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EXPLORING SERVICE VARIETY IN HOT CRYPTO-WALLET SERVICES: A MODEL OF INFLOW, ROLL & GO

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ABSTRACT
The emergence of cryptocurrencies has fostered the development of different hot crypto-wallet services, who usually integrate the wallet with cryptocurrency exchanges and other different services, serving their users with no software installation required. However, it is unclear how these service providers can develop and manage varieties of their services, which is nevertheless essential for addressing different customers’ needs. In this study, we adopted qualitative methods reviewing several hot crypto-wallet services. We established a preliminary model covering all capital flow activities around the service, namely “inflow, roll & go”. This model may serve as a reference for hot crypto-wallet services to develop their service varieties.

Keywords
Cryptocurrencies, Qualitative Studies, Service Diversity, Bitcoin, Cryptocurrencies wallet

INTRODUCTION
In recent years, cryptocurrencies are rapidly gaining popularity. According to the reports of Blockdata, the quarterly transaction volume of Bitcoin in 2021 is estimated to be $489 billion, surpassing Paypal and about 27% of MasterCard (Wouters, 2021). During the pandemic of COVID-19, market capitalisation and the number of users of cryptocurrencies continued to increase (Corbet et al., 2020). Cryptocurrency transactions are enabled by a particular type of wallet called "crypto-wallet", which allow users to store, send, and receive cryptocurrency tokens. These wallets may be classified into hot and cold (Gennaro et al., 2016). Hot crypto-wallets (or known as “hot-wallets”) are permanently connected to the Internet, while cold crypto-wallets (or known as "cold wallets") go online only when users switch them on. Hot wallets have a lower technical adoption barrier (Eskandari et al., 2018), and may be combined with centralised exchanges and different add-on services options. These hot-wallets are offered as a service accessible using web browsers with no software installation requirements (Rauchs & Hileman, 2017), and are becoming more popular in recent years (Tepper, 2022). However, the development prioritisation among their different add-on service options remains unclear. Given many FinTech start-ups may be of limited resources (Au et al., 2020), prioritising vital options would be desirable before developing other options upon reaching a larger scale (Eskandari et al., 2018).

We used qualitative methods to review 14 successful early-mover hot-wallet services. It is hoped that by identifying their different associated service options, we can understand how these services may develop their service varieties. Accordingly, our research question is, "What categories of hot crypto-wallet service varieties should be established?"

LITERATURE REVIEW
Cryptocurrencies and Hot Crypto-wallet Services

Cryptocurrencies are currencies that secure transactions and their value through blockchain and trust mechanisms. Its root may be traced back to the decentralised cash proposal introduced by Satoshi Nakamoto, which enabled Bitcoin's launch in 2009 (Li & Whinston, 2020). According to CoinMarketCap (2023), the market value of all cryptocurrencies has reached 1.6 trillion USD. Table 1 shows a selected list of some previous arguments related to different aspects of cryptocurrencies.

<table>
<thead>
<tr>
<th>Source</th>
<th>Key Arguments / Prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Alstyne (2014)</td>
<td>The adoption of Bitcoin in transactions may prevent fraud and lower transaction costs. Therefore, Bitcoin is increasingly being accepted by the public and has gained value. In light of its advantages, the usage of Bitcoin should not be discouraged solely due to its potential for illegal applications or high volatility.</td>
</tr>
</tbody>
</table>
Table 1. Selected Studies in the Context of Cryptocurrencies

<table>
<thead>
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</tr>
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<tbody>
<tr>
<td>Yermack (2015)</td>
<td>Bitcoin behaves more like a speculative investment than a currency due to its low trading volume, high volatility, and thus not being accepted by banks. Its applications as a currency are also resisted by its adoption barriers of technical knowledge and low merchant acceptance rate.</td>
</tr>
<tr>
<td>Böhme et al. (2015)</td>
<td>Hot-wallet services are developed as centralised platforms. They may introduce different additional services to address users' diverse needs. Very often, they have a low-margin cost structure.</td>
</tr>
<tr>
<td>Rauchs &amp; Hileman (2017)</td>
<td>With the increasing number of cryptocurrency owners, many cryptocurrency exchanges have provided additional services to individual owners of cryptocurrencies and merchants who want to include cryptocurrencies in their businesses.</td>
</tr>
<tr>
<td>Dierksmeier and Seele (2018)</td>
<td>Cryptocurrencies are considered a remedy against poverty by providing financial services to those who are traditionally unbanked, given the costs of wallet establishment and transactions are lower than the costs of adopting traditional financial services.</td>
</tr>
<tr>
<td>Huberman et al., (2021)</td>
<td>With a decentralised payment system at the core of Bitcoin, no simple mechanisms can change prices, products, and rules of Bitcoin. Thus, these properties of Bitcoin tend to be more stable.</td>
</tr>
<tr>
<td>Au et al., (2022)</td>
<td>Given the dark side of cryptocurrencies, such as money laundering and energy wastage, may hinder the broader cryptocurrency adoption, some hot crypto-wallet services have adopted different measures to address these concerns so that more people will adopt cryptocurrencies.</td>
</tr>
<tr>
<td>Hsu et al., (2022)</td>
<td>With value pegged to real-world currencies, stablecoins may mediate the risk of cryptocurrency investment and thus foster wider cryptocurrency adoption. However, the concept of stablecoins may be confusing for junior users as it violates their “volatile” perception of cryptocurrencies.</td>
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</table>

Cryptocurrency applications bring a wide range of benefits, such as financial inclusions, hedging in investment portfolios, lowered transaction costs and better fraud detection. On the other hand, the dark sides of cryptocurrencies include price vulnerability and potential illegal applications. To transact with cryptocurrencies, a crypto-wallet is needed. These wallets may be classified into cold and hot (Gennaro et al., 2016). The hot ones are permanently connected to the Internet. Some of them are realised as software installed on different devices, while some are integrated with cryptocurrency exchange functions and other service options as hot crypto-wallet services and are accessed as a service using web browsers (Rauchs & Hileman, 2017). In this paper, we focus on the latter one (i.e., hot-wallet services accessed by web browsers with no installation required).

While some of these services have achieved considerable success (e.g., Coinbase, see Levy, 2021), previous literature on cryptocurrencies did not adequately cover their development and successes. Some literature discussed the importance of offering additional service options (e.g., Au et al., 2022; Böhme et al., 2015; Rauchs & Hileman, 2017), but they did not discuss further what services to be added and bundled with. Also, Corbet et al., (2019) did not cover any forms of cryptocurrency businesses in their classification or stated these businesses as a research gap. Given the technical requirement and fixed costs of using cold-wallet (Böhme et al., 2015), the importance of understanding the development and successes of these services will only increase. Given the previous successful cases (e.g., Binance and Coinbase) often linked its wallet with a diversified range of services, we reviewed previous literature related to product and service variety.

**Product and Service Variety**

Service variety is the number of service options in the same company. Kahn (1995) argued that consumers tend to patronise a company with a higher product and service variety. In addition, users may seek diversity due to uncertainty about the future (Simonson, 1990; Walsh, 1995), changes in the usage environment (McAlister & Pessemier, 1982), unable to find a service or product that can meet all (Kahn, 1995), or out of curiosity (Raju, 1980). In FinTech contexts, service varieties are also increasing in recent years, given financial institutions would like to expand their user base population (Leong et al., 2017). Table 2 shows a selected list of arguments related to how product and service variety affect businesses.

Table 2. Key Arguments / Prescription

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Murray &amp; White (1983)</td>
<td>Limiting the diversification of a financial institution's services makes its operating costs high. Conversely, providing varieties of services can achieve cost complementarity.</td>
</tr>
<tr>
<td>Lancaster (1990)</td>
<td>The degree of product variety positively impacts firms' overall competitiveness, but such outcomes may also be subjected to customers' views or different homogenous substitutes on the market.</td>
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</tbody>
</table>
As indicated in Table 2, increasing product/service variety can foster users' demand, realise cost complementarity, gain a larger market share, and retain more customers, given that customers tend to reduce the effort required in their purchase decisions. Given the impact of product/service variety on addressing customers' needs, some companies have launched some "superapps" or service ecosystems, which provide multiple services for addressing different needs of the same customers (Steinberg, 2020). However, some researchers argued that increasing product variety could be counterproductive, as users may feel complex (Huffman & Kahn, 1998). Customers’ purchases may be delayed as they are unsure of their needs (Kahn, 1995). Nevertheless, fostering customers to learn about the product/service offering may reduce their perceived complexity (Huffman & Kahn, 1998) and thus switching costs. Thus, their willingness to switch may increase (Tétard & Collan, 2009).

### RESEARCH METHOD

We adopted qualitative methods for a few reasons. First, since the targeted phenomenon is multi-dimensional and includes both external (e.g., customers and collaborators) and technological (e.g., Blockchain and web technologies) dimensions, an objective approach may be too complex to be adopted (Gable, 1994). Second, qualitative methods are more robust in identifying the development of a specific outcome or a process (Markus & Robey, 1988). Since the sector is still emerging, the service options offered by different providers are still expanding. Therefore, we analysed multiple successful cases to identify possible service options of hot crypto-wallet services. We began by selecting the providers based on multiple sources, ranging from official blogs and websites, social media, technological news trend websites and third-party online communities. A hot-wallet would be included in our dataset if we could observe their significant business success and diversity of usability enhancement measures. For business successes, we considered different factors, such as the number of customers and employees, total funding amount and the external ratings they obtained. Selecting successful cases would ensure the established implications are based on proven, if not the best practices (Pan & Tan, 2011). Moreover, within each selected case, we would cover multiple sources to ensure our comprehensive understanding of them, similar to when we selected cases to cover. As an ongoing study, we have currently covered 14 services providers, including (1) Binance, (2) Uphold, (3) Coinbase, (4) FTX, (5) Kraken, (6) Kucoin, (7) Huobi, (8) Gate.io, (9) Bitfinex, (10) Bybit, (11) Gemini, (12) Crypto.com, (13) BlockFi and (14) AAX.

Based on the literature in Table 1 (cryptocurrencies) and Table 2 (product/service variety), we established an initial set of theoretical lenses (Pan & Tan, 2011). We collected and analysed the data concurrently to take advantage of the flexibility of qualitative research methods (Eisenhardt, 1989). The data collected was then coded using a mix of open, axial and selective coding (Strauss & Corbin, 1998). Open coding was first used to apply conceptual labels to the relevant excerpts of our interviews to form first-order concepts (van Maanen, 1979). The first-order concepts were grouped into second-order themes via axial coding. If the first-order concept fitted an existing second-order theme within our coding structure, the concept was assigned to the theme directly. However, if the fit was not exact or the concept related to a theme that did not yet exist, an existing or new second-order theme would be modified or created accordingly before restarting coding based on the changes made. Finally, selective coding was used further to abstract the second-order themes into several aggregate dimensions. We also created visual maps, tables and narratives to help us make sense of the voluminous amount of data collected (Langley, 1999). We will continue identifying and analysing successful hot-wallets until we reach the point of theoretical saturation.

### Table 2. Selected Studies in the Product and Service Variety

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Nayyar (1993)</td>
<td>When choosing other services, users will prefer existing service providers they are satisfied with. However, new market players can profit from related diversification, which may create a economies of scale.</td>
</tr>
<tr>
<td>Kahn (1995)</td>
<td>Influenced by the external environment, the pursuit of excitement and the uncertainty of the future, consumers will seek various products and services. Firms that have just established or have a small market share should encourage users to pursue variety, as some users tend to choose companies they haven't tried.</td>
</tr>
<tr>
<td>Huffman &amp; Kahn (1998)</td>
<td>Increasing product variety may increase customers' perceived complexity, leading to delays in using or purchasing a service. This may be mediated by supporting users to learn, which also depends on the information provided by the firms.</td>
</tr>
<tr>
<td>Tétard &amp; Collan (2009)</td>
<td>Users usually choose services that meet their least effort. The effort includes time, cost, energy, as well as switching and learning costs. Among different options that provide similar functions, users will choose the most familiar one unless they perceive the learning costs outweighs the benefits.</td>
</tr>
<tr>
<td>Leong et al. (2017)</td>
<td>Products/services variety can be part of a prosperous FinTech ecosystem. For example, the FinTech ecosystem for college students might feature websites that facilitate their financial and non-financial needs. In turn, targeted clients' needs could be met entirely.</td>
</tr>
</tbody>
</table>
(Eisenhardt & Graebner, 2007; Pan & Tan, 2011), which means the induced implications comprehensively accounted for the data on-hand and additional data will not provide new insights (Eisenhardt, 1989).

PRELIMINARY FINDINGS

We found that service options offered by the hot-wallet services providers may be classified into three categories, which allow capital to be deposited into the wallet, grow, and withdraw. A diversified range of options may address users’ habits and needs while reducing the learning required for adoption (Nayyar, 1993; Tétard & Collan, 2009). With different types of needs being addressed (Leong et al., 2017), more users will adopt the service. A network effect will be thus created, which increases the value of both cryptocurrencies and the services. We propose an "inflow, roll and go" model, which may guide these service providers to expand their offerings.

Inflow

Despite their increasing appearance in media, crypto-mining can be hard for potential users that are less tech-savvy (Yermack, 2015). Seeing the opportunities brought by cryptocurrencies, Internet users may opt to acquire cryptocurrencies by options other than crypto-mining. Observing the market needs, these alternatives have been offered by different hot-wallet services. We name these options "inflow", given users' capital flows into the services. The most straightforward option was to allow users to purchase cryptocurrencies using credit cards, similar to how they shopped online (Tétard & Collan, 2009) and launched by almost all services. Some services allowed users to earn free cryptocurrencies to establish competitive advantages. For example, Uphold and Gemini worked with Brave Browser. By allowing the browser to show advertisements in notifications, the browser’s users may earn a Basic Attention Token (BAT, a type of cryptocurrency). As a result of diversified and unique inflow options, customers may perceive higher convenience.

Roll

While cryptocurrencies may be regarded as an investment tool, technical barriers have prevented some users from adopting them (Yermack, 2015). Therefore, it will be desirable if hot-wallet services develop a diversified range of options to facilitate the investment processes so that cryptocurrency owners can profit more easily (Böhme et al., 2015). We named these options "roll", given that the capital deposited into the service is rolling and hopefully gaining larger size.

Integrating with exchange functions, hot-wallet services can allow trading between different types of cryptocurrencies. And yet, more innovative and unique functions should be offered by these service providers (Lee & Teo, 2015). A good example was "Earn", provided by Crypto.com, which allows users to stake their cryptocurrencies asset, thus earning a return higher than the saving interest rates offered by traditional financial institutions. Despite the difference in the principle of offering returns (i.e., staking mechanisms instead of lending money to other customers), Crypto.com marketed the option similar to bank saving accounts so that customers perceive lower complexity and are more likely to adopt this saving-like option (Huffman & Kahn, 1998). In addition, some providers provided gamified service options, given the engagement power of gamification (Lui & Au, 2020). For example, Kucoin launched its Futures battle, which allowed users to compete with others for their investment portfolios and earn. Combining these unique roll options satisfy users' curiosity (Raju, 1980), reduce their decision-making efforts (Tétard & Collan, 2009), and make them more likely to stick to the same hot-wallet. In the era of platformization with lowered switching costs, users may otherwise multi-home or switch to different hot-wallets (Au et al., 2019).

Go

Users may perceive a FinTech service as a scam if they cannot or find it difficult to withdraw their capital. In turn, they will not put their capital into the services. Conversely, hot-wallets services should ensure a diversified range of options that allow users to withdraw their capital from their wallets, transfer their capital to other wallets or utilise their capital for different purposes. We named this range of options "go", given the capital is going away from the wallets.

To show different facets beyond the illegal perceptions that may be upheld by some prospective users (van Alstyne, 2014), some hot-wallet service providers have launched charitable go options (e.g., community giving and donation options by FTX and Binance), which allow users to donate cryptocurrencies to charities. Altogether, these go options enhance convenience and, thus users' continuous usage intention (Davis, 1989). A good example of go options was the VISA card launched by Crypto.com, which allows its users to use cryptocurrencies in their daily life as if using their credit cards issued by traditional financial institutions. Despite the difference in the principle of offering returns other than crypto-mining. Observing the market needs, these alternatives have been offered by different hot-wallet services.

DISCUSSION AND CONCLUDING REMARKS

Our preliminary results have hinted at a few theoretical implications. First, we present a theoretical "inflow, roll and go" model for guiding hot-wallet services development. The convenience offered by the service (Eskandari et al., 2018) and the overall usability and usage of cryptocurrencies may be enhanced. Hot-wallet services may earn a spread from the increased number of
transactions. Second, we identified the positive impact of product/service variety in hot-wallet services contexts, which may contradict previous literature which suggested the negative side of product/service variety in other contexts (e.g., Huffman & Kahn, 1998). This may be explained by how hot-wallet services facilitate their users to learn about their various service options and thus overcome the complexity barriers, which was the key behind this literature.

In our initial stages of research, we identified limited service varieties for hot-wallets that are installed on devices. However, given that the cryptocurrency world is still rapidly emerging, there are several areas that may be addressed in the future, including the service varieties of the installed wallets (instead of the online wallets that we studied), as well as the technical formulations of different hot-wallets service options. For our subsequent research, we will focus on extending and validating our theoretical implications by collecting and analysing additional data from different hot-wallet services. We may also review more literature on cryptocurrencies and FinTech, which may help us conduct more in-depth analyses. In turn, we hope to refine our implications further for building a more holistic understanding of hot-wallet services.

REFERENCES


