, including the ones who use it occasionally or whenever available, have a much higher crypto-shopping frequency when compared to the consumers who have not yet tried the Lightning Network. As shown in Figure 37, 15.9% of the crypto-consumers who use the Lightning Network do crypto-shopping on a daily basis. This is more than twice the ratio of the ones who do not use the Lightning Network. Likewise, 31.3% of cryptoconsumers using the Lightning Network do cryptoshopping on a weekly basis, this is more than 50% higher than non-users. When combined, nearly half of Lightning Network-using crypto-consumers do crypto-shopping at least on a weekly basis. This rate is only 27.4% among the ones who do not use Lightning Network and about 40% among the general crypto-consumer population. The shopping frequency of the Lightning Network users (and the gap between the non-users) is quite impressive. Generally, it is safe to assume that the Lightning Network users have more expertise in the field and have more exposure to blockchain due to their work. Moreover, there are more innovators among them. What we found even more noteworthy is that the better user experience (i.e., higher speeds and lower costs) that the Lightning Network provides may most likely have been playing a significant role for its users in making a habit out of crypto-shopping, whereas the non-users may find it more expensive and may not get the same benefits as the users.

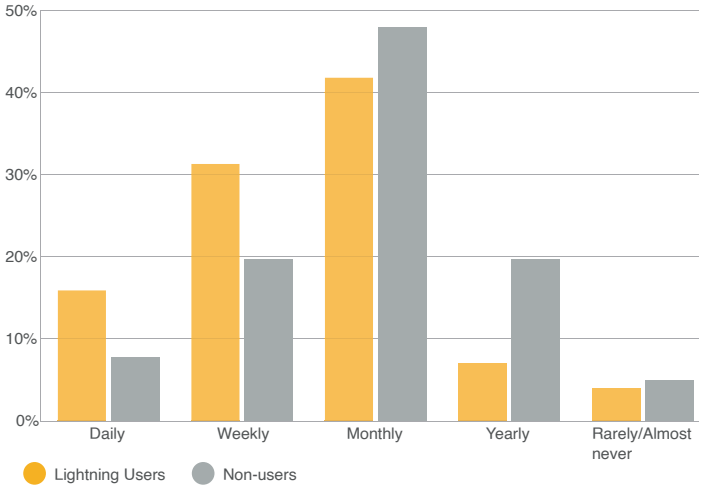


Figure 37: Crypto-shopping frequencies of Lightning Network users and non-users.

"Crypto-consumers using Lightning Network have a much higher shopping frequency than nonusers."

6. SHOPPING EXPERIENCE

Businesses should assess the consumers' previous and present experiences to understand the market's demand for future actions. Our data shows that they are pleased by many aspects of crypto-shopping, but also that there are still some bothersome problems.

6.1 Satisfaction

On the whole, crypto-consumers are generally happy with their shopping experiences. However, as order confirmation delays and transaction costs rise, satisfaction rates plummet, making them the key elements influencing how satisfied consumers are with their crypto-shopping experiences. Although costs and delays are closely related in blockchain ecosystems, fees are decided upon prior to an order being submitted, whereas delays occasionally occur after an order has already been placed. So, we go into further detail on delays here and fees in the subsection after that.

"In crypto-shopping, 75% of the orders are confirmed within the first 5 minutes, and 92% of the orders are confirmed within 20 minutes."

There are two reasons for delays: the intentional processes of the stores (e.g., payment handling, billing procedures, the supply-chain matters, etc.) or the waiting queue (e.g., the memory pool, otherwise known as the mempool) of a particular cryptocurrency platform. Since most modern e-commerce systems can handle orders within minutes (actually, even in seconds), when longer delays are mentioned, the readers should think of the latter case. It is important to understand that such delays vary a lot from one cryptocurrency to another; even for the same currency, it can differ from time to time depending on the utilization rates of the waiting queues (the mempool paradigm and its effects on the user experience are further elaborated in Section 6.2).

Almost one-third of the crypto-consumers claim that their orders are (most of the time) placed and confirmed instantly or within seconds. As this ratio was around one-fifth last year. Another 42.6% claim that their orders are confirmed within only 5 minutes, though not instantly. This means that three-quarters of the orders are confirmed within 5 minutes, which rose from half since last year. We can think of two main reasons for the evident speedup in the order confirmation processes. First, the crypto-payment systems were improved significantly over the course of one year; second, more crypto-consumers have learned about and started using faster and cheaper systems like "lighter" currencies (e.g., LTC, DASH, BNB, etc.) and layer-2 networks (e.g., Lightning Network, Polygon/MATIC, etc.).

Those are indeed satisfactory results also considering that 17.8% of all orders are completed within 5 to 20 minutes, and cumulatively, more than 90% of purchases are confirmed within the first 20 minutes. On the other hand, 4.4% of the orders are confirmed within 20 to 60 minutes, which is the acceptable-but-not-sogood range. Only 2% were confirmed within 1 to 6 hours, dropped from 4.6%, as little as 1.2% stated that their orders got confirmed within more than 6 hours of waiting time, dropped from 3.4% in 2021. The last two time ranges mentioned contribute to the negative customer experiences and must be eliminated by the stores and providers, as elaborated below. The full breakdown of order confirmation feedback is provided in Figure 38.

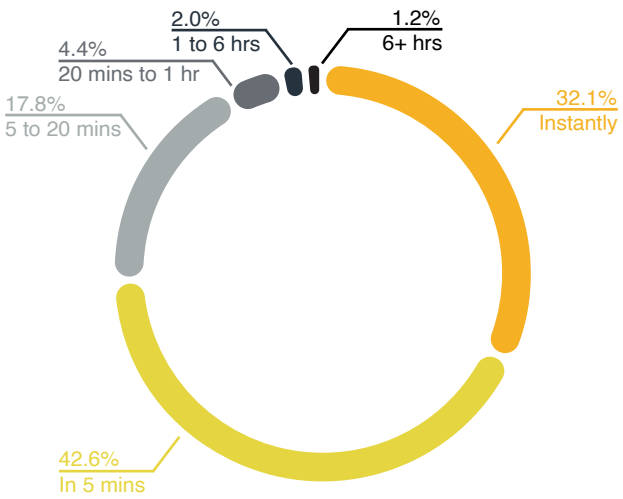


Figure 38: How long it takes for an order to be confirmed.

Figure 39 shows how transaction delays affect overall consumer satisfaction. The satisfaction rates are produced over a 5-point Likert scale, where five stands for the best satisfaction and one stands for the worst (on the right Y-axis). Yet, the bars show the share of crypto-consumers who complain about the delays per duration of transaction delay (on the left Y-axis). The data makes it obvious that crypto-consumers find confirmation delays tolerable as long as they don't last more than an hour. But delays of more than an hour sharply lower customer satisfaction levels. After around 6 hours of delays, the customers' satisfaction stopped declining around "neutral" (3) levels (not drawn due to statistically insufficient numbers), possibly indicating that consumers still benefit from crypto-shopping to some extent despite the delays. Anyway, we may therefore conclude that a delay of no longer than an hour is tolerable for crypto-consumers before the satisfaction levels begin to decline. This scale should be considered a minimum standard from a business standpoint and might be used as a target for providing the best customer experience.

"Among all other age groups, young people of Gen- Z are the happiest with their purchase experiences with crypto."

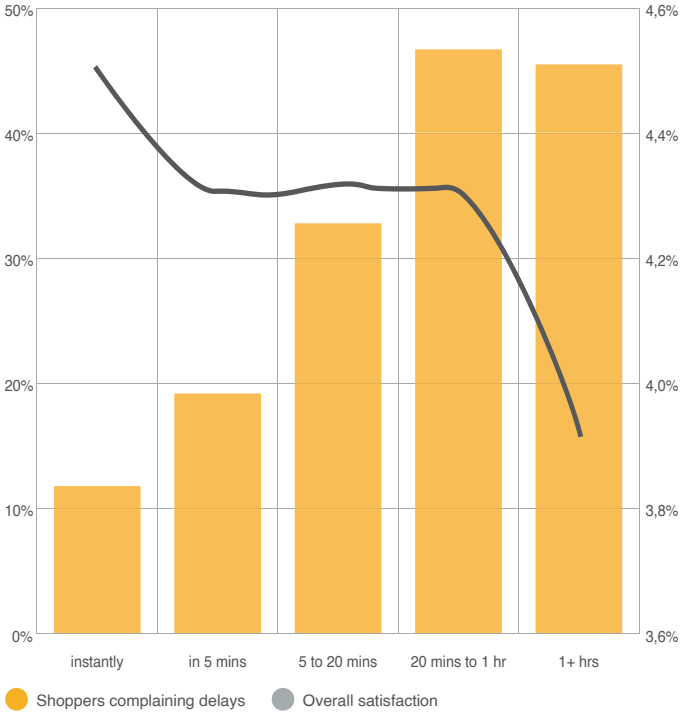
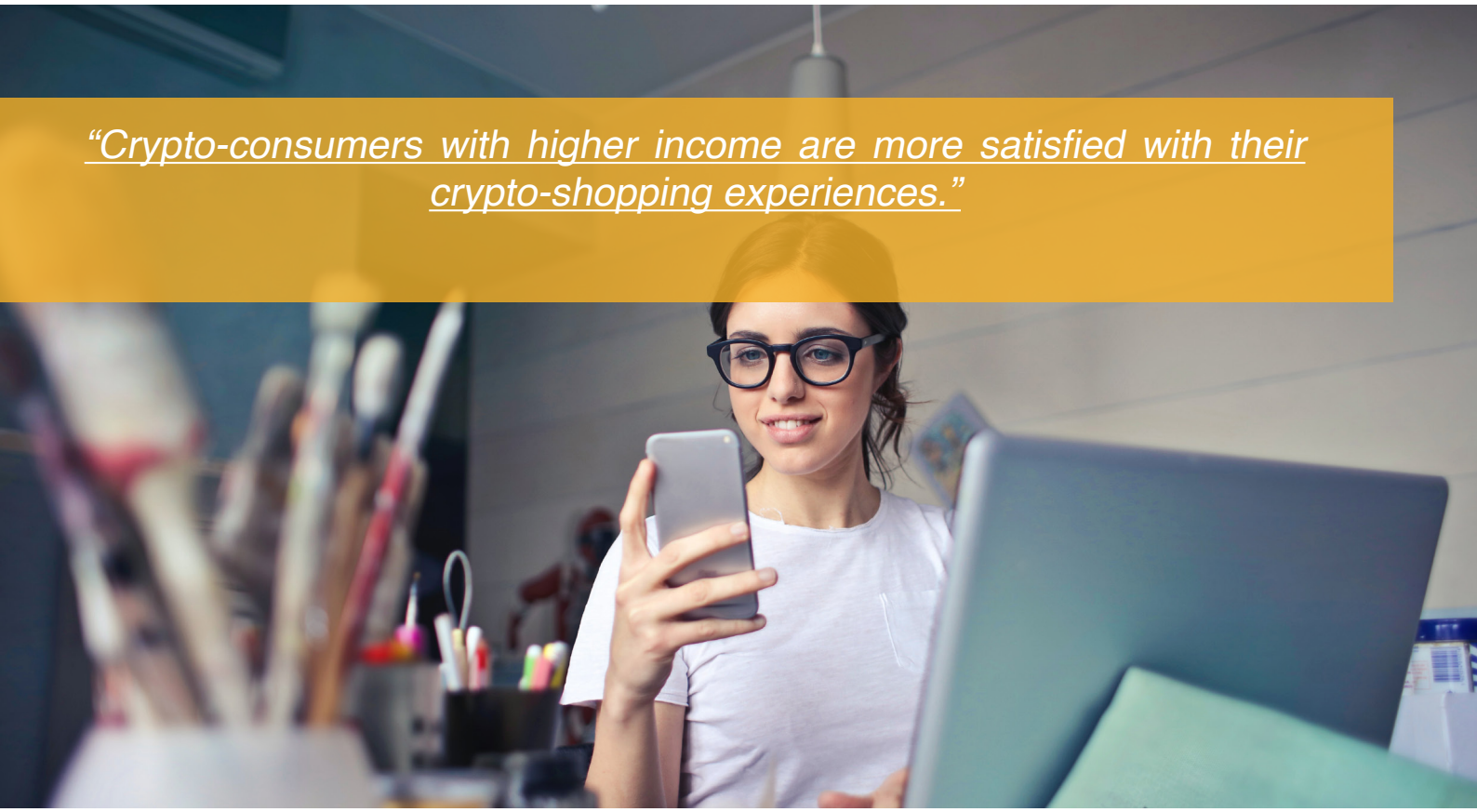


Figure 39: Breakdown of crypto-consumers complaining about delays and their satisfaction per delay length.



"Crypto-consumers with higher income are more satisfied with their crypto-shopping experiences."

Although not exactly linear, there is a positive correlation observed between the income groups of cryptoconsumers (very low: <$5,000, low: $5,000-$10,000, middle: $10,000-$50,000, high: >$50,000) and their crypto-shopping satisfaction degrees (on the 5-point Likert scale), as illustrated in Figure 40. The share of satisfied ('5' and '4' points) consumers is clearly higher in the middle-income and high-income groups when compared to other groups and the overall average. Similarly, when looking at the dissatisfaction rates ('1' and '2' points on the Likert scale), although the percentages are very low, it is found that low-income cryptoconsumers are dissatisfied the most (7.4%). Dissatisfaction is literally zero in the middle-income group and as low as 4.3% in the high-income group, lower than that of 2021. So, the dissatisfaction rates decrease as income increases, but not purely linearly. It is most likely caused by unbalanced transaction fees that are not proportional to the value of the purchases. This phenomenon affects most of the consumers who buy cheaper goods in each individual order, which is more frequent among very low and low-income consumers.

By the way, satisfaction rates seem to be increased a bit since last year. What affects the satisfaction rates more is the crypto-consumers' age. Younger consumers of Generations Y and Z have higher satisfaction, whereas the rates drop as age gets older. This might be a result of the complexity of crypto-shopping and related technologies, which the younger generations can likely learn and adapt faster. Furthermore, the adoption of Lightning Network and layer-2 systems are also found to have a correlation with positive experiences.

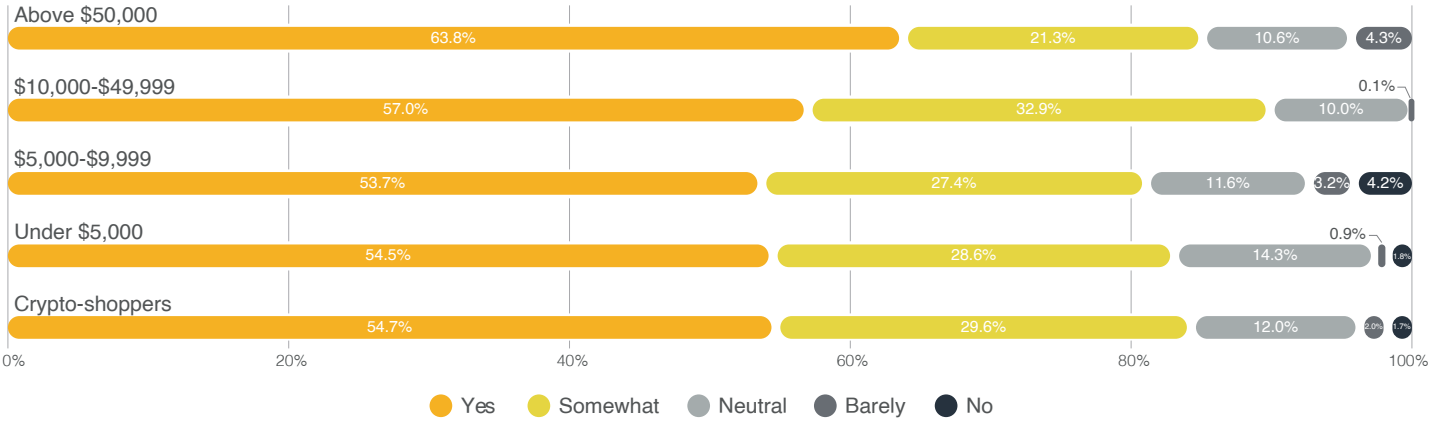


Figure 40: Crypto-consumers' overall satisfaction per their annual income.



"Crypto-consumers using Lightning Network are happier with their purchase experiences."

6.2 Issues

The issues that bother crypto-consumers the most are carefully examined. We also incorporated demographic breakdowns because we noticed there are minor variations among various population groupings.

6.2.1 Overview

Among the most unpleasant problems encountered when purchasing with cryptocurrencies are high transaction fees and protracted processing times. As was previously mentioned, the majority of cryptoconsumers are already used to paying fees and waiting for delays, but in reality, these charges seem to be more than they can bear. However, cryptoshoppers face more than just delays and costs. An extensive list of connected concerns is shown in Figure 41.

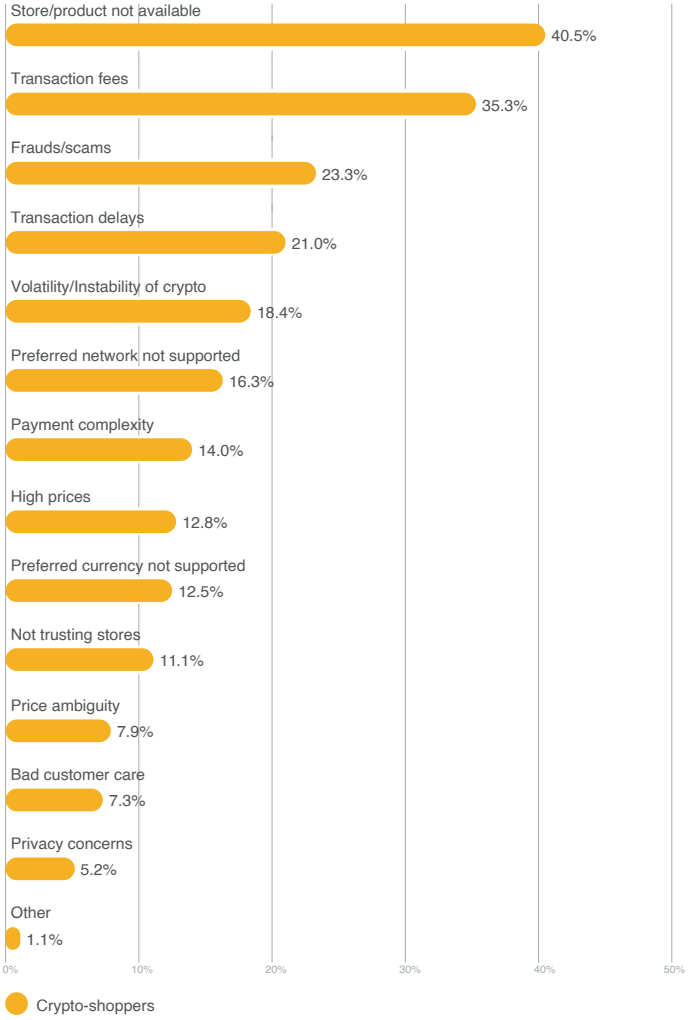


Figure 41: Issues that crypto-consumers face during shopping.

High transaction fees, the top concern of the cryptoshoppers in 2021, is no longer the number one issue they face. It is now surpassed by the unavailability (or occasionally, insufficiency) of stores that accept crypto-payments and sell desired products, as 40.5% reported. That is to say, crypto-commerce still covers only a limited subset of the overall retail sector. The top complaint of crypto-consumers being such unavailability must be understood as a huge signal for entrepreneurs, investors, and businesses who are looking after new markets or channels as this translates to people that are ready to pay extra fees (although not so willingly) and wait for delays to be able to buy stuff with their cryptocurrencies, but they cannot find the correct spots to spend their money!

The second-most reported issue is the transaction fees with 35.3%, showing that this issue is still very important, even though its share has dropped drastically from 49.4% since 2021. More than one-third of crypto-consumers complain about the high transaction fees occurring during shopping transactions. The transaction fees are the amount of crypto-money that will be "gifted" to the blockchain nodes that process the pending transactions. As there is no tariff for such handling, the fees fluctuate depending on the length of the queue of the pending transactions, commonly called the mempool. When there are too many pending orders for the processing nodes to handle within a reasonable time, only those orders pledging the highest fees are processed. In such a situation, transactions offering very low fees cannot even be processed at all, resulting in the cancellation of the transactions due to timeouts. This undermines the usability of crypto-shopping.

Related to the problem of the fees is the "waiting problem" since this also depends on the blockchain being used and its current mempool status. Specifically, transaction delays rank fourth (fallen from third place in 2021) in terms of crypto-consumer complaints, with 21% (was 25.9%). The current third-most annoying issue is fraud and scams, as reported by 23.3% (was fourth with 20.5% in 2021). Scams and frauds can be encountered everywhere, especially everywhere online. However, in the crypto world, they may be more threatening as it is nearly impossible to reverse any fund transfers and difficult to verify the identity of scammers, although tracking transfer records is somewhat downhill. Decentralized user-experience databases may help build trust within the crypto-community since 11.1% (increased by more than 10 percent in one year) do not trust the stores that sell goods and services with cryptocurrencies, even including those that are not blatantly scams. Similarly, 5.2% have some privacy concerns, so they are worried that their personal information can leak to distrusted third parties during or after crypto-shopping.

As reported by nearly one-fifth, another major issue is the high volatility and instability of the fiat values of (many) cryptocurrencies. Drastic and sudden changes in the conversion rates can make consumers feel like they are paying more (or sometimes less) than they should. Plus, they may worry that by spending their cryptocurrency now, they might be missing an opportunity to earn money on it if its value increases after they have already spent it. Consequently, 7.9% are complaining about the ambiguity of the fiat value of the goods and services they are about to buy, probably because of complex and volatile conversion rates. Provision and acceptance of stablecoins provide a solution to this volatility issue, but they come with their own issues, which again include the fees. The most widely accepted stablecoins are generally ERC-20 tokens (e.g., USDT, USDC, etc.), thus requiring an even higher amount of "gas" (i.e., fees) than a typical Ethereum transaction. Nevertheless, more efficient and cheaper blockchains (e.g., Binance Smart Chain) or layer-2 scalability networks (e.g., Polygon/, OMG, etc.) could be a solution, provided that they are easy enough to be used within a shopping context.

In fact, 12.5% are complaining that payments with their preferred cryptocurrency is not accepted by the shops they would like to be shopping at, and 16.3% state that the blockchain network that they would favor is not supported by the stores accepting crypto-payments, even though their preferred currency may be accepted. Therefore, in order to keep their customers (and attract more), stores must improve the selection of the currencies they accept and should support alternative solutions, like layer-2 networks. However, 14% (jumped from 10.9%) of crypto-consumers find the crypto-payment processes to be annoyingly complex and would prefer crypto-shopping to be a simpler procedure. Furthermore, some consumers (7.3%) are in need of supporting customer care, and 12.8% of crypto-consumers just find the prices of goods and services higher than they expected. This can either be pointing out a comparison to the prices in conventional shops (so that the goods and services are more expensive when sold in cryptocurrencies) or the level of prices in general (e.g., due to the phenomena of low purchasing power and/or high inflation in some countries).



6.2.2 Fees

To get a deeper understanding of the fees and waiting issues, it is important to know that the mempool states are subject to frequent changes, because they operate on a supply and demand principle. This may have profound consequences for the perceived shopping experience and may also drive (or inhibit) certain behaviors and preferences of crypto-consumers. Specifically, when the estimated transaction fees start to feel overpriced (due to the mempool being overloaded), it may work to wait, but there is no guarantee that the fees will decrease anytime soon. Another (and obviously better) option could be changing the currency used to pay. Likewise, using layer-2 solutions may also work very well, possibly even better than changing the currency as it eliminates exchange commissions.

To clarify how cryptocurrency and layer-2 preferences affect the fees paid per purchase transaction, we present an example comparison using the real statistics of Bitcoin, Litecoin, Ethereum, and Dash mempools. Throughout the time period in which the research was being conducted, July 2, 2022, we observed the highest average transaction fees on Bitcoin's main network. On that day, the median fee was as high as $5.3. In the exact meantime, it was $1.5 for Ethereum, which was exceptionally low. On the other hand, the median fees for Litecoin and Dash were even lower, around a tiny fraction of $0.01. Similarly, cryptoshoppers who insist on using Bitcoin can also benefit from such low (virtually non-existent) fees if they opt to use the Lightning Network. Here we would like to remark that the mempools also contain many unprocessed transactions that fell short of the pledged fees; hence the fees issued on transactions that were completed are expected to be even higher than the ones presented in the table. Although we observed a decrease in fees, in general this year, when compared to the previous year, the difference between the fee rates is still huge.

The amount of fees to be paid per transaction does not linearly correlate with the value of the transaction; rather, it changes as the size of the transaction in bytes or virtual bytes changes - assuming the stake for the fees is constant (which normally is not). Therefore, the smaller the transaction value, the bigger the impact of the fees. This creates a major drawback in crypto-shopping for people who want to spend smaller amounts, as the fees may reach up (or even surpass) the nominal price of the products or services they intend to buy (which are called dust transactions).

On Apr 3, 2022, the date when the median Bitcoin fees were observed, the median transaction values (incl. exchange transfers, DeFi, and all others) were $502.3 for Bitcoin, $15.6 for Ethereum (much lower than last year's stats), $174.9 for Litecoin, and $2.6 for Dash. So, it is still true that Dash and Litecoin, and now also Ethereum after sharp drops in transaction costs, are being used in smaller-valued transactions compared to Bitcoin. Likewise, the data from our business analytics suggests a well-matched pattern on how crypto-consumers tend to adjust their blockchain and cryptocurrency preferences also based on the fees and on how these relate to the overall value of the transaction they are making, with an observable increase in Ethereum usage.

In fact, we provide a report of the median fees paid (as a percentage of the total transaction) by our customers per the cryptocurrency they used for their orders on July 2, 2021 when the average Bitcoin fees were the highest, June 29, 2022, when the Bitcoin fees were the lowest, and April 3, 2020, when the median of average fees were observed. The values given are the median value of delivered orders per day per the cryptocurrency used for payments (i.e., Bitcoin, Litecoin, Dash, and Ethereum. Stablecoins are excluded due to limited support within the study's time period). According to the analysis results presented in Table 1, the median transaction fees paid for an order made 21% of the original price of the item purchased. In extreme cases, the fees even surpassed the original cost of the item (observed for cheaper products like vouchers with smaller face values). A crazy bargain where consumers pay two and get one still continues from time to time, but definitely less likely this year than it was in late 2020 and early 2021. Even in the day with median BTC fees, a crypto-consumer could expect to pay a fee that is around 6% of the products' actual cost. Even on that day, extreme fees that surpassed the original price of the products were observed. The lowest day showed more acceptable fees, though. Anyway, paying with Bitcoin without using Lightning Network or other layer-2 alternatives is a waste of money for a consumer.

On the other hand, Litecoin and Dash offer very cheap transaction fees, rarely more than ¢1, if not virtually free. When they are used to purchase goods and services, the fees typically do not exceed five per thousand, and not rarely do they become lower than one per ten thousand. Apparently, from a consumer perspective, it might be wise to consider either using more efficient currencies, such as Litecoin and Dash, or a scalability solution like Lightning Network for crypto-shopping purposes. Lightning Network is not the only scalability solution available. Fast transactions and low fees are possible for Ethereum-compatible currencies (ERC-20 tokens, incl. stablecoins) via a plethora of different blockchains (e.g., Binance Smart Chain, Avalanche, etc.) and Ethereum layer-2 solutions (e.g., Polygon, OMG, XDai, etc.). Crypto-consumers who want to, or are obliged to use Bitcoin, Ethereum, and ERC-20 tokens (incl. stablecoins) for payments should consider making the transactions via more efficient networks, sidechains, or other scalability solutions (when made available by businesses). We are pointing out an opportunity to be taken in order to avoid high transaction fees and long delays caused by the overcrowded mempools during crypto-shopping.

"Even 45.5% of crypto-consumers who are (certainly or somewhat) willing to pay some transaction fees do find the current transaction fees too high."

Currency	Day w/ Highest BTC fees	Day w/ Median BTC fees	Day w/ Lowest BTC fees
BTC	21%	5.8%	1.5%
LTC	< 0.01%	< 0.01%	< 0.01%
DASH	< 0.01%	< 0.01%	< 0.01%
ETH	4.4%	11.1%	0.1%
BTC w/ Lightning	< 0.01%	< 0.01%	< 0.01%

Highest: 02 Jul 2021. Median: 03 Apr 2022. Lowest: 29 Jun 2022.

Table 1: Median transaction fees paid as a percentage of the median value of purchased items a day with select currencies; when the highest, median, and lowest daily average BTC fees were recorded.

6.2.3 Age factor

The issue perception is different among various age and income groups, although the lists of the top 3 problems remain mostly similar. From Figure 42, store/product unavailability is the biggest issue for all age groups except for 35-44, yet its prevalence is much more significant among 45+, the oldest group (57.1%), followed by 15-24, the youngest group (43.6%). The oldest group's shopping list is not that diverse, so they may be looking for more specific items, especially physical goods and services, but the young group's wish list is more diversified. Transaction fees are disliked by all age groups similarly, but a little more by the 45+ crypto-consumers (38.1%). With slight differences between groups, consumers at ages 15 to 24 care about fees the least (34.1%), which has dropped 10 percent since the last year. Transaction delays affect the youngest group the most (31.9%) and its annoyance decreases significantly as age increases; indeed, the oldest group does not seem to care about the delays a lot (14.3%). While the Generation Z is very impatient, boomers are seemingly (more) okay with waiting for longer delays. Scams and frauds are a primary concern, mainly for the oldest and the youngest groups. Consumers in the groups 25-34 and 35-44 are not afraid of scams as the others. Payment complexity is more of a problem for 45+ (19.0%), while younger consumers seem to tolerate it.

The volatility and instability of fiat values of cryptocurrencies discomfort all groups to a comparable extent, while the youngest group is the one caring for it the least. This finding contradicts with the 2021 report, where they were found to be the most affected group. One reason may be that they learned the nature of the market and got used to it quickly. Compared to other groups, cryptoconsumers at ages 25 to 34 care about high prices the most (14.6%). Yet, the ambiguity of the fiat value of goods and services sold in cryptocurrencies becomes a problem again for the oldest (9.5%) and the youngest groups (10.6%) together. Young adults of Generations Y (14.6%) and Z (14.9%) complain that their preferred currencies or networks are not supported by the stores the most; as a consequence of their openness to test and adopt new technologies. Generation X is the most skeptical group about the stores (13.9%), whereas the oldest have the biggest privacy concerns. This is consistent with other findings (and the last year's data) as they are afraid of scams and frauds a lot. Per our data, crypt-shoppers younger than 45 do not seem to care about privacy, or at least do not have concerns.

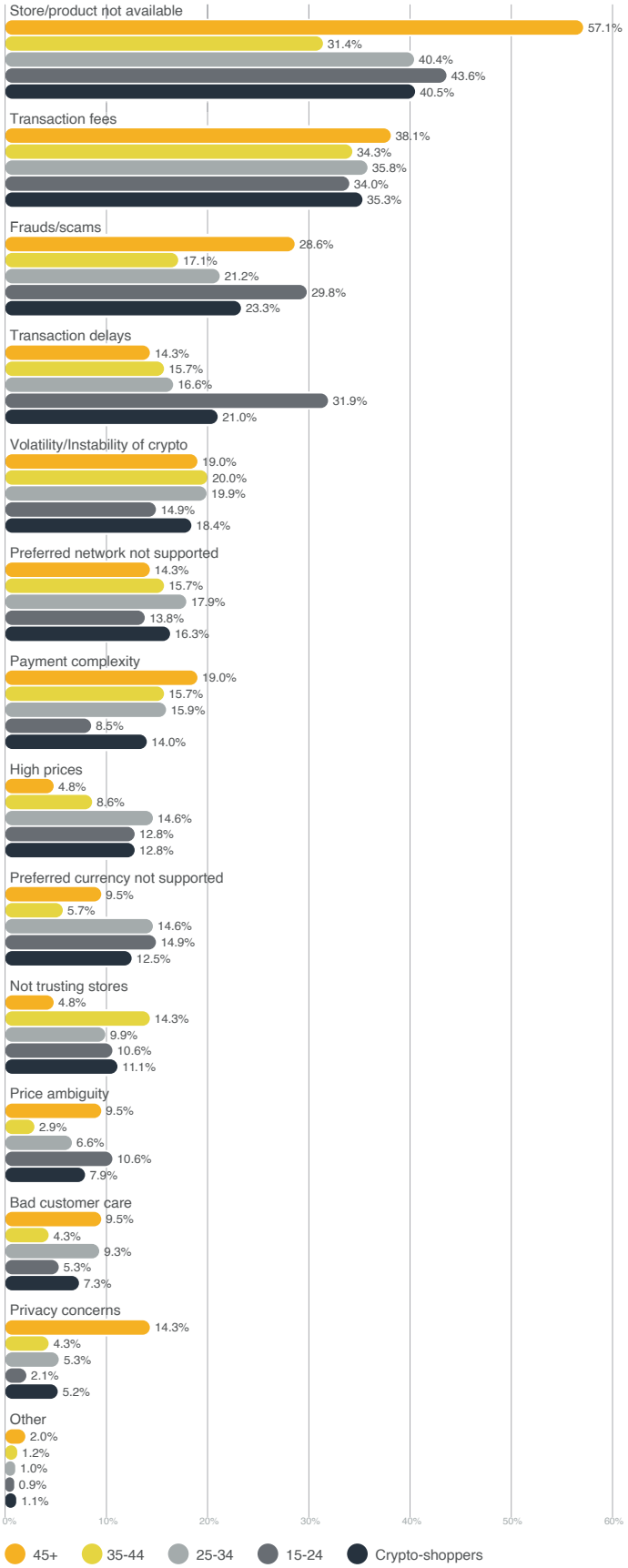


Figure 42: Issue perception per crypto-consumer age.

6.2.4 Income factor

Another determinant factor on the "issue perception" is the income level, which is shown in Figure 43. The difference is not huge, but still, the rich and poor may have different concerns. Transaction fees have the biggest impact on the lowest income group (<$10,000), with no surprise. However, there is no linear correlation since the high-income group (>$50,000) is in second place. This may be due to the snowball effect of the percentage-based fees charged when buying expensive things. Store and product unavailability affect all groups a lot, but the middle-income group ($10,000-$50,000) suffers slightly more than the others (37.7%), which may point out a wider product range for them. Transaction delays are equally annoying for the low (30.6%) and middle-income (31.2%) groups but seem more tolerable for the high-income group (20.6%). Scams and frauds are another solid concern of more than one-fifth of all groups.

"High transaction fees, the volatility of cryptocurrency prices, and expensiveness of goods and services affect the low-income crypto-consumers the most."

The volatility of fiat prices of cryptocurrencies (and the resulting instability of their value) is a major concern for the low-income consumers (25.3%) since a quarter of them complain about it, but this is less problematic for the middle and high-income groups. The same situation is also valid for the price levels of goods and services sold in cryptocurrencies. Low-income crypto-consumers find general price levels higher in crypto-shopping (compared to noncrypto-shopping) and care about it much more (22.7%) than the others. Payment complexity is a problem almost exclusively for high-income consumers (14.4%). That may be related to their age also being older. Another such issue is privacy concerns. This concern decreases as income decreases. However, when compared to other groups, high-income consumers find the fiat value of goods and services less ambiguous when sold in cryptocurrencies, as only 7.2% see it as a problem. The issues of not trusting the stores and lack of customer care services affect middle-income consumers the most (11.5% and 9.8%, consecutively).

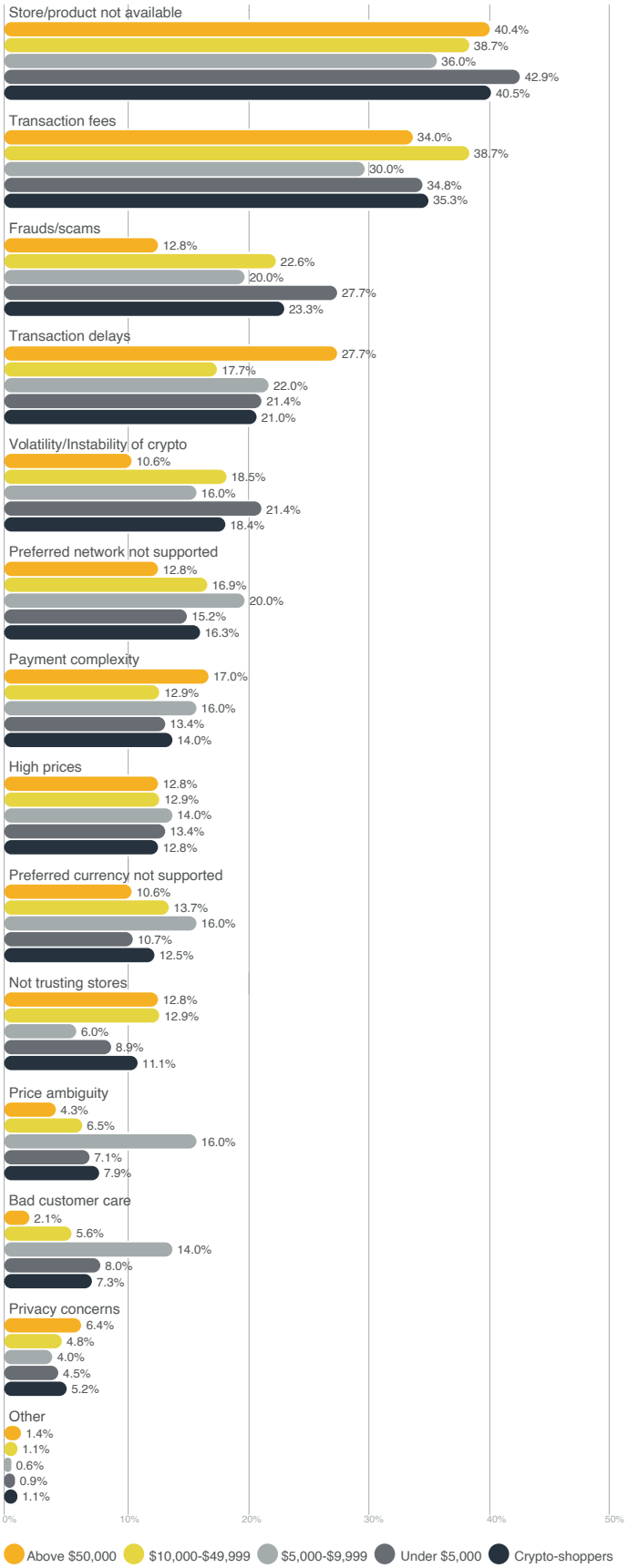


Figure 43: Issue perception per crypto-consumer income.

6.3 Future use

Despite the prevalent issues, crypto-consumers are rather optimistic about (their) future usage of cryptocurrencies in shopping, as depicted in Figure 44. More than two-thirds of the crypto-consumers plan (or predict) to do crypto-shopping at least one more time within as short as one month, while 14.8% would likely not. A whopping 81.2% will buy goods and services by paying with cryptocurrencies within the next six months. The percentage of those who would not is just below 6.3%, which is just a tiny fraction. The crypto-consumers who will do cryptoshopping within the next year reach as high as 82.6%. We can conclude that crypto-consumers get some essential benefits from using cryptocurrencies in shopping and would like to continue since they can tolerate the costs and issues to some extent. It can be said that they are hopeful that the issues will be at least partially mitigated in the future.

"Within the next month, two-thirds of existing crypto-consumers will do crypto-shopping at least one more time."

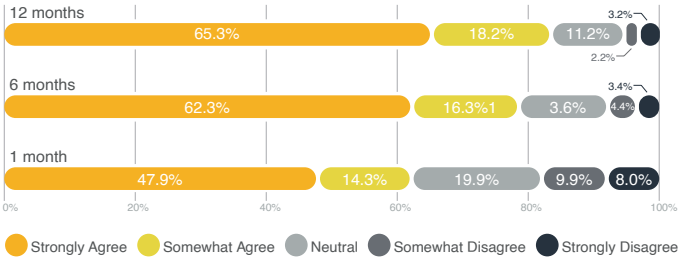


Figure 44: Share of crypto-consumers that will shop using crypto within the next...

Figure 45 reveals the crypto-consumers' predictions about Bitcoin prices by the end of 2022 (please note the survey was conducted between February and June 2022, before the big market decrease, the Terra crash, and the FTX scandal). A quarter of crypto-consumers expect that the prices will be between $20,000 and $50,000, and another quarter predicts a price range between $50,000 and $100,000. So, half of the cryptoconsumers come up with an estimated range of $20,000 to $100,000, which is a rough estimate. Nevertheless, 36.6% predicts a price lower than $20,000, whereas 13.4% predicted a price higher than $100,000. Cryptocurrencies become more and more popular as prices increase. This makes some people see them as a viable investment option to some extent. However, the expectation of a significant increase in cryptocurrency prices makes crypto-consumers refrain from spending the crypto-money in their portfolio due to the fear of missing a future gain.

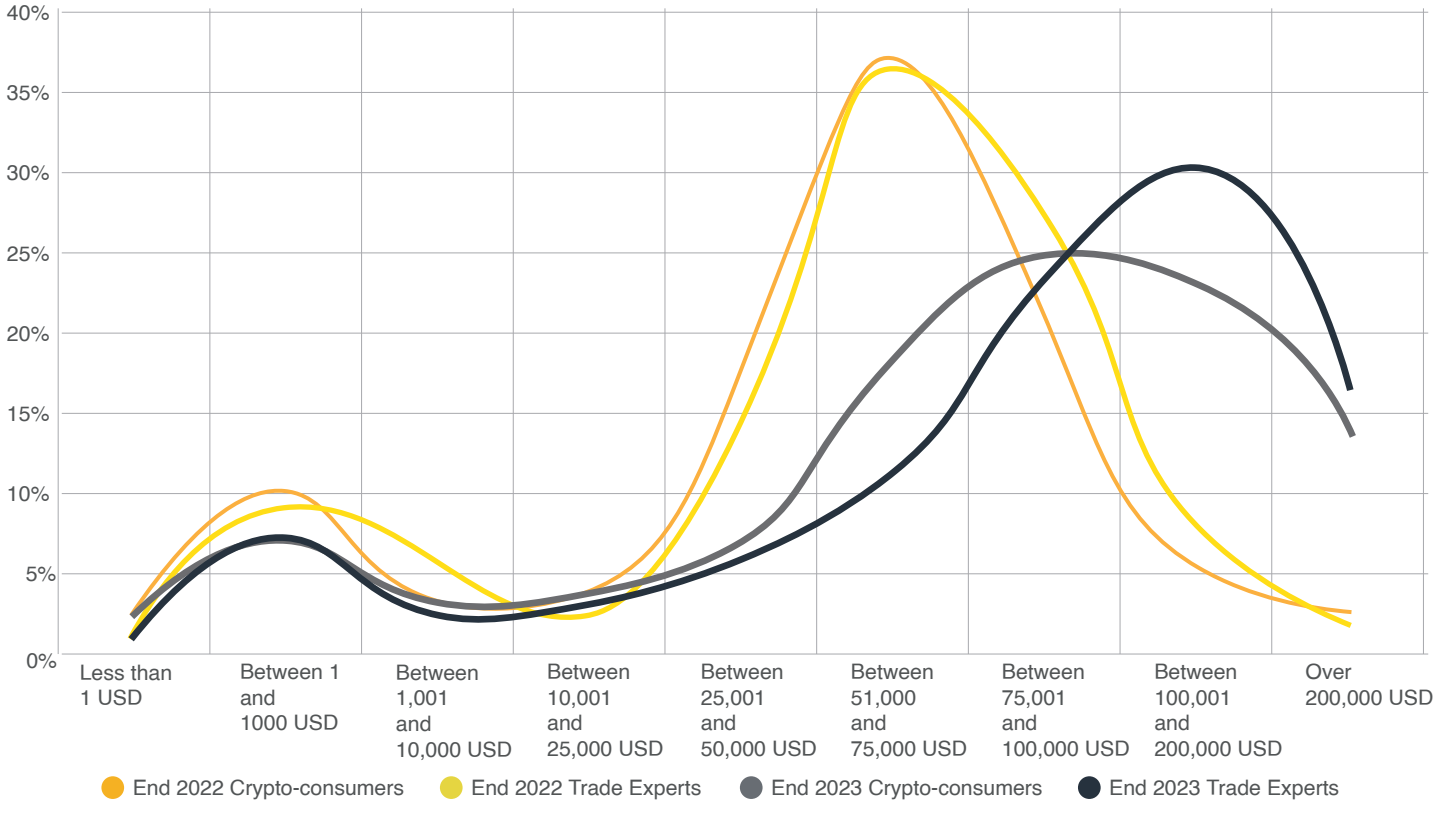


Figure 45: Crypto-consumers' BTC/USD ratio predictions by the end of 2021.

6.4 Expertise

Crypto-consumers' level of knowledge regarding blockchain technologies and cryptocurrencies may limit or boost their crypto-shopping experiences, as well as their benefits and concerns, depending on the depth of information they have. Lack of knowledge increases the difficulty perception and causes some unrealistic expectations, whereas expertise increases the satisfaction rates, although it increases some concerns (e.g., privacy), and vice versa.

Most crypto-consumers are knowledgeable about at least the basics of blockchain technologies and cryptocurrency concepts. Some are even (selfproclaimed) experts, but the ones with very limited knowledge are not negligible either. From Figure 46, more than a third already have a general understanding of what a blockchain is and how it works, while nearly one-fifth do not even know the fundamentals. Crypto-consumers seem to be more familiar with Bitcoin and other cryptocurrencies rather than the underlying blockchain technology, in general. 71.7% know what Bitcoin is and how it works. Likewise, 70.7% know how to obtain (e.g., buy, earn, etc.) Bitcoin. When the same question is asked for other cryptocurrencies, the rate drops to 66.2%. This is quite understandable since Bitcoin is the first and still the most dominant currency. The ones with some good awareness regarding the Lightning Network are much less frequent in the community as 38.3% are confident about it, while 40.4% have limited knowledge or no knowledge at all. So, the Lightning Network seems to be limited to experts.



"About one-fifth of crypto-consumers still do not know how to obtain Bitcoin or other cryptocurrencies."

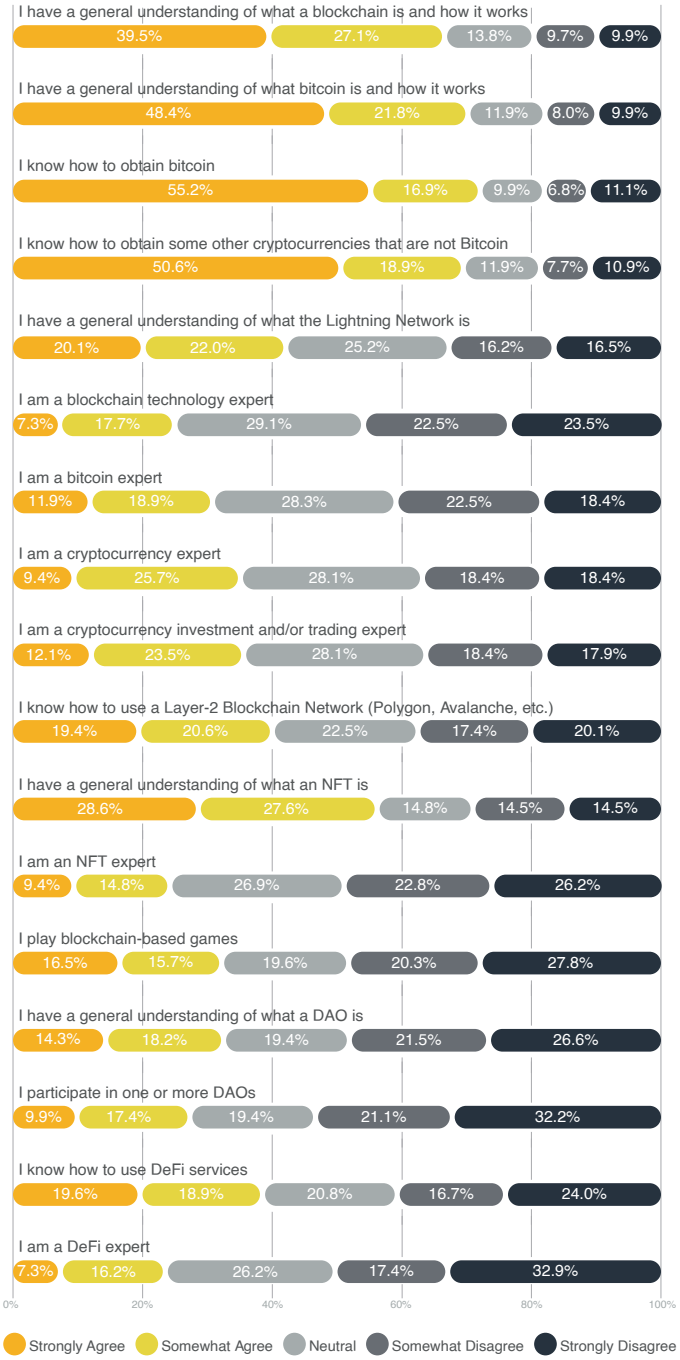


Figure 46: Knowledge base and expertise level of crypto-consumers.

When it comes to being (or feeling like) an expert, the shares change significantly. Slightly more than a quarter define themselves as blockchain technology experts (among which only 10.5% strongly agree), whereas approximately half of all the crypto-consumers claim no expertise in blockchain. The ones with expertise in Bitcoin are a bit higher, as declared by one-third of crypto-consumers.

Data presented in Figure 47 suggests a strong correlation between the crypto-consumers' shopping frequencies and their degree of expertise in cryptocurrency trading and investments. The higher the level of expertise, the higher the crypto-shopping frequency. Three-fourths of experts do cryptoshopping at least once a week (on average). This is a tremendous rate that clearly shows the interest of knowledgeable consumers. When people get to know more about cryptocurrencies, they tend to shop more with them. Potential reasons include higher work exposure to cryptocurrencies, better trust in the technology, and more benefit anticipation that the experts may have. Likewise, 45% of cryptoconsumers with some expertise do crypto-shopping at least once a week, and another one-third of them do so once a month. Crypto-consumers who do not claim expertise in cryptocurrency trading and investing have significantly lower shopping frequencies. Nevertheless, the mode of their answers demonstrates a monthly shopping pattern, which is still of interest from a business perspective.

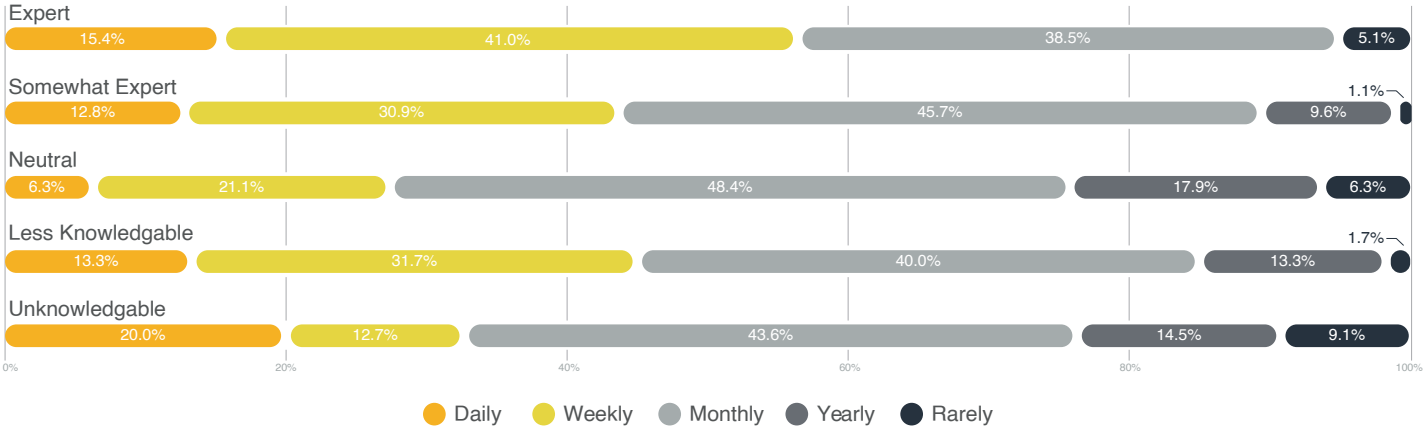


Figure 47: Crypto-consumers' shopping frequency per their degree of expertise.

7. MOTIVATIONS

Crypto-shopping has already gone far beyond being a trendy experimental technology because using cryptocurrencies in shopping addresses a few crucial demands of both customers and businesses. In order to achieve a global market that is more profitable to all parties, it is important to find out how valuable using cryptocurrencies in shopping is to crypto-consumers, as well as which problems they struggle with most while crypto-shopping.

7.1 Drivers

Crypto-consumers' main reasons for choosing crypto-shopping when available are listed in Figure 48 as per their declarations. Top motivating factors for cryptocurrency usage in retail seem to be related to enthusiasm and future projections. As the chart reads, two-thirds of crypto-consumers think cryptocurrencies are the future (i.e., will be more common, if not the norm, in the foreseeable future), again two-thirds think that spending crypto in purchases will boost its adoption worldwide, and again two-thirds stated that they are eager to test new technologies whenever they can. Likewise, a bit more than half define themselves as innovators. 60% believe that using crypto in shopping will increase their (fiat) value.

"56.2% of crypto-consumers do not trust banks, payment system providers, or other financial institutions."

Security and privacy also appear to be among the major drivers in favoring crypto-shopping. 60% (with a slight decrease from two-thirds last year) of crypto-consumers find crypto-shopping as a safer option. Similarly, 56.2% think that their privacy can only be protected by crypto-shopping as they do not trust banks, payment system providers, or other financial institutions, which indicates a huge lack of trust in the current financial system. More than half are against the monetary control (e.g., policies, regulations, emissions, etc.) by governments and/or banks.

In some cases, crypto-shopping even becomes a necessity rather than a choice between comparable options, especially in struggling economies. Although most cryptocurrencies, except for stablecoins, are known for their huge price volatility (as also observed through

2021 and 2022), a remarkable 41.4% of crypto-consumers claim that their local currency is even less stable than

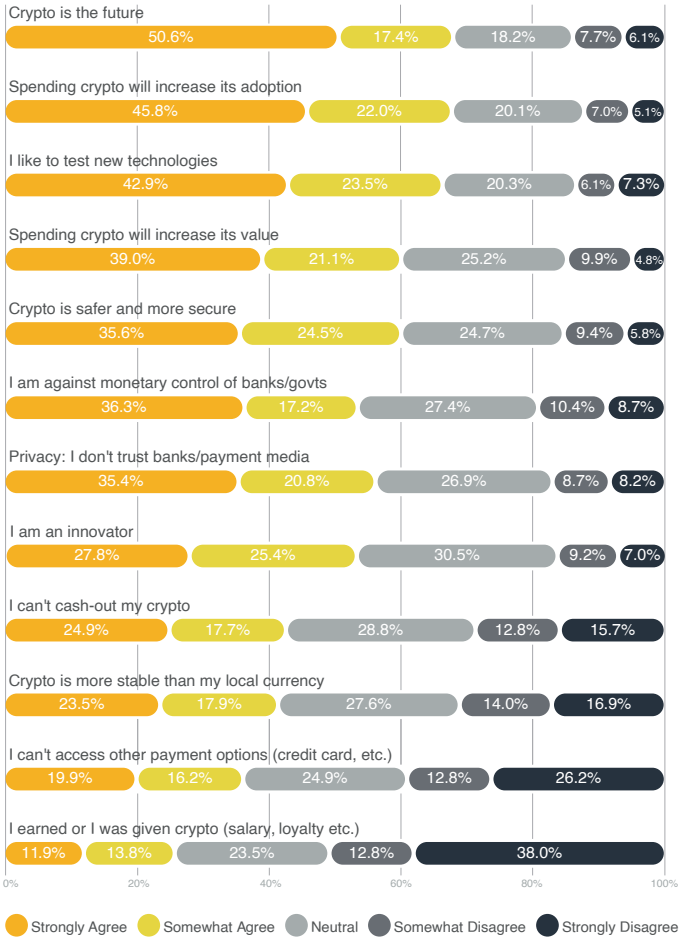


Figure 48: Main reasons for using cryptocurrencies in shopping.

cryptocurrencies in general. What is more dramatic is that 36.1% (was 43.1% in 2021) of crypto-consumers are either unbanked or underbanked so that they have limited access (or no access at all) to conventional payment systems, including banks, credit cards, and online banking. Hence, they are forced to use cryptocurrencies in shopping for their everyday needs and wants. While a quarter earn some sort of income paid in one of the cryptocur rencies, 42.6% of them cannot even cash out the crypto-money they keep in their digital wallets due to the unavailability of such an option or high fees/ commissions they would face otherwise.

Figure 49 shows the breakdown of cryptoconsumers who cannot access conventional payment methods according to their countries' income levels. As seen from the chart, this is a more common issue in low-income countries and less common in high-income ones, as can be expected. Half of the crypto-consumers from low-income countries stated that they do not have access to other payment options, which is a huge ratio, although there is a significant improvement since last year as it was around two-thirds. An interesting fact is that there are also many (40.8%) crypto-consumers in uppermiddle-income countries who are struggling to get access to other payment methods.

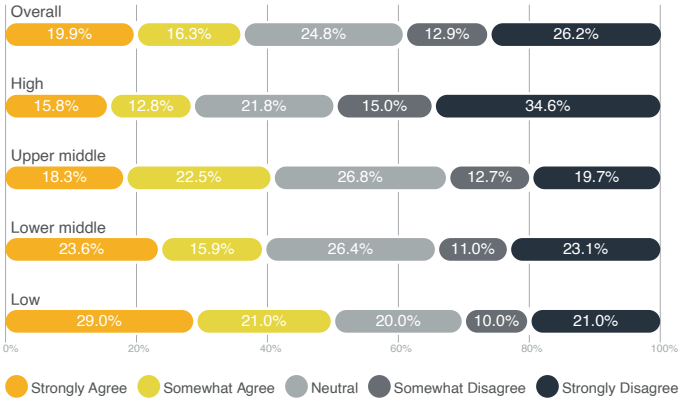


Figure 49: Share of crypto-consumers who cannot access other payment options, breakdown per country income.



"More than 40% of crypto-consumers do not have, or have limited access to credit cards and online banking systems."

7.2 Barriers

Despite all the advantages, there are also a few significant (and less significant) drawbacks that concern crypto-consumers and even cause them to reconsider using cryptocurrencies for their purchases. Those concerns are considered barriers against a wider adoption of crypto-shopping.

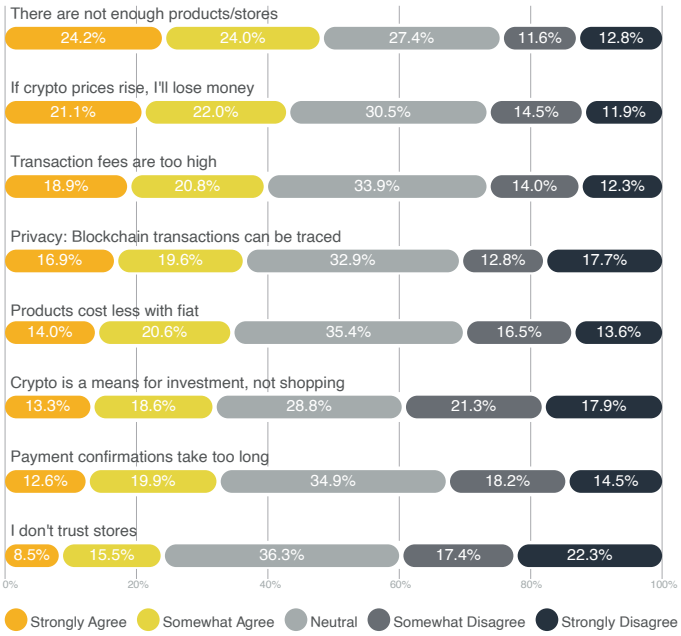


Figure 50: Main reasons for not using cryptocurrencies in shopping.

Figure 50 presents the breakdown of reasons that make crypto-consumers refrain from spending their crypto by purchasing goods and services or at least slow down their pace. The largest barrier to the broader adoption of crypto-shopping is no more the high transaction fees, in fact, it is not even the second largest barrier. The top complaint in 2022 is the lack of products and services that can be bought through crypto, as nearly half of shoppers complained. That barrier climbed up to the top from second place in 2021. Crypto-consumers seemingly cannot find what they are looking for. The unavailability of specific stores, brands, and goods within the crypto-markets is inhibiting crypto-shopping's spread. This is likely explained by a lack of understanding of the sector, more conservative marketing plans and company policies, or a lack of technical know-how by businesses and stores. Since there are countless stores and products in numerous sectors, this problem looks insoluble, but it is not. Gift cards (and derivatives like vouchers, coupons, promo codes, etc.) are a solution to be provided for the underserved demand of crypto-consumers. There are clear opportunities for businesses intending to expand their market, but if such a need is not addressed very quickly, people may look for alternative channels.

"Nearly half of crypto-consumers have difficulties in finding the stores or products they are looking for."

The second-most disrupting factor (43.1%, increased from 40.1%) is the expectation that the crypto prices will increase soon. Such projections or expectations may be positive for the long term, but combined with the volatility of crypto prices, they can be harmful to the market in the short term, as they make cryptoshoppers hodl (yes, hodl!) their crypto instead of spending them at the current prices. There is not much individuals and businesses can do to prevent this due to the nature of cryptocurrencies, but the opposite case may also happen. The prices will eventually converge to a trendline as the market grows. The perception of very high transaction fees is the third-most-popular complaint, with 39.7% (decreased from near-half last year) reported. It is still a major barrier, but not the top issue anymore. Shoppers either have adopted ways to avoid/minimize fees or can now tolerate them as long as they can buy their stuff. Bitcoin and Ether, the two most preferred cryptocurrencies, have considerably high transaction fees caused by the high demand as well as the underlying blockchain technologies. Ethereum-based ERC-20 stablecoins also have high transaction fees.

Nevertheless, about one-third of consumers who occasionally shop with cryptocurrencies do not see them as a means of shopping but merely commodities for investment. Another one-third (was 40.7% last year) of crypto-consumers avoid cryptoshopping when there is another viable option due to the long transaction and order confirmation delays. Hence, widespread adoption of faster layer-2 solutions, like the Lightning Network, will also boost crypto-shopping adoption. Even more than onethird reported that most products are sold at a more expensive price when sold in crypto compared to their fiat prices which annoy crypto-consumers and make them abstain from shopping with crypto to some extent. Privacy and trust concerns related to shops accepting crypto are a concern for a quarter of shoppers.

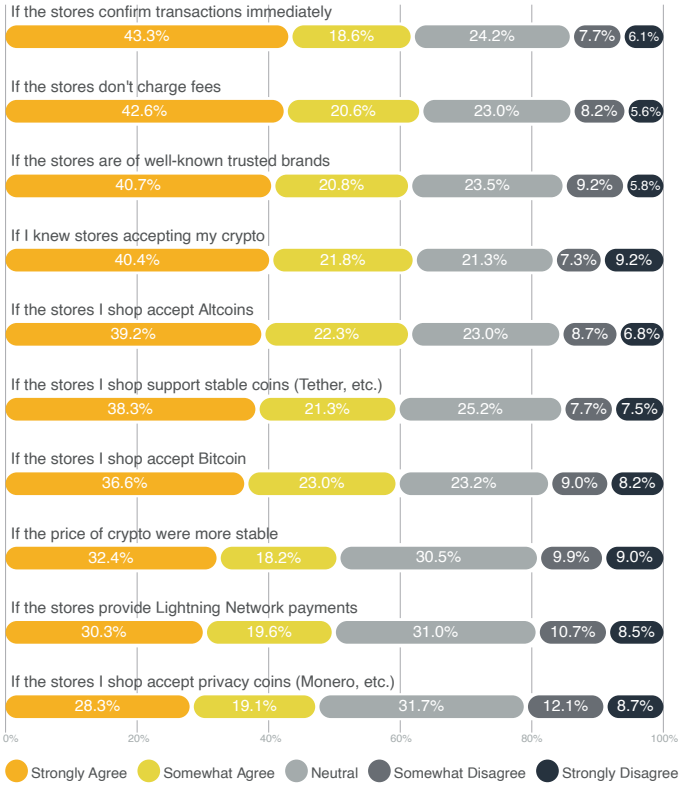


Figure 51: I would likely to shop more...

As presented in Figure 51, crypto-consumers have stated that they would do crypto-shopping more often if some existing issues were addressed. Apart from stating the obvious (i.e., faster and cheaper shopping), crypto-consumers want to learn more about the existing crypto-shopping possibilities and want to access more stores or products (especially well-known and trusted brands), as more than 60% reported. There is also a great demand for altcoins (i.e., coins other than Bitcoin, by 61.5%), stablecoins (e.g., USDT, USDC, BUSD, etc., by 59.6%), privacy coins (e.g., Monero, etc., by 47.5%), and the Lightning Network (49.9%). If the crypto-stores and associated businesses can satisfy these demands on time, the growth in the cryptomarkets may gear up.



"More than half of crypto-consumers would likely shop more if the stores accepted privacy-coins and stable-coins as well."

8. CLUSTER ANALYSIS

This section presents the very detailed results of a comprehensive standalone study aiming at discovering and introducing the customer segments within the entire crypto-shopping community. The study is a multivariate non-linear regression analysis, namely K-prototypes mixed clustering methodology, to identify and describe the different segments of crypto-shoppers, as well as their demographics, motivations, and related preferences.

8.1 Overview of consumer groups

There are seven different clusters found with clear distinctions in their members' demographic backgrounds, education levels, motivations to adopt crypto-shopping, expectations regarding crypto's future, cryptospending patterns, and economic power. These clusters are labeled with pretty self-explanatory names as follows:

- Indifferent wealthy
- Crypto elites
- Imitators
- Trapped innovators
- Desperate and excluded
- Ghost innovators
- Dreamers

Figure 52 shows the populational breakdown of all defined crypto-consumer clusters whereas Figure 53 (not on exact scale) provides a brief exposition of the definitive characteristics of those clusters and shows how they are aligned according to each other.

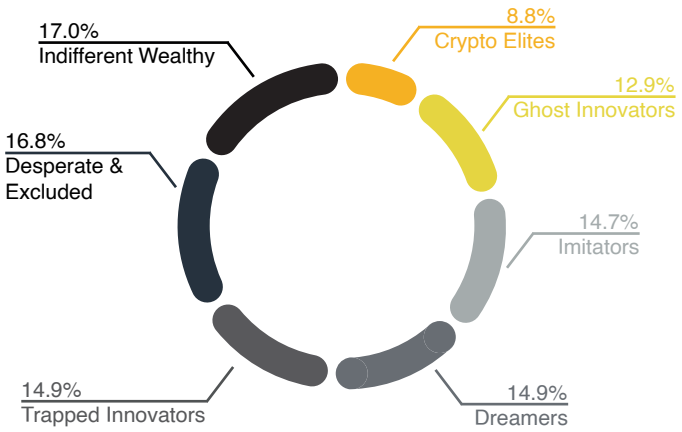


Figure 52: Breakdown of crypto-consumer clusters.

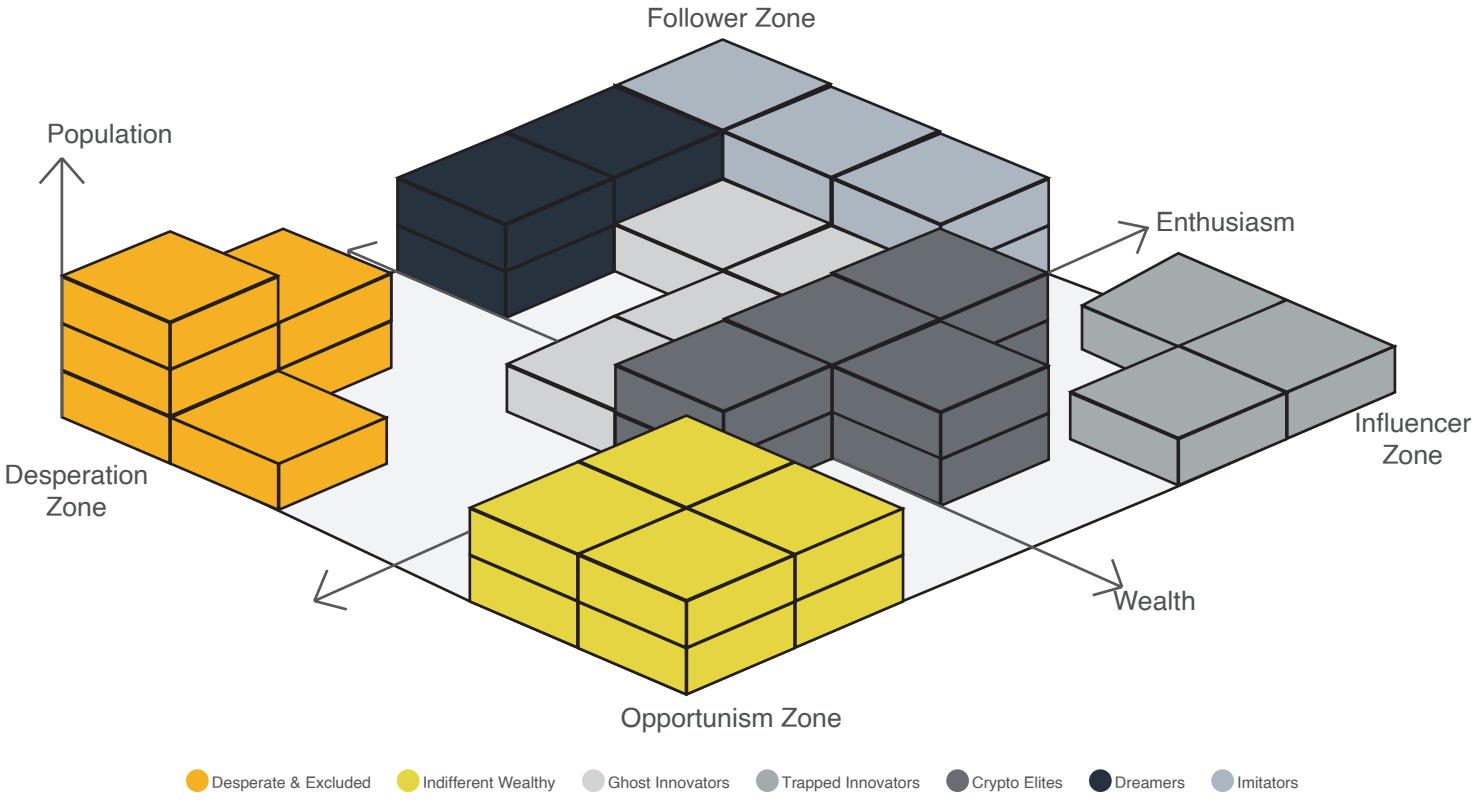


Figure 53: Crypto-consumers segmentation map.

8.2 Indifferent wealthy

A large number of people who actively (although not necessarily very frequently) buy, earn, invest in, and spend cryptocurrencies have an indifferent stance on crypto shopping, cryptocurrencies, and blockchain technologies in general. People in this group seem to occasionally benefit from the opportunities that blockchain-based systems enable, but they mostly prefer (or at least do not object to) sticking to the traditional banking system and more conventional payment tools most of the time. They are mostly from high-income economies, with some living in upper-middle-income countries and having high average to high personal income. However, their income is remarkably lower than that of the Crypto Elites' although living in a high-income country is more common among the Indifferent Wealthy.

A critically important fact is that those people constitute the largest crypto-shopper group in terms of population, as they account for 17% of all. They have a middle-to-good level of education, where having a university degree of any kind can be considered typical. The main reason we call this group "indifferent" is that, although strictly not being experts, they are somewhat knowledgeable about blockchain technologies but still not excited about it. They do not expect it to dominate the future of the financial system and do not foresee a substantial economic or political benefit in adopting cryptocurrencies as a major money substitute. But contrarily, they still invest in crypto assets and use crypto payment methods from time to time even though they are not forced to do so. Characteristic features of Indifferent Wealthy are illustrated in the radar chart in Figure 54.

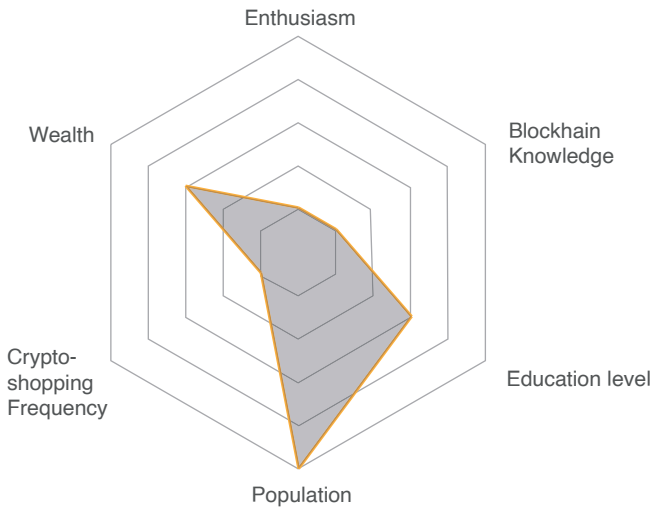


Figure 54: Characteristic features of Indifferent Wealthy.

8.3 Crypto elites

The crypto elites are the "creme de la creme" of the crypto shopping society. They only constitute 8.8% of the entire crypto shopping population, making them the smallest group in terms of population. This small community, on the other hand, is financially the most powerful among all, and by far. They are mostly from high-income or upper-middle-income countries and have high or high average personal incomes. Individuals in this group are most likely middle-to-high-rank white collars, middle-to-high-scale entrepreneurs, and investors. While there are a few students, there are no unemployed or retired in this elite community. It is also no surprise to find out that they have the highest education level, with many having some post-graduate degrees (i.e., master's and doctorate).

Some people in this group do not only believe that the blockchain will be an essential part of the World's financial future but also push hard to make this become real, as they are experts – in one way or another – working in the crypto industry (or at least are exposed to blockchain owing to their work or businesses). This group is clearly the current leading force within the crypto economy. Apart from buying more and more often, they earn crypto from their crypto-driven businesses, investments, and through large scale mining. Characteristic features of Crypto Elites are illustrated in the radar chart in Figure 55.

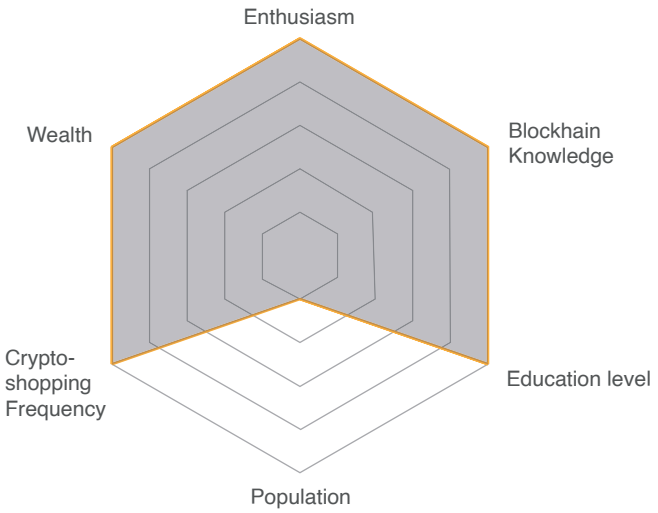


Figure 55: Characteristic features of Crypto Elites.

8.4 Imitators

Nowadays, it is not uncommon to see many young people involved in everything blockchain related, just like many other innovations. These youngsters generally continue their education at various levels, are not yet employed in a decent job, have a temporary job, or are just employed at a lower rank, and have not accumulated enough wealth to establish a considerable presence in the crypto market. In line with those is that they are not (yet) among the creators of such innovative technologies but definitely are impassioned followers. They believe in crypto to the greatest possible extent and expect it to be much more prevalent in the foreseeable future, in which, not surprisingly, they want to be among the crypto elites. This is why that mid-sized group of crypto-shoppers, with a ratio of 14.7%, is called the imitators.

Imitators have the highest share of students and are predominantly from lower-middle-income countries. Their education stats point out somewhere near a university degree, but this will go even higher in time as they conclude their ongoing studies. Among them, it is also quite common to earn small amounts of crypto in exchange for small online tasks and minor freelance jobs. Characteristic features of Imitators are illustrated in the radar chart in Figure 56.

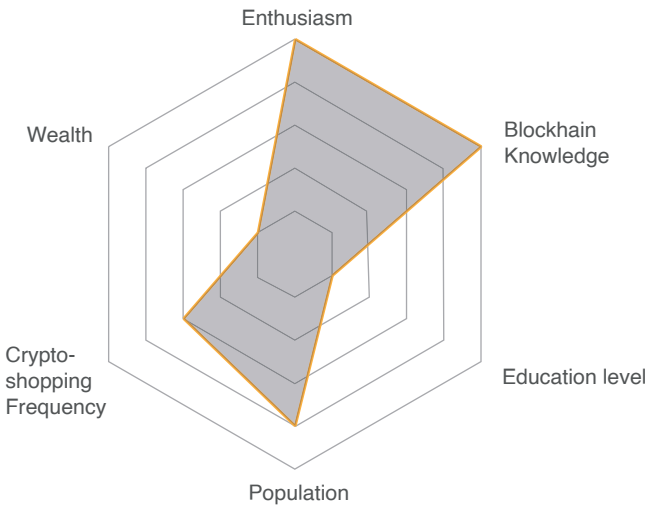


Figure 56: Characteristic features of Imitators.

8.5 Trapped innovators

A good degree of education, an innovative mind, and an entrepreneurial spirit are not enough to move the wheels. Some surplus in the budget and higher-average-to-high quality of life provided by a steady job (or family sources) can easily be an inhibitor against taking risks associated with the wider adoption of crypto for personal savings and payments. The situation of this group resembles a variant of the well-known “middle-income trap” phenomenon; hence this is why these 14.9% are called the Trapped Innovators. They are by no means underbanked or so, but not financially very strong either.

People in this group have different employment types or income sources. Low to middle-rank (and possibly young) white collars and grey collars are in the scope. Yet the high density of students must also be noted. They are mostly from (both lower and upper) middle income countries and have middle-level mean personal income (although the income variance is relatively large within the cluster). As a result of those people’s higher education, vision, and efforts in keeping up with the latest technology and fashion, they believe that blockchain products and services will be much more common in the near future, and humankind will greatly benefit from its mass adoption. In contrast, they strictly refrain from personal adoption of anything crypto on a large scale. Their current shopping and payment customs (also possibly their investment strategies) do not match their future projections due to the conformist stance they pose. Nevertheless, they have the potential to increase their adoption of crypto assets as it is common to earn small amounts of crypto in exchange for short online tasks and also mining among the individuals in the group. Characteristic features of Trapped Innovators are illustrated in the radar chart in Figure 57.

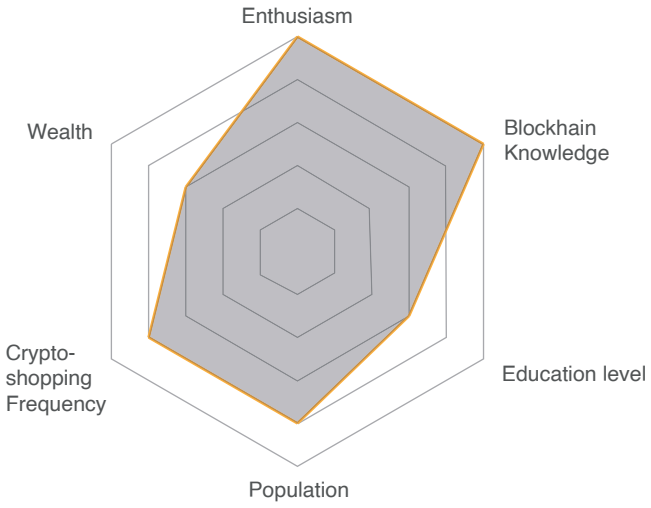


Figure 57: Characteristic features of Trapped Innovators.

8.6 Ghost innovators

The so-called Ghost Innovators are similar to the Trapped Innovators in many aspects, including an innovative mind and enthusiasm for crypto. However, there are also major differences. On average, those have a lower degree of education and a smaller income. Ghost Innovators are predominantly employees, most likely as low-rank white collars, grey collars, and other skilled workers, even more likely than that of Trapped Innovators. Whereas the share of students is equally high, this group has less variety in the form of employment of its members and their income range, which is centered around the lower-middle-to-middle class.

Individuals from this smaller-sized group, making up 12.9% of crypto-shoppers, mostly reside in lower-middle-income countries with their faces looking towards the more developed World. They seem to follow and try the newest fashion and technology but hesitate to do so in reality. They have a stable income, provided by employment or through family (although less than they eventually aim to have), and a hard-earned decent life quality, which may not be risked quite easily. Nevertheless, they are not completely faded out. Still, they participate in the crypto economy and get paid by completing small online tasks or a side hustle that pays crypto. Buying small amounts as an investment and mining are also popular, when allowed by the budget. Almost no one conducts large-scale businesses in the crypto space, in parallel with the non-existence of investors and entrepreneurs within this cluster. There is an observed transitivity between Ghost and Trapped Innovators, yet it is also understood that they would rather be among the Crypto Elites someday. Characteristic features of Ghost Innovators are illustrated in the radar chart in Figure 58.

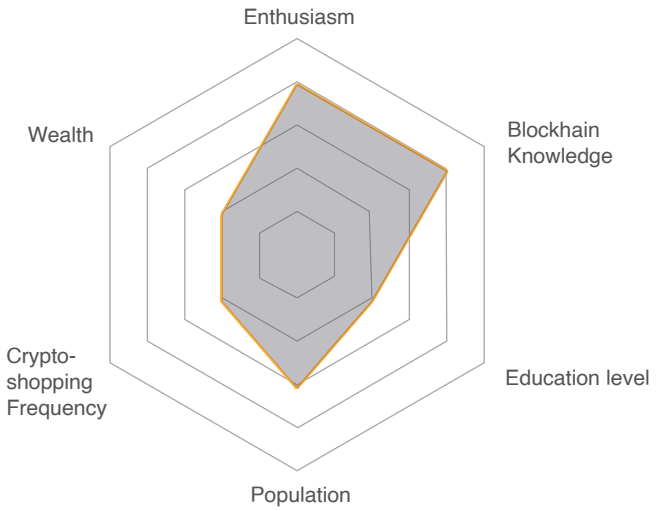


Figure 58: Characteristic features of Ghost Innovators.



8.7 Desperate and excluded

Among crypto shoppers, a tremendously large group, with a share of 16.8%, is living in very harsh conditions due to facing significant-to-extreme poverty, being in a politically unstable country, or experiencing financial exclusion (at personal or even regional level). The majority of the people in this cluster have the lowest education level (most likely below a university degree) but have some desirable technical skills that let them contribute to the global economy and accumulate income through teleworking, gigs, or various forms of digital labor. As this group mainly consists of unbanked, underbanked, or financially excluded individuals, being able to use cryptocurrencies when receiving and making payments, as well as shopping, is like an oasis full of life in the middle of an all-dry desert.

As can be foreseen, most of them reside in the lowest-income countries with plenty of political problems at varying degrees, mostly in SubSaharan Africa, South America, and South Asia. They have little knowledge about blockchain or the technologies under the hood of cryptocurrencies and crypto payment systems, definitely far from having any expertise. Although crypto is a vital tool for their financial inclusion, they do not have a remarkable enthusiasm for it and no specific expectation concerning its future. They do not seem to care about ethical, political, and financial discussions centered around the crypto economy; as long as they can be paid via crypto (in exchange for their "online" labor) and spend their crypto earnings without visiting a bank (which can be non-existent) and getting cash (a credit card is not even an option in most cases). Desperate and Excluded are somewhat forced to use cryptocurrencies and crypto payment methods to survive, as many of them face financial exclusion issues at different levels, including being unbanked or underbanked. Yet these problems also hit people from more developed economies, although on a smaller scale. Characteristic features of Desperate and Excluded are illustrated in the radar chart in Figure 59.



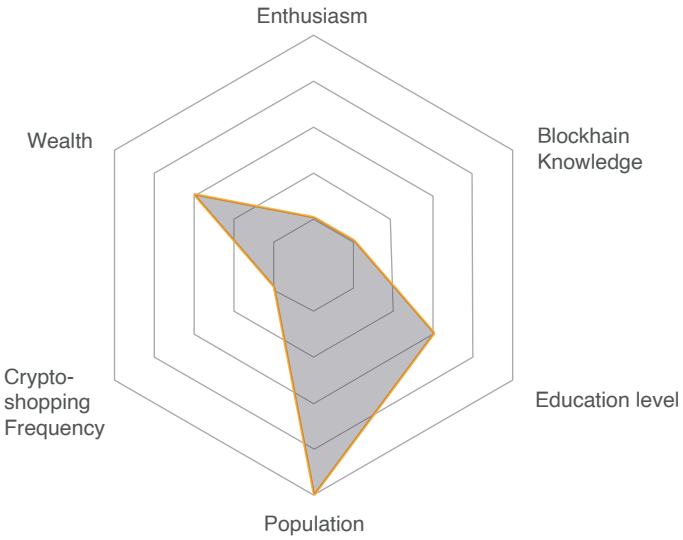


Figure 59: Characteristic features of Desperate and Excluded.

8.8 Dreamers

Dreamers are believers, sort of similar to innovators, but there are major differences that make them a standalone cluster separate from both Trapped and Ghost Innovators. They have no expertise related to anything blockchain. Most of them lack even the most basic knowledge of how things work in the crypto markets. In parallel with that, they are not after more advanced technologies (which are supposed to mitigate some issues in the existing blockchain schemes) like the Lightning Network. Because they use crypto payments and do crypto shopping less frequently and fall back on them when other options are not available (or feasible).

Those individuals are spread all over the World, yet there is an observable concentration in the middleincome countries. On the other hand, the Dreamers have a low household income in higher-income countries and low to middle income in the rest of the World. Their education levels are low to average but do rarely go beyond a university degree as well. Dreamers have a diverse form of employment (or unemployment) and also a variety of sources that let them earn in crypto. They accommodate the second-highest share of unemployed and again the second-highest share of retired people; whereas the share of innovators is very low among the Dreamers, penultimate just after Ghost Innovators. That indicates no near-future intention to run a large-scale crypto business, although they commonly adhere to side hustles that make them earn crypto. Some earn larger amounts potentially from long-term investments, but mining is way too technical (and quite expensive) for them. Characteristic features of Dreamers are illustrated in the radar chart in Figure 60.

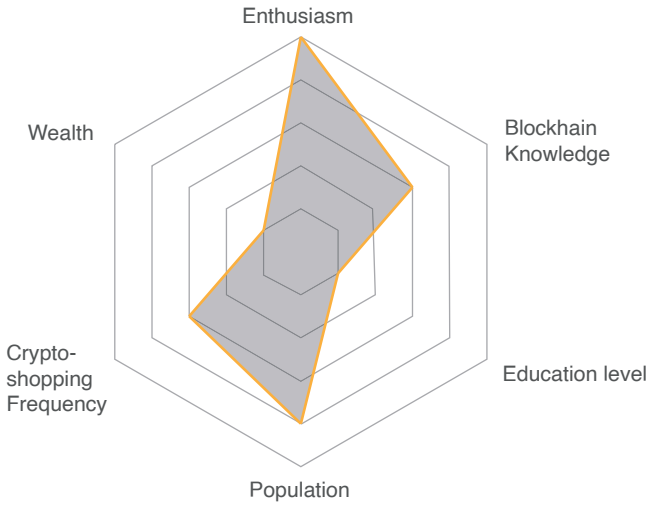


Figure 60: Characteristic features of Dreamers.



8.9 Comparative breakdown

Demographic features, perception of crypto-economy, and crypto-shopping habits.

8.9.1 Demographics

The crypto-consumers come from a highly diverse selection of ethnic, socioeconomic, geographic, and academic/professional backgrounds. Their average age is 33.7, considerably young, and only slightly higher than the World's median age, which reached 31 as of 2020. Yet, each group of crypto-consumers has a unique age distribution. Speaking of averages, the youngest consumer groups are the Ghost Innovators and the Dreamers, with mean average ages of 31.5 and 31.8, respectively. They are followed by Imitators (32.3), Crypto Elites (34.4), and Trapped Innovators (34.7). Desperate and Excluded is the oldest group on average, by quite a margin. The latter may seem a bit surprising as the Desperate and Excluded has the second-highest share of students (19.5%), but it also has the highest share of retired (2.7%).

In terms of numbers, gender inequality is at extreme levels among crypto-consumers. Women's participation in the crypto-economy is slowly increasing, but the gap is still huge. That phenomenon is also observable at varying degrees in each consumer group. The two youngest groups also have the highest share of female shoppers. The Dreamers group has the most females, as females constitute 14.1% of the entire group. The runner-up is the Ghost Innovators, with a share of 11.2%. Which is followed by Indifferent Wealthy (11%). In the others, women make even less than a tenth of the group's population. The largest gender imbalance is observed among the Desperate and Excluded, where only 6.2% are females. The penultimate is the cream layer of the society. This time, far from guiding the others, the Crypto Elites only have 7% females. The Imitators is very similar (7.1%), but Trapped Innovators is quite better with 9.7%.

The clustering was not made per the geography, meaning that the people making up the clusters by no means live in the same places. However, there are obvious correlations between the cryptoconsumers' country of current residence and the group that they are included in. The most notable relation is the wealth (or development) of the countries they are residing in, according to the classifications made by the World Bank, as depicted in Figure 61. The Indifferent Wealthy and Crypto Elites have the highest percentage of members from highincome countries, with rates of 51.8% and 46.5%, respectively. As approximately half of the people forming those groups live in wealthy countries, only a tiny fraction of them live in countries facing extreme poverty (i.e., low-income countries.). While that was not a surprise, an interesting fact about those two groups is that members from lowermiddle-income countries are higher in number than those from higher-middle-income countries. The group with the least people from high-income countries is the imitators (11.1%) since they are predominantly from lower-middle income countries (63.9%). Less surprisingly, the cluster with the most people from low-income countries is the Desperate and Excluded (12.1%). As this group is

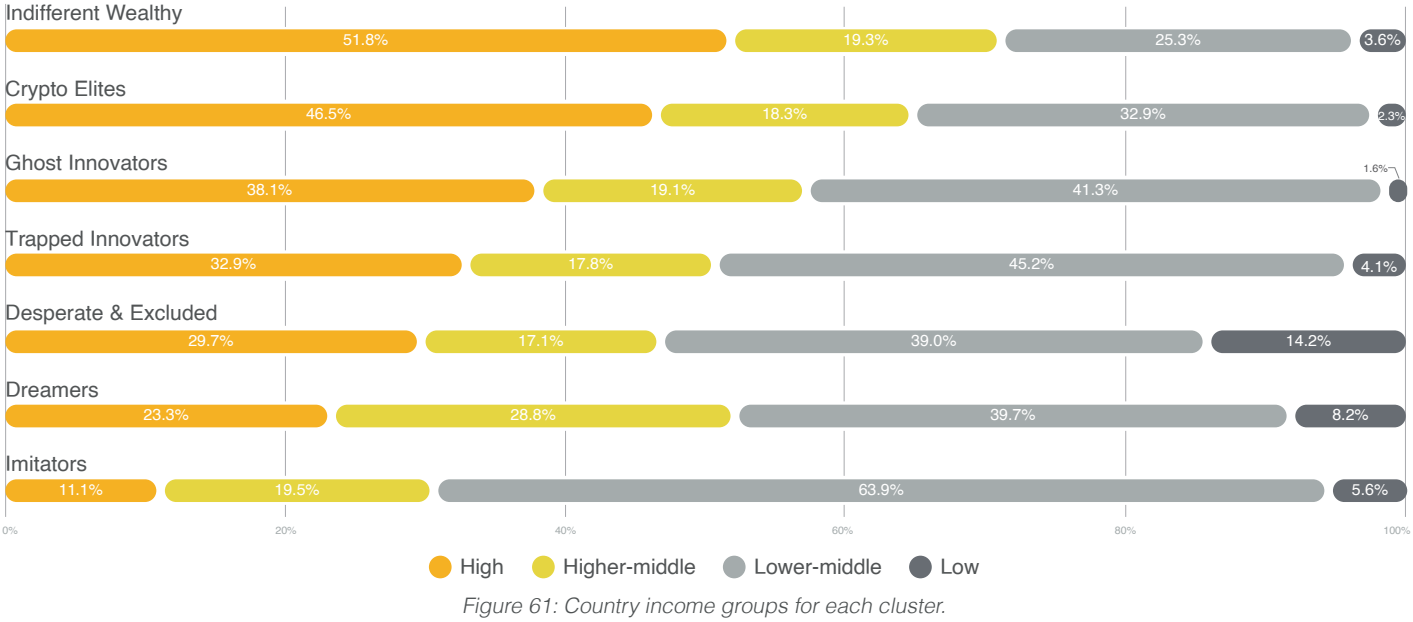


Figure 61: Country income groups for each cluster.

already one of the two most crowded clusters, that share points out a very large number of people from struggling economies using crypto to solve their financial exclusion problem.

A consumer's country of residence is only one side of the story. On the other side, there is their personal income. People with higher incomes might be able to do more crypto-shopping than the ones with lower incomes; however, they may also lack the necessity to do so. The motivating or demotivating factors can be different for various income segments. Figure 62 provides an insight into the annual income levels of the crypto-consumers in each group. As partly hinted by the group names, Crypto Elites is the wealthiest group with the majority earning more than $50,000, followed by the Indifferent Wealthy with the majority earning more than $20,000, whereas Imitators have the tightest budgets as the majority makes less than $10,000 a year.

Employment type, or in other words, source of main income (if any), is a highly definitive factor for two reasons. First, it coarsely tells how likely a consumer is used to (or ready to) tolerate risks within their financial routines (remarking that many forms of crypto are still a risky monetary tool), which also means how likely a consumer is eager to adopt changes in their dollars-and-cents habits. Second, it gives an insight into the range and diversity of potential income and expenditures of a person, independently of their actual income level. For instance, being employed in a steady job is generally associated with taking milder risks and a monotonous spending pattern, especially when compared to being self-employed or being an investor (or entrepreneur), which involve higher risks and more diversified expenditures. On the contrary, being unemployed, retired, or a student indicates a more limited cash flow, yet there is some room for exceptions.

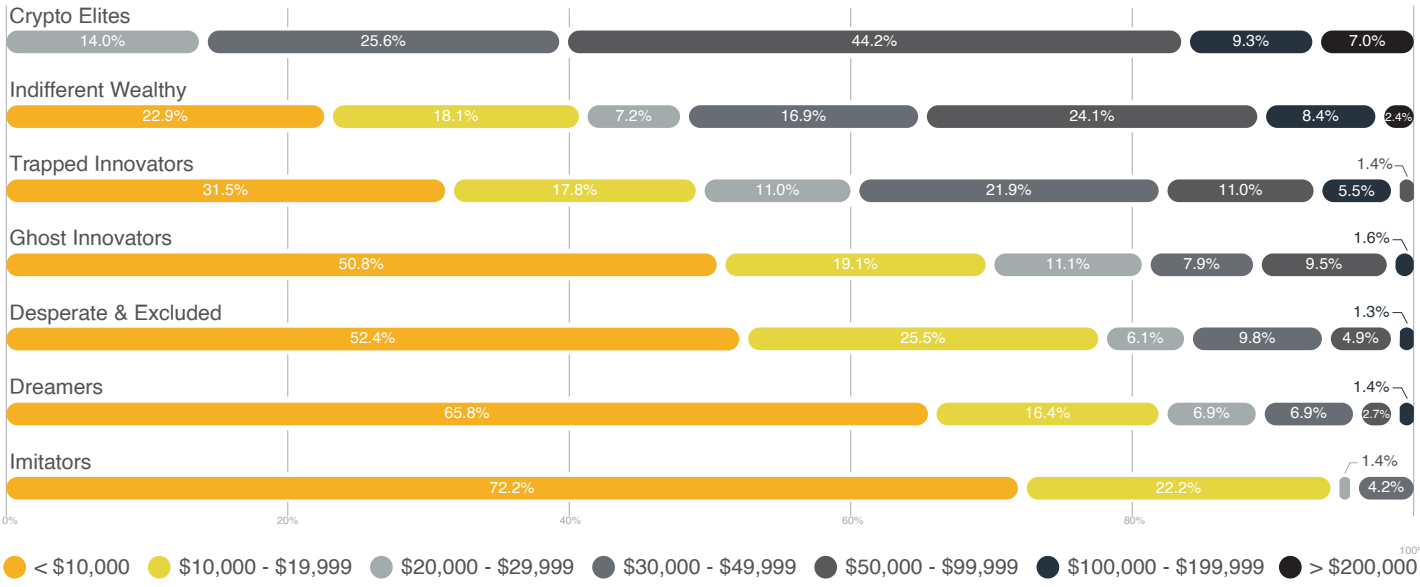


Figure 62: Annual income levels for each cluster.

As shown in Figure 63, among all groups, Crypto Elites have the highest share of entrepreneurs/investors (16.3%) and self-employed (58.1%), which translates to three-quarters of them conducting their own businesses. Note that the group does not include any retired or unemployed, yet has few students. Although having a similar ratio of investors, IndifferentWealthy has more employed (37.3%) and more students (14.5), but less self-employed (25.3%). Interestingly, Indifferent Wealthy somewhat resembles the combination of all the groups.

The highest rate of unemployed and retired is recorded among Desperate and Excluded, which is consistent with other data, especially regarding financial exclusion and hardship. It is also the second of the two groups in which there are more self-employed than employed (after Crypto Elites). Imitators has the highest ratio of students (22.2%), and Ghost Innovators has the highest ratio of employed (57.1%), which is quite related to why their innovative soul can not get into motion.

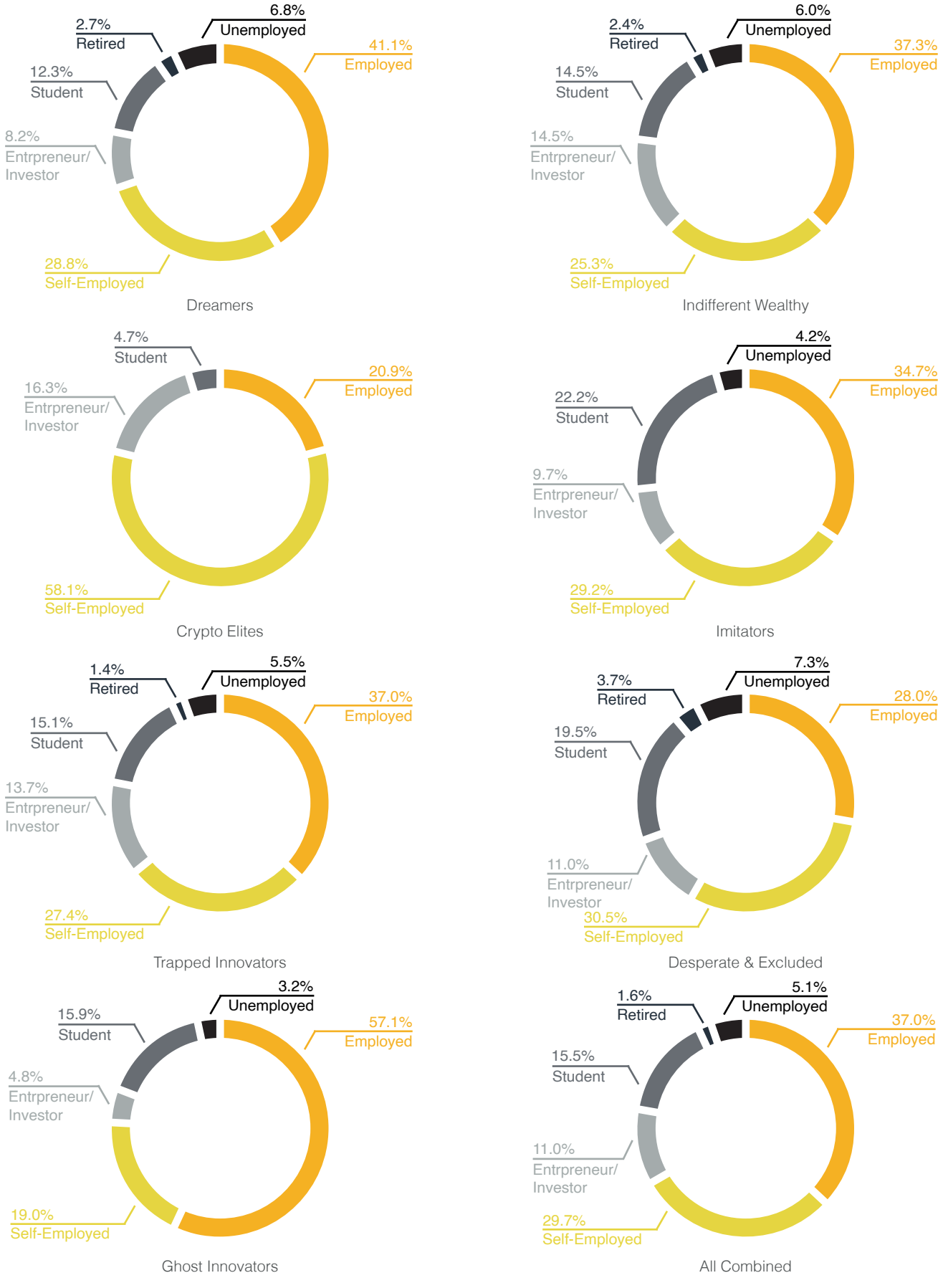


Figure 63: Employment types for each cluster.

Whether they are employed somewhere, are self-employed, or are investors of some businesses, cryptoconsumers are by no means solely tech workers but working in a wide range of industries, although ITrelated jobs are quite common. However, the concentration of popular sectors vary accross different consumer segments. While the entire breakdown is given in Figure 64, top industries of each group may tell another catchy story. Manufacturing of products and commodities is the leading sector among Dreamers, Trapped Innovators, and Indifferent Wealthy. Education sector (possibly including some students) is very common among Imitators and Desperate and Excluded, whereas scientific services is the top industry among Ghost Innovators. Those more generic non-IT sectors appear to be throwing a curve, but show how widespread crypto-shopping is among different slices and layers of society.

In contrast, but as expected, Crypto Elites engage in finance/banking (16.7%), software development/ testing (14.3%), and information technologies (11.9%) more than any other group. This is highly in line with their leading stance in the world of crypto. At the other extreme, Desperate and Excluded has the least engagement in the IT sector with their top five sectors being education (14.3%), manufacturing (8.9%), arts/entertainment (8.9%), consutruction (8.9%), and agriculture/husbandry (7.1%). This helps us understand how and why they use crypto-shopping. Clearly, they have too little interest in the blockchain technology itself. But, they use it to get the benefits and mitigate the economic issues they are facing, including but not limited to getting paid for their online side hustles and remittance. Even though not in the first place, Dreamers, Trapped Innovators, Ghost Innovators, and Imitators all accommodate at least one of finance, software, computer/electronics, or IT sectors in their top five. Despite their enthusiasm, why the scientific community lacks the action and are mostly squeezed into Ghost Innovators deserves some questioning. Last but not least, significance of construction workers in almost any group is conspicious.



Figure 64: Occupation industries for each cluster.

8.9.2 Opinion on crypto

Crypto-consumers' perception of cryptocurrencies (and crypto assets in general) changes significantly according to their background, industry, and of course, personality. As their perception defines their attitude, it was an important factor when determining the clusters.

Most crypto-shoppers have at least a very basic understanding of what blockchain is and how it works, but clearly not everyone. Crypto Elites, Trapped Innovators, and Imitators altogether know the topic quite well as only around 2% are less confident about it. On the contrary, as much as 88% of the shoppers in Desperate and Excluded do not know what is going on under the hood. Ghost Innovators and Dreamers have many knowledgeable and little to not-knowledgable members. Indifferent Wealthy seems very balanced as the number of knowledgable (32.5%) is remarkably close to not knowledgable (27.7%). And almost 40% of the cluster stated a neutral standing point which may also reflect the "don't care" attitude. Figure 65 presents the remaining details about blockchain knowledge among clusters.

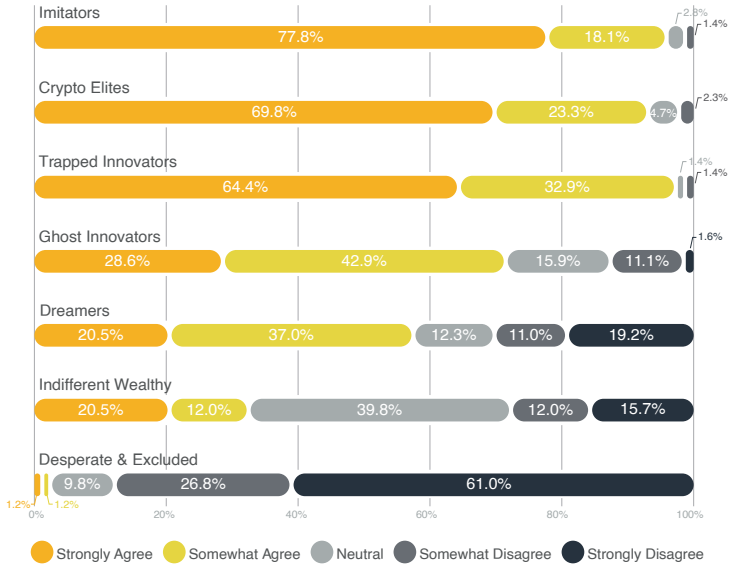


Figure 65: Basic blockchain knowledge for each cluster.

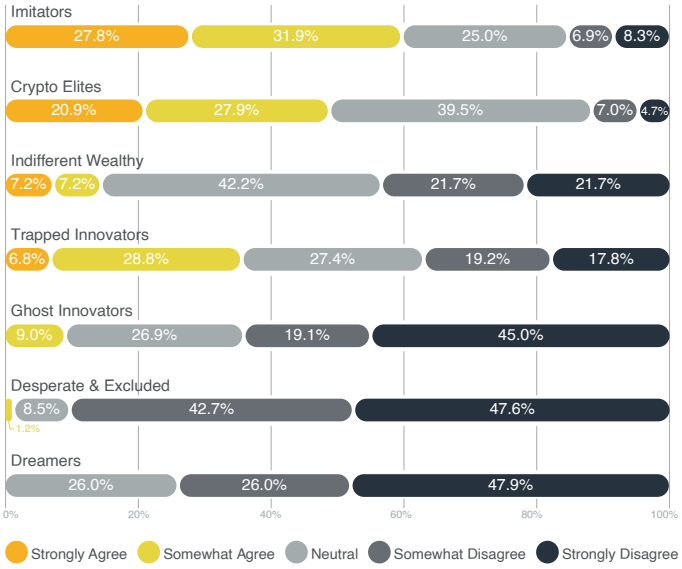


Figure 66: Blockchain expertise for each cluster.

Unlike basic knowledge, expertise concerning blockchain technology or cryptocurrency trading is much scarcer within the community. The chart in Figure 66 has some similarities with Figure 65, yet there are significant differences. For example, there are no experts among Dreamers, Desperate and Excluded, and Ghost Innovators. While this is by no means a surprise for Desperate and Excluded, it points out a major distinction between Ghost Innovators and Trapped Innovators, as well as between Dreamers and Imitators, as the former sides in both pairs lack any expertise while latters have some. While nearly half of Crypto Elites define themselves as blockchain experts, this rate is even higher among Imitators.

A major factor that helps define the clusters is the consumers' belief in that blockchain technologies and everything crypto will be an integral part of our future lives. Such a belief (most likely accompanied by a passion) is one of the two fundamental drivers of the adoption of cryptocurrencies in payments and shopping (the other one being that the crypto solves society's several acute everyday problems better than other options or it is the only viable option).

As Figure 67 illustrates, Crypto Elites, Imitators, Trapped Innovators, Dreamers, and Ghost Innovators have no doubt that crypto will have a strong presence in the future, much more than today. Indifferent Wealthy are quite unsure about that, although currently benefiting from crypto payments, they suspect that it could also fade away in the future because of some drawbacks (e.g., price volatility, privacy, legal status, etc.). Desperate and Excluded stand far on the other end of the scale. They use and benefit from crypto-shopping to a great extent (even more than most other groups) thanks to crypto's irreplaceable help in dealing with financial exclusion and other economic hardships. Yet, they still do not expect it to be a part of the future, and neither do they care to keep it as their main payment method. They seem eager to replace it if possible, but crypto is currently the only option for many under this category.

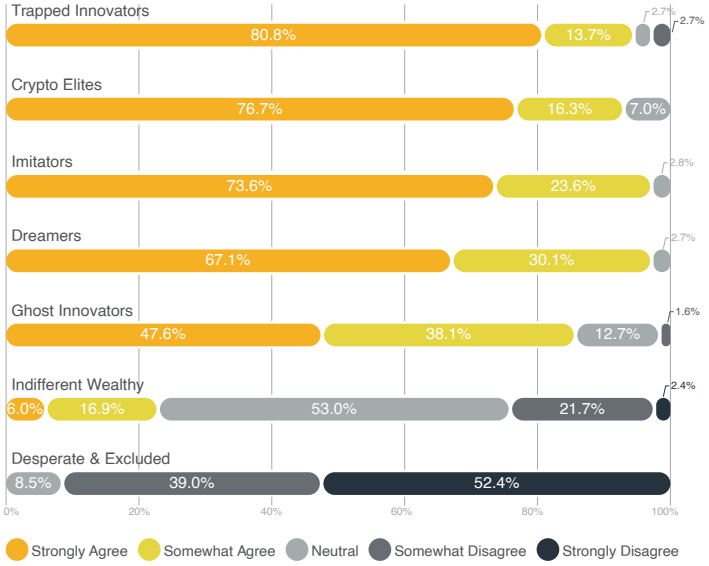


Figure 67: Agreement with the statement "blockchainis the future" for each cluster.



The consumers' stance towards crypto also depends on how they obtain their crypto holdings in the first place, which changes remarkably (but not completely) from cluster to cluster. When people get earnings in cryptocurrencies in return for the services they provided or when they get parts of the revenue of their business in the form of cryptocurrencies, they tend to do more crypto-shopping without cashing their crypto out, a very understandable move with cost and time benefits. What makes the difference is that not everyone earns crypto, and not everyone earns comparable amounts. As observed in Figure 68, the most preeminent way of getting some crypto is (mostly but not necessarily small-scale) freelance jobs that let getting paid in crypto or earning crypto through accomplishing small (mostly online) tasks. This is the number one source of obtaining crypto coins in terms of popularity (but not of volume), even more than buying crypto, for all groups. This tendency also draws a thick line between crypto-consumers and other crypto-investors/traders who do not commonly shop with their crypto.

Almost all (97.7%) individuals in the Crypto Elites group earn some crypto through freelance jobs or small tasks, as one of the possibly many sources of their crypto income, which is a huge ratio. Yet the freelance jobs they do is not necessarily the same as the ones being done by other groups. Crypto Elites are followed by Ghost Innovators (92.1%) and Trapped Innovators (87.7%). What follows freelance jobs and small tasks is buying (or investing in) crypto assets (most likely through exchanges), whose popularity is very close to the former except for Ghost Innovators. Apart from those two most popular options, the ranking varies across groups. Dreamers favor mining their crypto (31.5%) and obtaining some for free through airdrops, special campaigns, and loyalty/affiliation programs (31.5%), while other means are less popular. Among Indifferent Wealthy, earning crypto as salary is more common (26.5%) yet getting some as a gift (22.9%) and mining (22.9%) are equally popular. That distribution is quite similar to that of Crypto Elites with the sharp exception of gifting as Crypto Elites rarely get crypto as a gift. Also, they earn more crypto from their commercial activities (i.e., businesses). While Imitators are less likely get their salaries paid in crypto (9.7%), that is even less common among Trapped Innovators (4.1%) and virtually non-existent among Ghost Innovators. What is also super rare among Ghost Innovators are business incomes in the form of cryptocurrencies. On the other hand, one-third of Desperate and Excluded get their salaries in crypto, which is the highest rate among all groups. Also combining that with the prevalence of freelance jobs and minor tasks that pay crypto within the group, there is a significant likeliness that many among Desperate and Excluded have a continuous (but not necessarily steady) flow of crypto as their main source of income. Note that they are followed by Crypto

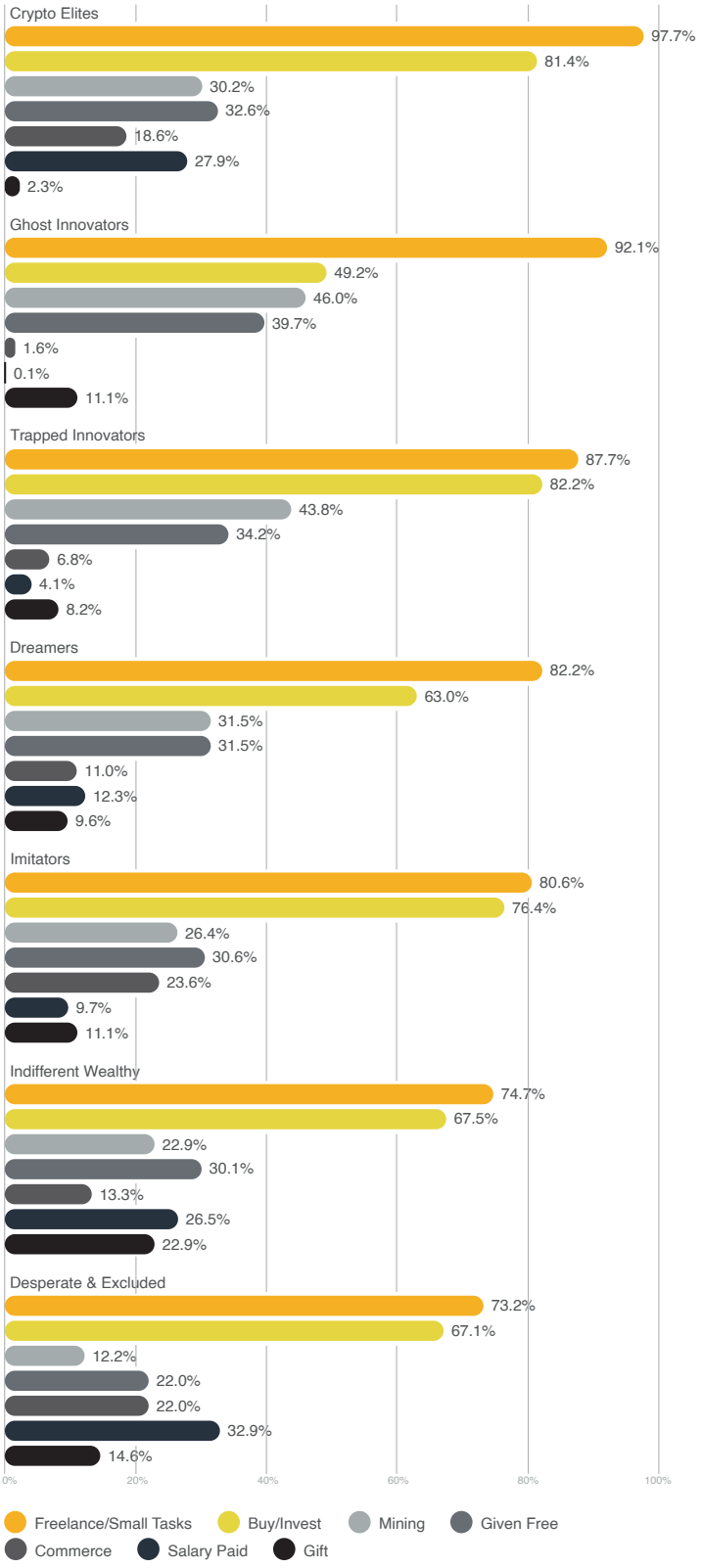


Figure 68: Source of cryptocurrency holdings for each cluster.

Elites in terms of crypto-paid salaries, which resembles some sort of coexistence of the opposites in the market. Nevertheless, what is less popular among Desperate and Excluded is mining (12.2%), possibly due to the high costs of the equipment required to have a feasible setup.

8.9.3 Crypto-shopping habits

Different crypto-consumer segments naturally have different habits of shopping and making payments through cryptocurrencies. For instance, some shop more frequently, while some rarely. Likewise, there are many who use crypto because of being beyond the hope of more traditional alternatives, whereas some prefer crypto as they are passionate tech enthusiasts.

A super-important factor in depicting the cryptoshopping habits of each consumer group is their dependence on crypto-shopping. Such dependence can be described as a feeling of being forced to spend cryptocurrencies (instead of using fiat money) in order to buy goods and services. The degree of that feeling may be anything from nonexistent to a matter of survival. Figure 69 shows the related breakdown. As expected, consumers that make up the Desperate and Excluded are heavily dependent on crypto-shopping as 86.6% agree on the indispensability of crypto, possibly at the survival level for most. Other groups show much less dependency, but still not negligible. An interesting fact is that less wealthy groups like Dreamers and Imitators have even less dependency on crypto than richer Crypto Elites and Indifferent Wealthy. This may be an indicator that some people from the latter groups may have businesses or investments that are related to crypto-shopping or that they expect benefits from crypto-shopping on a larger scale.

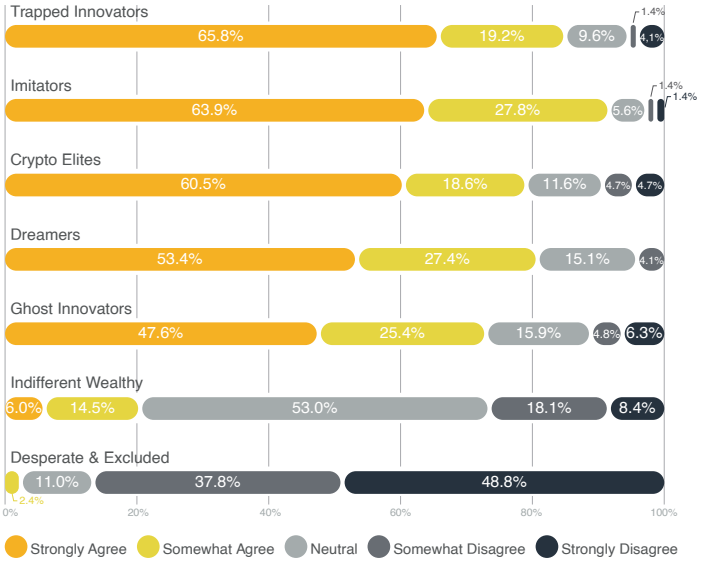


Figure 69: Consumers not forced to use crypto for each cluster.

Using the Lightning Network (or other layer-2 technologies) when making crypto payments can be considered a technical skill, although things have become much easier than when it was first introduced. So, one would expect it to be used only by consumer groups with some expertise. But that is definitely not the case, as the

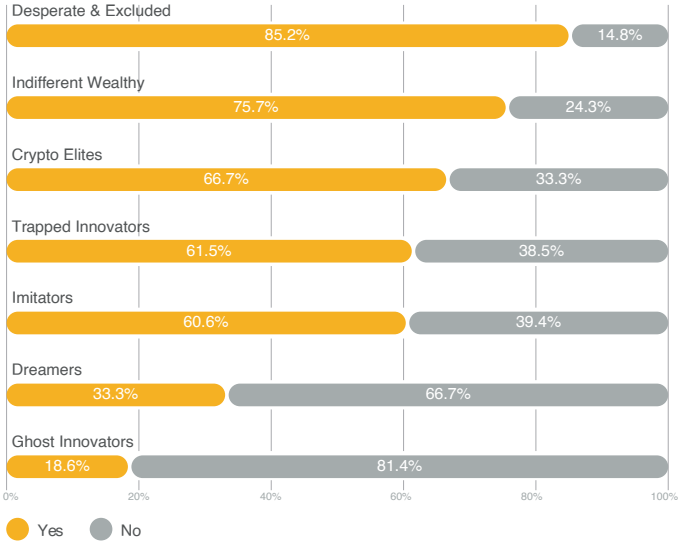


Figure 70: Usage of Lightning Network for each cluster.

potential benefits of using it are crucial for those who are living on a budget and relying on cryptoshopping as a matter of survival, as well as anyone who wants to save on transfers and remittance. Figure 70 shows how popular the Lightning Network is among the members of Desperate and Excluded (85.2%), as well as among Indifferent Wealthy (75.7%). Those are particularly noteworthy since Desperate and Excluded know very little about blockchain, and Indifferent Wealthy do not depend on the crypto economy. They are followed by Crypto Elites (66.7%). Groups that use the Lightning Network the least are Ghost Innovators (18.6%) and Dreamers (33.3%). The reason could be that they are the ones crypto-shopping the least, which makes the benefits they can get from layer-2 technologies more marginal. This statement is, in fact, in parallel with the breakdown given in Figure 71.

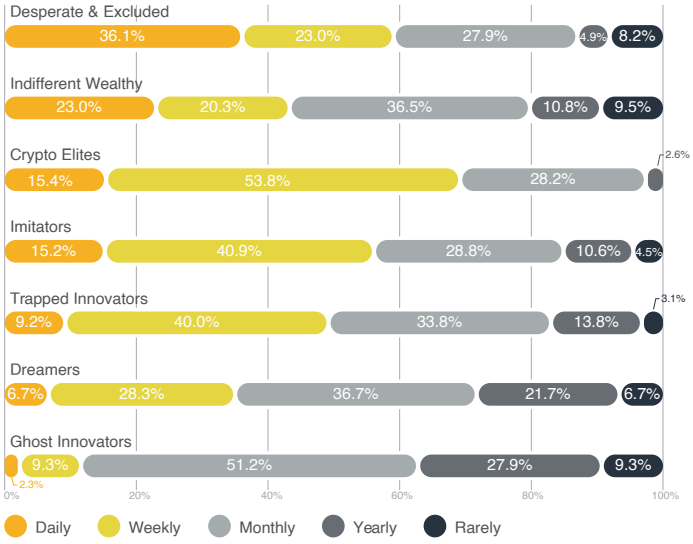


Figure 71: Crypto-shopping frequency for each cluster.

Crypto-shopping frequency is another factor for consumer segmentation and must be taken into account by businesses in developing efficient marketing strategies. In all groups, the majority resort to crypto-shopping at least on a monthly basis, while some do more frequently. 69.2% of Crypto Elites do crypto-shopping at least weekly (and none of them does less than once a year), while 59.1% of Desperate and Excluded do so. When it comes to daily shopping, Desperate and Excluded takes the lead from Crypto Elites with a whopping rate of 36.1%. This may be an indicator that they are buying more everyday needs and may also mean that they get paid some pocket money in crypto by completing short tasks. Ghost Innovators are the least frequent shoppers, followed by Dreamers and Indifferent Wealthy, consistent with the characteristic definitions.

Coin preferences (for shopping purposes) do not differ very significantly across different consumer segments. However, there are a few specific choices that may be for a reason. First of all, Bitcoin is still super-prevalent among all consumer groups without exception. The top three most BTC using groups are Imitators (90.9%), Crypto Elites (84.2%), and Desperate and Excluded (81.7%). This is highly interesting, because Crypto Elites and Imitators are very innovative and aware of better options in the sense of transaction speeds and costs, and are eager to test those. Likewise, Desperate and Excluded are among the most frequent shoppers which make them more susceptible to Bitcoin's expensive and slow transactions. Such insistency on Bitcoin may be for several reasons, including that it is the first and still most popular cryptocurrency. But, there is another valid reason: crypto-consumers who shop a lot are aware of and use layer-2 protocols that allow faster and cheaper transactions, like the Lightning Network (as shown in Figure 70).

Figure 72 shows the major coin preferences of all consumer groups. As Bitcoin's place in the front line is secured, Ether and Litecoin are mostly competing for the second place with varying ratios between 23% and 42%. Ripple is also popular among Crypto Elites (42.1%, sharing the second place with Ether), Indifferent Wealthy (35.1%), and Imitators (30.3%). Bitcoin Cash is remarkably popular among Desperate and Excluded where almost a quarter use it for shopping. ZCash, possibly thanks to its very low transaction fees, is also a popular choice among Desperate and Excluded. Another credit definitely goes to stablecoins. USDT and USDC (also BUSD, DAI, and a few others on a near negligible scale) have crystal-clear popularity among Dreamers, Trapped Innovators, and Crypto Elites; but are less preferred among Ghost Innovators and Desperate and Excluded. Fun fact: Doge Coin is preferred by 9% of the Ghost Innovators, which is its only occurrence in the list, possibly due to expectations towards a potential bullish price movement.

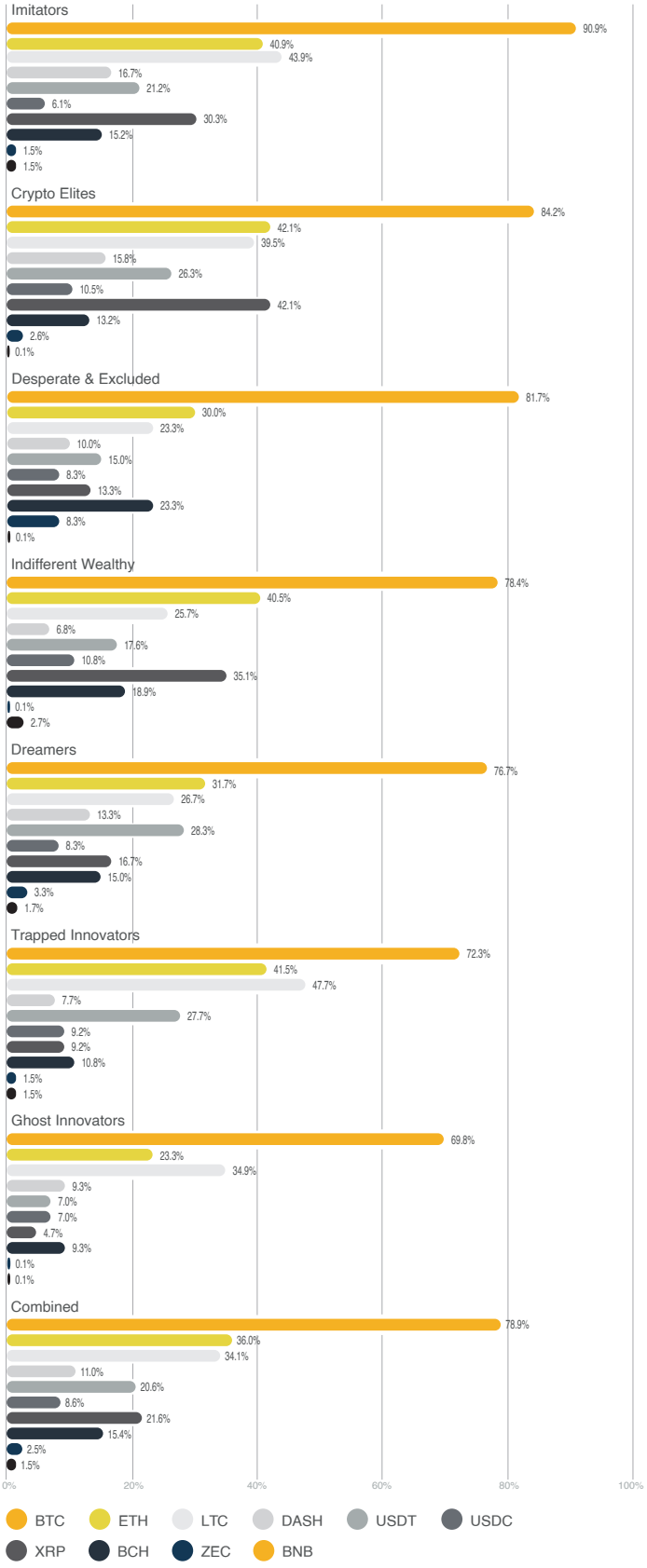


Figure 72: Cryptocurrency preferences for shopping for each cluster.

Previous research already revealed that not all the factors regarding preferability, prevalence, and frequency of crypto-shopping depend solely on personal choice, meaning that there are some external factors that inhibit (or sometimes boost) motivation to spend crypto to buy goods and services. One such factor is the availability of the stores and businesses that accept crypto payments, as well as their recognition on the consumer side. Recognition of such stores and satisfaction with available options change drastically among different consumer segments. Figure 73 visualizes each cluster's satisfaction with the availability of stores accepting cryptocurrencies as a payment option. Clear from the chart is that Imitators, Crypto Elites, and Trapped Innovators are somewhat satisfied with the current situation, whereas consumers in Desperate & Excluded are extremely dissatisfied as they cannot find enough stores offering crypto-payment options, which can be a clear hint for businesses trying to expand their customer base.

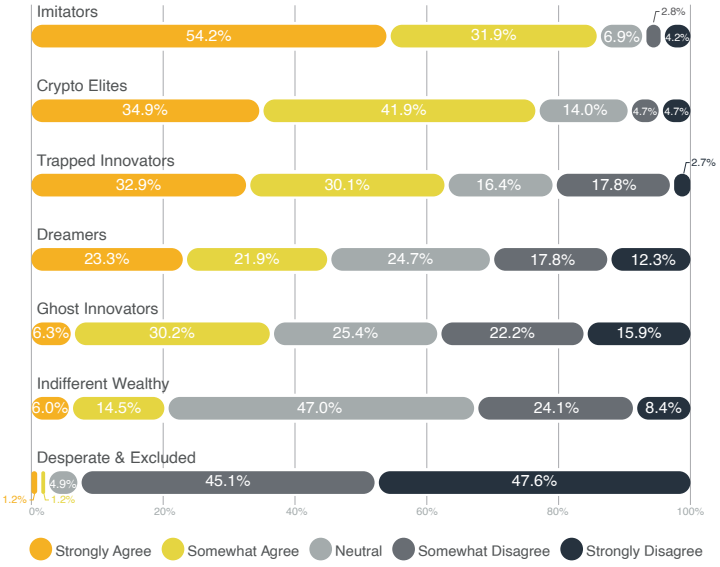


Figure 73: Satisfaction of availability of stores accepting crypto-payments for each cluster.

9. CONCLUSION

As a concluding result of our comprehensive research, we have come up with a number of concise theories regarding the current and future use of cryptocurrencies for shopping and payments.

9.1 Bridging markets

Our research reveals the universal demand for the possibility of buying goods and services by paying in cryptocurrencies. However, the availability of stores, brands, products, and services in the crypto-markets is far from being sufficient. There may be different reasons for that, including but not limited to restricting legal regulations, branding decisions, exclusive business plans, lack of sources or vision, etc. These may prevent the desired stores or products from existing in the crypto-markets. This is precisely where gift cards, vouchers, and coupons come in handy since most stores and e-commerce platforms already issue one or another.



Intermediary companies that sell fiat-valued gift cards (etc.) that the contracted stores issue in exchange for a quasi-equivalent amount of crypto-money are playing a significant role in bridging the conventional online markets with the crypto-markets. In this way, the crypto-consumers find the opportunity to shop at their favorite online stores even though they do not directly accept payments in cryptocurrencies. As 40% of crypto-consumers already rely on indirect payments via gift cards, this is clearly a key enabler of the cryptoshopping concept. Such methods may occasionally come at a cost (e.g., commissions), yet they create a win-win condition for everyone. The unavailability of a crypto-payments option for most renowned brands and stores likely explains why crypto-consumers consolidate their crypto-shopping activities at one-stop shops (such as CryptoRefills) that can satisfy a variety of the customers' needs via gift cards.

9.2 Financial inclusion

There are crypto-consumers from all around the globe and from a wide variety of socioeconomic backgrounds. However, there are also some easily discernible patterns. The financial inclusion theory suggests that many unbanked or underbanked people, or people with limited access to online banking systems, predominantly from less-developed countries (e.g., in Sub-Saharan Africa, etc.), keep their (usually personal or small-scale) businesses up and running by accepting crypto-payments. Therefore, it makes perfect sense for them to be able to shop with crypto-money. As these people constitute about one-fifth of all crypto-consumers, apparently, crypto-shopping is a matter of survival for many.



For a majority of crypto-shoppers, the cryptocurrencies are already a part of a circular economic process, where it is in some way earned (by performing small tasks online, digital freelancing, etc.) and then spent in the form of crypto-shopping. This means, for certain unbanked or underbanked people, cryptocurrency is perhaps their only chance to participate in the digital economy, both on the demand and the offer sides.

9.3 A better way of payments

From various aspects, paying with crypto-currencies is a better option for shopping rather than paying with fiat money. It is obviously a great opportunity for people who do not have access to other payment or transfer methods. The ones who already earn (e.g., through salary, mining, etc.) some income in cryptocurrencies are potential crypto-consumers as well. On the other hand, many prefer it due to privacy and security concerns, while some want to avoid middlemen and intermediary handlers. A great majority have an innovative spirit and like to adopt new technologies, including the ones involving crypto-currencies.



Despite its inestimable benefits and high potential, there are some drawbacks, including high transaction fees, long confirmation delays, commissions, value instability, and store/product unavailability. Cryptoconsumers tend to tolerate these to a small extent but not entirely. Concerning delays and fees, we see that the race is absolutely still on. Different blockchains and currencies are competing to win the shopping and fast/small transactions space. The Lightning Network is the first case of a scalability network offered to users to make crypto-payments for shopping purposes. It is available only for Bitcoin transactions, and although favored by many crypto-consumers, the reality shows only limited adoption of this technology. Our data reveals a growing trend in the Lightning Network's adoption but is still far from its potential. The growth is driven by users trying to overcome the cost of using their Bitcoin, but also by more user-friendly next-generation Lightning wallets, and maybe to some extent by the efforts of stores like CryptoRefills in educating their users. There are also many interesting solutions for resolving the delays and fees of Ethereum and ERC-20 token payments, including payments with stablecoins (which are also highly favored by customers). OMG, Polygon, Loopring, XDai, and many others might see stronger adoption in the upcoming months, especially due to the increasing cost of Ethereum.

9.4 Future of money

Okay, this may sound a bit too pretentious, but technological advances force numerous permanent changes in the shopping habits of consumers. Like online banking, credit cards, and digital money, cryptocurrencies are also becoming an integral part of the modern economy and finance. Of course, we do not foresee a complete replacement of conventional money in either the short or medium terms. However, cryptocurrencies already have their own rewarding use cases and will increasingly be more common within the near future, as more than 70% of crypto-consumers are reportedly agreeing with that. Our research shows that cryptocurrency owners see them as both a means for investments and a means for payments. Moreover, using cryptocurrencies addresses some specific needs that cannot be better addressed by conventional alternatives.

We definitely cannot say for sure if any of today's promising technologies, such as the Lightning Network, are here to stay long or if it is "overhyped" already, or which technologies and currencies will emerge as clear leaders in the consumer shopping payments domain. From our data, it seems that the top currencies by market cap and the stable-coins have the biggest chances of succeeding, provided that they can offer easy, scalable, and cost-efficient solutions to both consumers and businesses. Such scalable solutions may pass through other blockchain networks, sidechains, and scalability networks, as long as they are found feasible and usable by both merchants and consumers. Liquidity will also play a role, likely driving the shopper consolidation around such solutions.

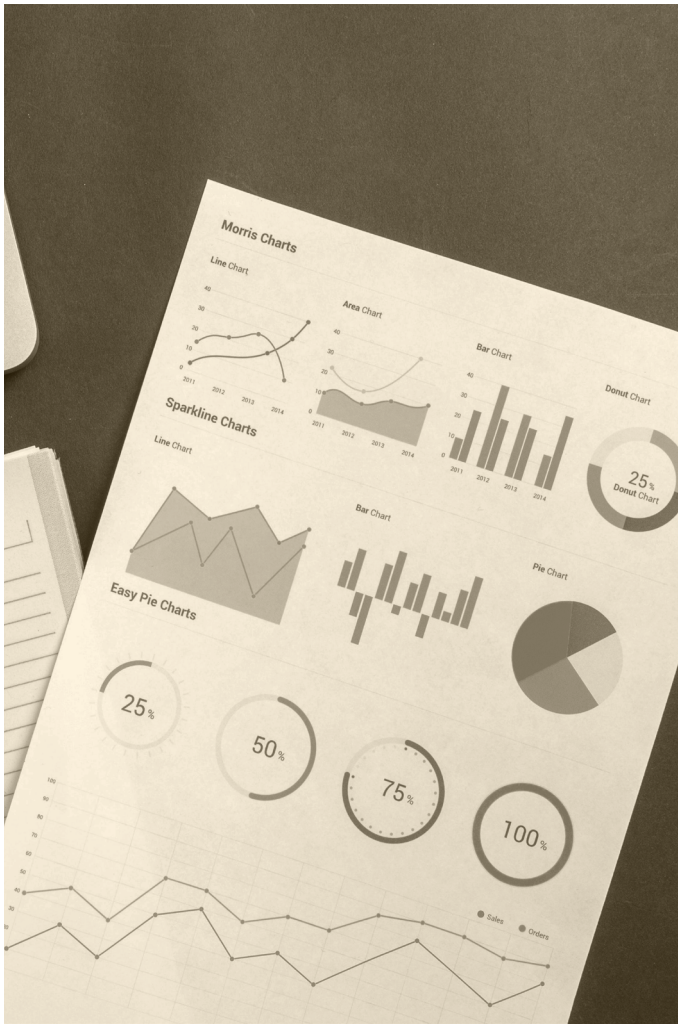


10. METHODOLOGY

This Consumer Analytics Report is a result of various academic and theoretic research approaches, as well as some of the best practices in qualitative and quantitative market research methodologies, such as k-prototypes cluster analysis. To avoid potential bias within the study outcomes, our research team is supported by independent researchers. The privacy of our users and the participants are of critical importance to maintain the trust of our users and our business. All data collected from the surveys were immediately anonymized using "aliases" and studied in aggregated forms. This publication has full compliance with the latest GDPR requirements.

10.1 Survey & data collection

The core of the report is based on a customized version of the Technology Acceptance Model 2 (TAM2), adapted from the work of Venkatesh and Davis[19]. The data is collected through a comprehensive questionnaire with more than 110 questions to be answered on a voluntary basis. By using the TAM2 model, we covered the experience of users regarding purchasing goods and services using blockchain-based currencies to a great extent. We specifically learned about numerous aspects related to ease of use, usefulness, confidence, and social aspects related to the use of these currencies in shopping. The data collection phase of the survey took place from the start of February 2022 to the end of June 2022. The market-related data is up-to-date as of the end of June 2022. The data we collected is elaborated for validity through crosschecking key (e.g., contradictory) questions. Furthermore, in-depth verification of the insights obtained from the adapted TAM2 questionnaire is made by comparison to our aggregated user spending statistics.



The study can be best described as a quantitative analysis with some qualitative aspects. In many of the questions, the participants were asked to define their agreement with some given statements using a 5-point Likert scale where the options are "strongly agree", "somewhat agree", "neutral", "somewhat disagree", and "strongly disagree". Occasionally these can also be interpreted as "yes", "somewhat", "neutral", "barely", and "no". The rest of the questionnaire includes multiple-choice questions, free-response questions, and multiple-choice questions with the possibility of manual entries.

10.2 Population & Sample size

The entire population of the survey exclusively consists of the registered users of the CryptoRefills website (www.cryptorefills.com). The population presumably consists of crypto-consumers, who are (i) actively using cryptocurrencies in shopping, (ii) have quit using cryptocurrencies in shopping for a while for any reason, or (iii) never tried but are eager to use cryptocurrencies in shopping in the future. The overall population size (N) is confirmed to be 15690 unique individuals. Repeating entries are eliminated carefully. The number of participants, namely the sample size (i.e., the base) of the study, is 413 for all questions in the questionnaire. We can say that this year, the study is broadened and has become more accurate as there are more participants than last year. As a side note, the participants were allowed not to disclose their answers to only a few questions due to privacy concerns; even so, the base is not lower than 200 for any of the survey questions.



The confidence interval is customarily chosen as 95%. The worst-case error margin (i.e., in a binary question with two options, where both options have a selection rate of 50%) is calculated as ±4.8%. As this is a rare case, the mean error margin would be even lower. For instance, for a binary question with selection rates 10% and 90% (e.g., the gender questionnaire in Section 2), the margin becomes ±2.9%. This approach can be generalized to the multiple-choice questions since the option with the most votes can be compared to the rest of the answers. The standard error can be calculated separately for every question using the option selection rates and the sample size.

10.3 Cluster analysis

The consumer segmentation analysis, also called cluster analysis, included in this research used a different dataset than the rest of the study due to time constraints. The data used to study the clusters was collected from June 2020 to December 2021 and incorporated answers from 489 respondents. It, in fact, covers the data that was used in the 2021 report and is extended with newer inputs (but does not include 2022 data). The analysis utilizes the k-prototypes method included in the kmodes library of Python3, over 29 distinct variables (i.e., survey questions), with the elbow number of 7, which is also found experimentally by an exhaustive best-fit search between 2 and 25. The maximum error margin of that part of the study is ±4.4%, similar to the other sections and previous editions of the research.

10.4 Criticism

Throughout this study, we have followed a scientific approach to increase precision and eliminate biases. However, there is still some discussion worth mentioning. First of all, the survey is conducted with people who are currently crypto-consumers, as they are registered to a crypto-shopping web portal. Therefore, the survey's extent does not cover former crypto-consumers (i.e., people who quit crypto-shopping for good, for whatever reason). So, it was not possible to discover their motivations. Secondly, we also could not reach people who were eager to try crypto-shopping at some point but did not take any action yet (apart from the minority who are registered to our portal but have not made a purchase). Thirdly, the survey was carried out online, on a voluntary basis, so the crypto-consumers who were eager to attend may be the ones who are less busy, who are more helpful, or even who have higher exposure to the survey. Lastly, although the data used in the research is very up-to-date, the cluster analysis part of the study used an older data set which may not reflect the most recent changes in crypto-shopping behaviors.

On the other hand, in this year's study, we have addressed one of the important concerns existing in the last year's report: the survey has questions related to the amount or volume of the crypto-money that the crypto-consumers earn, buy, own, or spend. Hence it became more accurate and informative in that sense.



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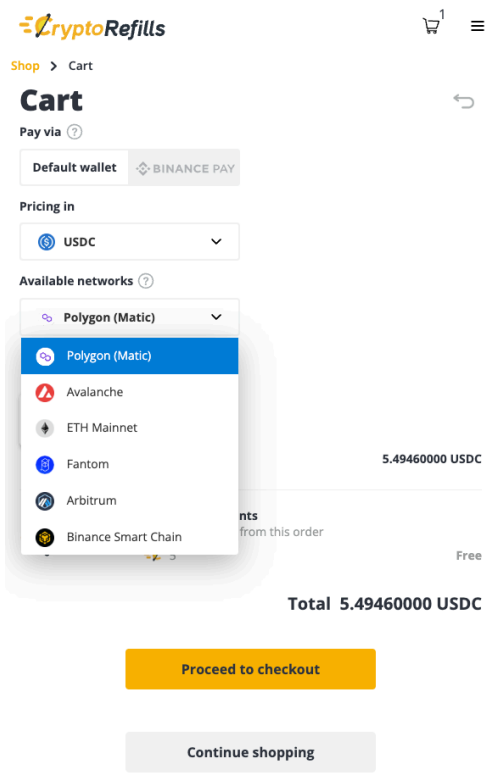
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ACKNOWLEDGMENTS

About Cryptorefills

CryptoRefills is a fast-growing fintech company headquartered in Amsterdam. CryptoRefills (www cryptorefills.com) today is the world's leading crypto commerce platform and brand, offering users in over 150 countries and territories the possibility to use their Bitcoin and crypto to make everyday purchases. With CryptoRefills, users use various cryptocurrencies to top up their phone credits across 600 Mobile Operators, pay their utility bills, subscribe to their favorite entertainment services, make purchases from top e-commerce brands and even shop at retail stores.



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Umut Can Çabuk . is a post-doc researcher at Ege University and an adjunct at San Diego State University. He received his B.Sc. degree in electronics engineering from Uludag University (Bursa, Turkey) in 2012; and his M.Sc. degree in information technology engineering from Aarhus University (Aarhus, Denmark) in 2015. He recently concluded his Ph.D. studies at the International Computer Institute of Ege University (Izmir, Turkey), where he also works as a research assistant. Umut's research interests include blockchain technologies, mobile and wireless networks, the Internet of things, computer security, and graph theory. He has co-authored over 35 scholarly publications and submitted four patent applications.

Massimiliano Silenzi is the CEO and co-founder of CryptoRefills. He is an entrepreneur and executive with 20 years of international experience in web, mobile and financial technologies. He is passionate about new payment technologies and their impact on commerce and society. He built his career on this passion, starting in the telco sector in TIM and Ericsson, following different country and regional director positions in mobile commerce businesses in Europe and MENA. He served as CEO in Onebip (mobile payments) between 2011 and 2015 and, as of 2016, is an entrepreneur in the telco, payments, and blockchain space. Massimiliano earned his Ph.D. in business and finance from the University "La Sapienza" in Rome with a thesis on mobile payments. He also holds an M.A. in marketing management from the University "La Sapienza" and a B.A. in international business administration from the University of Nottingham Trent.

Supports & Partnership

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Failure of BDV at any time to enforce any of these terms and conditions or to require performance by you of any such term or condition shall not be construed as a waiver of such provision or affect the right of BDV to enforce the same.

7.3 Severability

If any provision of these License Terms, or an Order, is held to be invalid or unenforceable by any court or administrative body of competent jurisdiction, the invalidity or unenforceability of such provision shall not affect the other provisions of these License Terms, and all provisions not so affected by such invalidity or unenforceability shall remain in full force and effect. The parties agree to attempt to substitute for any invalid or unenforceable provision a valid or enforceable provision which achieves to the greatest extent possible the economic objectives of the invalid or unenforceable provision.

7.4 Survival

Sections 2 through 8 and 10 shall survive the expiration of termination of these License Terms.

7.5 Governing law and jurisdiction

These License Terms shall be governed by the laws of The Netherlands. Any disputes arising in connection with these License Terms (including non-contractual disputes) shall be subject to the exclusive jurisdiction of the courts of The Netherlands.

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