# Resource mobilization and technology adoption by small firms to co-create opportunities in uncertain environments

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## Abstract

**Purpose –** Resource mobilization and technology adoption by small firms are mainly studied separately, although considering them together is crucial for understanding how resources are accessed and mobilized to address uncertainty. Moreover, we know little about how small firms pursue new opportunities in a constantly changing environment. The purpose of this study is to investigate how small firms adopt technologies to engage different stakeholders and facilitate the access and mobilization of key resources in the opportunity co-creation process.

**Design/methodology/approach –** We applied a qualitative case study method and conducted 14 interviews with co-founders or top managers of five small firms in Iran.

**Findings –** Our findings reveal how small firms adopt technologies to access and mobilize social, human, psychological, and financial resources in a highly uncertain environment to co-create new opportunities.

**Research limitations –** First, the study applies a cross-sectional approach. Therefore, it does not capture longitudinal aspects that might impact resource mobilization and technology adoption over time. Second, the selected five case firms represent rather successful firms, each of which adopted different technologies to challenge the established structure of the market. That is, we did not focus on unsuccessful cases that would enrich the theory further.

**Originality/value** – This study reveals how small firms adopt new technologies to mobilize resources and co-create opportunities in highly uncertain environments. It reveals that small firms employ technology adoption strategies to utilize operant resources and accelerate operand resource mobilization. Active learning plays a critical role in this process.



**Keywords** Resource mobilization; Technology adoption; Co-creation; Opportunity; Uncertainty: Small firms

## Introduction

The economic center of gravity is moving from rich countries to emerging countries. It allows us to deepen and broaden our theoretical understanding of the concepts, models, and frameworks of management and entrepreneurship literature (Foo et al., 2020). Even though emerging economies have enormous potential, some have highly uncertain business environments, making entrepreneurial operations particularly challenging. In an uncertain business environment, resource mobilization, a process in which a venture acquires resources to exploit its business opportunities (Gaol et al., 2017) plays an important role (Reypens et al., 2021; Zane and DeCarolis, 2016) by enabling entrepreneurs to control their environment (Karami and Tang, 2021). However, there is limited theoretical development regarding how entrepreneurs mobilize resources in uncertain environments where it is difficult to access appropriate resources. Commonly, entrepreneurs' mobilization of resources spans financial, human, social, and other forms of capital (Clough et al., 2019; Zane and DeCarolis, 2016), but most entrepreneurs lack such resources to scale up their ventures (Hertel et al., 2021). This is why entrepreneurs are compelled to adopt creative means to engage relevant stakeholders (Kerr and Coviello, 2020).

New technologies enable entrepreneurs to facilitate resource mobilization and foster the process of new venture creation and growth (Chatterjee et al., 2020). These technologies encompass digital platforms, social media, data mining, artificial intelligence, nanotechnology, etc. They empower firms to transform external inputs into innovations (Melville et al., 2004), gain a competitive edge (Lin, 2008; Neumeyer et al., 2020), achieve business growth (Bridge and Peel, 1999; Karami et al., 2022), and attain economic gains (Doganova and Eyquem-Renault, 2009). Additionally, new technologies enable entrepreneurs to rely more on operant resources (e.g., human capital, social ties, market knowledge, business knowledge, etc.), which allows them to access complementary resources and utilize their resources in more creative and efficient ways to overcome limited resource liabilities and explore new opportunities (Shahid et al., 2023). Prior research suggests that digital technologies drive small firms' growth and resource mobilization in emerging industries (Audretsch and Belitski, 2023). For instance, early-stage medical technology firms employ resource-seeking and bricolage strategies to mobilize resources (Reypens et al., 2021), while social media enables entrepreneurs to gain access to scarce resources (Drummond et al., 2018; Olanrewaju et al., 2020), and allows start-ups to develop new opportunities (Troise et al., 2023).

Nevertheless, despite their high relevance, the concepts of resource mobilization and technology adoption under uncertain conditions remain two distinct and isolated research streams in the existing literature (Lo, 2015), particularly in the context of emerging economies where under-resourced small firms utilize technology to gain access to operant resources, mobilize operand resources (such as financial resources, machinery, raw material etc.) and overcome their liabilities of limited resources. By considering these two concepts, we pose the question: How do small firms utilize new technologies to mobilize resources and develop new opportunities amidst uncertainties? Hence, the objective of this study is to explore how small firms adopt technologies to engage various stakeholders, such as customers, suppliers, and channel members, and facilitate the access and mobilization of key resources in the opportunity co-creation process.

To answer our research question, we apply a qualitative research method and study small firms in Iran – a country experiencing an uncertain business environment due to various international blockades – where an active ecosystem of knowledge-based small firms is thriving. Further, Iran presents an interesting emerging economy context for business studies, which is underrepresented in existing literature (Karami et al., 2024; Shultz et al., 2014). This study makes several contributions to the literature. First, it explains how small firms utilize new technologies in novel ways to mobilize resources in highly uncertain environments. Second, considering resource mobilization and technology adoption, this study explains how small firms collaborate with their stakeholders to co-create opportunities. Finally, our findings reveal the critical role of new technologies in changing the established business paradigms, which changes the market remarkably and puts technology-oriented small firms in an advantageous position over their competitors.

## Literature review

### *Resource mobilization*

A recent study by Clough et al. (2019) highlighted the need for a stronger theory of entrepreneurial resource mobilization. Resource mobilization refers to a process in which a venture acquires resources (operant or operand) to exploit its business opportunities (Gao et al., 2017). Resource mobilization is a key entrepreneurial activity for its pivotal role in new venture creation (Crick et al., 2021; Karami et al., 2022), product development (Knizkov and Arlinghaus, 2020), and business growth (Van de Ven and Jing, 2012). These resources can be categorized in different ways. The widely used categories are human, social, and financial

resources (Batjargal, 2007; Clough et al., 2019). Eeducation, skills, training, and experiences of individuals are considered *human capital* (Linder et al., 2020). *Social capital* is the network of relationships with key stakeholders to acquire resources. It comprises individuals, social structures (Coleman, 1988), and context (Guiso et al., 2008; Iqbal et al., 2023). Social networks play an important role in resource mobilization due to the existence of trust in such networks (Akhavan and Hosseini, 2016; Clough et al., 2019). *Financial capital* is the fund firms need to run their businesses. A Lack of financial capital is commonly cited as a primary reason for entrepreneurship failure (Chandler and Hanks, 1998). Resource mobilization enables small firms to access complementary resources and overcome the liability of limited resources, newness, and smallness (Crick et al., 2022; Gimenez-Fernandez et al., 2020). It becomes more critical for small firms in emerging economies with less developed regulatory institutions (Karami et al., 2024).

Small firms in emerging economies may optimize resources through networking and recognizing alternative sources (Kozan and Akdeniz, 2014). Organizational structure, coordination, and firms' connections with external stakeholders are crucial for resource mobilization (Mu, 2013; Yang et al., 2019). Entrepreneurship research provides rich literature on gaining access to new resources through networking (Kerr and Coviello, 2020). For instance, effectuation is an established practice for mobilizing complementary resources among self-selected stakeholders who agree on a certain goal and commit their resources to actualizing it (Jones and Li, 2017; Sarasvathy et al., 2014). Firms use various networks to collaborate with key stakeholders to acquire operant and operand resources for business growth (Kerr and Coviello, 2020).

There is a considerable amount of research on resource mobilization in emerging economies (Reypens et al., 2021). These works have investigated several research areas, such as the role of technology diffusion in resource mobilization within the context of Chinese and Indian firms (Surana and Anadon, 2015), the impact of governance on the relationship between resource mobilization and inclusive growth (Oyinloga et al., 2020), and the significance of information and communication technology (ICT) infrastructure in natural resource mobilization in Sub-Saharan Africa (Kpognon, 2022). However, most of these studies are concerned with macro-level factors, leaving our understanding of resource mobilization mechanisms in small firms within emerging economies relatively underdeveloped.

### *Technology adoption*

Technology adoption refers to the process by which individuals, organizations, or societies begin to accept and use new technology (Lee et al., 2013). Technology adoption contributes to the efficiency and effectiveness of entrepreneurial ventures in attaining a sustained competitive edge (Neumeyer et al., 2020). Small firms need to master technology adoption and management to be competitive in the market (Julien and Raymond, 1994). Prior research indicates that technology adoption boosts entrepreneurial activities (Chatterjee et al., 2020) by enabling small firms to successfully develop their employees' skill sets (Gerli et al., 2022), which, in turn, provides higher-level competencies for those firms to drive further technology adoption. Technology adoption by small firms also results in high-impact socioeconomic changes (Adams et al., 2021) by enabling small firms to run their businesses more efficiently and sustainably to serve both their customers and the larger society.

Technology adoption has been widely studied in various industries, such as the handloom (Bortamuly and Goswami, 2015), agriculture (Adams et al., 2021), high-tech markets (Meade and Rabelo, 2004), solar energy (Irfan et al., 2021), and gambling (Scott et al., 2019). Recent studies indicate that in emerging economies, the value of technology adoption is high, considering the liabilities of small firms therein (Xu et al., 2021). New technologies, such as digital technologies, enable innovation activities in small firms, resulting in the development of new products, services, and processes (Radicic and Petković, 2023). It is argued that new technologies create uncertainty in the market, which may be a positive enabler for smaller firms who are able to utilize the new technologies to create business opportunities (Drnevich and West, 2023). Employing new technologies to leverage diverse sources of information—ranging from customer feedback and market insights to competitor analysis and institutional data—in innovative ways has the potential to transform uncertainties into new opportunities, thereby bolstering the performance of small firms (Fletcher et al., 2023). Adopting technology is imperative for firms to enhance efficiency in operations and marketing, thereby gaining a competitive edge essential for long-term survival and growth (Bruque and Moyano, 2007). In this context, we posit that leveraging new technologies innovatively allows small firms in emerging economies to access complementary resources, optimize resource utilization, and deliver products more effectively to their customers.

## *Entrepreneurial opportunity co-creation*

Value is a key concept in management and business studies, so the entire business process is supposed to result in a valuable offering to key stakeholders. However, the recent entrepreneurship literature has critiqued the shortsighted view of value creation and delivery by the supply side to customers who passively receive the offering (Karami and Read, 2021; 2024). The core argument is that due to the uncertain environment in which small firms operate, no single entrepreneur or firm can develop new opportunities to produce and deliver superior value to its stakeholders (Ranjan and Read, 2016). In uncertain conditions, predictive methods and planning do not provide actionable knowledge for the decision-makers of small firms. As such, decision-makers rely on their social and business ties to gain new knowledge and other complementary resources to unpack uncertainty and co-create new opportunities (Kerr and Coviello, 2020).

Co-creative entrepreneurship (Karami and Read, 2021) and marketing literature (Grönroos, 2011) build on the importance of having access to the required knowledge about different key stakeholders in the marketplace. Contrary to transaction cost economics (Williamson, 1991) and industrial organization (IO) theories (Trigeorgis and Reuer, 2017), which explain how large resource-rich firms leverage their resources to control the market, the co-creation literature appreciates the unpredictability of the future and the critical importance of resource pooling in the growth and survival of small firms (Sarasvathy, 2001; Wiltbank et al., 2006). Co-creative entrepreneurship relaxes the assumptions of neoclassical economics about the stability of the environment and the rationality of decision-makers and calls for behavioral theories to explain how small resource-poor firms co-create new opportunities to produce and deliver value to their stakeholders (Karami et al., 2021; Trigeorgis and Reuer, 2017).

Gaining new knowledge plays a key role in co-creative entrepreneurship, where collaborating stakeholders can learn from each other (Kerr and Covielo, 2020; Vahlne and Johanson, 2017). Under-resourced small firms in emerging economies rely heavily on social and business networking to gain resources and collectively develop new opportunities (Karami et al., 2022; Zhou et al., 2022). Gaining new knowledge through collective sense-making and a shared understanding of the uncertain situation enables stakeholders to form an environment that can be controlled through their shared resources and interactions. Each action and interaction produces more information, which becomes new knowledge in collective learning that enables stakeholders to gradually make sense of and unpack uncertain situations (Kerr and Coviello, 2020). This co-learning process enables the constellation to adjust and fine-tune

business goals, share required resources, and systematically build a new future (Sarasvathy, 2024).

## Methods

### *Research setting*

We applied a qualitative case study method (Yin, 2009) that allowed us to collect and use data that were rather difficult to collect and access (Swanborn, 2010). It also enabled us to investigate a phenomenon that has received insufficient attention (Yin, 2009), that is, the impact of international sanctions as sudden supply shocks and how small firms address it through technology adoption and resource mobilization. The process of opportunity co-creation of small firms in an uncertain environment presents such a phenomenon in this study. Furthermore, a multi-case study facilitates theory development, as the findings can be deeply grounded in various empirical data sources (Eisenhardt and Graebner, 2007).

In this study, we selected small Iranian firms with experience in resource mobilization and technology adoption to create opportunities in uncertain environments caused by international sanctions. Further, the selected case firms met the following criteria to ensure relevance for the study: 1) their management team had a clear perception of emerging opportunities due to international sanctions to gain a better position in the market, and 2) they had established business with revenue streams based on sales of their products or services. As it was rather challenging to find Iranian small firms that fulfilled both criteria, we consulted an industry expert familiar with the firms we were looking for.

The expert provided a list of 12 firms within our scope. These small firms operated in diverse industries, including family consultancy, residential complex services, and business-to-business (B2B) services. Table 1 provides further details about these firms. The firms employed varied approaches to new technologies; some developed apps to enhance customer service convenience, others created new products to improve service efficiency, and some specialized in providing data analysis services to businesses. Within this context, we define technology, according to Arthur (2011), as a set of interrelated components. In addition to tangible products or services, knowledge, processes, and organizational structures are also required for practical purposes or applications. We approached the top managers of these firms and discussed their interests and willingness to participate in our study. Altogether, five firms accepted our request to participate.

Table 1. An overview of the five firms and data

| Firm | A | B | C | D | E |
|---|---|---|---|---|---|
| Industry | Tourism | Business data services (Big data analysis) | Family consultation | Gas and water services | Logistics (postal service) |
| Company size (employee) | 15 | 5 | 6 | 7 | 8 |
| Services | -Website, content | -Customized reports and data | -Magazine<br>-Game<br>-App | -Ultra-sonic meter<br>-App | -App<br>-Website |
| Interviewees | -CEO and co-founder | -CEO and co-founder<br>-Business developer and co-founder | -Business Developer and co-founder<br>-HR manager<br>-Content manager | -CEO and co-founder<br>-Business developer and co-founder<br>-CTO and co-founder | -CEO and co-founder<br>-Marketing manager<br>-CTO |
| Secondary data | -Official website<br>-Customers' reviews of social platforms<br>-Talking to employees<br>-Field notes | -Official website<br>-Talking to investors<br>-Field notes | -Official website<br>-Talking to employees<br>-Talking to a competitor<br>-Field notes | -Official website<br>-Researching this sector and foreign competitors through the Internet<br>-Field notes | -Official website<br>-Field notes |
| Date and length of each interview | Feb 29, 2019<br>3.5 hours<br>March 2, 2019, 2 hours | March 5, 2019<br>March 12, 2019<br>April 1, 2019, 3 sessions, each session around 1 hour. Totally 3 hours,<br>March 7, 2019, 2.5 hours<br>March 18, 2019, 2.5 hours | March 14, 2019<br>March 15, 2019, 2 sessions<br>Total of 4 hours<br>April 5, 2019, 2.5 hours<br>March 22, 2019, 2 hours | April 19, 2019, 4 hours<br>April 23, 2019, 3.5 hours<br>May 15, 2019, 3.5 hours | June 7, 2019, 3.5 hours<br>June 11, 2019, 1.5 hours<br>June 11, 2019, 2 hours |

Source: Authors own work

## *Data collection*

The data collection included 14 face-to-face interviews with founders and managers of small firms from different industries. All case firms had fewer than 50 employees. The interviewees were selected based on their important roles in the firms. They were either co-founders or top managers, thus having the most relevant and accurate knowledge of their firms' operations. As we applied a semi-structured interview approach, it was possible to ask detailed, open-ended questions and clarify unclear issues (Edmondson and McManus, 2007). These open-ended questions also allowed us to develop further questions based on the interviewees' reactions and answers (Myers and Newman, 2007). At the outset, we formulated the interview questions in English. Subsequently, these questions were translated from English to Farsi by a bilingual author. All interviews were voice recorded and transcribed entirely. After the interviews, the

Farsi transcripts were then translated back into English. A second bilingual co-author carefully verified the accuracy of these back translations. Following each interview, three co-authors diligently reviewed the transcriptions until a consensus was reached that no further interviews were necessary, as data saturation had been achieved. In total, the transcribed data spanned 106 pages using a 12-point font size, one-inch margins, and single spacing.

The interview protocol followed a structure in which we proceeded from general questions to more detailed and specific questions (see Appendix 1). We first asked general questions about their business idea, business model, and the establishment of the firm. Second, open-ended questions were used to map the firm's history and evolution. Third, more detailed questions related to changes in the markets, revenue, delivery modes, and technologies were made. Fourth, we asked questions focusing on customers, especially how the firm's business brings value to its customers. Finally, we asked and discussed an uncertain situation in the economy, the way the firm coped with that kind of situation, and further actions taken to survive in the market.

To validate the collected data and to avoid retrospective bias (Huber and Power, 1985), we collected secondary data (see Table 1) that allowed us to triangulate the interview data (Miles et al., 2013). This was conducted systematically by comparing the primary and secondary data. If we found inconsistencies between the data sets, these were discussed with the interviewees to eliminate possible misunderstandings (Huber and Power, 1985).

### *Data analysis*

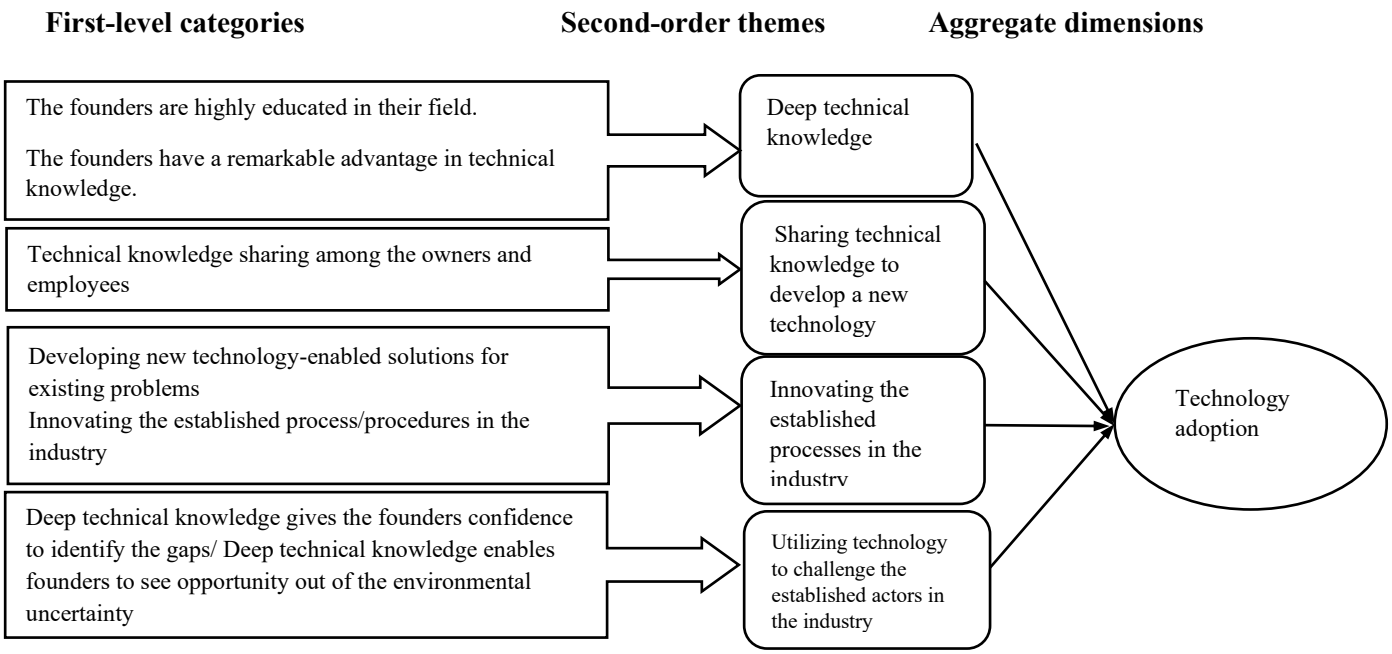
In the data analysis, we employed a combination of deductive and inductive approaches. Initially, we applied pre-established coding based on the themes identified from the literature. These themes were "technology adoption," "resource mobilization," and "opportunity co-creation." Subsequently, we conducted open coding to identify potential new themes from the data as we remained open to emerging new themes during the analysis process (Strauss and Corbin, 1999). Through our open coding analysis, we identified the theme of "active learning." This hybrid methodology facilitated the validation of existing theories while also capturing the richness and complexity of the data. Two authors collaborated on the data analysis to identify first-level categories, while a third author served as an external observer, reviewing the analysis and suggesting possible revisions.

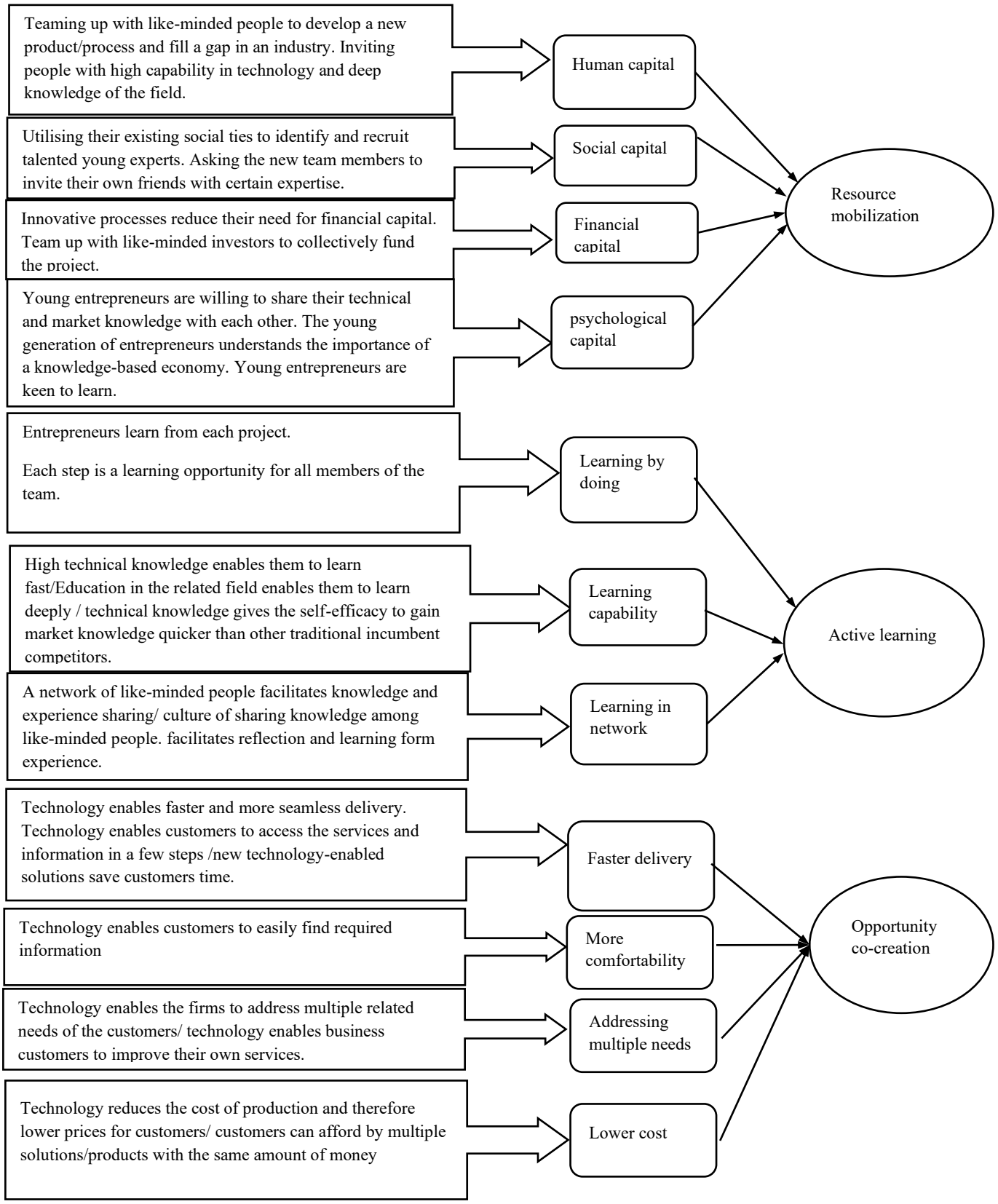
In our second-order analysis, we integrated the initial themes into second-order themes. Drawing on our theoretical knowledge, we further developed the first-order categories and

linked them to our theoretical themes. This process involved an iterative approach encompassing five stages: 1) Qualitative content analysis of each interviewee's account; 2) Evaluation of the consistency of accounts across interviewees; 3) Creation of theoretical dimensions by connecting our first-order findings with theoretical labels; 4) Reflection and refinement of different codes, themes, and labels until the data structure stabilized; and 5) Consolidation of emerged patterns into a cohesive conceptual framework to facilitate theorizing (Shepherd et al., 2020). This process was conducted by the first two authors, who then reached a consensus on the second-order themes. These themes were then presented to the third author, who reviewed them and adjusted them as needed.

Based on the data analysis process, we identified the following aggregate dimensions as our main themes: 1) resource mobilization, 2) technology adoption, 3) opportunity co-creation, and 4) new knowledge development. Below, we provide details of the constructs and their relationships in Figure 1, which presents the structure of the data analysis. Appendix 2 presents the main themes of the study along with representative quotes from the empirical data.

Figure 1 Data structure






Source: Authors own work

## Results

Based on the empirical findings, we argue that ***Technology adoption capacity*** was a key factor for small firms in utilizing human, social, and psychological capital to make sense of uncertain situations, co-creating new opportunities, and influencing the resource mobilization process of small firms. In all cases, the founders were highly familiar with the core technologies in their industries due to their engineering background. They had *deep technical knowledge,* which gave them a better understanding of the products, processes, and capabilities to deliver better customer service. Their acquaintance with technology and know-how enabled them to think of new solutions to problems and utilize existing and accessible operant resources to *challenge established trends and processes* in different industries. Case C was established in a direct response of the founders to such problems in the industry. As mentioned by the founder of the firm, "*We decided to revolutionize the family consultation industry by developing an online platform*." In all cases, utilizing their skills and expertise in working with big data, machine learning, and other technologies enabled small firms to identify some gaps in the market, signaling new opportunities, and utilize human, social, and psychological capital to mobilize financial resources and develop new opportunities. For instance, Firm A utilized big data to follow tourists' behaviors and restructure the markets. In contrast, Firm E utilized big data to extract the critical patterns in a business-to-business (B2B) market. *We were quite familiar with using big data for emotion analysis, time series, AI, regression models, etc. (B)*

As mentioned by interviewees, incumbent firms not only lacked such skills but also had no idea where these new and innovative solutions came from. The traditional firms' myopic view of business, focusing on their established business models mainly based on importing and distributing products from international producers, was the main hurdle for them. As a result of familiarity with new technologies and knowing the importance of these technologies in filling the market gaps, the entrepreneurs of small firms successfully *revised the established procedures and processes* in their industries across the supply chain. They offered new solutions, services, and products to customers in their industries. The case highlighted by the founder of case A:

*The traditional large-size travel agencies provide tours via their distribution channel in different countries. Our online platforms changed the game by providing a platform for all travel agencies to offer their series to international tourists. (A)*

Considering the massive impact of international sanctions on the import of all sorts of products, machinery, and software to the country, the case firms were highly motivated to invent and come up with any kind of required solution for their business customers in the absence of global providers. The entrepreneurs of small firms relied on their entrepreneurial and innovative production orientation (vs. import orientation) mindset; and built teams around their new ideas. In all cases, filling a market gap caused by international sanctions as sudden supply shocks was one of the main motivations that triggered young entrepreneurs to think of developing new solutions.

> *We learned from our investors how to reduce our dependency on exchange firms in regional countries and establish two branches in European countries to balance the risk of sanctions. (A)*

We found that ***resource mobilization*** was a key factor in opportunity co-creation by small firms with limited resources in a highly uncertain environment. The entrepreneurs started with their existing means and used their technological capabilities to apply new technology for resource mobilization. New technologies enabled them to utilize operant resources, including human and social capital, to develop new solutions. By mobilizing their operant resources, small firms found ways to access other complementary resources, including financial resources. Operant resources played a major role in starting a business and scaling it up. For instance, the entire process in Firm D started with the *human capital* of the focal entrepreneur. As stated clearly by the founder of D, "*We three brothers were equal and relied on each other. When we found a problem with the investor, we kept our business alive. I think that the human resources, including our family, are the most important factor in the success of this business*." The founder's education and familiarity with the technical aspects of the business enabled him to imagine new solutions and services for filling a new gap in the market. Similarly, the focal entrepreneur's expertise in Firm C provided a ground for other like-minded people to trust her and be inclined to share their expertise and knowledge of the service, process, and market. Actively collaborating with a group of like-minded people with complementary expertise and skills related to the needs of a specific sector in the market enabled her to develop initial human capital further, providing both market and technical knowledge. The focal entrepreneur's work experience in the same market also established more legitimacy, enabling her to build trust with other experts in the field and convince them to share their resources. Almost all cases revealed the key role of *human capital* as both the initiator of the process and as an important factor in building trust and commitment to mobilize complementary resources.

*My experience working in top companies in this field has allowed me to have a relationship with talented staff and the managing board of these companies. This network enabled us to introduce our product to the market smoothly. (D)*

*Social capital* played a key role in the mobilization of complementary resources. As mentioned in all cases, the focal entrepreneurs identified experts in their fields through their social ties, some being direct ties (Firms C and D), and others being introduced by their direct ties (Firms A, B, and E). In both cases, friendship and trust between the focal entrepreneur and her business and social ties were a key factor in resource mobilization. The first step was to find people with the same mindset and complementary resources in their social circles. This seems to be a rational way of gaining access to the necessary resources in the Iranian collectivist culture, where families, relatives and friends support family members in all aspects of their lives. Because of the activated human and social capital, not only was a remarkable degree of different operant resources mobilized, but *financial resources* were also accessed. All cases started with limited or no money, and the focal entrepreneurs collected a remarkable amount of financial capital both within their social ties and from financial institutions.

*We had only a deep technical knowledge, but no idea what was going on in the market… until one of our friends with good experience in starting several new businesses joined us… (B)*

*Psychological capital* also played a critical role. The new generation of entrepreneurs in Iran has different approaches to business that are rooted in their education, work experience, and approach to business. Their lifelong experience of living under heavy international sanctions has given them a strong psychological capital, enabling them to address extreme uncertainty and absorb sudden economic shocks. As captured by one of the interviewees "*I thought the entire process can be much more efficient and different by utilizing new technologies."* (C). This mindset was present in all case firms, encouraging them to focus on innovation, problem-solving, and high-added value rather than on short-term income generation through importing finished products. We consider this mindset as *psychological capital,* as it describes the mindset of the new generation of entrepreneurs and distinguishes them from import-based businesses.

Based on findings, young entrepreneurs used new technologies to mobilize different types of resources, enabling them to enter a market dominated by established incumbent players. Using technology to set new online platforms for resource procurement and

distribution of their products opened new supply chain arrangements that were out of reach for their competitors. By doing so, the young small firms challenged the dominant business models and created new competitive advantages without spending much money or other operand resources.

***Active learning*** was a key mechanism in the entire process of resource mobilization for opportunity co-creation. Although the founders were highly educated in technology-related fields and had high familiarity with the technologies in their industries, they did not have a clear idea of what the final solution would be to fill the market gaps. In most cases, the founders started the business with a general aspiration to apply their technical knowledge and work experience to solve issues and fill the market gaps. As such, they were aware of the importance of developing the required skills, capabilities, and resources to find new solutions. For instance, Firms A and C directly connected their initial ideas to a problem observed by the founders. This open mindset and confidence formed by their expertise and technical knowledge encouraged them to look for opportunities to learn and find out the subsequent steps.

The main mechanism of learning in all cases was *learning by doing,* which took place gradually. In the absence of financial resources, which greatly reduced their affordable loss, the entrepreneurs relied on their operant resources, including their social ties, to work out different ways in difficult situations. As mentioned by an interviewer from case C, "*We started with an App, then we learned that the market still likes print media as well, so we launched a magazine*." *Learning capacity, or ability to learn how to learn,* which was established as an important factor during their university years, provided them with a great capability that their traditional import-oriented counterparts lacked. This learning capacity enabled the entrepreneurs to learn from their mistakes and successes in each step and absorb new information, techniques, and so on represented by their social and business ties. For instance, case E mentioned that: "*We tested this model in two states and corrected their mistakes in 2018 and we noticed that where and with what views people live*." As such, they considered their networks to be *learning networks.* All cases mentioned the importance of their networks as a platform for learning complementary skills and techniques, among other important market-related information. The founder of case B mentioned it clearly, "*I was convinced that I do not know all necessary things for this business, and my social and business friends know a lot of those things that I do not….*"

***Opportunity co-creation*** was the outcome of the entire resource mobilization process, technology adoption, and active learning. Opportunity orientation, encouraged by entrepreneurs' technical capabilities and psychological capital, enabled them to use technology

adoption to mobilize resources in a dynamic process. Each step informed the next so that by gaining access to new resources, entrepreneurs fine-tuned their perception of technology and its application in filling the gaps in their supply chain. A key finding was that in all cases, the entrepreneurs described a process that resulted in opportunity co-creation. In all cases, the process of co-creation began early through active interaction with customers who were suffering from a broken-down machine, lack of software support, lack of after-sales services from an international vendor, and other issues commonly due to international sanctions. The traditional import-oriented businesses could not address those issues due to myopic view of their business. Relying on their psychological, human, and social capital, the entrepreneurs interpreted these issues as new opportunities to overcome the traditional ways of doing business in Iran. The first step was engagement with the customers to understand the situation and their specific needs better. The founder of case C provided a good example: "*Our platform enables families and other clients to input their concerns, and any related information, and receive the consultation service in the fastest and most efficient way*." Openness to new knowledge, technological capabilities, and human and social capital enabled the case firms to establish and utilize such associations with different actors in the market.

Establishing a long-term relationship with customers and having direct and friendly conversations with them provided opportunities to investigate their machinery, existing technology, and related needs. The ongoing conversation with their customers was also a mechanism for building trust between them, which, in turn, facilitated knowledge and experience sharing. The next step was collaboration with customers, suppliers, and technology providers, as well as with external actors who were willing to contribute to their projects. The result of this dynamic process of collaboration with multiple actors created certain types of value for those actors. The most important value that customers received from these collaborations was the *fast delivery* of services to their customers in the B2B sector (Firms B and E) and the fast and seamless delivery of the services in the B2C sector from a local provider with much lower prices and reliable after-sales services (Firms A and C). The founder of case B provided a good example:

> *I was convinced that I did not know all the necessary things for this business, and my social and business friends knew a lot of those things that I did not…. we tried several different programming and AI schemes, Piton, R, etc. in our collaboration with different people and the process was so fruitful…*

The big data-based solutions also helped address the *multiple needs* of their customers. Furthermore, these innovative solutions came with *lower prices* than imported products and

services. Considering the localized supply chain, currency exchange rates, and problem-oriented innovation, one can make sense of such a price reduction. The new solutions also reduced production and maintenance costs for business customers, reducing their final prices. Appendix 2 provides more representative quotations underlying first-level categories and second-order themes.

## Discussion and conclusions

### *Discussion*

Our findings revealed that to mobilize resources in a context characterized by uncertainties such as sudden supply shocks caused by international sanctions, small firms team up with like-minded actors and use new technologies in innovative ways to find solutions. Lack of resources due to broken supply chains makes social networking and collective business models a critical option for small firms under such conditions. Although international sanctions are not the case for all emerging economies, small firms in most emerging economies often face challenges due to the liability of limited resources and uncertainty (Carrière-Swallow and Céspedes, 2013; Kumar et al., 2021; Shahid et al., 2023). Our findings reveal that continuing collaboration with key stakeholders for value co-creation (Ranjan and Read 2016) and overcoming liabilities of limited resources and the unpredictability of the environment (Karami and Read, 2021) provide new opportunities for these small firms to survive and thrive under uncertainty. These firms rely on new technologies and consider the uncertain situation as a source of new opportunities to reconstruct the supply chain and gain more advantageous positions compared to their established incumbent competitors, which depend on importing and distributing products. Tech-savvy small firms use social ties to recruit enthusiastic young and resourceful people and also gain access to financial resources. Moreover, due to their learning capabilities, they quickly learn from their mistakes and evolve their technology-based business strategies. Learning capability enabling quick learning provides small firms in uncertain conditions with new opportunities to fill emerging market gaps in the absence of giant international competitors. The importance of learning in new opportunity creation has been emphasized in prior studies (e.g., Johanson and Vahlne, 2009; Karami and Tang, 2019; Sarasvathy, 2001). Our findings elaborated on its role in technology adoption and resource mobilization in the specific context of emerging economies. Given the rapid development of technologies, mere technology adoption alone is not enough to develop sustainable businesses. Our findings revealed that small firms adopt new technologies to mobilize key resources and cope with

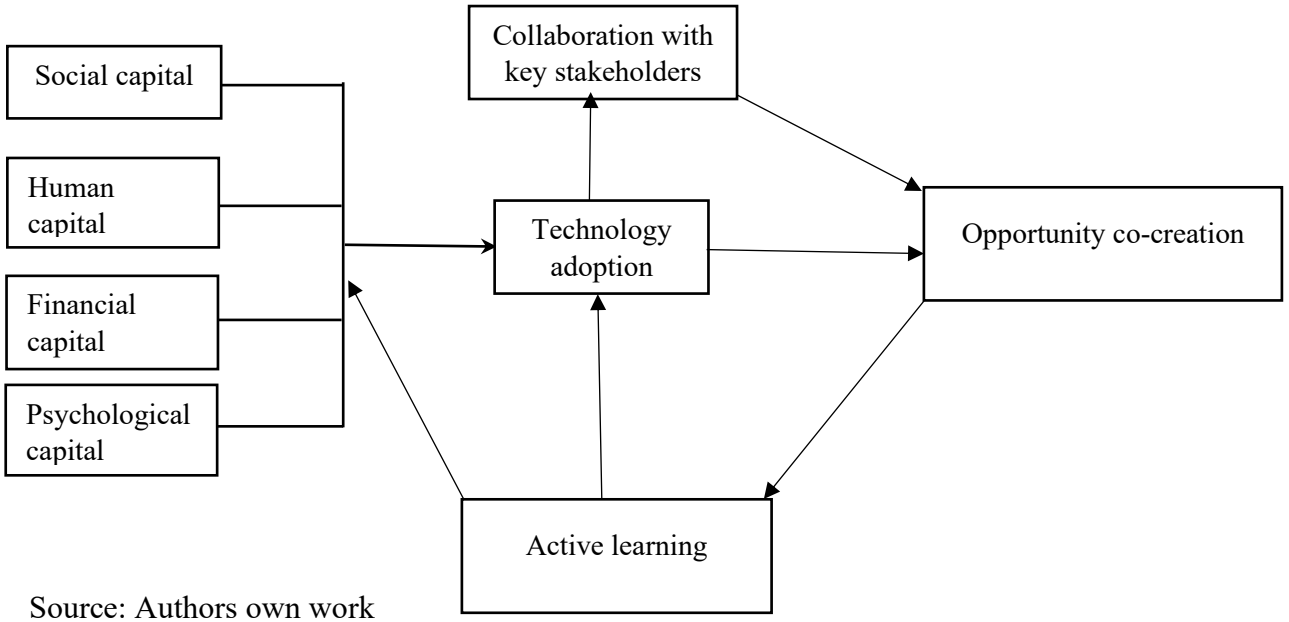
rapidly changing environments (Baldwin and Lin, 2002). These conditions became even more uncertain under international sanctions, which block access to key resources and normal ways of doing business in some countries (Karami et al., 2024; Meyer et al., 2023).

### *Theoretical implications*

This study integrates the resource mobilization and technology adoption literature to explain the process of new opportunity development by small firms. Even though both are important to consider together, they have been studied in isolation (Desa, 2012). This study explained how technology adoption enables small firms to utilize their operant resources (human, social, financial, and psychological) to facilitate access to operand resources in highly uncertain environments (Juma et al., 2001). While previous studies on resource mobilization had been conducted in emerging market contexts (Xu et al., 2021), this study explored resource mobilization in an uncertain environment with international blockades. Hence, the specific geographical context of this study, Iran, provides new insights into our understanding of doing business under extreme uncertainty and sudden shocks, which is becoming a new normal due to recent pandemics and other geopolitical issues.

We developed a conceptual model that captures the theoretical relationships between resource mobilization, technology adoption, learning, collaboration with key stakeholders, and new opportunity development by small firms (Figure 2). The conceptual model explains how technology adoption works as a mechanism to mobilize psychological capital, social ties, and human capital as key resources, provide access to financial resources, and enable small firms to not only overcome the uncertainty caused by international sanctions but also take the situation as an opportunity to co-create new solutions for customers. As shown in Figure 2, active learning plays a critical role by enabling small firms to learn from each innovative technology application and make their resource mobilization more efficient.

Figure 2. Conceptual Model




Source: Authors own work

Our study implies that the founder's deep technical knowledge enables them to rapidly adopt new technologies (Partanen and Goel, 2017) and collectively develop new opportunities. These small firms share technical knowledge with their employees and business parties. Thus, they challenge incumbent companies with a myopic understanding of business in their industries. Technical knowledge aligned with cultural and psychological capital encourages resource-poor, tech-savvy small firms to share their knowledge with their business partners, which, in turn, facilitates the process of resource mobilization and opportunity co-creation.

Collaborations and trust in networks have been discussed extensively in the entrepreneurship literature (e.g., Johanson and Vahlne, 2009). This study adds to our understanding of the mechanism that accelerates resource mobilization and sharing among the key stakeholders of small firms. Quick technology adoption helps small firms develop efficient supply chains and faster delivery systems. Customers could find products easily due to the rapid adoption of technologies by small firms. Moreover, technologies help reduce production costs; as such, small firms could offer better value to customers and co-create opportunities with their key stakeholders (Karami and Read, 2021).

The findings of this study make several contributions. First, the study proposes a model based on the findings that capture technology adoption as a mechanism that enables small firms to gain access to operant resources, mobilize key resources efficiently, and collectively co-create new opportunities. As such, this study considers two important concepts of technology adoption and resource mobilization in an integrated framework to explain innovation and

opportunity co-creation under uncertainty. Finally, the findings reveal that technology enables small firms to mobilize important operant resources such as social ties and psychological capital to see the international sanction as an opportunity to overtake their long-established incumbents and develop new solutions for their customers.

## *Practical implications*

Our findings imply that decision-makers of small firms need to take a different lens to look into their extant means and the way they can use those means. First, means are not limited to financial or other types of tangible means, such as buildings and machinery. Our findings revealed that operant means, such as human capital, knowledge, experience, attitude, and culture, are more important than financial resources for small firms, which can be efficiently mobilized by proper technology adoption for facilitating new opportunity development. Small firms should revise their perception of resources and use new technologies in innovative ways to mobilize their personal and social means.

Second, the extant operant resources need to be mobilized properly to fusion the energy and positive affect on the entire team within the firm, as well as on the external ties, to further mobilize and develop complementary resources. More specifically, small firms should utilize their extant technical and market knowledge along with their learning capabilities to reinforce the learning capacity of the organization. When the extant human capital is mobilized, it nurtures confidence in the team and starts a virtuous circle of learning, which in turn results in more efficient mobilization of further resources.

Third, social ties are another important operant resource that needs to be properly activated to become useful resources. The decision-makers of small firms need to identify easily accessible existing social ties and utilize new technologies to connect them to their business and encourage them to participate in their endeavors to construct a better future. Facilitated social ties can provide solutions to different pieces of the problems with which decision-makers are coping, as well as the required resources to address those problems.

Fourth, technology adoption is another important factor that the decision-makers of small firms need to deal with actively. Technology plays a critical role in challenging the established structures of the market, wherein large incumbent firms leverage their financial capital to outperform small firms. Technology is the game changer that challenges established business models in the market and opens new avenues for providing services in different ways.

Small firms should apply their technical knowledge to utilize cutting-edge technologies in developing new products and solutions for their customers. The incumbent firms should also recognize their myopic view on technology and new markets and collaborate with small knowledge-based firms towards more innovative solutions.

Finally, learning is a lubricating factor that enables small firms to continue with resource mobilization and technology adoption. The environment continuously changes, and uncertainty is a constant feature of the business environment in emerging economies. Small firms that rely on their human and social capital for opportunity creation have to keep up with changes in technological, societal, economic, and political changes in the marketplace. Being open to gaining new knowledge and developing an organizational culture to embrace learning and reflect on changes can ensure the long-term growth of small firms.

### *Limitations and future research directions*

Our study has several limitations, which provide some directions for further research. *First*, our study did not focus on uncertainty as a theoretical construct. We simply considered uncertainty as a context. Future studies could conceptualize uncertainty and look at resource mobilization and technology adoption with that conceptualization. Future research could focus on different elements of uncertainty such as sate and response uncertainty (McKelvie et al., 2011), and how small firms may address those elements through resource mobilization, technology adoption, and gaining new knowledge.

Second, we focused only on successful firms that employed technology to mobilize resources and challenge the established structure of the market. Future research may consider unsuccessful cases regarding resource mobilization, technology adoption, and gaining new knowledge. This would provide counter-evidence to better theory building (Eisenhardt, 1989). Future research may also consider successful small firms that utilize different resources or do not necessarily rely on technology for resource mobilization.

Finally, entrepreneurs' attitudes toward uncertainty, resources, success, and failure play an important role in their perceptions of uncertainty and resource mobilization (Rindova and Courtney, 2020). While "psychological capital" explains why the new generation of entrepreneurs in Iran thinks and acts quite differently, we did not elaborate on the role of their attitudes toward uncertainty and resources as an antecedent of the entire resource mobilization process. Future research may investigate different antecedents of psychological capital.

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## Appendix 1. Interview protocol

1. Tell me about the *original idea* for the firm *and how you started to develop the idea further*. (Year of the original idea and the year of establishment)
2. Who are your *target customers*, and have there been *changes in the target customers* during the firm's history? If yes, why?
3. What are the *major changes in your product/service* during the firm's history? What are the *reasons* behind these changes? (Year of the changes)
4. What is the *value of your product/service* for customers?
5. Who are your most important partners? How did you *develop relationships* with them?
6. Do you have *competition* in the market? How do you follow competing firms?
7. Tell me about your *delivery model*. Has there been changes in the delivery mode?
8. Tell me what kinds of technology/digital technologies you use to support your business.
9. Have you got the necessary resources (relational, personal, financial) through the process from the beginning till now? How have you acquired these resources? What are the resources that you consider the most important for your business?
10. Do you see the recent environment of the country as challenging for your business? how/why?
11. How have you managed the uncertainties in an unpredictable environment of the country? (to find out if it's a matter of affordable loss, logic of control, etc.)

Appendix 2. Representative quotations underlying first-level categories and second-order themes

| Aggregate dimensions | Second-order themes | Exemplary quotations |
|---|---|---|
| **Technology adoption** | Deep technical knowledge | - I assembled a team of a few of my friends who were highly educated in engineering fields at top universities, and we decided to start a business around big data and AI. B<br>- In our team, we had high knowledge of psychology and IT…C<br>- The excellence of our big brother in technical knowledge, his ability in designing and production, his experience at work, and market intelligence, as well as the market needs, led us to move towards the idea of producing ultrasonic smart meters. D |
| | Innovating the established processes | - The existing service in the industry was limited to providing very superficial analyses to the customers… we started using AI and big data analysis to provide much more advanced and useful analysis. B<br>- He was technically strong enough to build a bench test device for the water supply company, which used to be imported until that time. He is the first founder of a bench test in Iran, a calibration device for water meters, and is currently priced at more than $ 2 billion. D<br>- The speed of order registration has diminished… the speed of operation increases and better support is offered, which is strongly to the customer's interest and almost there is no need to telephone call, and the customer can observe and follow all affairs on the website. A |
| | Technology to challenge the established actors | - We used digital technologies to provide transportation services, and as a result, the rules of the game changed in the industry. E<br>- There are lots of consulting firms in the market but none of them use up-to-date data for their analysis. They do not have access to that type of data. However, with this team, we can gather hidden data from the internet and propose the best practical solutions to companies. C<br>- There are some competitors in the market, but most of the competitors work traditionally and are not considered serious competitors. A |
| **Resource mobilization** | Human capital | - The initial idea was formed among us when we were first-year university students … B<br>- The founder of our start-up has a degree in psychology, which enables us to have a good understanding of the client's needs. C<br>- The most important resource we build on is highly educated and skillful people. E |

| | | |
|---|---|---|
| | Social capital | - We decided to provide an online "marketplace". We talked with several travel agencies that we were in touch with to let us introduce their tours in our marketplace. … we then expanded our relationships to include other travel agencies introduced by our network members. A<br><br>- Our previous and traditional business, which still works, let us have a vast network with many different businesses. E<br><br>- Since the founder is a psychologist, she invited all her psychologist friends and professors to the product launch event. It was a very good marketing for our products. C |
| | Psychological capital | - Most of the industry and ecosystem experts predicted that we would fail unless we pivoted by changing either the product or the business line… we believed that we were moving in the right path. D<br><br>- We thought that we could work against what our direct competitors are working on based on this business model instead of using a foreign investor to disappoint internal investments. We believed that this way, we would be able to develop simultaneously, and we started researching and programming on this subject in 2017. E<br><br>- The interesting thing is that nobody has been able to crawl Instagram so far. As a result, we both worked on the subject. We used different artificial intelligence programming languages like Python and R and performed trial and error for one year without success. Finally, we could make relatively significant progress after one year. B |
| **Active learning** | Learning by doing | - We started with an App, then we learned that the market still likes print media as well, so we launched a magazine … C<br><br>- We started by inventing a new smart meter for big residential complexes, but then we understood that the main problem is the exact measurement of each household's electricity usage. Then we moved on with an App to satisfy the household's needs for controlling their usage. D<br><br>- At the beginning, we thought that international tourists were looking for tours, but then we learned that they were not after r tours; they were looking for different services while visiting the country. A |
| | Learning capability | - It took two years for us to learn how to extract data from Instagram… B<br><br>- We tested this model in two states and corrected their mistakes in 2018, and we noticed where and with what views people live. E<br><br>- At first, we tried to attract co-founders, but we were not successful. However, the positive point was that we were three brothers, and we were educated. So, each of us performed several tasks, and we acquired different skills. D |
| | Learning in network | - I was convinced that I did not know all the necessary things for this business, and my social and business friends know a lot of those things that I do not…. we tried several different programming and AI schemes, Piton, |

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| | | R, etc. in our collaboration with different people and the process was so fruitful… B<br><br>- The main founder had some experiences in different companies as an employee or a consultant and he learned a lot from top experts in these companies. D |
| **Opportunity co-creation** | Fast delivery | - Our digital platform increased the speed of transportation service for our customers. E<br><br>- Our online platform provides real-time information, such as customized tour guides, payment information, booking confirmation, etc., to our customers. A<br><br>- We think we are on the right path… customers can find us through our website and social networks. D |
| | More comfortability | - Our services are available online, on telephone, and in person. C<br><br>- We have programmed an operating system for the hardware. Now, customers can use their smartphones to connect to data of their facilities, especially to our smart meters. D<br><br>- Our service is now more customized and readier to use with a few clicks, eliminating long waiting queues and the possibility of choosing different consultants… B |
| | Addressing multiple needs | - We provide entertainment for kids, which is based on educational material. Also, we provide a report of kids' performance in terms of different skills to their families… C<br><br>- We provide a platform where our business customers can receive 200 different administrative services. E<br><br>- We provide services such as transfer, flight, payment, tour planning, and many more through our online platform to international tourists. A |
| | Lower costs | - Our package of more than 200 services reduces our business customers' human resource costs, transportation costs, etc., by outsourcing these services to us. E<br><br>- We generate and use the most recent data to uncover problems, bottlenecks, and weaknesses with much lower prices for our business customers. B<br><br>- We enable our customers to decrease their consumption and the costs. When you do not know the amount of your consumption from a shared utility, you try to consume more to prevent losing your right and paying for another person's consumption. So, the consumption rate increases in this way. D |

Source: Authors own work