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# **Developmental Strategies of Proliferating Cryptocurrencies – A Case Study on Solana**

*Research-In-Progress Paper*

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## **Abstract**

*Cryptocurrencies have disrupted the financial world and created opportunities for businesses to raise capital. However, not all cryptocurrencies have been successful, and identifying the critical factors for success is essential. Many successful cryptocurrencies have established ecosystems and partnerships with leading companies. The purpose of this article is to explore the strategies for building an ecosystem of cryptocurrencies to promote their development and adoption. By examining successful cases and identifying the associated technological innovations and external partnerships, this study aims to provide empirical evidence and insights into the proliferation of cryptocurrencies.*

**Keywords:** Solana, Cryptocurrencies, Ecosystem, Innovations

## **Introduction**

Cryptocurrency is a digital or virtual currency enabled by cryptography. It has been an emerging concept since Satoshi Nakamoto introduced Bitcoin as a transaction currency (Nakamoto 2008) and has disrupted the financial world. The total market capitalization of cryptocurrencies has reached over \$130 billion in 2022 (Coinmarketcap 2023), while the number of types of cryptocurrencies worldwide reached over 10,000 in early 2022 (Statista 2022). The advantages of cryptocurrencies include decentralized control, lower transaction fees, global accessibility, and increased security through encryption (Li and Whinston 2020). Some countries, such as the Central Africa Republic and El Salvador, have launched or planned to launch their official cryptocurrency, while some other countries have adopted cryptocurrencies to varying extents for financial inclusions and transaction acceleration (Dierksmeier and Seele 2018). Moreover, issuing cryptocurrency is a great business opportunity for companies to raise capital. Some firms have launched initial coin offering (ICO) campaigns, which issue cryptocurrency tokens to investors (Preston 2017).

However, not all of them are successful. For example, once an emerging cryptocurrency, LUNA collapsed in May 2022 due to the complication of managing the value peg with TerraUSD, its sister stablecoin<sup>1</sup>, across centralized and decentralized trading values. In turn, investors suffered from financial losses of billions (Li and Au 2022). Apart from LUNA and TerraUSD, many cryptocurrencies failed to gain traction and quickly became obsolete after their introduction. In turn, investors of these cryptocurrencies will lose their money, while the issuers cannot achieve their initial targets, such as capital raising and other social missions (Conoscenti et al. 2016).

Previous literature suggested the relevancy of ecosystem development and stakeholder engagement for the proliferation of a cryptocurrency ecosystem. For example, Bhambhwani et al. (2019) highlighted the importance of having a large number of accepting parties for a network of cryptocurrency to grow. However, they also pointed out that the existence of network effects alone does not necessarily guarantee the success of a cryptocurrency. Conversely, it is a matter of having stakeholders who play varying roles (e.g., users, merchants, and developers) so the cryptocurrency ecosystem can proliferate (Narayanan et al. 2016).

Therefore, it is essential to investigate the strategies that may contribute to the success of cryptocurrencies. This paper reports an ongoing case study of Solana (SOL), focusing on the activities within its ecosystem. It is hoped that by identifying the strategies adopted by the issuer of Solana, we can recognize the strategies for developing the ecosystem of a cryptocurrency. In turn, we can further promote the development and adoption of cryptocurrencies and leverage their potential to revolutionize the financial industry. The leading research question (RQ) of this short paper is: “How can an ecosystem of cryptocurrencies be effectively developed?”

## **Literature Review**

### ***Cryptocurrencies***

Cryptocurrencies enable secure online payments without third-party intermediaries and are generally not issued by any central authority, rendering them theoretically immune to government interference or manipulation (Li and Au 2022). They are primarily enabled by blockchain, where the data cannot be tampered with, destroyed, or forged (Di Pierro 2017). Cryptocurrencies can be mined or purchased from cryptocurrency exchanges (Krause and Tolaymat 2018) and have been used as potential financial instruments for trading and cross-border transfers (Mendoza-Tello et al. 2019). Previous literature suggested that some of the cryptocurrencies include (1) Low Transaction Fees, (2) Fast Transaction Speed, (3) Decentralized, (4) Volatility, and (5) Self-Governed (Dierksmeier and Seele 2018; Li and Whinston 2020).

Narayanan et al. (2016) highlighted three factors related to the proliferation of cryptocurrencies, which interplay with each other, including blockchain security, ecosystem establishment, and perceived value of cryptocurrencies. For example, perceived higher security levels in a cryptocurrency may increase investors' confidence, which leads to their greater willingness to invest and appreciation of the cryptocurrencies.

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<sup>1</sup> Stablecoin is a type of cryptocurrency with value pegged to real-world asset, such as fiat currencies or commodity (Hsu et al. 2022).

However, the proliferation and success of cryptocurrencies present a complex challenge, as many have failed. With over 1,000 cryptocurrencies failing since Bitcoin's inception in 2009 (Coinopsy 2022), researchers are actively studying the factors driving successful cryptocurrencies. Table 1 shows a list of critical success factors (CSFs) related to the proliferation of cryptocurrencies.

Critical Success Factor	Description
Security	Security is critical for the success of cryptocurrencies. Advanced cryptography, a decentralized network, secure private key storage, and robust consensus mechanisms are essential security features that prevent fraud and ensure transaction security (Mukhopadhyay et al. 2016).
Low cost	The lower transaction fees associated with cryptocurrencies may incentivize users to shift away from traditional banks towards these alternative currencies, as they offer a more cost-effective transaction option (Li and Au 2022).
Gamification	To engage more users and developers, gamification is often integrated into cryptocurrency ecosystems (Buhalis et al. 2019). For example, users may earn cryptocurrency by playing games within the ecosystem. In addition, gamification measures may help reduce developers' learning curve when learning different technical aspects of cryptocurrencies (Li and Au 2022).
Institutional policies and adoptions	It refers to government (or other statutory bodies) support, restrictions, regulations, and adoptions (as an alternative to fiat) of cryptocurrencies in their country (Caginalp and Caginalp 2018; Zhang and Huang 2022).
Value expectation	The perceived value of cryptocurrencies is rooted in the shared belief among owners that these digital assets will maintain their reliability as a store of value and means of exchange, which can sustain their market value and acceptance over time (Zhang and Huang 2022).
Buyer and vendor acceptance	It refers to the extent to which cryptocurrencies are accepted by buyers and vendors as a currency for payment of their products/services (Bolt and Van Oordt 2020). A larger number of accepting parties would foster a network of cryptocurrency (Bhambhwani et al. 2019).
<b>Table 1. Factors Related to the Proliferation of Cryptocurrencies</b>	

However, prior research on the adoption and proliferation of cryptocurrencies has some limitations that should be addressed. Specifically, the findings of De et al. (2022) were based on empirical evidence from Bitcoin, but the initial development stages of Bitcoin and those of other cryptocurrencies are significantly different. Bitcoin was initially developed solely for financial transactions, but many other cryptocurrencies were developed for more alternative, diversified applications. Hayes (2015) offered a more comprehensive overview of cryptocurrencies but failed to adequately investigate the drivers behind stakeholders' actions. Additionally, the cryptocurrency landscape has been evolving rapidly, marked by the emergence of new altcoins<sup>2</sup>, increased market capitalization, and the establishment of novel cryptocurrency exchanges (Au 2022). Furthermore, many cryptocurrencies have been short-lived, with a number of them being abandoned shortly after launch. Narayanan et al. (2016) have also suggested that it can be complicated to bootstrap cryptocurrencies. Therefore, empirical research is necessary to how to understand a cryptocurrency and thus realize its potential benefits. Given that existing literature on cryptocurrencies suggested the significance of different stakeholders of cryptocurrencies proliferation, we review previous literature on Innovation and Business Ecosystem adoption and development. This is to construct a theoretical lens and "sensitizing device" (Klein and Myers, 1999) which help us make sense of the data that we collect, as well as serve as building blocks that we can use for theory development (Pan and Tan 2011).

<sup>2</sup> Altcoins refers to cryptocurrencies other than Bitcoin (Narayanan et al. 2016).

### **Theories in Ecosystems in Businesses and Innovations**

An ecosystem is a complex network of interconnected entities that interact and influence each other (van der Heijden and Hartmann 2016). In innovation contexts, an ecosystem plays a critical role in creating, developing, and commercializing innovations (Granstrand and Holgersson 2020). An ecosystem facilitates collaboration, knowledge-sharing, and access to resources, support, and experimentation in business contexts. Both innovation and business ecosystems are essential for the growth, sustainability, and well-being of the entities and communities that rely on them, drive economic growth, create new jobs, and address pressing social and environmental challenges (Tan et al. 2015; Wulf and Butel 2017). Alibaba and Apple are examples of successful firms that have adopted an ecosystem approach (Mukhopadhyay et al. 2016). Table 2 shows a selection of arguments related to business and innovation ecosystems.

<b>Literature</b>	<b>Arguments</b>
Tan et al. (2009)	To achieve enterprise agility in a digital business ecosystem, the focal firm must (1) achieves centrality and a critical mass of participants, (2) strengthen internal networks and ecosystem boundaries, and (3) promote symbiotic relationships.
Gawer and Cusumano (2014)	To maintain leadership in a business ecosystem, a leader can engage various partners and develop a vision of their products or services becoming an essential part of the ecosystem. This involves building the necessary technical architecture to engage innovators, evolving capabilities and approaches to innovation and strategy, coordinating innovation at a broad scale, and bringing the entire ecosystem of users and partners along.
Dong and Zhang (2016)	Collaboration with enthusiastic customers in innovation ecosystems can reduce research and development costs while promoting customer loyalty by providing support for products or services and facilitating development processes.
Adner (2017)	This article examines how entities in a business ecosystem are interconnected through shared value propositions, which are expressed through digital platforms, multi-sided markets, supply chains, and technology systems.
Jacobides, Cennamo, and Gawer (2018)	Business ecosystems emphasize the interdependence of entities around a central value proposition. Ecosystems are characterized by various actors with unique complementary roles and no hierarchical control, allowing customers to choose and combine components within the ecosystem freely.
Senyo, Liu, and Effah (2019)	The distinguishing features of business ecosystems for digital companies are the adoption of platforms, symbiosis, co-evolution, and self-organization. A platform encompasses tools, innovations, and services that other partners within the ecosystem can leverage to improve their performance and collaborate, while symbiosis refers to the interdependence of partners in processes and technologies, resulting in synergies and value co-creation.
Wang et al. (2022)	For AI technologies to truly gain mainstream acceptance, there is a need to develop a vast array of different applications to cater to the myriad needs of the market. This, however, cannot be achieved by any AI firm in isolation. Instead, there is a need to collectivize a synergistic ecosystem of entities.
<b>Table 2. Previous Cryptocurrencies related to the Development of Innovation and Business Ecosystems</b>	

As indicated in Table 2, previous researchers discussed how collaboration with customers in business ecosystems could reduce costs and promote loyalty. Business ecosystems are characterized by interdependent entities around a shared value proposition, with unique roles and no hierarchy. To achieve agility and leadership in a digital ecosystem, firms must strengthen networks, promote symbiotic relationships, and build technical architecture.

## **Research Methods**

We adopted qualitative case research methods (Klein and Myers, 1999) for two reasons. First, case research methods are robust at exploring ‘how’ research questions (Benbasat et al. 1987) and processes that cannot be separated from their contexts (Gephart 2004). Second, given the phenomena of cryptocurrencies is multi-dimensional with both external and technological aspects, it has become too complex to adopt an objective research approach (Gable 1994).

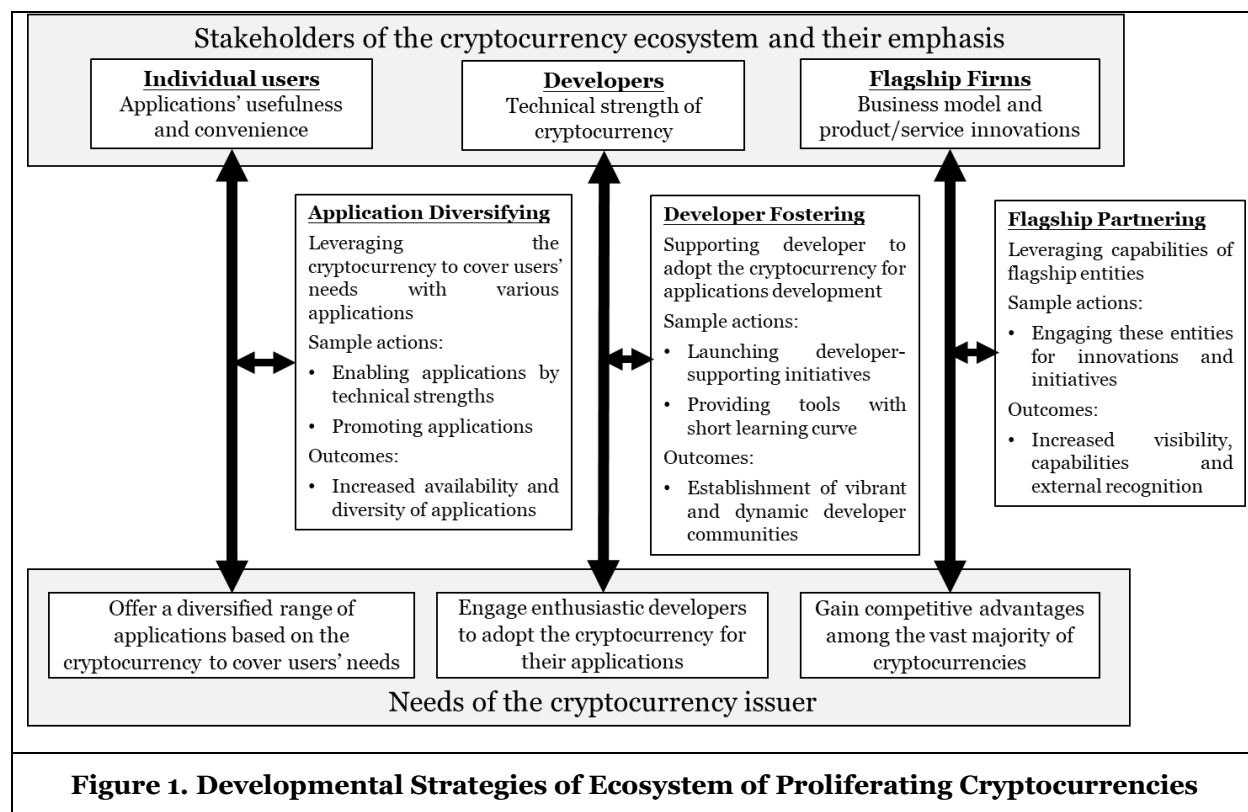
For studying successful cryptocurrencies, we identified two ideal case selection criteria. First, the selected cryptocurrencies should proliferate with a significant number of users so that we can build our theories on proven, if not best, practices (Pan and Tan 2011). Second, the developer of the selected cryptocurrencies should have adopted various strategies for building the cryptocurrency ecosystem so that we may identify more theoretical possibilities in response to the phenomenon of cryptocurrencies. After conducting extensive research and analysis, Solana (SOL) was identified as a promising case study target. Its technical strength has attracted the adoption of many developers and investors. In addition, it has been ranked as one of the top ten cryptocurrencies, according to [coinmarketcap.com](https://coinmarketcap.com), suggesting that Solana has met our first criteria. Furthermore, our preliminary search suggested that the organization that introduced Solana (i.e., Solana Foundation) had taken a wide range of initiatives, such as hosting hackathons worldwide and introducing different Solana-related products. This suggested that Solana fulfills our second criterion.

We plan to collect data using a mix of data sources such as the official website (<https://solana.com>), Solana’s whitepaper, online news portals (e.g., [Forbes.com](https://www.forbes.com)), and other unofficial cryptocurrency-related online communities (e.g., an unofficial Solana community on Discord, <https://discord.gg/pquxPsqN>) to cover the voices of a comprehensive range of stakeholders for data triangulation and thus establish a deeper understanding of the phenomenon under study, to offer richer details to interpret the findings (Gable 1994) and to ensure the case representativeness (Pan and Tan 2011). As of now, we have identified approximately 106 web pages that are relevant to our case. The webpage links are documented in an Excel file for data management purposes. Webpage title, authors (if any), and keywords were kept along with the links.

We plan to collect and analyze the data concurrently to take advantage of the flexibility of the case research method (Eisenhardt 1989). The data collected will be coded by using a mix of open, axial, and selective coding processes (Strauss and Juliet, 1998). More specifically, open coding was used to identify new and validate existing theoretical dimensions. While at the same time, axial coding was used to point out the new, as well as validate existing, second-order themes that could fall under those dimensions (e.g., CSFs of cryptocurrencies successes). The selective coding was then used to distill our case evidence into several first-order categories, which were then assigned to the appropriate dimensions and themes (Pan and Tan 2011). We also plan to summarize our findings using visual maps and narratives (Langley 1999). The study is still ongoing, but this process of iterating between data, analysis, and theory development will continue until theoretical saturation is reached (Eisenhardt 1989).

## **Preliminary Findings**

Published in 2017, the whitepaper of Solana (SOL) proposed a blockchain architecture that addresses the scalability and transaction speed issues of existing cryptocurrencies, such as Ethereum. The consensus mechanisms of SOL provide high parallelism and processing speed, with throughput and resilience. In 2020, SOL was fully launched (i.e., the cryptocurrency had become publicly available), followed by the rapid expansion of the SOL ecosystem and growing market capitalization. Our findings suggested that Solana’s ecosystem includes an increasing number of developers, partners, and users (Tan et al. 2009). This fosters the growth of SOL in terms of external acceptance and market capitalization exceeding some other earlier altcoins, such as Litecoin and Basic Attention Token (both launched in 2017). Such growth is supported by at least three strategies, including (1) Application Diversifying, (2) Developer Fostering, and (3) Flagship Partnering, each for a specific type of stakeholder. Figure 1 shows an overview of the three ecosystem-building strategies.



### Application Diversifying

Launching a cryptocurrency may not be difficult, but boasting its number of users can be challenging (Narayanan et al., 2016). Individual users often emphasize **usefulness** and **convenience** of applications before making the adoption decisions. This has driven a need for issuers to **offer a diversified range of applications based on the cryptocurrency**, so that more users may be attracted to the cryptocurrency ecosystem. In turn, long-term growth and sustainability of the cryptocurrency may be achieved (Bhambhwani et al. 2019).

In Solana's diverse ecosystem, applications span a broad spectrum, including decentralized finance (DeFi) platforms, non-fungible token (NFT) marketplaces, gaming, supply chain management, social media, and more. Anatoly Yakovenko, the co-founder of the Solana Foundation, highlighted his vision of having various types of applications within the Solana ecosystem.

*"We want to build a network that has a lot of different types of applications on it. We don't want to just have one type of application, we want to have a really diverse ecosystem."*

To allow more applications to be developed based on the cryptocurrency, various technical characteristics (e.g., security and speed, see Li and Au 2022), as the cornerstones of the ecosystem, will play essential roles. As indicated by its whitepaper, Solana was initially designed to support *"a diverse range of applications"*. Therefore, Solana could be used for developing various applications such as Decentralized Finance (DeFi), gaming, supply chain management, and identity management. Among these applications, DeFi and gaming applications are particularly time-critical, while supply chain management applications require a high-security level. All these requirements are relevant to the strength of SOL.

Moreover, for gaming applications that largely adopted SOL, some of them allowed users to earn SOL (Buhalis et al. 2019). A good example was Mango Markets, where users could earn SOL by participating in liquidity provision and staking activities on the platform.

Last but not least, these Solana-enabled applications are listed on Solana's website, which will inform more users and recommend their adoptions. The **increased availability and diversity** of diversified Solana-

based applications, as a result, can provide more opportunities for long-term users, leading to sustainable growth and adoption.

### **Developer Fostering**

For a cryptocurrency to get more users, a wide range of applications that adopt the cryptocurrency will be required. These applications, however, may not always be developed by the cryptocurrency issuer alone (Wang et al. 2022). Conversely, having more **enthusiastic developers to adopt the cryptocurrency** is crucial for the success of ecosystems (Dong and Zhang, 2016).

Among different cryptocurrencies, developers often emphasize the **technical strengths** of the cryptocurrency. For example, they will choose a low-cost option given they want to reduce the transaction fees (Li and Au 2022). The low-cost aspect of SOL has been recognized by some leaders in the world of cryptocurrencies, for example, according to Grayscale CEO Michael Sonnenshein.

*“In some sense, it is a more cost-effective blockchain [than Ethereum], and today we are seeing over 500 decentralized apps and about 1.2 million monthly active users on the network. When you kind of take a step back, and you see how quickly it has been able to ramp up, it’s certainly pretty impressive.”*

In addition, similar to other cryptocurrency issuers, tools and libraries with short learning curves supported by documentation were provided by Solana Foundation.

Moreover, the Solana Foundation launched a range of developer-supporting initiatives, such as hackathons (known as “Grizzlython”) and grants, to encourage developers to introduce innovative and valuable applications based on Solana (Gawer and Cusumano 2014). Juila, a major developer of the Solana-based Venture Capital Project HIRO, shared her delighted developmental experience in Solana’s hackathon.

*“I had a great time building on Solana. The development experience was really smooth, and I appreciated the support from the Solana team throughout the hackathon. The Solana ecosystem is rapidly growing and I’m excited to see what developers will build next!”*

Solana encourages collaboration between developers, aiming to have more innovations. Solana’s hackathon was a massive success. In 2021, it attracted over 10,000 participants from all over the world and engaged a large number of developers. These fostering efforts, altogether, enable Solana to establish a **vibrant and dynamic developer community**, which allowed the growth of the number of enthusiastic developers. By promoting innovation and identifying talented developers, Solana could establish a vibrant and dynamic developer community, which would drive the ecosystem’s growth.

### **Flagship Partnering**

However, it is common for many cryptocurrencies issuers (and many other innovation developers) to establish an ecosystem. This included the issuer of LUNA, the failed cryptocurrencies. Therefore, solely having an ecosystem may have become necessary but not sufficient for gaining **competitive advantages** among the vast majority of cryptocurrencies. On the other hand, the emergence of cryptocurrencies and other emerging technologies have fostered the needs for flagship firms to arrive at **business model and product/service innovations**.

The need of both parties, in turn, may drive collaborations and partnerships between cryptocurrency issuers and flagship firms, which accelerate the growth of cryptocurrencies (Jacobides et al. 2018). Firms also need innovation in their models and products or services. More specifically for Solana, its foundation worked with a wide range of industry leaders in different sectors, such as Universal Studios, one of the world’s largest film production and distribution companies. Tim Rothwell, their Senior Vice President of Global Consumer Products and Games, highlighted the role of Solana in their gaming content distribution.

*“We’re excited to partner with Solana to bring our intellectual property to life in the form of NFTs. The speed and scalability of the Solana network make it an ideal platform for creating and distributing high-quality digital content.”*

In addition, Solana’s hackathon successfully engaged senior executives from various leading firms as their judges. Some of these firms include Coinbase, Stripes and Bessemer Ventures.



Moreover, the Solana Foundation worked with different leading cryptocurrency exchanges, such as Binance and Coinbase, to list SOL on more different platforms. In turn, more buyers and vendors and accepting SOL (Bhambhwani et al. 2019). As a result, Solana's position as a leader among different cryptocurrencies may be reinforced (Senyo et al. 2019). Moreover, Solana can gain additional **visibility, capabilities, and recognition**, which can attract more users and fuel sustainable growth (Gawer and Cusumano 2014).

## Discussion and Conclusion Remarks

While our study is still in progress, our preliminary findings suggested three strategies for building an ecosystem that supports the proliferation of a cryptocurrency in the background of failures of the vast majority of cryptocurrencies. These strategies focus on users, developers, and external partners, respectively. The interplaying of these strategies leads to a diversified range of engaged stakeholders that can drive further innovation of cryptocurrencies, foster the value of the cryptocurrency, and solidify its position in the cryptocurrency world.

Future data collection and analysis may broaden and validate our findings. We plan to test the boundary conditions of our implications through deeper data analysis and a continuing assessment of the literature. Our theoretical model will be further developed by gathering and analyzing additional data to provide a more comprehensive understanding of cryptocurrency successes and implications. This research aims to answer the research question and provide a starting point for future research on other cryptocurrencies.

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