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Cover Page Footnote

[*Note: This paper is dedicated in memory of our friend and colleague Leben Johnson.] This manuscript underwent peer review. It was received 03/13/2023 and was with the authors for 15 months for one revision. Mazen ElMasri served as Associate Editor.

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Abstract:

The development of a Fintech ecosystem offers significant socio-economic benefits, such as promoting financial inclusion, reducing transaction costs, improving efficiency, and increasing entrepreneurial activities. However, research on the initial establishment of Fintech ecosystems, especially in resource-constrained settings, is limited. This study, set in Visakhapatnam, India, examines the processes involved in establishing a frugal Fintech ecosystem. Our research extends the resource orchestration framework for frugal Fintech ecosystem development by introducing five unique sub-processes: bricolaging, prioritizing, emulating, extrapolating, and sandboxing. These sub-processes provide a comprehensive understanding of how resources can be managed and utilized effectively. For practitioners, our study offers an empirically based guide to the initial establishment of a Fintech ecosystem. Policymakers can use our framework to design and implement regulatory models tailored to their specific environmental uncertainties, fostering growth and sustainability in Fintech ecosystems.

Keywords: Fintech Ecosystem, India, Frugal Innovation, Resource Orchestration, Case Study.

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1 Introduction

Financial Technology (Fintech) is an umbrella term representing the application of technological innovations to financial services and processes (Lagna & Ravishankar, 2022). The global Fintech market is valued at $294 billion in 2023 and is expected to grow to $1.15 trillion by 2032 (Fortune, 2023). Fintech innovations offer several socio-economic benefits, including promoting financial inclusion, reducing transaction costs, improving efficiency, and increasing entrepreneurial activities (Blakstad & Allen, 2018). Realizing these benefits requires the involvement of various entities within a Fintech Ecosystem (FE), such as government regulatory bodies, established financial institutions, startups, investors, and academic institutions (Lee & Shin, 2018). Given the diverse entities involved, an ecosystem-level study is crucial to understanding the dynamics of Fintech innovation (Takeda & Ito, 2021).

While Fintech plays a major role worldwide, launching a new Fintech venture is very risky. Studies suggest that around 90% of Fintech startups fail within their first six years (Ng & Pan, 2024). This is significantly worse than the typical 50% failure rate for new businesses in developed economies over 5 years (Jonathan et al., 2011). This big difference in failure rates suggests that our current understanding of how to make Fintech companies successful might not be enough for this new way of delivering financial services. Therefore, understanding the underlying processes in FE development is vital to reap the radical benefits and, at the same time, alleviate the undesirable consequences. Fintech innovations are gaining importance in developing countries that have limited resources (Nicoletti, 2017).

Our knowledge of FE development is limited, due to at least two gaps in the existing research. First, there is little research on the initial establishment and development of FE. Study of the initial establishment of the ecosystem is especially important since this stage is characterized by the formation of inter-network ties between firms to collaborate and innovate (Huggins, 2000), which is essential for their long term success in the ecosystem. Further, the majority of the firms in the initial establishment stage are young and small technology startups, which have the highest risk of failure (Muthukannan et al., 2020). Second, most research studies only focus on developed countries (Bahrami & Evans, 1995; Dorfleitner & Hornuf, 2017). There is even less research on the development of FEs in developing countries, which are resource-constrained settings. The societal impact of Fintech is the greatest in developing countries (Gabor & Brooks, 2017). In developed countries, the vast majority of people already have access to financial services through traditional financial organizations (Puschmann, 2017). Hence the establishment of a FE in developed countries provides an additional choice to consumers (Mackenzie, 2015) or improves existing user experience and efficiency (Anandarajan et al., 2000; Nicoletti, 2017). In contrast, the creation of FEs in developing countries enables financial services to be provided to traditionally unserved consumers (Haddad & Hornuf, 2019). For instance, consumers without banking services in developing countries have no option other than borrowing money through illegitimate lenders for their financial needs (Jagtiani & Lemieux, 2018). Hence, the study of the initial establishment of FEs in developing countries is critical.

The research objective is to conduct a case study of a resource-constrained FE to investigate how a frugal ecosystem is established. Frugality represents finding cost-effective solutions that effectively meet the needs of system users achieving maximum value with minimal use of resources (Sun et al., 2016). Grounded on empirical evidence from FE development in Visakhapatnam (Vizag) India, our study aims to provide a more in-depth insight into the processes that turn the resources in the ecosystem into capabilities and leverage market opportunities to generate value for the entities in the ecosystem. Accordingly, the research question of our study is: How is a FE initially established by stakeholders in a resource-constrained setting?. We start the paper with a literature review on Fintech Ecosystem development and Resource Orchestration theories. This is followed by the research methods section, where we describe the case, data collection, and analysis approaches. Next we present the findings and discuss our results and theoretical implications. The paper concludes with further research, limitations, and practical implications.

2 Literature Review

2.1 Orchestrating Ecosystem Development

In recent years, the concept of "ecosystems" is gaining traction as a way to understand competitive environments in both academics (Guggenberger et al., 2020) and practice (EY, 2021; McKinsey, 2020).

Ecosystems represent groups of firms that rely on unique, interconnected functionalities that require specific collaborative structures to create value (Jacobides et al., 2018). However, the concept of ecosystems has varied interpretations in the literature. Seppanen et al. (2017) identified variations like "platform," "mobile," and "innovation" ecosystems, while Benedict (2018) categorized seven dominant types of ecosystems in information systems research. New concepts like "data ecosystems" (Oliveira & Lóscio, 2018) further blur the lines. Jacobides et al. (2018) offer a helpful breakdown of ecosystem research into three streams: (i) Business ecosystem: Focuses on a single firm and its surrounding environment; (ii) Innovation ecosystem: Centers on a specific innovation and its supporting actors; (iii) Platform ecosystem: Examines how actors organize around a platform. Despite these attempts at classification, the concept of ecosystems is recognized as overlapping rather than being clearly distinct in the past literature (Hyrynsalmi & Hyrynsalmi, 2019). Ecosystems do not emerge spontaneously; they result from deliberate experimentation and engineering by various actors in the ecosystem to create or extract value (Jacobides et al., 2018). The ecosystem develops through the orchestration of resources in the ecosystem (Ivarsson & Svahn, 2020). The focal actor performs the role of orchestrator which involves identifying, integrating, and managing the interdependent roles, skills, and actions of other actors to achieve desired outcomes (Breidbach et al., 2016; Ivarsson & Svahn, 2020). Understanding how the orchestration shapes ecosystem development provides significant insights to firms in their collaboration within the ecosystem (Mann et al., 2022).

2.2 Fintech Ecosystem Unique Characteristics

Innovation in Fintech arises from the competitive and collaborative dynamics among the actors in the ecosystem. The Fintech ecosystem consists of five interacting actors: Fintech firms, technology developers, governmental actors, financial customers, and traditional financial service firms (Lee & Shin, 2018). Each actor contributes unique capabilities, and their collaboration fuels innovation by creating a synergy of strengths. According to Senyo et al. (2019) the Fintech ecosystem traverses through three stages - birth, expansion, and maturity with a central orchestrator often mobilizing the resources. On the other hand, Hendrikse et al. (2020) emphasize the importance of locational opportunities in financial services. The historical strengths and weaknesses of a region's financial sector influence its integration into the larger global financial network. The ecosystem evolves through interactions and tensions among technology, the state, and traditional financial service actors. As these ecosystems form, new interactions and interdependencies emerge among the actors. These connections foster unexpected combinations of technological prowess, resources, and partnerships.

However, the Fintech ecosystems have certain unique characteristics that have profound implications on their strategies, such that the traditional innovation ecosystem might not fit the Fintech ecosystems (Ng et al., 2023). First, the Fintech ecosystem needs to balance dual identifies of technology and financial firms, which often have conflicting institutional logics (Stulz, 2019). This dual identity creates unique strategic tensions and opportunities that are less prevalent in general innovation ecosystems. The challenge lies in navigating the expectations and demands of both the technology and financial sectors, which often have differing priorities and regulatory requirements. Second, Fintech firms must constantly strive for "cognitive legitimacy" while carving out a niche and gaining a competitive edge (Currie et al., 2018). This requires building trust with stakeholders who may have entirely different expectations compared to participants in broader innovation ecosystems. Third, the Fintech ecosystem must prioritize "socio-political legitimacy" and adapt to a constantly evolving regulatory landscape (Dirk et al., 2019). The regulatory environment surrounding Fintech is often more unpredictable and complex than for other innovation ecosystems. This necessitates a more nuanced and flexible approach to strategy development. Fourth, the Fintech ecosystem needs long-term strategic planning. They need to anticipate and react to the competitive actions of established players (Langley & Leyshon, 2021). The rapid pace of technological change in Fintech, coupled with the significant influence of traditional financial institutions, demands a forward-looking approach that is more critical than in other innovation ecosystems. Hence, Fintech ecosystems are dynamic and complex. Understanding the interplay between actors, development stages, and unique strategic challenges is crucial for navigating this new frontier and unlocking its full potential for innovation and growth.

The rise of Fintech Ecosystems is reflected in the increasing volume of research within academic literature (Lagna & Ravishankar, 2022). To understand the dynamics of Fintech ecosystem development let's delve into some key arguments from existing research (refer to Table 1). These studies provide a solid foundation for comprehending how Fintech ecosystems operate and contribute to the financial landscape.

Table 1. Selected Studies on Fintech Ecosystem Development

Source	
Muthukannan et al. (2020)	The emergence of Fintech ecosystem traverse through three stages - envisioning, enacting and enlivening. In each stage the system and agent-wide interactions, environment and the nature of interconnectedness resulting in a specific outcome that propel the ecosystem development.
Muthukannan et al. (2021)	New forms of collaboration emerge in the provision of financial services. The mechanisms of platformization, decentralization, localization and democratization positively influence the scalability in the delivery of financial services.
Senyo et al. (2022)	Three theoretical propositions—(1) innovative and collaborative practices, (2) protectionist and equitable practices, and (3) legitimizing and sustaining practices—shape financial inclusion in developing countries. These propositions are essential for fostering collaboration between new entrants and incumbents within the Fintech ecosystem.
Senyo et al. (2019)	The strong political will is crucial for nurturing digital business ecosystems throughout their lifecycle, from birth to expansion and maturity phases. The political-will translates to Resource Allocation, supportive legislation, and strategic planning. These actions pave the way for a range of socio-economic benefits.
Hendrikse et al. (2020)	Geographic locational opportunities are gaining importance in the financial services industry. A region's historical strengths and weaknesses in the financial sector affect its integration into the broader global financial network. The ecosystem develops through the interactions and tensions between technology, the state, and traditional financial service actors.
Terrence et al. (2021)	The boundary between finance and technology companies is increasingly blurred. Traditional financial institutions are evolving into information technology (IT) firms, incorporating advanced digital solutions. Conversely, IT companies are expanding their portfolios to include financial services, leveraging their technological expertise to offer innovative financial products and solutions, thus merging both sectors.
Ng et al. (2023)	Fintech platforms face a complex balancing act. They straddle two worlds – finance and technology – which creates internal conflicts. To gain trust (legitimacy), they may need to follow traditional financial rules. But to stand out (competitive advantage), they might need to innovate and break from the norm. Further complicating things, regulations are constantly changing, and established financial players pose a significant competitive threat.
Ng and Pan (2024)	The optimal approach for a Fintech platform depends on two factors. (1) the extent to which their services can be differentiated, and (2) the tangibility and physical presence of their service offerings. Differentiation sets the platform apart from competitors, while tangibility and physical presence shape customer interaction and perception.

The review of the existing literature shows that existing research literature lacks knowledge on the initial establishment of FEs in resource-constrained settings. A significant reason for the failure of an ecosystem is the lack of collaboration and inefficient management of its resources (Diemers et al., 2015). The initial establishment phase is where things are most likely to go wrong (Carroll et al., 1983; Cressy, 2006) and the firms in this phase face challenges and threats to their survival (Navis & Glynn, 2011). Therefore, research on the initial establishment phase of a FE is critical.

Further, research focusing on the frugal setting is especially important. A large amount of existing research addresses the adoption of Fintech in terms of technology and user perspectives in mature ecosystems, drawing knowledge from their established success (Ryan et al., 2020). The dynamics of value creation to the structure of interdependence in the ecosystem settings are not adequately explored (Hua et al., 2019). In developed markets, the shift to Fintech is driven by regulatory intervention in providing the resources and infrastructure to have more diversified financial systems (Magnuson, 2018). For example, the FE in a developed market has access to an evolved research sandbox, large investments, and availability of a talented workforce (Dirk et al., 2018). However, none of these resources is available for FE creation in a developing country, especially in the initial establishment stage (Arner et al., 2016). Consequently, the findings from the existing literature may not suit the frugal context. Hence the study of FE development in the frugal setting is essential to uncover the shift to Fintech in a developing market.

The focus of our research is on the initial establishment stage of FE development in frugal settings. Accordingly, to answer our research question, we reviewed the existing research on resource orchestration (RO) theory. Resource orchestration refers to the processes to effectively manage the resources to achieve competitive advantage (Sirmon et al., 2011). In the quest to make a profit,

entrepreneurs establish new linkages or collaborate in new ways with other resources across the ecosystem (Foss & Foss, 2008; Foss et al., 2007; Matsusaka, 2001). The outcomes of such entrepreneurial experiments are productivity-improving innovations (Bjørnskov & Foss, 2013) coupled with evolved business models (Adomavicius et al., 2007). The available resources across the ecosystem get combined, recombined, and configured in new ways to derive business value and competitive advantage, driven by entrepreneurial endeavors. When a Fintech Ecosystem is in the initial establishment phase, the organizations pass through a rapid growth phase and encounter heightened challenges threatening their survival (Navis & Glynn, 2011). Further, the firms vigorously build the capabilities to run their business by either developing internal resources or obtaining them through external alliances with other firms in the ecosystem leading to the ecosystem experiencing resource constraints (Carnes et al., 2017). The resources in the ecosystem undergo the process of resource orchestration (Sirmon et al., 2011), to derive productivity-improving innovations in frugal settings to capitalize on the market opportunities. Hence, resource orchestration is an appropriate lens through which to view FE development.

2.3 Theoretical Foundation: Resource Orchestration Theory

The resources of an organization include all assets, capabilities, information, knowledge, attributes, and processes that the organization can use to execute its strategy to create value (Barney, 1991). The resources of an ecosystem represent the resources of all the organizations within the ecosystem. Managerial acumen is essential to derive business value from resources (D'Oria et al., 2021). The managers need to select and develop internal and external resources to form a combinative capability (Hitt et al., 2011). These actions are known as resource orchestration, which may be applied for problem-solving and value generation (Li & Jia, 2018). Sirmon et al. (2011) have established a new framework of resource orchestration, which focuses on how managers can transform resources into competitive advantages and generate value.

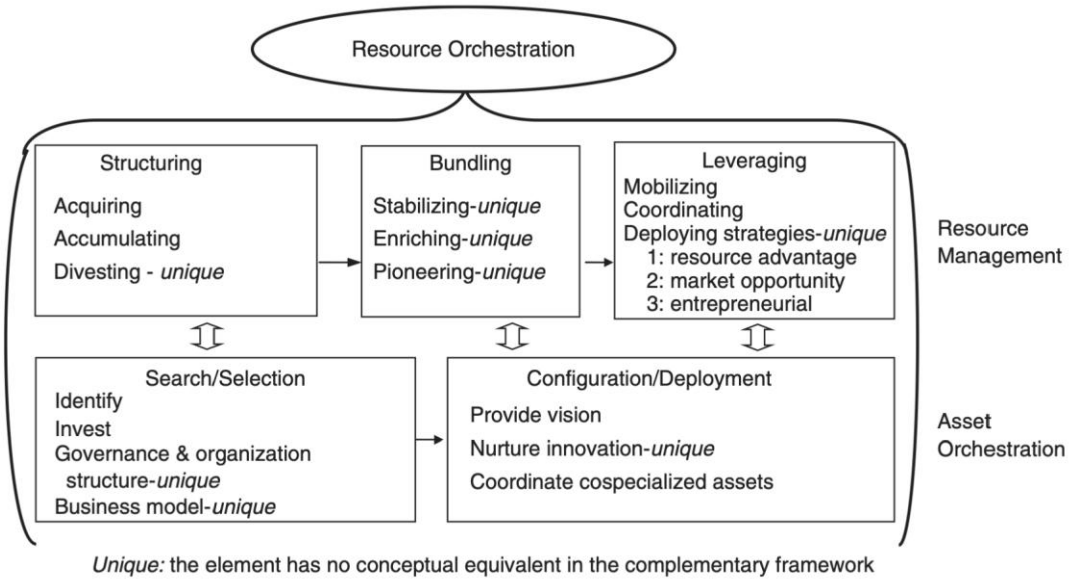

Figure 1. Resource Orchestration Framework (Adapted from Sirmon et al. (2011))

The framework of Sirmon et al. (2011), represented in Figure 1, suggests that resource orchestration as a comprehensive process has three main processes: (1) **structuring** the resource portfolio, (2) **bundling** the resources to specific capabilities, and (3) **leveraging** those capabilities to generate and sustain value for the organization and customers (refer to Table 2). More specifically, **structuring** the resource portfolio is the process by which an organization gathers the required resources, using the sub-processes of acquiring, accumulating, and divesting. The managers must adjust the intensity of the sub-processes in **structuring** in tune with the environmental uncertainties (Sirmon et al., 2007). Once a required resources portfolio is gathered, the **bundling** process transforms the resources into unique capabilities (such as R&D and quality control) needed by the organization. Generally, an organization delivers value to its customers by solving their problems through the products or services provided. An organization builds the capabilities depending on the delivery model of its products and services (Sirmon et al., 2007), by

integrating their resources using the sub-processes of stabilizing, enriching, and pioneering. **Leveraging** is the process of generating value to customers and owners through a sequence of sub-processes of mobilizing, coordinating, and deploying to capitalize the market opportunities. The actions of the manager must be synchronous across the three processes to generate business value (Carnes et al., 2019; Chirico et al., 2011).

Table 2. Resource Orchestration Processes in Prior Studies (Sirmon et al., 2007)

Process	Description
Structuring – indicates gathering required resources	
Acquiring	The process of procuring resources from external sources. The organization incurs costs to obtain the resources.
Accumulating	The process of obtaining resources from internal sources. The organization absorbs the knowledge of strategic value and develops available resources by diffusing the newly gained knowledge.
Divesting	The process of removing resources from an existing non-strategic activity and allocating resources to strategic activities. The organization incurs the loss of opportunity cost due to taking away resources from the current activity.
Bundling – indicates the grouping of resources into capabilities	
Stabilising	The process of making minor increments to existing capabilities to deliver the expected value to customers.
Enriching	The process of improving existing capabilities to deliver additional value to customers.
Pioneering	The process of gaining new capabilities which enable organizations to maintain a competitive advantage.
Leveraging – indicates the exploiting of capabilities generating value for customers	
Mobilising	The process of identifying the capabilities needed for solving customer problems to exploit opportunities in the market.
Coordinating	The process of integrating identified capabilities into effective and efficient capability configurations.
Deploying	The process of applying the capability configurations to the target leveraging strategy, which is the resource advantage strategy, market opportunity strategy, or entrepreneurial strategy.

2.4 Resource Orchestration Theory Beyond Organizational Level Studies

Sirmon et al. (2011) have been widely cited in many scholarly articles. Our analysis of the existing literature revealed that multiple researchers have emphasized managing the resources using resource orchestration theory in varied contexts beyond the organization level studies. Freeman et al. (2021) applied elements from stakeholder theory to make it more comprehensive in addressing management issues. In contrast, Bjørnskov and Foss (2013) applied resource orchestration theory to explain variance in the economic growth rate between countries based on the way entrepreneurs manage the resources of the country. Schneider and Spieth (2013) have applied resource orchestration theory to bring out a framework for continuous improvement and innovation through resource orchestration. Hitt et al. (2016) used resource orchestration theory to explain the value creation of a resource depends on its ability to integrate with other resources and strategic managerial decisions. Li et al. (2014) applied resource orchestration theory in organizational learning to explain the moderation of the network ties of the firm to capture new opportunities. Cui et al. (2017) applied resource orchestration theory in the context of e-commerce enabled social innovation, to explain the need for alignment between the strategy and resource capabilities to achieve social innovation.

A few researchers have extended the resource orchestration concepts by merging them with other novel concepts. Amit and Han (2017) developed the resource orchestration concepts by coupling them with business model design and proposed a framework for value creation through a novel resource configuration. Warnier et al. (2013) extended the resource orchestration concepts to include all categories of resources, and distinguished three categories of resources – strategic, ordinary, and junk – based on their perceived value, and proposed a systemic analysis to manage them based on the resource category to derive optimal value.

"The Resource Orchestration theory, has been widely applied in diverse contexts beyond organizations (refer to Table 3), offers a valuable theoretical framework for analyzing the development of Fintech Ecosystems."

Table 3. Selected Articles Illustrating the Application of Resource Orchestration Theory Beyond Firms

Articles	Context of RO theory application	Focus of study
Zhang et al. (2022)	This study uses resource orchestration theory to offer a fresh perspective on air pollution management. It examines how effectively managing big data resources, developing big data analytics capabilities, and creating value from data all work together.	Country
Cui et al. (2019)	The study examines how stakeholders in rural e-commerce development (lead users, community members, local governments) collaborate to manage existing resources effectively. It sheds light on how specific resource-related actions can contribute to community capability development. It extends the resource orchestration perspective to a community context to reveal the resource interactions in building competitive advantage.	Community
Mann et al. (2022)	The study investigates how the focal firms become orchestrators of digital transformation amongst other interdependent actors in their business ecosystem. The study defines orchestration as an undertaking by a focal actor that intends to integrate and leverage the resources and capabilities of others within a business ecosystem.	Business Ecosystem
Lee et al. (2024)	The study explores how governments, playing a leading role, can unite various societal groups (heterogeneous entities) to work together on managing resources effectively (resource orchestration). This collaboration is aimed at building digital resilience, which is the ability to adapt and recover from extreme crises using digital tools and resources.	Pandemic Management
Plugge et al. (2024)	The study employs resource orchestration theory to investigate how organizations and their external suppliers co-create value by integrating complementary resources for business services. It also highlights that modularizing business processes improves business process flexibility.	External suppliers
Yoshikuni et al. (2024)	This study investigates how the use of organizational technology impacts strategic decision-making, dynamic capabilities, and organizational agility within the relevant business context. Additionally, it investigates the influence of external environmental uncertainty on resource orchestration through a cross-country empirical study.	Cross-country

3 Research Method

Our research aims to explore the processes and underlying development of a FE, and a case study methodology is highly suitable for exploratory research (Eisenhardt, 1989; Siggelkow, 2007). Case research helps us to gain a deeper understanding of an emerging phenomenon (Flyvbjerg, 2013), where the process needs to be analyzed within its context (Pentland, 1999; Rynes & Gephart, 2004). A FE involves a variety of interactions between social, technological, and business factors. It might be inappropriate to study an inherently complex and multifaceted phenomenon using objective research (Dubé & Pare, 2003). Our research investigates the phenomenon through a shared understanding of relevant stakeholders, which can be accomplished through case study research (Klein & Myers, 1999). Therefore, a case study is our preferred research strategy, especially for its strength in exploring “how” research questions (Walsham, 1995).

Based on our research objective we focused on two case selection criteria. First, the case must be a resource-constrained ecosystem with multiple stakeholders. This condition allows us to analyze the resource-related challenges encountered in the ecosystem, the availability of alternatives, effective management of resources in-hand, initiatives undertaken, and engagement between various stakeholders. Second, the FE development must have effectively crossed the initial establishment phase with some measure of success. The initial establishment phase is when the majority of the stakeholders join the ecosystem and form network relationships. Therefore, this condition allows us to study the integration and collaboration dynamics across multiple stakeholders, influencing factors, decisions, and events. The Vizag Fintech valley in India is especially appropriate for our study as a vibrant Fintech Ecosystem was established despite the resource-constrained settings. Further, Vizag aspires to be a top global Fintech hub building on the success of the initial establishment phase. These reasons make the case appropriate (Gerring, 2008) for our research.

3.1 Case Background: Vizag Fintech Valley, India

Visakhapatnam, popularly known as Vizag, is a city on the east coast of India. As one of the top 100 fastest-growing cities in the world, Vizag had an impressive gross domestic product (GDP) output of US$43.5 billion in 2016 (Haritas, 2018). In 2016, the city ranked as the ninth-largest contributor to India's overall GDP (Shamika, 2016). With a population of 4.3 million, the city has a cosmopolitan mix of people from different parts of India (AP-Govt, 2019a). The presence of an international port on the Bay of Bengal provides a logistical advantage to the city. Several heavy industry giants such as Vizag steel, Hindustan Shipyard Limited, Hindustan Petroleum Corporation, and Coromandel Fertilizers Limited have established plants and have been operating for the past few decades (AP-Govt, 2019b). These heavy industries have been significant drivers of job creation and economic growth in the city (Raju, 2014).

Vizag is located in the south Indian state of Andhra Pradesh, which underwent a bifurcation in 2014 after a decade-long domestic agitation for a separate state. The northern area of the old state, including the capital city Hyderabad, was carved out to create a new administrative state called Telangana. Hyderabad has long been the growth engine of the original Andhra Pradesh, and its well-established tech hub infrastructure provided a significant share of the state's revenue. The state reorganization made Hyderabad the combined capital for both the newly created states, but only for a maximum of 10 years. The truncated Andhra Pradesh was saddled with a massive state deficit and faced financial constraints in developmental projects. Vizag started its Fintech journey in 2016, with the new state Andhra Pradesh announcing the Fintech initiative for the city to promote business infrastructure and attract investments (PTI-News, 2016). The Andhra Pradesh state government set up Vizag Fintech valley bringing together industry, academia, and investors to innovate and co-create the FE. Vizag was successful in raising US$900 million and creating more than 5,500 jobs up to December 2017 (Haridas, 2018). Vizag aims to turn the Fintech valley into a global Fintech hub by enhancing the FE with mutually beneficial cross-border collaboration relationships. The Andhra Pradesh government has signed a Fintech cooperation agreement with the Monetary Authority of Singapore (MAS) to promote financial service innovations (SG-MAS, 2016). While Vizag is progressing in its ambitious journey to become a top global Fintech destination, it still has a long way to travel (Santosh, 2018).

Recognizing the potential of the Fintech sector, the government has launched a series of programs, to accelerate the Fintech adoption in the region. These programs act as a catalyst by connecting promising Fintech startups with established players in the market, accelerating their growth. Furthermore, considering the vast potential user base of 50 million people in Andhra Pradesh state, the government is actively enabling market access. This includes facilitating partnerships with banks and other financial institutions, as well as promoting self-help technology platforms that integrate Fintech solutions. These initiatives position the state as a breeding ground for innovation and financial inclusion (Muthukannan et al., 2020).

3.2 Data Collection

Research access for the case Vizag Fintech Ecosystem was granted in July 2018. The data collection for the research study was designed in two distinct phases: a preparatory phase and a fieldwork phase. The preparatory phase aimed to get an overview of the Fintech phenomenon, the FE, and the role of each entity. During this phase, we gathered inputs from a variety of secondary data sources such as past Fintech conference videos, media releases, and news articles, and analyzed them to gain a holistic understanding of the case and entities in it. The information gained in the preparatory phase guided our progression to the fieldwork phase (Ritchie, 2013). The focus of the fieldwork phase was to collect data on our research question after gaining an in-depth understanding of the FE (Pan & Tan, 2011). Face-to-face interviews were the primary source of data collection (Myers & Newman, 2007), and a total of 26 informants were identified by snowball sampling (Biernacki & Waldorf, 1981; Marshall, 1996). The job positions of informants ranged from junior managers to top leaders of the interviewed organizations, which included academia, startups, investors, incubators, tech vendors, incumbent financial institutions, and regulators (refer to Appendix B).

The average duration of an interview was about an hour, and interviews were conducted using a semi-structured interview guide (Myers & Newman, 2007). The questions were open-ended to facilitate discussion (refer to Appendix A). The guide consisted of a standard set of questions on the development of FEs, dynamics between the stakeholders in the ecosystem, and social and economic implications. The interview guide also had a few questions tailored to the role of specific informants and their organization (Pan & Tan, 2011). All the interviews were conducted in English and were digitally recorded and

subsequently transcribed for data analysis. We also made notes from the direct observations in the field interview locations. We performed a historical analysis of secondary data to supplement our interview data (Mason et al., 1997). We collected the secondary data from a variety of sources, including newspaper articles, journals and magazine articles, internal organizational promotional materials, pamphlets, and information from corporate websites (refer to Appendix C). We verified the credibility of the collected data by assessing the overall coherence of the data collected from the interviews, secondary sources, and direct observation notes (Porra et al., 2014). In total we gathered nearly 800 pages of text data covering interview transcripts, notes from direct observation, and secondary data.

3.3 Data Analysis

We performed the data analysis in parallel with the data collection to take advantage of the case study research methodology (Eisenhardt, 1989). Initially, we condensed and organized the data, then applied coding techniques to make sense of the data. For data organization and reduction, we used a mix of visual mapping, temporal bracketing, and narrative strategies (Langley, 1999). The visual mapping strategy enabled us to document the significant milestones and critical decisions in FE development. Subsequently, we tried to ascertain the processes involved in transforming the resources into FE. Through our theoretical lens, we can identify three different sets of processes in FE development. The first set is **structuring** the resource pool; the second set is **bundling** the resources to integrate and form capabilities; and the third set is **leveraging** the capabilities on upcoming market opportunities to create value. Accordingly, we used a temporal bracketing strategy (Langley, 1999) to segregate and map the data into respective process periods – **structuring**, **bundling,** and **leveraging**. We continued this exercise of segregating and mapping the data for the sub-processes. We used the narrative strategy to capture the story of the journey from the resources to the FE development navigating through the resource orchestration processes. These strategies enabled us to create a logical structure to organize the collected data and to compare them against the ecosystem development processes iteratively as we collected new data. The ecosystem development processes are explained more systematically and comprehensively in the findings section.

Next, we used a combination of open, axial, and selective coding techniques to code the data into first-order concepts, second-order themes, and a set of aggregate dimensions (Gioia et al., 2013). More specifically, open coding was used to apply the conceptual labels to the interview data to form first-order concepts, whereas axial coding was used to abstract and classify the first-order concepts into a number of distinct second-order themes (Strauss & Corbin, 1998). We started with an initial set of second-order themes obtained from the theoretical lens of resource orchestration and progressively matched them with the second-order themes developed from axial coding. Whenever the second-order themes derived from axial coding went beyond the schema presented by our theoretical lens, we started a new second-order theme and reapplied the coding techniques. We have included some samples of intermediate outcomes of our data analysis in Appendix D. Following the axial coding, we applied the selective coding techniques to further abstract the second-order themes into aggregate theoretical dimensions (Gioia et al., 2013). We iterated between the data collection, data analysis, and theory development and inductively derived a frugal FE development framework. We continued the iteration until reaching the state of theoretical saturation (Eisenhardt, 1989), which means the inductively derived framework can fully explain the case data and the additional data does not reveal any new findings by bringing changes to the framework (Glaser & Strauss, 1967). Further, we verified the sketches and narratives from our analysis with informants to ensure the validity and reliability of the interpretation (Klein & Myers, 1999).

4 Findings

Our analysis indicates that the FE was developed through the orchestration of available resources in the ecosystem. The journey from resources to FE unfolds, as the resources are gathered and integrated to form capabilities, which are then coordinated and deployed to suit the market opportunities to create value. Further, evidence from data suggests that the FE development in Vizag unfolded in a frugal fashion. The frugality represents the resource-constrained setting which focuses on the optimal utilization of the resources (Lastovicka et al., 1999). Our data suggest that Vizag Fintech valley has attained the desired outcome just like any other successful FE despite the resource-constrained settings. A key measure to determine the success of a FE is its ability to attract investments and create new jobs (Diemers et al., 2015; Nicoletti, 2017). In the first year of operation, the Fintech valley received investments of over US$900 million and generated 5,500 new jobs (GCI-Report, 2018; Sinha, 2018).

We propose a frugal FE development framework (refer to Figure 2) based on our research and findings from the case. The frugal resource orchestration processes, namely **structuring**, **bundling,** and **leveraging**, transform the resources into a developed FE. Each of these processes, in turn, has three distinct sub-processes. The outcomes of each process form the antecedent conditions for the subsequent process. The antecedent conditions serve as the foundation for the critical success factors (CSFs) of the process. The processes have respective drivers and inhibitors. Collectively, both the drivers and inhibitors form the antecedent conditions for the execution of the orchestration process. In the following subsections, we more fully describe the frugal FE development journey through the processes of resource orchestration. We also narrate the antecedent conditions and the frugal outcomes of each process and provide the empirical case evidence at appropriate locations in the journey.

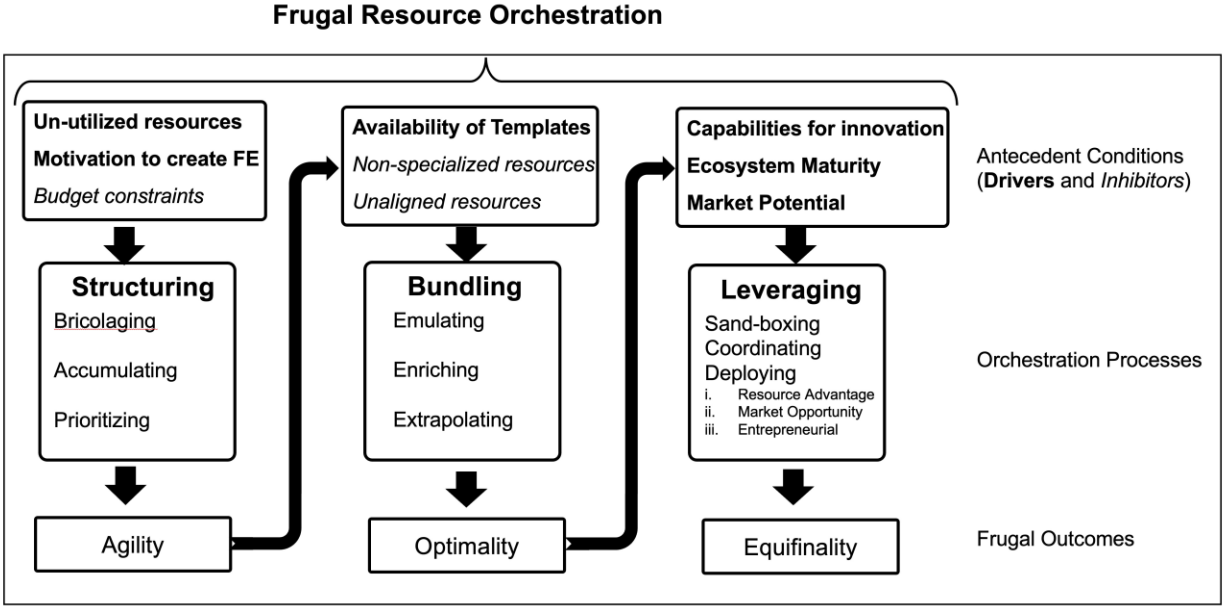

Figure 2. Frugal Fintech Ecosystem Development (FFED) Framework

4.1 Structuring Process

The first step in the FE development journey is to gather the resources required (Sirmon et al., 2007) to create an ecosystem. The resources of an ecosystem represent the collective resources held by all the organizations in the ecosystem. The resources of an organization include all assets, capabilities, information, knowledge, attributes, and processes that the organization can use to execute its strategy to create value (Barney, 1991). The evidence from the case indicates that the necessary resources are gathered by the **structuring** process, which has three sub-processes of *bricolaging*, *accumulating* and *prioritizing.* The **structuring** of resources involves creating a flexible pool of resources, which then adapt and transform based on the strategy of the ecosystem (Cainarca et al., 1992). The drivers of the **structuring** process include the availability of unutilized resources and strong motivation among the entities to create the FE. In the case of Vizag, the strong motivation is exhibited by the state government, which was passionate about transforming the tier-2 city into a top global Fintech destination (Patnaik, 2016). In addition, the state Andhra Pradesh had unutilized resources, with an unemployment rate of over 18% (Hindu-Daily, 2016). On the other hand, the inhibitor for the **structuring** process is the budget-constrained setting. The state had a deep budget deficit of 29% of the state's GDP (Sridhar, 2018). Thus, Vizag Fintech valley experienced the antecedent conditions of the **structuring** process.

According to Baker and Nelson (2005), ***bricolaging*** is especially important when the organizer does not have too many resources. *Bricolaging* is the process of deploying combinations of resources already available to resolve new problems and capitalize on opportunities (Senyard et al., 2014). The resources are applied with a new perspective to achieve the desired objective. Despite the budget-constrained settings, Vizag aimed to establish a FE to achieve the socio-economic benefits and demonstrate to others that it is a workable concept. The Vizag Fintech valley took advantage of unused land and infrastructure to set up the required infrastructure for Fintech growth. The organizations across new startups, incubators,

accelerators, and large technology service providers were brought together in the same location to cross-share and benefit from each other. The Vizag Fintech valley retained the same leadership team which developed another nearby city, Hyderabad, into a leading IT destination in India. The leadership team was deployed to suit the new organizational structure to orchestrate the Fintech Ecosystem. The CEO of the Vizag Fintech valley for the government of Andhra Pradesh explained how they moved their existing talented individuals to the development of the new FE: *"[The Government leadership] team working in the same kind of environment like almost two decades ago in Hyderabad where IT and IT-enabled services industry was set up, where they were very instrumental in creating the ecosystem in Hyderabad. So, they [same leadership team] have come with the idea to establish Vizag."* Our analysis suggests that the *bricolaging* process is applied in the case of Vizag, with the optimal utilization of resources in-hand (Rao, 2013) to achieve the desired result, so as not to acquire more (Bhatti, 2012).

Accumulating is the process of developing resources internally (Sirmon et al., 2011). The process involves moving the available skills in the ecosystem to where it is needed across firms to facilitate knowledge sharing and improve efficiency (Franco & Filson, 2006). Evidence from the case suggests that the *accumulating* process was used in the Vizag Fintech valley in several ways. First, academia trained the workforce in Fintech skills by offering Fintech programs. The academic institutions refined their course curriculum to stay relevant in offering future-focused technology courses essential for the Fintech industry. Second, the Vizag Fintech regulatory agency initiated the *accumulating* of the knowledge of market opportunities to the Fintech firms by creating the use-case repository (Haridas, 2018; Nasscom-Report, 2018), which represents the real-life problems faced by the industry. Third, the Fintech firms recruit less skilled staff and enable them to gain knowledge through internal training and on the job experience. The Director of a Fintech firm located in Vizag Fintech valley described how they recruited unskilled talent and trained them in the required technological skills: *"we prefer [hiring] local people, which is helping society. But, finding the hire [qualified staff] for a startup is very difficult because we pay less, but we needed good talent. This is the biggest challenge. So, we take juniors and make some service agreement for two / three years and we train them for one year. Then we try to use them*." Our evaluation indicated that Vizag Fintech valley uses the *accumulating* process to absorb and transfer the newly gained knowledge to enhance the performance of the firms (Zahra, 2009) in the ecosystem.

We define **prioritizing** as the process of selecting partner organi**z**ations that align with the strategic goals and providing preference to the type of startup the government wants to focus on and nurture in the new ecosystem (Diemers et al., 2015; Schuler & Jackson, 1989). Vizag Fintech valley had a clear focus to select and support Fintech firms in futuristic technologies such as AI, cybersecurity, machine learning, and distributed ledger. The Vizag Fintech valley invested in such strategically aligned firms by providing the infrastructure at deeply discounted prices. The Vizag Fintech valley became India's first blockchain hub, attracting young startups in emerging technologies like blockchain (TechCircle, 2018). Further, the Fintech valley regulatory agency provided support and guidance for the firms on the activities required to set up and begin their operational activities. The founder and CEO of fast-growing blockchain Fintech startup BELFRICs described how Vizag Fintech valley attracted strategically aligned firms to set up operations in the city: *"[Vizag Fintech valley regulators].. they understand the technology and understand the potential of the startups who can actually play the role over there [Vizag Fintech valley]. One major edge that they [regulators] are having because of that and are able to drive the Fintech companies like us to join the ecosystem, that is very important at this stage [of initial FE establishment]."* Our findings reveal that prioriti**z**ing enables the Fintech Ecosystem to obtain the strategic resources that are vital in achieving competitive advantage (Andersén, 2011; Diemers et al., 2015).

4.1.1 The Outcome of Structuring: Agility

In the FE development journey, the completion of the **structuring** processes forms a resource pool in the ecosystem. The resources in this stage are flexible to respond to the dynamics of the external environment. The resources are adaptive to the changing needs of the organi**z**ations in the ecosystem. We term the status of the ecosystem as agile as it is characteri**z**ed by the readiness of the resources to assemble to form capabilities (Roberts & Grover, 2012) in the subsequent **bundling** processes. For instance, the firms in the ecosystem have not established connections with whom to collaborate or partner to innovate their products and services. Further, at this stage, the resources are maintained in a non-committal status, such that they can be easily reversed when conditions require it in the subsequent **bundling** processes (Sirmon et al., 2011). The President of IT and Innovation, Vizag Fintech valley, government of Andhra Pradesh, explained how the resources required are pulled together*: "You have to create a pull factor for people to come to your place. We focused on something that is upcoming as*

technology as an initiative, so that is what we focused on. We all agreed that Fintech could be one of the pull factors. They [Fintech firms] will come here, assuming that I am missing something. Right? So that is the thought process behind it, and that's how we came out with 'Fintech valley Vizag' as a concept." Agility is an essential capability to compete in the digital world (Vial, 2019). The **structuring** process culminates with the FE development gathering the agile pool of resources, which, in turn, provides a strong foundation for the subsequent FE development process.

4.2 Bundling Process

Once the required resources are pulled together, the next step in the FE journey is to assemble the resources to form capabilities. The capability represents an ability of one or more entities in the ecosystem to create and maintain a network relationship, which is established through mutual trust, communication, and commitment (Levy, 2006). An example of capability is the formation of a center of excellence of a particular technology or a business function. Our case data suggests that the resources are integrated into capabilities by the ***bundling*** process (Sirmon et al., 2011), which has three sub-processes: ***emulating*****,** ***enriching, and extrapolating***. The sub-processes are non-linear. The first two sub-processes of emulating and enriching are concurrent mechanisms, while the last sub-process of extrapolating appears later in the sequence. The Vizag Fintech valley has set a goal to emerge as a center of excellence for futuristic technologies such as blockchain and the internet-of-things (SCC-India, 2018; TechCircle, 2018). These initiatives integrate the FE entities to connect, collaborate, and come up with innovative solutions. The drivers of the **bundling** process are the availability of best practices and templates from prior established FEs. On the other hand, the inhibitors of the **bundling** process include a lack of alignment among the resources for a common purpose (i.e., non-specialized) and the resources are not aligned to a common vision. Collectively the drivers and inhibitors form the antecedent conditions for the execution of the **bundling** process.

We define **emulating** as a process of actively learning from existing templates and adopting a strategy depending on available resources and alternative possibilities to achieve the desired goals (Barzelay, 2007). Templates are proven methods, best practices or a successful execution mechanism (Rasmusen & Yoon, 2012) from prior established ecosystems. The templates provide the opportunity for the entities in the FE to learn from both the successes of prior established FEs as well as failures. The evidence from the case suggests that the Vizag Fintech valley actively learned from the templates of other established top global FEs and applied learnings after calibrating to suit local strategic needs. Vizag provided the local Fintech companies with access to global best practices and proven execution methods by establishing regular meetup events between industry experts and startups on strategic technology themes. Managing Director and CEO of GOVIN Capital, a startup accelerator in Vizag Fintech valley, explained how Vizag gained the ability to make more informed choices by learning from other established FEs, *"...most of the initiatives that we have started [in Vizag Fintech valley] are basically things that we learnt in Singapore, the government acts as a catalyst. They are like an enabler. There is a facilitator so if you look at block 71 [the Singapore Fintech Ecosystem initiative that took its name from its birthplace] and the entire FE created around that, there are block 71 to block 79, and I think those kinds of examples we take and we try to build it in our own manner."* Our analysis implies that Vizag Fintech valley uses the *emulating* process to gain knowledge from prior established ecosystems and make better choices in the execution of Fintech activities (Rasmusen & Yoon, 2012).

Enriching is a process of extending the current capabilities (Sirmon et al., 2011). Enhancing the skills and knowledge across various FE entities is critical in the rapidly evolving technological environment. Our data suggests that the case Vizag has enriched existing capabilities in several ways. First, the Vizag Fintech regulatory agency partnered with academia to provide the Fintech community with a steady supply of skilled workers. Second, the incubation center in Vizag enabled the Fintech startup organizations to be collocated to learn and share knowledge and best practices with each other. Third, the academia in Vizag partnered with industry organizations to give practical experience to students. The leading university in Vizag offered Fintech programs partially delivered by industry practitioners. Further, the academia collaborated with Thomson Reuters and set up an Innovation AppStudio (Patnaik, 2017), enriching novel knowledge for startups, students, and researchers. The Vice-Chancellor of Gitam University in Vizag explained how the university enriches students with industry skills, *"One advantage with our university is that we need not go for any permission and all those things for central bodies. Ours is a grade one university and we have grade one autonomy, and we can take up any course [which enriches student skills] we like. We need not go to other people to get permissions [since the university has already*

secured required entitlements]." Thus Vizag Fintech valley applies the enriching process to improve the existing capabilities (Zahra et al., 2000) in the ecosystem.

Extrapolating is a process of understanding the functioning of a successful mechanism elsewhere and developing the mechanism to suit the home context (Bardach, 2004). The extrapolating process may capture new and novel knowledge from several sources and create new capabilities in the home ecosystem. Evidence from the case suggests that Vizag Fintech valley focused on futuristic technologies and created several capabilities of radical innovation such as center-of-excellence in blockchain and internet-of-things. When a new capability is formed in the ecosystem, the resource in the ecosystem gets bundled in new ways. For example, when the ecosystem initiates a new capability in upcoming technology, then new bundles of suitably qualified teaching staff join academia to deliver courses targeted at enriching workforce skills relevant to the capability, new partnerships between firms in the ecosystem are created, and new investments occur to cater to the needs. Further, the capabilities are dynamic and continuously evolve to overcome the earlier limitations or weaknesses as the ecosystem matures (Sirmon et al., 2010). A continuous evolution and forming of new capabilities is essential to sustain the competitive advantage in the emerging market dynamics (Lei et al., 1996). The chair of startup incubation and investments holdings at Vizag Fintech valley described that *"what I follow is 80-20 principles, that is 80% startups are from Andhra Pradesh and 20% from outside Andhra Pradesh. I am actually trying to create cross cultural amalgamation of talent that is extremely important for startups to nourish. There has to be cross cultural amalgamation of knowledge of ideas of the best view points. So that is the business model we involve. So that is why if you notice, in my incubator we don't have any walls and based on the principles of open innovation, open partnership and open alliances."* The capabilities formed in the **bundling** processes form the base for an effective **leveraging** strategy of the ecosystem (Sirmon & Hitt, 2009).

4.2.1 The Outcome of Bundling: Optimality

In the FE development journey, the resources reach the optimality status with the completion of the **bundling** processes. The optimality represents the optimal distribution of resources between the entities for its functioning (Chen & Hsu, 2010) within the ecosystem. The resource optimality is especially important in the FE initial establishment phase which is characterized by resource-constrained settings. The organizations that are newly established and grow in the ecosystem require resources in the form of infrastructure and skilled power (Bonina et al., 2021) in the FE. The manager of investment and promotion at Vizag's regulatory agency explained how they managed the resource optimality, *"what we are trying to create here is an ecosystem, so we are focusing on 5 M's as a strategy. One is manpower, second is market access, third is money, four is mentoring, and five is meetup events. Based on our interactions with startups for a couple of months, that is how we decided that these are the things we need to give to our startups. Actually, in fact, we started giving it to them, later we realized that these five things became the 5M strategy for us."* The capabilities formed in the **bundling** processes enable the firms in the ecosystem to deploy the solution in the dynamic environment and generate value through the subsequent **leveraging** processes (Carnes et al., 2017). The optimality ensures the organizations in the ecosystem simultaneously create and capture values by combining their resources, while they operate around the focal firm or are linked to a platform (Valkokari, 2015). In turn, the benefits of developing a Fintech Ecosystem are scaled to different stakeholders.

4.3 Leveraging Process

The final leg in the FE development journey is to exploit the capabilities formed from **bundling** processes to seize market opportunities and create value. Evidence from the case indicates that the resources undergo the **leveraging** process, which has three sub-processes – sandboxing, coordinating, and deploying – to generate value capitalizing on the market opportunities (Sirmon et al., 2011). The **leveraging** process involves a sequential execution of these sub-processes to capitalize on specific market opportunities (Sirmon et al., 2007). The **leveraging** process has three drivers, which form the antecedent conditions for the execution of the **leveraging** process: first, the innovation capabilities, which is an outcome of the **bundling** process, second, the Fintech Ecosystem maturity, which is characterized by a robust network of entrepreneurs, a conducive regulatory environment, high availability of a skilled workforce and successful startups attracting healthy investments in the ecosystem (Linton, 2013), and third, the potential market opportunities for developed Fintech services and products.

We define **sandboxing** as a process through which the stakeholders in the ecosystem collaboratively experiment on a concept on a small scale in a confined environment. The technologies used in financial services are rapidly changing, and the market opportunities are increasingly dynamic and uncertain (Nicoletti, 2017). The organization collaborates and experiments on a limited scale. The firms within the ecosystem form new linkages, exploring and collaborating in innovative ways to prove their concept on a limited scale (Li & Jia, 2018). The confined settings of the sandboxing process restrict the impact of the outcome to only the entities involved in the experimentation (Ford & Cox, 2008; Prevelakis, 2001). Vizag Fintech valley had the goal to adapt and implement any new emerging technology and become one of the top global Fintech innovation centers (PTI-News, 2017). The journey to the goal is evident from the two recent initiatives taken by the state government. First, the state of Andhra Pradesh has set up a publicly accessible Dashboard, which is a web portal of real-time data collected by the state government (eGov-India, 2018). The Vizag Fintech valley gave eligible Fintech companies access to e-governance data. The Fintech firms were able to experiment with their idea and perform a collaborative proof of concept with other entities involved in the Fintech service. Once proved to be a workable concept, the involved Fintech firms proceeded to invest in developing the solution. Second, Vizag Fintech valley made a strategic partnership with the Monetary Authority of Singapore (MAS), to jointly explore innovation projects in emerging technologies and undertake concept experimentation (SG-MAS, 2016). Experimenting on a small scale and learning from the outcome enables fine-tuning the next steps of the full-scale development (Bocken et al., 2018; Drejer, 2000). Vizag Fintech valley experimented with a blockchain-based solution for citizen services in the state. The CEO and founder of a leading Fintech firm operational in Vizag Fintech valley explained collaboration and sandbox approaches in formulating the regulation, "*the involvement of the industry player in formulating regulatory rules for the possible sandbox scenario solutions are very essential. The fintechs gain clarity on what they can do and what they cannot do and coming up with their innovative solution. The regulatory bodies approve their solution proposals. This approach eliminates the friction between different entities [in the ecosystem].*"

The **coordinating** process involves integrating capability configurations across the FE (Sirmon et al., 2011). The synergy between the capability combinations is critical for the FE to achieve the common goal. Our analysis of case data reveals that Vizag Fintech valley exhibits the coordinating process with the FE entities at two levels: an inter-organization level and across the ecosystem level. At the inter-organization level, a strong coordinating process was observed between industry and academia. Academia developed the course curriculum for Fintech programs based on the forecasted skill requirements and evolved the course contents based on skillset needs in the market. Academia created specialized institutions such as the Fintech academy and a blockchain academy to cater to the emerging tech skill needs in the market. These partnerships were mutually beneficial. The academic institutions gain knowledge about the technology trends, while the industry gets a suitably talented workforce. The coordinating of capabilities was also strongly observed between incubators or accelerators and their hosted startups. The incubation centers provided a forum for startups to connect with relevant experts in the industry as mentors, who guided the startups to navigate the challenges. In addition to mentorship, the incubation centers also combine market access, infrastructure support, investment opportunities, and legal advisory for new startups, forming a one-stop solution for startups. Further, the incubation centers supported the startups to bring out frugal innovations that have a wider market reach.

At the FE level, the coordination is driven by the Vizag Fintech regulatory agency, which convenes periodic meetup events and conferences. The Vizag regulatory agency has released a use-case repository created by gathering problem statements from leading financial institutions (Haridas, 2018; Nasscom-Report, 2018). The Fintech organizations working on the use-cases gain market opportunities by solving real-life problems. The Fintech regulatory agency also actively promoted the Vizag Fintech valley by participating in global Fintech events. The promotional activities created visibility and attracted even more collaboration and investments in Vizag. Further, the Fintech regulatory agency signed a Memorandum of Understanding (MOU) with academia for skill development programs and provided a clear direction for the workforce skill requirements. In addition, Vizag Fintech valley established collaborative arrangements with other top Fintech ecosystems such as the Monetary Authority of Singapore for joint innovations (SG-MAS, 2016). Collectively the two levels of coordination coordinate the capabilities and make them exploitable based on the deployment strategy. The principal of the Fintech academy of a leading academic institution based in Vizag described how they collaborate with Fintech industry practitioners, *"The university is supporting us to go ahead, look forward, try to associate, see what the corporate wants and then design it. That's how the Fintech department has got the collaboration from Thomson Reuters or Broadridge Financial Solutions."*

Deploying is the process of exploiting the capability configurations formed by the coordinating sub-process (Sirmon et al., 2011). An ecosystem might pursue either of the three strategies – resource advantage, market opportunity, or entrepreneurial strategy – depending on a few factors internal and external to the ecosystem (Sirmon et al., 2011). The internal factors include the availability of coordinated capabilities, and flexibility to adapt to new opportunities, whereas the external factors include the dynamic market environment, and competitive advantage over other Fintech ecosystems (Adner, 2006). The ecosystem needs to be flexible and respond to the changing environment (Leong et al., 2017), by calibrating the intensity of the processes depending on the environmental dynamics of the ecosystem. A highly dynamic environment might require rapid innovations, which is supported by more flexible **bundling** processes with an entrepreneurial deployment strategy (Adner & Helfat, 2003). On the other hand, a moderately dynamic environment might require only incremental innovations, which is supported by a relatively static **bundling** process with a resource advantage deployment strategy (Nelson & Winter, 1984).

Evidence from the data suggests that Vizag Fintech valley focused on building a strong competitive advantage over other Fintech ecosystems. Vizag focused on creating a center of excellence in digital ledger, AI, and data encryption technologies. Further, Vizag regulatory agency actively promoted Fintech valley by showcasing innovations in various global forums to forge a strong network. Vizag is also flexible and nimble to adapt to new emerging technologies. The manager of NASSCOM 10000 startups Warehouse, Vizag explained the deployment strategy, *"We have a network [of software and services companies] pan-India. And then all of our startups that are incubated here have access to this network. We enable startups to pitch their idea to all of our global and national events that happen on this platform. And they [startups] have access to mentors and access to basically anything that comes to this network and the enterprise connects as well".*

4.3.1 The Outcome of Leveraging: Equifinality

The FE development journey culminates with the ending of the **leveraging** processes. The resources in the ecosystem reach the status of equifinality, where the ecosystem achieves the desired outcome through different ecosystem configurations (Payne, 2006). The equifinality status refers to achieving the desired outcome through a different pathway (Gresov & Drazin, 1997). The Vizag Fintech valley operated in a resource-constrained setting and operated in a frugal fashion. The Fintech valley was able to achieve the desired outcome, that is as good or similar to the outcome achieved by other established ecosystems. The Special Secretary, Information Technology and Communications (Promotions) Department, the regulatory agency for Vizag Fintech valley described, *"Many a time if you are trying to do things very meticulously you never get them done. So, whatever they are getting, I mean with thinking or with resemblance of Fintech, is also most welcome. We want this place to be known as the go to place in the country for anything Fintech. So, we are on the right track and we have got very qualified people working with us in the Fintech team"* The resources in this state no longer require external support and are self-sustainable. The equifinality state enables firms to collaborate across boundaries to take advantage of emerging market opportunities driving collaborative innovation (Esposito De Falco et al., 2017). It is important to achieve equifinality as a lack of equifinality in a Fintech Ecosystem established with limited resources is very likely to be inferior to those Fintech Ecosystems that had greater resource support.

5 Discussion and Conclusion

5.1 Theoretical Implications

Fintech has revolutionized financial services through a wave of innovation driven by a collaborative ecosystem of players (Lagna & Ravishankar, 2022). However, much of the current research on Fintech prioritizes user behavior and perception (Ryan et al., 2020). As Ivarsson and Svahn (2020) highlight, the true power of Fintech lies in the orchestration of resources within its ecosystem. Our research fills this gap by offering an empirically grounded framework derived inductively from data. This framework complements existing literature on the emergence of Fintech ecosystems. Furthermore, the study contributes significantly to both the understanding of Fintech ecosystem development and resource orchestration within these ecosystems.

In FE development, our study has made two contributions. First, our research provided the resource orchestration angle to FE development. In the existing literature, an increasing cohort of scholars view many new innovations today as an outcome of collaboration between an ecosystem of players rather than

a single firm (Jacobides et al., 2018). Our study supports that view and further explores the development of an ecosystem as the orchestration of resources. The development of a FE involves optimal management of available resources in the ecosystem through three distinct processes: **structuring**, **bundling,** and **leveraging**. More precisely, (1) collecting a resource pool essential for the ecosystem, (2) integrating the ecosystem resources by promoting network relationships between the stakeholders leading to the ecosystem capabilities, and (3) capitalizing on the market opportunities by reorganizing the ecosystem capabilities to suit the market needs. While a few scholars (Muthukannan et al., 2017) have revealed the FE development through three maturity phases, their research does not delve into the initial establishment stage. Our study focuses on the emergence of a Fintech Ecosystem by demonstrating the processes involved in the initial establishment of a FE with its antecedent conditions and outcomes.

Second, our study has explored the dimension of frugality in FE development. The prior research has focused on ecosystem emergence in a developed country (Basole & Patel, 2018; Eickho et al., 2017). On the other hand, our research has approached the processes of ecosystem development in resource-constrained settings, providing insights on complex interactions that can occur between ecosystem participants. Further, we have elaborated on the antecedent conditions that trigger the frugal resource orchestration processes, which manage the available resources in the ecosystem to achieve optimal outcomes. While the existing literature has explored ecosystem development in a variety of dimensions (Bakos & Katsamakas, 2008; Iansiti, 2004), it has not explored it in resource-constrained settings. Therefore, our findings complement other research works which were conducted in a more resource-rich context. Indeed, our highlighting of frugal dimensions of innovations echoed some previous non-Fintech literature (Ng et al., 2018). Indeed, even in developed countries, a frugal approach may be desirable because individual organizations may not necessarily have the resources for non-frugal approaches (e.g., Au et al., 2022). Our study continues to extend the understanding of frugal innovations with a contextualization in FE development.

In resource orchestration literature, our study has made two contributions. First, our study presents conceptual innovations in introducing five new resource orchestration processes: *bricolaging*, *prioritizing*, *emulating, extrapolating,* and *sandboxing*. The new processes provide a frugal angle to resource orchestration theory, in particular, emphasizing the processes that can be applied in a resource-constrained setting. For example, sandboxing is needed more in frugal contexts, given the limitation of resources, as organizations have to make sure the solution works before they have large scale implementation. This is similar to some sandboxing practices for Fintech firms in more developed countries like Australia (Didenko, 2021; Lev et al., 2017), except the focus falls on risk and resources management. Second, our study presents conceptual innovation by elaborating on the outcomes of the three resource orchestration processes. For example, if the resources are already so limited, no one will consider investing as an option. Also, acquiring resources may be somewhat difficult in a frugal context, and the cost of acquisition may not be affordable. Conversely, resource-constrained firms can only accumulate the resources on their own. Further, our framework has suggested the antecedent conditions and the outcome for each process and established the link between the outcome and subsequent processes. At the same time, five sub-processes that were present in Sirmon et al. (2011)'s framework – acquiring, divesting, stabilizing, pioneering, and mobilizing – did not appear in our findings. One possible explanation could be these sub-processes are less relevant in the frugal resource orchestration of FE development.

5.2 Practical Implications

Besides its theoretical implications, our study also presents a number of significant practical implications, especially for two sets of stakeholders. The first set of stakeholders who might find interest in our research are policymakers and government regulatory authorities, more precisely, the government bodies who are interested in establishing a Fintech Ecosystem. Our study offers an empirically based prescription for this set of stakeholders on how to develop a FE with optimal resources. Establishing an ecosystem for technology-enabled financial services in resource-constrained settings requires meticulous planning (Diemers et al., 2015) of the available resources. The optimal resource allocation and calibration to suit the market dynamics are key factors of success (Barzelay, 2007) in a highly complex Fintech Ecosystem. Our framework could help regulators gain a deeper understanding of the process of successful ecosystem development. The policymakers can employ our ecosystem development framework to design and implement appropriate regulatory models calibrated to their environmental uncertainties (Sirmon et al., 2007).

The second set of stakeholders are the stakeholders within the FE, including the incumbent technology firms, incubators, and academia. The startup firms offering a technology-enabled Fintech service experience a very dynamic environment (Nicoletti, 2017). Aligning their resource strategy to the competitive advantage of the ecosystem in which they operate enhances their chances of success. For example, in a FE with blockchain technology as a center of excellence, the firms within the ecosystem might find it conducive to collaborate and partner with other entities in the ecosystem working on the same specialized technology. Finally, our study offers processes for building a strong symbiotic relationship between firms in the ecosystem. Fintech firms form new linkages with complementary service providers to come up with innovative financial services and business models (Foss & Foss, 2008). For example, mobile payment services such as Apple pay and Samsung pay are a collaborative solution between banks, network providers, and technology firms, and mobile device manufacturers. The knowledge of processes associated with **bundling** their capabilities and coordinating with complementary firms to offer an integrated market offering can enhance customer value and generate growth.

5.3 Limitations and Further Research Directions

Our research study is not without limitations. First, the single case research design adopted in this research can be seen as a limitation. A common criticism of the research method is the challenge of generalizability and external validity (Walsham, 2006). The singular case context of the research might limit the direct applicability of the results to other contextual configurations, as every context is unique with its own social, political, cultural, legal, and economic norms. However, our study is established on the principles of analytical generalization (Silva & Hirschheim, 2007; Yin, 2003) and building generalizable theory from the description (Lee & Baskerville, 2003). While we acknowledge that statistical generalization is not practical with our research design, we contend with the value of our case research design in bringing deeper insights into complex social phenomena (Ragin, 1997), given its theoretical and practical implications.

A second limitation is that our research has not addressed the impact of governance strategy on the RO processes in ecosystem development. According to Sirmon et al. (2011) and Floyd and Lane (2000), governance strategies can be of three types. The first type represents a top-down governance strategy, where a central authority holds control and orchestrates the available resources leading to the ecosystem development. Typically, the ecosystem development initiatives directly driven by government regulatory bodies use the top-down strategy. The second type is the bottom-up governance strategy, where the central regulatory body ratifies the plans championed collaboratively by the entities in the ecosystem. This type of ecosystem mostly operates on a self-governance basis. The third type of governance strategy is bidirectional, which has elements of both top-down and bottom-up strategies. In this strategy, more than one entity in the ecosystem can initiate the resource orchestration process. The flexibility for innovative changes and efficiency of process execution differs between various governance models (Wooldridge et al., 2008), leading to different pathways of ecosystem development. The Vizag Fintech valley ecosystem development falls under the top-down governance strategy, where the Vizag regulatory authority controls and orchestrates the resources leading to the ecosystem development. Considering the single case context of our current research, we could not investigate the other approaches. In future studies, we plan to explore the different types of governance strategies and their impact on the pathways of ecosystem development.

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Appendix A: Sample Interview Guide

Table 3. Sample Interview Guide – Vizag Fintech Valley Case Study

Semi Structured Interview Questions
Aim: To get the background and context of informants
Informant background • Can you tell us about your role in your organization? • Why did you decide to start your own company? • How did you get involved with the Fintech initiatives in your organization?
Aim: To obtain informant's organizational background
Organization background • Can you briefly explain about your company and its products or services offered? • How long did it take you to get the company started? • How many people work at your company? • What were the reasons for you deciding to start the company in Vizag Fintech valley?
Aim: To draw out information on the ecosystem formation
Ecosystem formation • Why was Vizag chosen to be the place to set up an ecosystem? • What were the main challenges encountered in establishing the ecosystem? • How did you bring cooperation between various stakeholders in the ecosystem? • How do you promote and attract investments to develop the ecosystem? • How was the ecosystem strategy developed? Did you use templates or model after any prior established IT hub? • What is unique in this ecosystem? How is it differentiated from other emerging global ecosystems?
Aim: To induce discussion on governmental support and strategies on the ecosystem development
Strategy and Governance • Which governance body was responsible for overseeing the development of the ecosystem? • What type of support did you offer to the new startup firms joining the ecosystem? • Does your support level differ for a different type of organizations? Do you have any preference for any specific kind of organization to join the ecosystem? • How do you evaluate the progress of organizations you support in the ecosystem? • How do you generate business opportunities for the firms joining the ecosystem? • Do you partner with other global ecosystems to exchange ideas? • What are the success factors you use to evaluate the ecosystem?
Aim: To elicit challenges encountered in various stages of ecosystem development
Ecosystem Challenges • Do you get the workforce with the required skill set to run your organization? • Is the support you are receiving adequate to run your organization? • Do you get the required infrastructure to operate your business?

Appendix B: Informants and Interview Topics

Table 4. Data Collection Topics by Informants

Informants	Topics Discussed
Academia	
Vice-ChancellorGitam University	Academia – Fintech and industry partnerships, program delivery by Fintech industry practitioners, the conceptualisation of Fintech academic program, Fintech curriculum formation, the requirement of unique skills to deliver Fintech programs, strategies to overcome unique challenges in Fintech program delivery.
Pro Vice-Chancellor (Dr. K. SivaRama Krishna, Gitam University)	Fintech – academia collaboration use-cases, academic programs offered, competitors in academia, Fintech education, employable manpower, new Fintech services and the requirement for skilled workforce in emerging technologies, selection criteria for students joining Fintech programs.
Principal, Head of Fintech Academy, Dept of Finance, Gitam University	Fintech curriculum design, corporate–academia partnerships in teaching emerging technology topics to students, industry responses to Fintech academic program, Fintech program offerings, mechanism to refine Fintech curriculum continually, enrich Fintech skills in academic staff.
Coordinator, Fintech Academy	Fintech Academy formation, academia–industry partnerships, the requirement of unique skills to deliver Fintech programs, strategies to overcome unique challenges, job placement opportunities for students who graduated in Fintech programs.
Fintech startup Incubation center 1 (Govin Capital)	
Managing Director & CEO GOVIN Capital, startup accelerator, Vizag Fintech valley	Overview of the Fintech startups in the incubator, reason for choosing to invest in Fintechs hosted in Vizag Fintech valley, relationship between the incubator and Vizag regulatory authority, the average invested amount by startups, the exit strategy for startups from incubators, adopting best practices and proven templates from other established Fintech ecosystems, strategies to provide market access for the Fintech solution.
Startup incubation manager	Support and mentorship for startups, selection criteria for choosing to host a new startup firm within incubation center, number of Fintech firms hosted in the center, infrastructure support provided to Fintech companies, the average turnaround time to get required help from Vizag regulatory agency, linking mentors from the Fintechs based on domain expertise, average months Fintechs remain hosted within incubation center, the relationship of Fintechs after exiting from incubation center.
Founding partner, startup company #1 (hosted in Govin Capital)	Details of problems aimed to be solved by the Fintech solution, availability of competitor solution, target customers for the Fintech solution, participation in events organized by Vizag regulatory agency, learning and sharing with other Fintech firms hosted within incubation center.
Founding partner, startup company #2 (hosted in Govin Capital)	Details of problems aimed to be solved by the Fintech solution, the relationship between different startups located in the same Fintech incubator, ability to learn using best practices and templates from others, technologies applied to develop the solutions, nature of data gathered from the Fintech solution, strategies to use the data for further analytics.
Founding partner, startup	Details of problems aimed to be solved by the Fintech solution, the

company #3 (hosted in Govin Capital)	reason for partnering with the Fintech incubator, availability of skilled workforce, available governmental support.
Founding partner, startup company #4 (hosted in Govin Capital)	Details of problems aimed to be solved by the Fintech solution, challenges and benefits of collocating multiple Fintech startups in the same incubator location, adequacy of mentorship provided by incubation center, opportunity to showcase the proof of concepts.
Founding partner, startup company #5 (hosted in Govin Capital)	Details of problems aimed to be solved by the Fintech solution, mode of delivery of the Fintech solution, Fintech products offered and pricing strategy, planned exit strategy from incubation center.
Founding partner, startup company #6 (hosted in Govin Capital)	Details of problems aimed to be solved by the Fintech solution, target consumers for the Fintech solution, support received from incubation center, the average turnaround time for any infrastructure support requests, support received from Vizag regulatory agency.
Fintech startup Incubation center 2 (non-profit organization)	
Manager, NASSCOM 10000 startups Warehouse, Vizag	Role and vision of the non-profit incubation center, selection criteria to host a Fintech startup, number of Fintech firms hosted in the center, infrastructure support provided to Fintech companies, the average turnaround time to get required help from Vizag regulatory agency, strategies to connect Fintech firms with industry experts and mentors available in the domain, infrastructure, guidance provided to the Fintech firms hosted in the incubation center.
Founding partner, startup company #1 (hosted in NASSCOM startup warehouse)	Details of problems aimed to be solved by the Fintech solution, challenges encountered in operating within incubation center, availability of skilled workforce, support received from Vizag regulatory agency, available opportunity to network with other firms in the ecosystem.
Founding partner, startup company #2 (hosted in NASSCOM startup warehouse)	Details of problems aimed to be solved by the Fintech solution, target consumer for the Fintech solution, infrastructure and support received from incubation center, ability to learn using best practices and templates from others, technologies applied to develop the solutions.
Founding partner, startup company #3 (hosted in NASSCOM startup warehouse)	Details of problems aimed to be solved by the Fintech solution, the sufficiency of mentorship and guidance received, planned exit strategy, frequency of interaction, opportunities to showcase the Fintech solution to investors.
Founding partner, startup company #4 (hosted in NASSCOM startup warehouse)	Details of problems aimed to be solved by the Fintech solution, transportation facilities for the staff working in Fintech valley, required infrastructure to perform proof of concept of developed solution.
Founding partner, startup company #5 (hosted in NASSCOM startup warehouse)	Details of problems aimed to be solved by the Fintech solution, the technology used to develop the solution, availability of skilled workforce, support received from Vizag regulatory agency.
Incumbents and Technology Vendor organizations	
Director, Alykas Innovations Pvt Ltd. Block chain & IOT startup	Reasons for establishing within Vizag Fintech valley, the lead time between application submission and starting operation in Fintech valley, strategies to get hire and develop staff with required technological skills, support received from government.
Founder and CEO, Founder & CEO - Belfrics Group	Governmental support received, challenges and opportunities in the Fintech valley, strategies by Vizag regulatory agency to attract the Fintech firms, potential use-cases where blockchain technology can be

Blockchain tech solution firm	applied, industry–academia collaboration.
Head of Strategic Initiatives at FT42 Labs Cybersecurity solution firm	Ease-of-doing-business in the Fintech valley, support received from Vizag Fintech regulatory agency, planned Fintech products and solution, revenue generation strategy, challenges and benefits from operating in Vizag, the average turnaround time for any support request with Vizag regulatory agency.
Founder and CEO, Incremint Pvt Ltd financial services aggregation firm	Strategies to acquire the skilled workforce, support received from Vizag Fintech regulatory agency, ease of getting market access, reasons for choosing to establish in Vizag Fintech valley, market access for the Fintech solutions.
CEO and Co-founder, TAQBIT Labs Pvt Ltd Cybersecurity solution firm	Challenges in getting talented workforce in Vizag, cost of living in Vizag, social impacts of Fintech, structural constraints in resource allocation, support received from Vizag Fintech regulatory agency.
Regulatory organization (an autonomous body formed by local government)	
Special Secretary, Information Technology & Communications (Promotions) Department, Regulatory Agency, Vizag Fintech valley	Objectives in establishing Fintech valley, reasons for choosing Fintech over other domains for developing Vizag ecosystem, the role of government in regulating the Fintech players, socio-economic impacts of Fintech, strategic and immediate priorities.
President, IT & Innovation, Vizag Fintech valley.	Strategies used by the governmental body to attract the Fintech companies, ease of doing business, reasons for choosing Fintech over other domains for developing Vizag ecosystem, strategies to create interest among Fintech firms to move to Vizag.
CEO, Vizag Fintech valley, government of Andhra Pradesh	Vision of the Fintech valley, focus and support received from the government, approach to developing required skilled workforce to support the Fintech Ecosystem, enabling market access for the Fintech firms, strategies to create visibility for Vizag Fintech valley, strategies to build a self-sustainable ecosystem.
Manager – Investment Promotion, Regulatory Agency, Vizag Fintech valley	Role of government in regulating the Fintech players, Fintech valley promotion and marketing activities, 5M Strategy to optimally develop Fintech Ecosystem, creation of problem statement, the mechanism to attract strategically aligned Fintech firms, focused technologies, Fintech regulatory policy development, industry mentorship for new startups, technology adoption in government processes, sandbox environment for startups to try their ideas, incentives to boost startups.
Special representative for IT and innovation, government regulatory body, Vizag Fintech valley	Conceptualisation of Vizag Fintech valley, strategies to attract required resources to develop Fintech Ecosystem, vision of Vizag Fintech valley, government–industry–academia three way collaboration, creating visibility for Fintech Ecosystem, creation of use-case repository with real-life problem statements, for startups, mechanisms to disseminate industry problem statements to startups, expose global best practices to Fintech startups, government–academia MOU to develop the skilled workforce, the vision of Vizag Fintech valley.

Appendix C: Sources of Secondary Data

News and Magazine Articles

Topic	Key Themes
N1: Rising unemployment problem in Andhra Pradesh and frustration of the youth over non-fulfilment of the ruling party Telugu Desam Party(TDP) government's promise to generate jobs in the government and private sectors was raised in the legislative council. The unemployment rate in Andhra Pradesh state rise to 18% – The Hindu, March 2016	The rise in unemployment, unutilised resources
N2: The need for revenue of India's state of Andhra Pradesh. The state lacks infrastructure and resources – Govind Bhattacharjee, The Statesman/Asia News Network, June 2016	Lack of infrastructure and resources
N3: Andhra Pradesh government announces Fintech valley initiative for Vizag – Amaravathi Voice, December 2016	Ecosystem strategy
N4: Six Fintech companies to launch development centers in Vizag. AP govt is bringing the CEOs of 50 top global financial services cos – Business Standard, December 2016	Ecosystem strategy, vision
N5: Vizag creates use-case repository by partnering with KPMG to collect the problem statements from industry organizations. The Andhra Pradesh government has announced Fintech Accelerator Programme and Blockchain Business Conference focusing on solving problems from use-case repository – Aparna Mishra, inc42.com, August 2017	Ecosystem strategy, market opportunity generation
N6: Vizag to emerge as the hub of new-age technologies — blockchain, cybersecurity, data analytics and artificial intelligence. The state wants to create a niche for itself after losing the IT-hub to Telengana- Mohammed Shafeeq, The Week, October 2017	Budget constrained-settings, Focus on futuristic technologies
N7: Meet the eight Fintech startups Vizag is betting on. After three months of intensive product development, mentoring, and networking, the first cohort of startups recently unveiled innovations that could be the future of Fintech in India – Neha Jain, Yourstory.com, March 2018	Government prioritizes startups, Provides support and guidance in the initial stage
N8: How Andhra Pradesh Is Emerging As India's Blockchain Hub> The state government is exploring blockchain to improve governance and transparency – analytics.com, March 2018	Futuristic technology focus, Job creation
N9: Fintech valley launches startup Market Connect. The shortlisted startups carryout Proof of Concept (PoC) with corporates – The Hindu, May 2018	Market access for startups, Marketing and promotion of Vizag Fintech valley
N10: This Indian City Is Embracing BlockChain Technology - Here's Why – Sharanya Haridas, Forbes, October, 2018	Emerging tech focus
N11: The Andhra Pradesh government entered into agreements with several global groups and firms as part of its efforts to create a complete ecosystem of financial technologies at Fintech Valley Vizag – Economic Times, October 2018	Establishing a strategic partnership, the collaboration between stakeholders
N12: Nine MoUs signed, five companies inaugurated in Vizag Fintech Festival. Andhra Pradesh. CM N Chandrababu Naidu exchanged the MoUs with the respective companies during the Fintech Festival – New Indian Express, October 2018	Government drives collaboration between stakeholders
N13: GITAM Deemed to be University signed an MoU with the	Creating networks, collaboration

UK-based Chartered Institute for Securities and Investment (CISI), to train students in wealth management – New Indian Express, October 2018	
N14: Humanoid robot Sophia to participate in Vizag Fintech. The first humanoid robot, a Saudi Arabian citizen, is visiting Andhra Pradesh for the first time to join in Vizag Fintech festival – Deccan Herald, October 2018	Promotion of ecosystem, attract new investments
N15: A total of 40 start-ups selected for participation in the finale of $1-million Fintech Challenge instituted by the Andhra Pradesh government have agreed to launch operations in Fintech Valley here, according to JA Chowdary, IT adviser to the State government – The Hindu Businessline, October 2018	Government prioritizes startups, Provides support and guidance in the initial stage, Promotion of Fintech valley
N16: Vizag Fintech Festival begins with CXO golf tourney. Chief Minister N. Chandrababu Naidu will take part in a roundtable with CEOs today – The Hindu, October 2018	Fintech valley promotion, Government–Industry network
N17: Vizag is mentioned on the Fintech global map for information technology-enabled services (ITeS) growth. Andhra Pradesh lost key IT Hub Hyderabad post-bifurcation, Vizag is chosen to be the base of Fintech and IT for the newly created state – Hydnews, October 2018	Budget constrained-settings, Fintech focus

Internal Documents

Title	Key Themes
IN1: Vizag Fintech valley brochures	The vision of the Fintech valley promotions
IN2: TiE Amaravathi – Entrepreneurship event pamphlet	Fostering entrepreneurship, promoting Fintech valley
IN3: Ananas – Only trucks: Fintech fleet management solutions	Product and services offered by Fintech firms
IN4: Peela: School bus tracking using internet-of-things devices brochure	Product and services offered by Fintech firms

Appendix D: Data Structure used for Analysis

The data structure used for analysis based on the Gioia et al. (2013) method is given below.

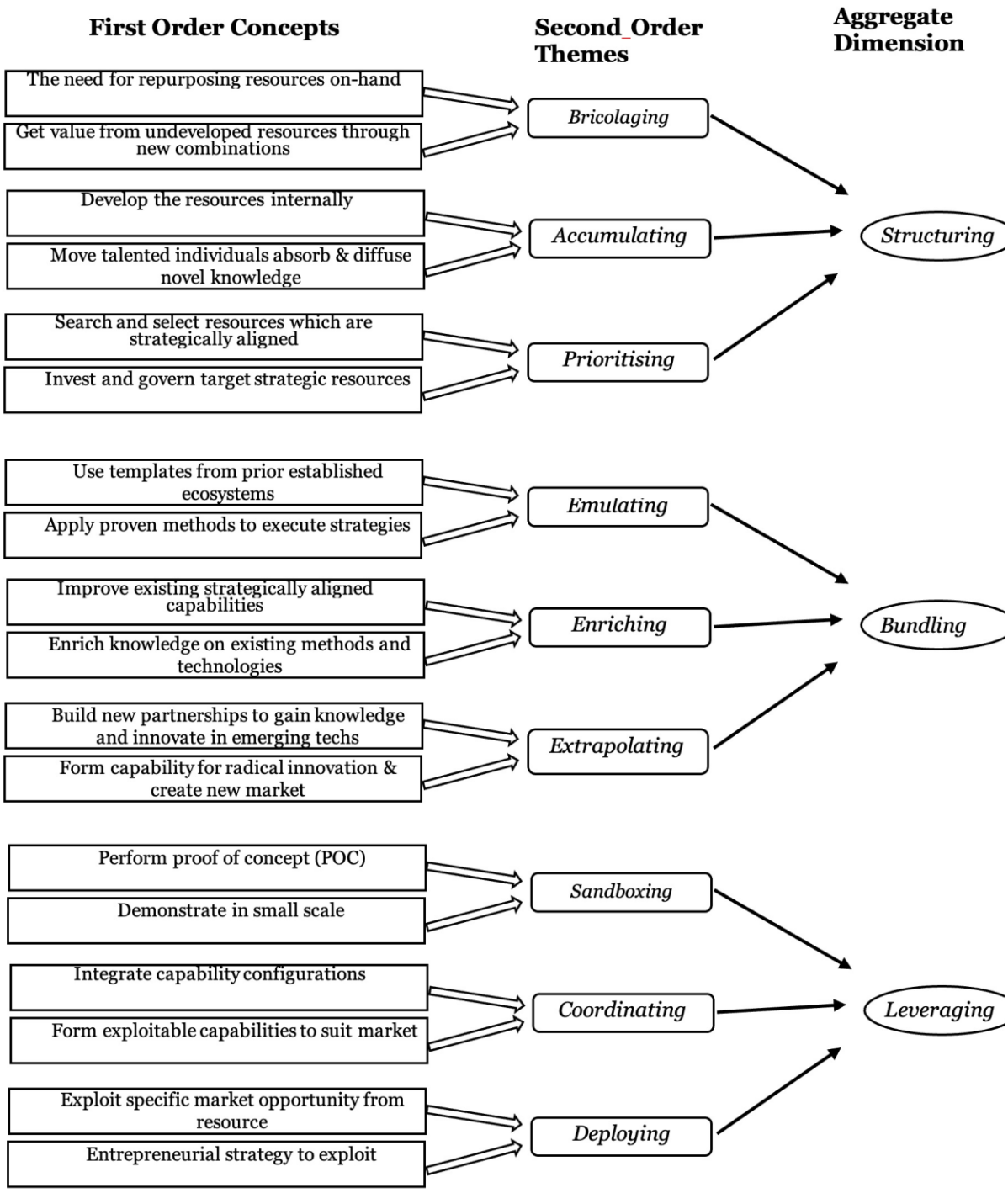

Figure 3. Data Analysis – Concepts, Themes and Dimensions.

The anecdotes collected from the case study received through informants and secondary data sources were mapped to the first-order concepts.

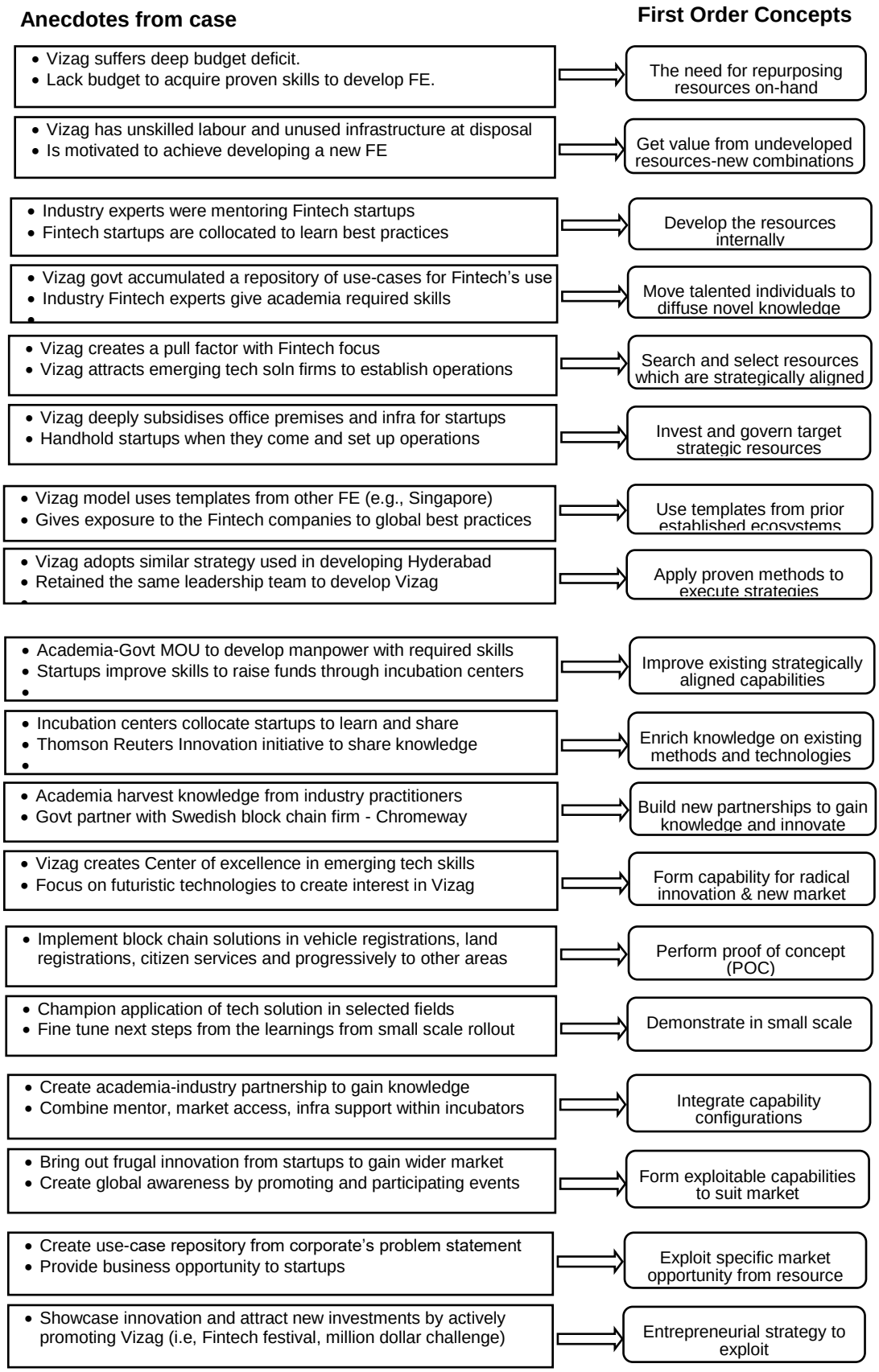

Figure 4. Data Analysis – First Order Concepts from Case Anecdotes

Appendix E: Theory – Data–Model Alignment

Structuring Process

The following table maps the second-order themes, first-order concepts and representative data from the case in the **structuring** process.

Table 5. Dimensions, Themes and Data in the Structuring Process

Second-Order Themes & First-Order concepts	Representative Data
1. Bricolaging	
A. The need for repurposing resources on-hand	*"[The Government leadership] team working in the same kind of environment like almost two decades ago in Hyderabad where IT and IT-enabled services industry was set up, where they were very instrumental in creating the ecosystem in the Hyderabad. So, they [same leadership team] have come with the idea to establish Vizag"* CEO of the Vizag Fintech valley, government of Andhra Pradesh
B. Get value from undeveloped resources-new combinations	*"If I am hiring a guy in Bangalore [instead of Vizag] with a same set of skills and pay salary to say 20,000 or 25,000 [Indian Rupees], it will be very difficult for him to survive in Bangalore. Vizag is comparatively cheaper than Bangalore since the city is not yet developed."* CEO & Co-founder of TAQBIT LABS
2. Accumulating	
C. Develop the resources internally	*"We prefer [hiring] local people, which is helping society. But, finding the hire [suitable staff] for a startup is very difficult because we pay less, but we needed good talent. This is the biggest challenge. So, we take juniors and make some service agreement for two / three years, and we train them for one year. Then we try to use them".* Director of Alykas Innovations Pvt Ltd.
D. Move talented individuals to absorb & diffuse knowledge	*"The industry experts handhold the academia right from designing of the curriculum to jointly delivering the program. In fact, the partnership we have with Broadridge Financials on the blockchain we had a faculty-to-faculty training, where the industry experts trained the trainer. We send our faculty for two weeks of them. They trained them on Blockchain technology. And they are back here to teach students. So, we (academia) have the hand holdings from the corporate because they are the ones who are talking about it, they are the ones who are in need for it (Fintech skilled resources)".* Coordinator of Fintech Academy, Gitam University
3. Prioritizing	
E. Search and select resources which are strategically aligned	*"[Vizag Fintech valley regulators]. They understand the technology and understand the potential of these startups who can actually play the role over there [Vizag Fintech valley]. One major edge that they [regulators] are having because of that and are able to drive the Fintech companies like us over there so which is very very important at this stage [of initial FE Establishment]*". Founder & CEO of fast-growing blockchain Fintech startup BELFRICs
F. Invest and govern target strategic resources	*"We get the required infrastructure [premises, network, etc., to operate] for the startups completely free from the Government. The process is simple. I had an idea. I applied online, and the process took just 3 months to get set up."* Founder of Blockchain & IOT startup, which is hosted in Vizag Fintech valley incubation center. Ramalinga Raju

4. Agility	*"You have to create a pull factor for people to come to your place. We focused on something which is upcoming technology as an initiative, so that is what we focused on. We [Vizag Fintech valley regulators] all agreed on Fintech could be one of the pull factors. They [Fintech firms] will come here, assuming that I am missing something. right. So that is the thought process behind it, and that's how we came out with 'Fintech valley Vizag' as a concept".* President (IT & Innovation) of Vizag Fintech valley, government of Andhra Pradesh *"The most important thing over here is the resource. All the spectrum of people would be getting employed (in Fintech valley). In some case, we will need engineers, sometimes we also might need a social scientist ...That analysis has been carried out by our Fintech team. We have worked out MOUs with the universities..on skill development".* Special Secretary, Information Technology & Communications (Promotions) Department, Regulatory Agency, Vizag Fintech valley

Bundling Process

The following table maps the second-order themes, first-order concepts and representative data from the case in the **bundling** process.

Table 6. Dimensions, Themes and Data in the Bundling Process

Second-Order Themes & First-Order concepts	Representative Data
1. Emulating A. Model best practice from prior established ecosystems	*"most of the initiatives that we have started [in Vizag Fintech valley] are basically things that we learn in Singapore and in Singapore, the government acts as a catalyst. They are like an enabler. There is facilitator so if you look at block 71 and entire FE around that has created there are block 71 to block 79, and I think those kinds of examples we take and we try to build it in own manner."* Managing Director and CEO of GOVIN Capital, startup Accelerator, Vizag Fintech valley.
B. Apply proven methods to execute strategies	*"I really like the way they [Vizag Fintech valley regulatory bodies] function, created as a separate organization where the industry can be in touch with the organization and continue to give feedback. That feedback really got translated in or the administrative guidelines for new companies to apply".* The head of strategic initiatives, Fintech startup FT42
2. Enriching C. Improve existing strategically aligned capabilities	"*One advantage with our university is that we need not go for any permission and all those things for central bodies. Ours is a grade one university and we have grade one autonomy, and we can take up any course [which enriches student skills] we like. We need not go to other people to take permissions [since the university already secured required entitlements].*" Vice Chancellor of Gitam University, Vizag
D. Enrich knowledge on existing products and technologies	*"Here we get to mingle with other companies. It is a different kind of experience. But still, it creates better surroundings at the same time we are able to share our knowledge with each other. That's really good."* Founding partner of Fintech startup, GOVIN Capital, startup Accelerator, Vizag Fintech valley

3. Extrapolating E. Build new partnerships to gain knowledge and innovate in emerging techs	*"The future is all about artificial intelligence, Deep learning, Deep machine learning and so on. Whatever traditional services that are there in existence today. They may not continue for long. So, if we focus on futuristic technologies and the interest in the city and the state will increase so as a state, we are trying to support that."* President (IT & Innovation) of Vizag Fintech valley, government of Andhra Pradesh
F. Form capability for radical innovation & new market	*"There are certain areas where like artificial intelligence. We have startups here [in Vizag Fintech valley]. So, we harvest in that skill set [of industry practitioners]. So, we are using the experts of the industry to come and deliver sessions so that it will be more practical oriented for the students".* Coordinator of Fintech Academy, Gitam University, Vizag
4. Optimality	*"what we are trying to create here is an ecosystem so we are focusing on 5 M's as a strategy. One is manpower, second is market access, third is money, four is mentoring, and five is meetup events. Based on our interactions with startups for a couple of months, that is how we decided that these are the things we need to give to our startups. Actually, in fact, we started giving it to them. Later we realised that these five things became the 5M strategy for us."* Manager – Investment Promotion, Regulatory Agency, Vizag Fintech valley

Leveraging Process

The following table maps the second-order themes, first-order concepts and representative data from the case in the **leveraging** process.

Table 7. Dimensions, Themes, and Data in the Leveraging Process

Second-Order Themes & First-Order concepts	Representative Data
1. Sandboxing A. Perform proof of concept	*"When I joined the government on a full-time advisory basis …I represented India in the last year global blockchain conference where we presented the initiatives that the government is taking in terms of implementing the blockchain for public services like land registrations, motor registration, citizen services, etc. "* Special representative for IT and innovation, government regulatory body, Vizag Fintech valley
B. Demonstrate in small scale	*"The first phase idea was to set the platform needed for this, get the exposure, get the awareness about the Fintech valley, so that's been the focus. So now we have done all of those, and I think this sort of works now we just need to do it in a larger scale to blow it up and that's where the million-dollar challenge and the Fintech festival now we are going to get a lot more, and then we are about to launch a more formal policy (for Fintech)."* CEO of the Vizag Fintech valley, government of Andhra Pradesh
2. Coordinating C. Integrate capability configurations	"*The university is supporting us to go ahead, look forward, try to associate, see what the corporate wants and then design it. That's how the Fintech department has got the collaboration from Thomson Reuters or Broadridge Financial Solutions."* Principal, Head of Fintech Academy, Dept of Finance

D. Form exploitable capabilities to suit the market	*"We all talk about innovation. How many of us actually get into affordable innovation? So, I believe that we are one of the leading players in affordable innovation which is also called the frugal innovation. And what I mean by that is basically if you look at the service that we provide through some of our startup companies they need anywhere from $1 to $2 per person."* Managing Director and CEO of GOVIN Capital, startup Accelerator, Vizag Fintech valley
3. Deploying E. Exploit specific market opportunity from resource	*"We have a network [of software and services companies] pan-India. And then all of our startups that are incubated here have access to this network. We enable startups to pitch their idea to all of our global and national events which happen on this platform. And they [startups] have access to mentors and access to basically anything that comes to this network and the enterprise connect as well".* Manager of NASSCOM 10000 startups Warehouse, Vizag
F. Exploit entrepreneurial strategy	*"There are a lot of people with a lot of access to money and ideas. But they don't know how to get started… right what the Fintech association does is to provide the right infrastructure and right process to get it all done very quickly, so that you are up and running".* Special representative for IT and innovation, government regulatory body, Vizag Fintech valley *"The hold was really is, you know, giving exposure to the Fintech companies to global best practices, access to global best organizations, venture capitalists, etc., which is why we do these events. We did a big blockchain event, which is one of the biggest and best in the world".* Special representative for IT and innovation, government regulatory body, Vizag Fintech valley *"Any startup or any technology company to come and start operations here definitely needs business [Opportunities]. Although, we do not have so much of business [opportunities] in Vizag, which is mostly like public sector dominated city…… We focused on the use-case repository. We have partnered with various corporates, financial institutions, technology partners, and we have created the use-cases. We give it to thee startups either through hackathons or innovation challenges. That's how we connect startups with the market connectivity".* Manager of Investment Promotion, Regulatory Agency, Vizag Fintech valley
4. Equifinality	*"Many a time if you are trying to do things very very meticulously you never get it done. So, whatever they are getting, I mean with thinking or with resemblance of Fintech also most welcome. We want this place to be known as the go-to place in the country for anything Fintech. So, we are on the right track, and we have got very qualified people working with us in the Fintech team."* Special Secretary, Information Technology & Communications (Promotions) Department, Regulatory Agency, Vizag Fintech valley

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