How high-tech start-ups learn to cross the market chasm?

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Received: 1 December 2021 / Accepted: 15 June 2022 / Published online: 5 August 2022
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Abstract
The importance of business learning especially among IT start-ups was recognized by many to cross the market chasm. This study aims to present dimensions and aspects of business learning in IT start-ups by using a case study as a qualitative methodology including 23 in-depth and online face-to-face semi-structured interviews with entrepreneurs and co-founders of start-ups in Tehran Province, Iran (about half of them (11) passed this chasm perfectly). This study shows that active IT start-ups in 12 areas or products of services used customers, benchmarking, prior experience, competitors, consultants, internal ideas, and educational content as learning sources from both, formal and informal channels. The team structure is used as the dominant organizational structure for learning. Active experimentation followed by concrete experience (accommodating) is recognized as the most used learning style. To depict a more realistic learning system for crossing the market chasm, triggers, reinforcement, and barrier factors are introduced in a proposed model.

Keywords Innovative learning · Start-up · Information technology · Market chasm

Introduction
Market-related problems are among the main challenges for start-ups (An & Ahn, 2016; Giardino et al., 2015) in the early stages of their life cycle (Moore, 2014; Ries, 2011) which increase their death rate (Shanbhag & Pardede, 2022). Despite the gradual growth of Iran’s entrepreneurship ecosystem in recent years (GEM Iran, 2018) as a developing country, the country is still very dependent on exporting its natural resources like oil and gas (Bagheri et al., 2020) while developing information technology (IT) and start-ups engagement in the economy could be a telling alternative (Mozayani & Moradhassel, 2020). Start-ups face two main fatal challenges within their initial years of activity, Technology, and Market (Polhill et al., 2019), and both of them are called chasms because start-ups may fail to pass them and cease their activity. Technology chasm is the first significant challenge for high-tech start-ups which is about the technology base of start-ups. Market chasm as the second important challenge is centered on scale-up for start-ups to gain a majority of customers in a specific market (Moore, 2014; Son et al., 2020). Considering the fact that this research is conducted only for market chasm, learning from initial customers (innovators and early adopters called early markets) is crucial for handling the scale-up (or product-to-market fit) process to cross the market chasm (Giardino et al., 2015).

Learning in academia may convey different meanings regarding their sources. Some researchers divided learning for the market into explorative and exploitative, which both are related to gaining and refining knowledge about new or existing markets (Kack, 2019). This view has an organizational orientation toward learning as an essential factor for success (Crossan & Berdrow, 2003; Hooi, 2019). But validated learning (Corbo et al., 2020; da Luz Peralta et al., 2020; Ries, 2011) and the role of early adopters in market acceptance of the new products or services amplified by many authors in today’s start-up era (Bianchi et al., 2017; Lynn et al., 2017; Moore, 2014; Sääksjärvi & Hellén, 2019).

In light of mentioned facts about our focus on market chasm and learning from customers, our paper aims to answer this important question: what are the dimensions and aspects of learning from early adopters customers to cross the market chasm in information technology start-ups in Tehran province.

Contrasting with existing research in business learning areas like Kolb’s learning styles (Kolb, 1984), experimental learning (Corbett, 2007), validated learning (Blank, 2013;
Frederiksen & Brem, 2017; Ries, 2011), and entrepreneurial learning architecture (Holcomb et al., 2009), this study examines the components and dimensions of high-tech start-ups’ learning in the information technology sector. This means previous experience-based learning research provides a practical standpoint on business learning (Morris, 2020) and shows there are opportunities for business learning as a more developed concept, especially in a start-up context. While we aim to encompass the knowledge of experimental learning and extend the literature, this paper is one of the first empirical studies that focus on business learning to cross the IT industry’s market chasm in start-up context and culture. Moreover, this paper will inspire IT business founders, to think and act about the importance of learning and hopes to help them establish new for their scale-ups to catch mainstream market customers.

We organized this paper into seven main sections. The first and second parts of the paper prepared insights and required a literature review about crossing the market chasm or death valleys of IT start-ups. Thirdly, the used methodology to answer the main research question was explained. The fourth section reflects the findings on how start-up founders learned to cross the market chasm in their market segment. Discussion, as the fifth section of this paper, holds conceptual analysis of learning in start-ups and the contributions of this study. The sixth section specifies the main research limitations and agendas for future research. Finally, this paper concludes by highlighting the implications of findings for entrepreneurship ecosystem players including IT start-up founders, investors, incubators or accelerators, and policymakers.

**Literature review**

**Business learning: definition and application in IT start-ups**

Learning is known as a broad range of activities that happens at different levels of organizational structures (Crossan et al., 1999) to manipulate and utilize knowledge (Argote & Miron-Spektor, 2011) in different ways and has been recognized as a comprehensive and deep-rooted concern mainly as a personal attitude or skill (Rae, 2005). The availability of IT tools, along with the prevalence of novel ideas for many entrepreneurs, encouraged them to quest for methods to find, gain or adopt their required knowledge for success (Giardino et al., 2015). In recent years, learning has gained the attention of many scholars and practitioners due to its importance to catch market trends (Moore, 2014; Ries, 2011; York, 2021) and follow lead users to pivot products and services in a short time not comparable to the old fashioned industrial models.

Despite the robust body of research, business learning is an emerging area of study in academia (Goldasteh et al., 2020). Scholars have adopted three main approaches to describe learning in social sciences. First, scholars used a behavioral approach concentrated on rewards and punishments as a general tool for controlling others’ learning and consequently their behavior (Man, 2006; Schmidtke et al., 2016; Soetikno et al., 2020; Zhang et al., 2019). This mindset has defined business learning as a relatively stable change in behavior to achieve an objective. The second approach to business learning is knowledge-oriented, which describes business learning as creating, retaining, and transferring knowledge within the business structure (Argote & Miron-Spekoe, 2011; Koh, 2000; Sulistiyani & Harwiku, 2016). The third approach is learning through real-world experimentation during a product launch or service development that defines learning as a response to a problem and aims for customers to accept the solution (Bortolini et al., 2018; Miller, 2003; Ries, 2011).

In this research, we integrated several learning approaches to provide a comprehensive definition of business learning that cover the three mentioned approaches behaviorist, solution finder, and knowledge management) in today’s ever-changing business environment. Therefore, we defined business learning as a process to find a better solution that meets customers’ expectations through the knowledge gained from experience.

**Business learning: dimensions and factors**

Reviewing literature in business learning and consulting with industry and university experts made our basic impression about the domain, dimension, and aspects of this study. Learning styles are one of the most discussed topics presented by Kolb (1984) as a model that paved the way for other researchers in this area (Morris, 2020; Yeo, 2006). It has four stages including concrete experience, reflective observation, abstract conceptualization, and active experimentation. The learner could start this process from any stage, which is an iterative movement between processing and perception actions (Sharma & Kolb, 2010). In addition to Kolb’s learning styles, learning has been explained in two separate types: experimental (accumulation of knowledge from previous experiences) and vicarious (acquiring knowledge by observing the behaviors and actions of others and related outcomes) by many authors (Corbett, 2007; Holcomb et al., 2009).

For many scholars, start-ups learn from both exploration and exploitation (Baltrunaite & Sekliuckiene, 2020; Bortolini et al., 2018; Crossan & Berdrow, 2003; Goldasteh et al., 2020; March, 1991; York, 2021) in a balanced way known as ambidexterity (Dhir & Dhir, 2018; Lyytinen et al., 2010). Designing and running purposeful tests is a source of
learning named experiments or learning through experience (Holcomb et al., 2009; York, 2021). Start-ups gain knowledge using different sources and ways in business environments (Cohen & Levinthal, 1990; Corbett, 2007; Yahyapour et al., 2015). Since business learning is a market-oriented topic (Goldasteh et al., 2020; Mahmoud et al., 2016), the importance of customers’ feedback is a crucial source of learning for many businesses (Franken et al., 2018; Töytäri & Rajala, 2015; York, 2021). Mentorship and support performed by incubators, accelerators, or science and development parks are considered another source of business learning in start-ups (Albort-Morant & Ribeiro-Soriano, 2016; Fukugawa, 2018; Mansoori, 2017). Benchmarking is also another key source for business learning in the IT entrepreneurship ecosystem (Bianchi et al., 2017; Töytäri & Rajala, 2015; Vaidyanathan et al., 2019).

Depending on the channel of business learning in start-ups, there would be different levels of formality in their learning process (Almeida et al., 2003). Formal learning channels consist of specific milestones and results in a start-up’s roadmap. In addition, informal learning channels including conversations with customers and consulting with people in a network of start-up founders are critical ways for start-ups to learn (Lim, 2002; Sharafizad, 2018; Spaan et al., 2016). Although formal learning channels are essential and exist in well-established start-up plans, informal channels are created by chance or with no prior intent that enhances the probability of start-ups’ success (Keith et al., 2016). Moreover, learning is not limited to the individual or team level (Crossan et al., 1999; Jones & Macpherson, 2006; York, 2021), but different levels of organizational structure are engaged in business learning.

**Crossing the market chasm**

Start-ups face two significant challenges during their lifetime as the innovative ideas pop-ups in the entrepreneur’s brain (Rogers, 2003), and they named these challenges differently chasm, discontinuity, or change of dominance time (CD-Time) (Moore, 2014; Muller & Yogev, 2006; Soetikno et al., 2020). The first challenge is inventing a technology from the abstract (Fig. 1). Scientific research results called this a technology chasm. The second chasm is not related to technology and happens when start-ups try to fit the product to market to catch the majority of the customers, which is our focus in this research. Successful start-ups develop their products differently in early and mainstream markets as two identical sides of the market chasm. They have to behave differently from visionaries in the early adopter’s phase and pragmatists in the early majority phase (Libai et al., 2009; Polhill et al., 2019) (Fig. 2).

Crossing the market chasm relies on a strategic move from a product-center approach to a market-center one by learning from early innovators and early adopters in favor of pragmatists who are interested in the product but not fully ready to use it (Moore, 2014; Muller & Yogev, 2006; Töytäri & Rajala, 2015). Moore (2014) believes that applying niche market and segmentation helps high-tech companies cross the market chasm and suggests that deploying the whole product is very important to enter the mainstream market. Moreover, he considered the lean start-up methodology used by IT start-ups to catch mainstream markets by four gears of acquiring, engaging, converting, and enlisting (Picken, 2017; Ries, 2011) faster, requiring minimum viable product (MVP) and rapid, agile learning. Competition in a small market with specific characteristics that make it an ideal target to sell a new product or service (Beachhead) would not be achievable without validated learning from IT consumers.

**Methodology**

To gain a deep understanding of business learning in IT start-ups who are looking forward to crossing the market chasm, we used a multi-case study methodology. In such a qualitative research methodology, researchers are looking
for interpreting their observations with a holistic lens to understand different aspects of a phenomenon (Saunders et al., 2009; Yin, 2011). Based on previous studies in business learning (Goldasteh et al., 2020; York, 2021) using this methodology, we explored the unique and apparent aspects of learning from early adopters to catch the mainstream customers in IT start-ups of Tehran province in Iran. Moreover, this methodology enabled us to focus on start-up founders’ real-world practices to cross the market chasm (Yin, 2011, 2015). Using a multi-case study is aligned with this research’s primary objective to explore dimensions and aspects of learning from early adopters of IT start-ups. It has also gained the attention of many researchers in different social science fields as a feasible research methodology. All of the most cited and highly recognized research in business learning especially in the IT industry have used qualitative research methodology (Blank & Dorf, 2013; Crossan et al., 1999; Moore, 2014; Ries, 2011).

**Sampling procedure and participants**

To provide a comprehensive sample of the IT start-ups, we have employed the maximum variation approach to select high-tech IT start-ups in Tehran province without limiting their scope of markets and activities (Saunders et al., 2009). The diversity of cases we have investigated in this study enriched our data and covered different types of activities combined with IT that reflects various angles of business learning in a start-up. Regarding the novelty of start-ups in Iran’s business environment and the absence of an official definition or comprehensive listing by the government or any official institution, it is not possible to estimate their population of them. It has been several years since some public and private institutions have been trying to boost Iran’s entrepreneurship ecosystem, so, eventually, we found a couple of start-ups listed in different accelerators and incubators to start the process. We found our first participant by looking into these lists, searching them, and messaging them on the LinkedIn social network. Regarding the fact that networking is popular among founders of start-ups who meet each other in different events like accelerator programs or tech festivals, they would be the best mindful source to find additional samples in this study. We continued using this chain-referral sampling method to find other participants one after another as they were more fit for our research (Naderifar et al., 2017).

Our participants were 23 founders of start-ups who had more than 1 year of experience and were active in their role constantly and were involved in learning from the early steps in the market and mainstream customers considerably. We continued to take new samples from IT start-ups to the point where we found that interviewing new founders did not provide important information about learning from the early market inhabitants (Moser & Korstjens, 2018). We focused on Tehran province for selecting the IT start-up samples because of the supportive environment created by accelerators, incubators, universities, and the recognizable potential markets compared to other cities in Iran.

The majority of the participants were male (n = 21, 91%) and a few of them were female (n = 2, 9%). Majority of them aged between 31 and 35 years (n = 9, 41%), with an average of 31 years old. Because of the nature of our sample of start-ups, a large portion of the participants did not have previous work experience with an average of 7 years of experience. The majority of the participants had a bachelor’s degree (n = 9, 39%) followed by a master’s degree (n = 9, 39%) in different fields of study ranging from engineering...
fields (e.g., computer engineering) to social science (e.g., management).

**Data collection**

In the beginning, we sent an invitation email or social media message to each participant and introduced ourselves and explained the focus of our study on their product-to-market fit learning process. Then, because of the global pandemic of COVID-19 and strict regulation and to prevent the spread of the disease and provide a safe interview with the participants, we planned virtual meetings with them. We used face-to-face Skype semi-structured interviews as an adaptive way for individual founders to have a clear and detailed understanding of IT start-ups’ learning model, leading them to cross the market chasm (Dodds & Hess, 2020). After each interview, we asked the participant for other potential start-up founders to participate in our study because the informal cooperative network between them is vital. We made an interview protocol to manage interview sessions to maintain interviewees in studying our framework and optimize how we get related information. First, we developed a structured track of questions for participants regarding the literature review on business learning. Sample questions are as follows: “What process or mechanism is resulting in your product or service development mostly?”; “What do you call this process or mechanism?”; “What learning resources do you use to develop your product or service?”; “How is the learning process for developing your product or service”; and “Who is actively involved in the learning process to develop your product or service?”.

We validated our questions by a panel including two types of experts from university lecturers in the field of entrepreneurship and the start-up mentors actively providing consulting services in accelerators to make sure the responses to the questions will cover our study research questions. According to the expert panel comments on questions, we modified some of the questions to collect deeper data from the IT start-up founders. Afterward, we tested the modified protocol in two pilot interviews and revised some questions considering the data gathered from the pilot study.

Then, we used the protocol in our skype meetings one after another. Skimming the data gathered after 23 interviews showed us that we were not getting considerable new information from the participants. Demographic information of our interviewees is presented in Table 1 including their age, gender, prior experience, and education. So, we conducted two other interviews to make sure about the adequacy and saturation of our collected data (Saunders et al., 2009; Yin, 2015). In total, we recorded about 31 h of interviews with the participants’ permission and transcribed them for analysis.

| Row | Age | Gender | Education | Prior experience |
|-----|-----|--------|-----------|------------------|
| 1   | 30  | Male   | Master    | 2.5              |
| 2   | 26  | Male   | Master    | 7                |
| 3   | 25  | Male   | Bachelor  | 1.5              |
| 4   | 27  | Male   | Master    | 2                |
| 5   | 23  | Male   | Bachelor  | 1                |
| 6   | 30  | Male   | Bachelor  | 3                |
| 7   | 33  | Male   | Master    | 7.5              |
| 8   | 28  | Male   | Bachelor  | 3                |
| 9   | 35  | Female | Bachelor  | 7                |
| 10  | 36  | Male   | Bachelor  | 0                |
| 11  | 24  | Male   | Bachelor  | 5                |
| 12  | 34  | Male   | PhD       | 12               |
| 13  | 32  | Male   | PhD       | 12.5             |
| 14  | 27  | Male   | Bachelor  | 9                |
| 15  | 31  | Male   | PhD       | 4                |
| 16  | 35  | Male   | Master    | 7                |
| 17  | 27  | Male   | Master    | 4.25             |
| 18  | 31  | Male   | Bachelor  | 4                |
| 19  | 39  | Male   | Master    | 15               |
| 20  | 32  | Male   | Master    | 8                |
| 21  | 38  | Male   | PhD       | 18               |
| 22  | 43  | Female | PhD       | 20               |
| 23  | 31  | Male   | Master    | 10               |

**Data analysis**

After completing each interview, we started our qualitative analysis by considering each participant’s data to find out if we needed to develop our questions for other interviews for more accurate and precise data. For this purpose, researchers reviewed interview transcripts. In addition, they recorded meeting files to discover the codes or themes regarding identified or new dimensions or factors related to the learning model for crossing the market chasm in IT start-ups using ATLAS.ti8 software. After analyzing the last interview, we performed a comprehensive analysis by reviewing all of the explored codes as a part of the open coding process. First, we included all of the early codes and themes from the previous stage to produce a profound understanding of effective factors and dimensions of in learning model of IT start-ups to cross the market chasm developed by axial coding ideas of authors. A table of main and subcategories of explored codes is presented in Table 2 as follows.

All of the recordings and transcripts of the interviews had reviewed by authors to provide more focused and to-the-point data expressed by IT founders of start-ups who failed or crossed the market chasm. For instance, some highlighted codes are as follows: “immature markets,” “benchmarking as a learning source,” “financial problems as a negative factor,”
"more informal channels in learning," “face to face interaction with customers,” “using a type of reflective observations,” and “very specific market segmentation.” Then, we used replication logic (Yin, 2017) along with comparing important codes of each interview to explore the process, dimensions, and factors of learning to cross the market chasm, which is partially understood (Ridder, 2017) and accepted by start-up founders (Moore, 2014).

We considered three different types of validation approaches to ensure the results of the study. First, we extracted our codes and themes from other cases of IT founders who crossed the market chasm. Thus, we could triangulate our data from different sources in deep which are close enough to the reality of start-up life (Moser & Korstjens, 2018). Secondly, to prevent misinterpretation of codes and themes from interviews and as a part of our study, we asked one expert in the entrepreneurship field and a mentor from a famous accelerator of IT start-ups to cross-check our analysis. (Saunders et al., 2009). Thirdly, as an invariable phase of the study, we held a short online meeting with participants to see if we genuinely

Table 2 Main and subcategories of explored codes from interviews

| Concept                           | Categories          | Subcategories                                             | Example of emergence |
|-----------------------------------|---------------------|-----------------------------------------------------------|----------------------|
| Main mechanism of learning        | Feedbacks           | Listening                                                 | P1                   |
|                                   |                     | Negotiating                                               | P7                   |
|                                   |                     | Reviewing comments and voices                            | P1                   |
| Product development               | Complicated product | P4                                                         |
|                                   | Make product simple | P4                                                         |
|                                   | Product analysis    | P8                                                         |
| Consultation                      | Talking with experts in the domain | P9                                      |
|                                   | Get consulting from foreign companies | P21                                      |
|                                   | Industry experts    | P13                                                        |
| Benchmarking                      | Same products of foreign companies | P9                                      |
|                                   | Clone copy          | P14                                                        |
| Market monitoring                 | Monitoring repeated needs of market | P11                                      |
| Experimentation and experience    | Adjusting by trial and error | P18                                      |
|                                   | Testing hypothesis  | P23                                                        |
| Resources                         | Learning from customers | Customer success | P8                   |
|                                   |                     | Data from customers                                        | P17                  |
|                                   |                     | Experiment on customers                                    | P23                  |
| Previous experience               | Previous employment | P21                                                        |
|                                   | Prior startup success or failure | P10                                      |
| Competitors                       | Available competitors in the market | P4                                      |
| Consultation                      | Industry experts    | P1                                                         |
|                                   | Other start-up CEOs | P11                                                        |
| Internal ideas                    | All of the people ideas | P8                                      |
| Educational materials             | Educational courses and materials | P5                                      |
| Formality                         | Formal              | Having milestones in formal process                        | P17                  |
|                                   | Informal            | Chatting and talks out of meetings                        | P15                  |
|                                   | Mixed channels      | Generation is informal but executing in formal ways       | P23                  |
| Structure                         | Team                | Teams related to the product                               | P21                  |
|                                   | Individual          | Between founders and more individual                      | P4                   |
|                                   | Engage all of the people | Suggestion by all people | P5                  |
| Learning style                    | Accommodating       | Active experimentation to concrete experience              | P10                  |
|                                   | Converging          | Abstract conceptualization to active experimentation       | P5                   |
|                                   | Diverging           | Concrete experience to reflective observation             | P21                  |
|                                   | Assimilating        | Reflective observation to abstract conceptualization      | P8                   |
| Reinforcements                    | Team structure       | Team diversity and matching founders                      | P1                   |
|                                   | Technical founders  | Technical people to develop the product                    | P21                  |
|                                   | Work climate        | Attractive work environment                                | P12                  |
| Barriers                          | Financial problems  | Financial problems to develop products                    | P11                  |
|                                   | Government policies | Government policies affect startups                        | P23                  |
transferred their ideas and point of view into codes and themes for further analysis as a triangulation (Yin, 2015).

**Ethical concerns**

Regarding ethical concerns and breathtaking competition between start-ups in the markets of our participants, we guaranteed the confidentiality of data we had collected in our interviews and ensured the participants that we keep the data confidential in favor or against any third party other than this research group. Moreover, we ensured them that they could skip answering any of the questions related to their business secrets or leave the interview process for any personal reason. Finally, we gained the verbal consent of each participant to record the interview; at the beginning of the interview, we have proof of the right of using start-up information from legal aspects.

**Findings**

Regarding the research framework and findings of the initial analysis over interviews, the authors decided to write this section with the following categories. At the beginning of each part, we presented the results of those IT start-ups that were successful in crossing the market chasm first; then, we continue with those that ultimately failed or are still learning from early adopters of the market.

**General characteristics of founders**

We interviewed 23 start-ups in IT to learn from their innovative learning model for crossing the market chasm. The authors were convinced that 11 start-ups passed the market chasm and interacted with the early majority of customers (first group). In contrast, nine others still need to practice product-to-market fit learning, and three failed ultimately and ceased their activity (second group). Participants of successful start-ups who passed the chasm mainly studied management, computer engineering, industrial engineering, statistics, entrepreneurship, marketing, and chemical engineering. Other participants also studied computer engineering, management, mathematics graphics, energy engineering, and entrepreneurship.

Considering previous job positions of all participants, we found that majority of them had experience in software development, sales, and marketing. A closer look at the data reveals no considerable difference between those who crossed the market chasm and those who were not successful. These two groups have the same diversity in prior job positions in their profiles. The majority of participants followed their previous work careers to obtain knowledge and experience for their businesses in the future. Still, few have no plan to create a start-up, and their work experience just happened as their routine life events. While most successful participants in crossing the market, chasm experienced an agile start-up or personal business climate in their experience, others worked in well-established, governmental, and or large institutions, and both groups were affected clearly by their paths.

Table 3 shows areas of products or services of our participant’s start-ups in 12 categories. Online educations consist of online lessons, educational content, and micro-educational materials. Software developers were active in software engineering, website applications, and online reservation systems. The artificial intelligence category consists of text processing, business intelligence systems, and logistic solutions. Listing start-ups include advertisers on the web, mobile marketplace, and local businesses promoter. Start-ups that were active in customer feedback and usability tests are considered market research category start-ups. The human resources category mainly consists of two recruitment services and application tracking systems start-ups. Other categories’ name demonstrates their product or service.

Almost 10 out of 23 start-ups started with their financial sources and could be counted as bootstraps, but more than half of them entered into accelerator programs and proceeded by their mentorship. Sharif Accelerator and Firoozeh Innovation Center and Accelerator were the two crucial and frequent accelerators whose research participants used their services and programs and succeeded in grabbing 22,160 million rials on average, mainly from the two mentioned accelerators and their angel investors. However, it is worthy to note that sometimes accelerators may cause difficulties for their start-ups. For example, start-up entrepreneurs in one accelerator are board members. They usually attend weekly meetings to share their concerns, but sometimes they were indirect competitors, and they decide to be silent instead of cooperative. For instance, “Listing start-ups who tend to have a huge amount of goods or services as ads in their platform are a mostly indirect competitor of many start-ups in accelerators” (P23).

Some of the main ideas of services and products of these start-ups were feeling market needs (P6, P16, P20, P22), fast

| Row | Area                     | No | Row | Area                | No |
|-----|--------------------------|----|-----|---------------------|----|
| 1   | Online educations        | 3  | 7   | Last mile delivery  | 1  |
| 2   | Software developments    | 4  | 8   | Civil services      | 1  |
| 3   | Legal tech               | 1  | 9   | Market research     | 2  |
| 4   | Artificial intelligence  | 3  | 10  | Human resources     | 2  |
| 5   | Discount platform        | 1  | 11  | Crowdfunding        | 1  |
| 6   | Listing platform         | 3  | 12  | Online home services| 1  |
learning and colon copy or benchmark of foreign start-ups (P17, P19, P21, P23), and customers’ need (P2, P9, P11) and its analysis which reflected by many participants. But, on the other hand, despite some exciting responses from participants like idea generation (P7) or personal needs (P8), or even psychological test of the founder (P15), the frequency of other items was few and mostly related to the three mentioned items indirectly.

**Start-up’s life step**

Determining the start-up’s life cycle step was essential for our research because we were looking for the learning model that led them to cross the market chasm and catch the eye of the early majority of customers. Authors had the challenge to estimate the approximate life step of start-ups because their market was immature, and it is barely impossible to find actual market size and share. We solved this problem by reviewing two indexes of scholars and experts in the industry: First, those start-ups that reached a whole product and didn’t need to change their core product for new customers seemed to be scaling up their product very well. Secondly, those start-ups with a steady remarkable revenue stream counted as those who passed the market chasm. For example, P18 as an early majority start-up entrepreneur said that “We had a steady rate of revenue without any considerable change in the product and increasing advertising costs.” Thirdly, a considerable number of customers often show their ability to fit the product into the market.

According to mentioned criteria, 11 start-ups passed out early adopters. They reached early majority stream customers. Eight start-ups were still in the early adopter’s stage and looking to complete their product as a whole product, and 4 of them are touching the base for innovator stream customers. To ensure that we are not missing any point about start-up life steps and estimate it right, we double-checked each participant’s status and life cycle step during the interview. They already knew it by themselves; for example, P3 as an early adopter said: “When we are talking about scaling or product to market fit, we have got first 1000 customers and are going to get next 50,000 customers.” Also, when we talk about the life cycle of a start-up, and if it is a platform, the business side of the platform (B2B) may not have the same life step as the customer’s side (B2C). In this paper, we considered both sides to consider a start-up a scaled-up one.

**Learning system**

Referring to learning as a process reminds us that this process should have inputs and outputs before and afterward. It will be improved or validated as long as a feedback element iterates this process. Benchmark analysis, interaction with customers and analyzing data gathered from them, customer needs, checking resources, and listing advantages and disadvantages have helped start-ups cross the market chasm to get into the early majority stream as an input for this process. While inputs of the learning process for early adopter start-ups only include idea generation, interaction with customers, and analyzing the situation, the innovators’ group mainly relies on idea generation and benchmark analysis.

Participants who passed the chasm as their process part mentioned feedback-based pivots, product development, consultation, and looking for a solution with networks. While start-ups that were busy with their early adopter customers used feedback-based pivots, convincing customers, and team analysis to learn from their customers to cross the market chasm, one innovator participant used feedback-based pivots to proceed to the mainstream market. Feedback-based pivots at all levels seem the most relevant process for learning to cross the market chasm.

The output of the described learning process for applicants with an early majority market stream includes creating or MVP or upgraded product, small to comprehensive changes in product, and customer training. The active participants in early markets (early majority or innovators) did not have anything more than MVP as their output in this process. User satisfaction and attracting more customers would be the logical feedback to this process. Also, this process would be triggered by the attention of start-ups to customer loss or looking for any anomaly in their business system.

**Dimensions and factors**

Exploring dimensions of learning to cross the market chasm for IT start-ups in Tehran province provided a more detailed view of winners of the market chasm by their language and intuition, as we reflected in the following sections.

**Main mechanism**

The learning process may occur in any of the primary practices of each start-up; for example, some scholars considered learning as networking (Scarmozzino et al., 2017; Zhang & Hamilton, 2009) or sales and marketing (Hansen & Levin, 2010; Töytäri & Rajala, 2015) or mentorship (Lim, 2002; Sharafizad, 2018). Understanding participant’s opinions about what mechanism includes learning guided us to the following findings: while start-ups in the early adopter stage mainly learn from getting feedback in different forms of listening or negotiating or reviewing their comments and voices, those which passed the chasm used product development, consultation, benchmarking, market monitoring, and experimentation as a base for learning to cross the market chasm. In addition, some start-ups explained that their success in learning to cross the market chasm was not a process and gained only by their valuable experiences, for instance,
participant 18 said that “Marketing cost is crucial for many start-ups and kills them, we used others user base for marketing as their social responsibility for charities. This idea came into our mind after thinking about the problem for about two years.”

Sources

Usually, successful start-ups in crossing the market chasm used a combination of learning sources; for example, participant 15 said that: “Depend on the state of the business, or whenever we needed to survive, we used a different source to learn from customers.” Many participants whose start-up was active in the early majority step stated that learning from customers (customer success, data from customers, and experimenting with them), previous experience, competitors, consultation with industry experts, internal ideas, and educational materials were the primary sources of learning to cross the market chasm with the relatively same importance. Although paying attention to stakeholders, investor mentorship, Incubators or accelerators, and academic background were some other sources of learning; they were the minority.

While learning sources for start-ups of early adopter step were similar to those used by the early majority, they were limited to customers, benchmark, network, and their previous experience. As a sample, “Working with a traditional market of lawyers worked very well for us” shows the importance of learning through networks in one of Law Tech’s start-ups. On the other hand, start-ups in the innovator’s step mainly used benchmarking as their primary source of learning. For example, participant 6 expressed: “We had a foreign benchmark from Canada in our mind, and we had tried to become as much as similar to that website.”

Structure

Participant 14 said, “Suggestions are usually made by all of the people in the start-up, but the main decision is taken by founders” about the structure of their learning to cross the market chasm. While start-ups who passed the market chasm try to learn from their customers mainly by team structure in the first place, individual or comprehensive structure (engaging all of the people) equally is the next popular type of learning among the participants of this case study.

The number of start-ups active in the early adopters’ stage of their customers in each type of learning structure, such as individual, team, or comprehensive, was equal, which means they had no preference for each other. However, participants with the innovator life step declared that they use the individual structure for learning from their customers, which means the start-up’s founder has no choice but to be the only one who is active lister from customers and decides how they should pivot their product.

Channel’s formality

The formality of the learning channel to scale up to cross the market chasm could be defined as the level of learning by milestones and regularly or through well-defined routines or processes. Also, it could be related to the ideology of the founders (Lyytinen et al., 2010) and the organizational climate type that supports learning as a regulated process (Park & Kim, 2018; Pham & Swierczek, 2006). Our interviews show that the number of start-ups that passed the market chasm with informal learning from their customers was equal to those which had formal procedures or, as participant 10 expressed, “Having a bureaucracy for that!” and also, when it comes to formality, having some key performance indicators shows that start-up profits from some levels of formality because of pre-defined indexes. Contrarily, start-ups within their early adopters’ or innovators’ life steps mainly used informal learning channels like small chats with customers while deploying new services for them.

In some cases, learning was a mixture of both channels for many start-ups. For example, “idea finding is completely informal but executing this idea obeys sprint agile execution as a formal process” (participant 18). Also, we could assign formal or informal channels to direct and indirect ways of learning from customers. “We could have considered two types of channels, one for direct feedback from customers and one for everything that may cause a need for feedback” (participant 5) leading us to prepare formal channels for direct feedback and use informal channels for unforeseen customers or user loss. Moreover, “few customers signal for informal channels and a greater number of customers require something like A|B testing” (participant 5) shows the importance of the number of users in learning channel selection.

Organizational culture and climate may affect choosing learning channels in start-ups. “Sometimes Formality in learning may become something invisible like the culture of the start-up” (participant 21). To declare more, the meaning of “mostly formal” is that a start-up’s learning channel is formal and maintained by routine processes. Still, sometimes they have some informal learning happening inside the start-up climate.

Learning style

Considering experimental learning as a key for entrepreneurial activities (Morris, 2020) of start-ups leads us to think of Kolb’s learning cycle and styles (Kolb, 1984). This cycle may start from feeling (concrete experience) something new and much heard from many participants like participant 18: “It has the most frequency for our product changes.” The next step continues with watching (reflective observation) of the new experience, but “It is mostly useful for company side of each platform or service because the number of them is
limited, then we were not able to use experimentation or A/B testing” (participant 14) or “We did not benchmark from any internal samples because we were much better than them and they had copied our features. Also, we couldn’t benchmark from foreign samples because our condition was different from them” (participant 18). Afterward, thinking (abstract conceptualization) was located in this cycle to internalize the change and concepts that were massively important for some start-ups like participant 18, who said: “Even though we had done few abstract conceptualizations, they had a huge impact on our product.” Finally, Kolb’s learning cycle continues by doing (active experimentation) in the last part to test if we could trigger the change in our desired way, but “It’s only useable when the number of customers is high, for example in the customer side of a platform business, not the business side” (participant 14).

Kolb stated that people might have emphasized one or some parts of this learning cycle and introduced four related learning styles regarding mentioned actions. First and most commonly, the accommodating style happens when a start-up tends to do active experimentation and turn it into a concrete experience. Therefore, it is preferred by most of our participants who crossed the market chasm and dealt with the early majority of the market. Secondly, the converging style overlaps between abstract conceptualization and active experimentation and has enough importance as an accommodating style in those start-ups inhabiting the chasm. Thirdly, diverging style happens when concrete experience causes reflective observation, which is essential in our case study only in start-ups with the innovator stage and did not mention by those in the early adopters’ step. And fourthly, if reflective observation triggers abstract conceptualization, then the learning style would be Assimilating, and it is only applied not a lot by our participants in the early adopter stage.

Reinforcements and barriers

Each case study participant named a couple of reinforcement or barrier factors that affected their customers’ learning. Participants who passed the market chasm recognized team structure, technical founders, and work climate as positively essential and supportive to learning from customers. Having experienced (participant 5) with diverse expertise (participant 1), and their supportive attitude (participant 23) are considered as parts of the team structure in their learning system. Having technical founders recommended by some participants of this study (participants 9, 17, and 21) enabled them to overcome many technical problems and say “No” to many products to prevent failure and develop products faster and more accurately. The start-up’s climate is described as essential and positive, which “leads to a problem-solving atmosphere,” participant 15 said.

Our study’s start-ups were striving to pass the market chasm in the early adopter step mainly affected by mentor/investor, team diversity, and skills factors. “Providing mentors for those businesses who sell virtual products would be very helpful for them to find what they need more easily and fast,” said participant 13 in support of the benefits of having an easy-going investor, who gives you a degree of freedom, holding guidance sessions and provides good business connections for start-ups. Although viewing customers’ problems with different lenses of social science or engineering represents team diversity is helpful, according to participant 1: “Psychological skills like active listening must be institutionalized for all of the people who work in such kind of start-ups to have better connection and understanding of the problems.” Surprisingly, participants of the innovator stage introduced their independence to external funds as a reinforcement factor that does not make sense to the authors. They did not fail if they could get funds from any investor, government institution, or other third parties.

To continue with barrier factors that hurt start-ups in their early majority life step, we could reach out to financial problems and government policies. “Low size of the market will hurt high-tech IT start-ups to scale their products in the beginning,” participant 4 said to express their difficulties to develop new products due to lack of early financial streams to their business. Furthermore, government policies resulted in network problems essential as infrastructure for IT start-ups directly or indirectly. “Our domain name was banned because of sanctions. So, we switched to IR domain by force and lost all our search engine optimization attempts,” said participant 23 sadly to bring a sample on why government policies are against them.

Participants of the early adopter’s stage were harassed by general negative business climate, laws, and regulations mostly to learn from their customers. In line with internal financial problems, participants 3, 16, and 22 expressed that they believe financial crisis due to multiple factors of sanctions, corruption, and mismanagement synergized each other making a hostile economic condition for both customers and start-ups to continue their business. Many governmental organizations like social insurance and tax put a lot of unfair pressure on start-ups based on their basic regulation and take a lot of time for these kinds of red tape jobs. Participant 19 said, “I feel law and tax are completely against start-up ecosystem.” All the required soft skills for listening to customers, solving problems, planning changes, and communicating with team members harassed participants of this research.

Innovators mentioned barrier factors as a combination of both early majority and early adopters’ problems. They were more product-oriented, and “being Idealistic instead of realistic led to late MVP and failure,” expressed participant 6. In addition to all items mentioned earlier, immature markets

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features and the COVID-19 pandemic affected all types of start-ups. Participants 4 and 15 talked about the diversity of customers and the inability to define niche-specific market segments that constantly make them recast market plans. They dreamed they were living in a blue ocean, but every time they were confused by their market share estimation, they found that they were wrong. In the next section, we will explain more detailed aspects of their immature markets. Also, as expected, while start-ups whose products had both physical and virtual elements were hit by the COVID-19 pandemic like participant 23, others like Participant 16 grew up serving more people through their pure online products or services.

**Immature markets or emerging markets**

High-tech start-ups usually face a high level of uncertainty about their markets, which we call immature markets (Blank & Dorf, 2013; Petti, 2013). The findings of this research reveal three main features of immature markets: competition map, market entrance, and market share. Having a deeper understanding of these three concepts about immature markets will help start-up entrepreneurs make decisions.

Probably, it is impossible or tough to define a competition map for the immature market of a high-tech start-up. Some start-ups like participant 17 have direct and indirect competitors, direct competitors precisely deliver the same services, and indirect competitors overlap in their products with the start-up’s company. Still, their core business is not the same. Having no competitors in the market indicates two significant drawbacks; participant 9 said: “First, it shows the market is immature because of new technology or logic behind it that makes it unattractive for others to enter this market. Second, customer has no choice other than our product, so we are not competing with others, and we won’t grow.”

Because many high-tech IT start-ups deliver entirely new products or services, many potential customers may not hear about them. Participant 9 said this about their product for other businesses “This means that businesses don’t understand the importance of our service.” Participants agreed that the perfect time to enter the market is essential and may lead to success or failure. Participant 14 told us, “In the beginning, we brought our service much sooner than its time, but a couple of years later there was some knowledge about it in the market and our business side customers knew what we are talking about.” So, by entering the market sooner, they may risk their resources to introduce a new product, and by being a latecomer, they may lose all of the market shares.

Another important feature of the immature markets of high-tech start-ups is their market share (Lynn et al., 2017). Participant 11 believed that “The value of the market segment could not be understood because of the newness of the product, and sometimes the relationships with other stakeholders would define the scope of customers and it’s normal because nor your customers don’t know what they need, neither your competitors are delivering the same product or service.” Accordingly, after we asked a question about their market share, someone like participant 17 said: “Although we are dominant in the market but still, we don’t have any estimation about our market shares and even many customers still don’t know the exact meaning of our product, so, it is not worthy to calculate the market share.” Because of the essence of high-tech markets seems pretty complicated and twisted with many sub-segments that make it impossible to map or calculate initially. For instance, participant 20 said: “Market share may be different in different categories of geographical areas or goods or products or services in comparison with other competitors.”

**Discussion**

Our research intended to provide a deep view of what is happening in IT start-ups in terms of business learning by exploring the factors affecting this process. Also, we are referring to entrepreneurs’ personal experiences and assumptions regarding this vital element (learning) to explain what they feel about the market chasm and how much they believe in learning from all market stakeholders. We provided a model-based clarification of business learning by combining Eric Ries’s validated learning (Ries, 2011), and David Kolb’s learning experiential theory (Kolb, 1984; Morris, 2020) as the primary base for this study. The presented model and insights from the research are entirely based on the IT industry and start-up ecosystem in the Tehran province and highlight the specificities of the context.

As it is shown in Fig. 3, we considered learning as a system in our research, which expressed by entrepreneurs of IT start-ups about crossing the market chasm. So, this study integrated various aspects of business learning as a system (Petti, 2013) and developed previously mentioned models to illustrate the path from early to the mainstream market. Respectively, this study found all four elements of a learning system and a trigger to start this process. Furthermore, considering influential factors in this system made it more realistic and closer to all previous research done by other researchers. These factors include the source of learning, the formality of the channel, learning structure, and learning style. As long as this system works perfectly, business founders or entrepreneurs of the IT industry could scale up their products and catch the eyes of mainstream market customers.

Thoughts or ideas for establishing a learning system may come from an unusual or unwilling event, such as a sales drop followed by customer loss at first glance. Something is not what customers expected and would not
work as they desire, and we should actively search for any abnormality in our start-up system. Finding the trigger is an essential and undeniable part of start-ups because they have already started their business based on another problem left behind by competitors or market stakeholders (Bianchi et al., 2017; Ries, 2011). So, they know the importance of the trigger and actively search for it and will not stop until they find it. However, some participants who we categorized as early adopters or innovators could not find the trigger or sometimes did not expect it as we said. They believed that everything was perfect with their start-up, but at the same time, they confessed that they did not have enough customers to take off to the following customers’ stream.

As a rational live unit, start-ups always seek to find a reason to do anything (Giardino et al., 2015). They would not spend their resources on unnecessary actions to learn how to scale up their products. So, listing the advantages of their learning speaks for itself loudly. Analyzing customer data helps successful start-ups find the reason behind customer loss or abnormalities to cross the market chasm. In some cases, data loss and a weak technical team or having no technical founder in the primary start-up team postponed their product scale-up and made them think about this problem as a significant problem. Checking available resources usually make priority between sources for learning. For instance, in one case, customer data loss resulted in a focus on benchmarking from foreign services.

Entrepreneurs or start-up founders explained the learning process as product development, consultation, benchmarking, market monitoring, or exploration. They believed that their learning happened through these mentioned activities regarding available resources, and each of them could be labeled as meaningful learning for them. However, among these five mentioned processes, only one (product development) is a product-oriented approach for crossing the market chasm, but others are market-oriented (Moore, 2014).

For those start-ups who deliver a service or virtual goods, customer training has more importance than MVP. The output of a market-oriented or product-oriented learning process will lead to a more aligned product with the majority stream of customers (Blank & Dorf, 2013; Bortolini et al., 2018). Products of the IT industry are more accessible than in other industries, and customers know that the existence and features of these products are of the highest importance. Practical and well-designed customer training might result in more attraction or repulsion among customers.

Listening to the customer’s voice was one of those start-ups that passed the market chasm. Of course, they were looking for customer satisfaction all the time with tools like phone calls, online evaluation forms, machine-operated rating systems working with cell phone messages or calls, or

![Learning model to cross the market chasm adopted by authors](image)
even face-to-face. But, more importantly, they have told us that the attraction of customers to their services or products enormously helps entrepreneurs find the taste and attitude of the market indirectly. To them, customer attraction is a sign that they passed the market chasm by catching the eyes of the conservative early adopter customers and having their recommendation on new products or services to break the door to the mainstream market.

Sources of learning would affect this system, and start-ups may boost their activities to cross the market chasm due to their availability (Rae, 2005). Customers, benchmarking, entrepreneurs’ prior experience, competitors, consultants, internal ideas, and educational content are extracted from interviews with successful start-ups in crossing the market chasm. Start-ups used both formal and informal channels to learn from their sources. Sometimes they explored customers’ comments in a non-formal chat outside of the planned meeting. Sometimes, they executed a strict formal computerized feedback system for every business transaction with customers. Exploring entrepreneurs’ recorded answers shows an intense atmosphere for team working to business learning to cross the market chasm in all successful start-ups. Entrepreneurs use all learning styles to learn from their source, but accommodating is the most used and popular style, which means a movement from active experimentation (doing) and concrete experience (feeling) (Morris, 2020; Sharma & Kolb, 2010).

To continue with, we could name some other reinforcement and barrier factors that may affect an IT start-up from their early days of existence (Innovators) or before crossing the market chasm (Early Adopter) or after it (Early Majority). As it appeared in Table 4, some of the internal factors could be manipulated by entrepreneurs. Still, some others could only be considered environmental and need higher-level institutions’ participation. Besides all of these mentioned factors, the impact of the COVID-19 pandemic and features of immature markets are also two major external effective factors that should be considered cautiously.

**Implication**

Provided results of this research may help policymakers of the government follow more detailed plans and guidance for start-ups in the IT industry to encourage them to scale up (Salamzadeh & Kawamorita Kesim, 2017) and get into the mainstream markets. Eliminating or at least fading the effect of barrier factors presented in Table 4 through national long-term development plans is the least men of authority could follow to empower start-ups to cross the market chasm and help the national economy in developing countries such as Iran. Government and parliament are both key players in changing the negative business climate and laws and regulations in Iran. Besides the direct effect of government action, there would always be some indirect programs and activities to support the business climate and simplify laws favoring start-ups. For instance, some entrepreneurs had problems registering their tax files for the first time, which could easily be solved by correcting laws related to companies. Moreover, start-ups are identified by some foundations of the government. However, there is still a long way to define start-ups in all government services as key economic players in society.

Our study has three implications in terms of theory development in the scope of crossing the market chasm by focusing on learning from early adopters of IT as high-tech start-ups. First, the findings of this study help in theory development in learning for crossing the market chasm by recommending a systematic view of this phenomenon which includes crucial aspects of business learning. Using different theory backgrounds like Kolb’s learning styles from psychology and Blank’s product life cycle in entrepreneurship, we have provided a base for learning theory development to cross the market chasm. Moreover, we contributed to the model by integrating business learning dimensions and factors instead of considering each separately and explaining it as a working mechanism. Finally, practicing an experiential learning approach to learn from customers and adjusting it with ideas and deep thoughts of start-up entrepreneurs made it possible for us to mark off learning in three different stages: innovator, early adopter, and early majority in the start-up’s life cycle.

The primary aim of doing such research is to describe the existing situation as a model and add to current literature about start-up learning. Sharing the results of this study would be more practical for entrepreneurs of IT start-ups. Especially for those in the innovator stage and attending

| Table 4 | Reinforcement and barrier factors mentioned by interviewees |
|---------|------------------------------------------------------------|
| Life stage | Reinforcement | Barrier |
| Innovator | Independence to external funds (internal) | Being product oriented (internal) |
| Early adopters | Mentor/investor (internal) | Negative business climate (external) |
| | Team diversity (internal) | Laws and regulation (external) |
| | Skills (internal) | |
| Early majority | Team culture (internal) | Financial problems (external) |
| | Technical founders (internal) | Government policies (external) |
| | Work climate (external) | |
scale-up programs run by accelerators or incubators. Activating the idea of learning behind what entrepreneurs do in the process part of the learning system in founders of new start-ups would be the best way to help them understand this concept and follow the line to learning from their customers in each stage purposefully.

**Limitations and future research**

Conducting qualitative research has its benefits and drawbacks. First, we tried to uncover the learning process of IT start-ups to cross the market. Regarding the fact that illustrating a comprehensive understanding of business learning may need more diverse consideration from other high-tech industries like aerospace, medical devices, or quantum computing. So, it would be more beneficial to have more industries included in future research on how to cross the market chasm to better and more accurately model this process. Conducting such qualitative research with a large sample would be more reliable because it will reflect more dimensions and aspects of business learning right from the tongues of interviewees and closer to reality (Yin, 2015). We found our sample start-ups from a few limited accelerators; it may not represent all start-ups in this context and is not very fit for a general learning model to cross the market chasm. Measuring and scaling factors that emerged from this study about the learning process from early adopters to cross the market chasm could be an interesting subject for future research in this area. Also, it is worthy to mention that conducting research that considers the effect of global challenges like the COVID-19 pandemic on IT startups in learning to cross the market chasm would be a new research trend. We believe that the results of this research provided a qualified source to develop the required tools and questionnaires to analyze the learning process more accurately and with more detail.

**Conclusion**

Although there is a considerable gap in research publication about the business learning area (Goldasteh et al., 2020), its importance was declared by many influential people in execution (Ries, 2011), research (York, 2021), and policy-making (Fukugawa, 2018). According to the finding of our study, crossing the market chasm essentially needs a learning process from the customer side (Blank & Dorf, 2013; Ries, 2011) that could be triggered by customer loss or finding something abnormal in the system. Although MVP plays an undeniable role in IT start-ups, the way how teams in start-ups learn about changing their products is more important. Our study shows that all of these processes from the beginning (data analysis, checking resources, and listing advantages) to final feedback (customer satisfaction or customer attraction) would be affected by sources of learning and their style (Morris, 2020; Rae, 2005). Examining internal and external dimensions and factors affecting this system to cross the market chasm from an entrepreneur’s point of view in a non-developed entrepreneurship ecosystem like Iran performs exclusive knowledge about crossing the market chasm is as much as important as the user base for many high-tech IT products in this market. Besides exploring business learning concepts and practices, considering emerging or immature markets as an absolute environment for high-tech products was obtained in the interviews with participants of this study. All of the learning systems explored by existing literature detailed with data from participants illustrated as a proposed process model for more clarification. The provided process with dimensions and factors (see Fig. 3) and some external and internal factors (see Table 4) came from a detailed analysis of qualitative data shaped understanding of the concept of learning in IT start-ups to cross the market chasm to acquire mainstream market customers and survive. However, we tried to put light on business learning by proposing this model, there is so much research remain to consider it as an accepted realization of the learning happens to cross the market chasm in high-tech IT products.

**Author contribution** Pouria Goldasteh provided literature, collected data and interviews, analyzed results, and discussions. Morteza Akbari revised research questions, provided literature and interview protocol. Afsaneh Bagheri Revised research questions and revised the whole paper and its integrity.

**Data availability** All of the interview recordings and manuscripts is available and could be delivered to third party with signing a non-disclosure agreement.

**Code availability** Codes of each interview is available and could be delivered to third party with signing a non-disclosure agreement.

**Declarations**

**Conflict of interest** The authors declare no competing interests.

**References**

Albort-Morant, G., & Ribeiro-Soriano, D. (2016). A bibliometric analysis of international impact of business incubators. *Journal of Business Research*, 69(5), 1775–1779. https://doi.org/10.1016/j.jbusres.2015.10.054

Almeida, P., Dokko, G., & Rosenkopf, L. (2003). Startup size and the mechanisms of external learning: Increasing opportunity and decreasing ability? *Research Policy*, 32(2 SPEC), 301–315. https://doi.org/10.1016/S0048-7333(02)00101-4
York, J. M. (2021). The impact of the Lean Startup in advancing innovative products and business models: An organizational learning perspective. *International Journal of Management Studies and Social Science Research, 1*(1), 87–118.

Zhang, F., Wei, L., Sun, H., & Tung, L. C. (2019). How entrepreneurial learning impacts one’s intention towards entrepreneurship: A planned behavior approach. *Chinese Management Studies, 13*(1), 146–170. https://doi.org/10.1108/CMS-06-2018-0556

Zhang, J., & Hamilton, E. (2009). A process model of small business owner-managers’ learning in peer networks. *Education + Training, 51*(8–9), 607–623. https://doi.org/10.1108/004009109101005181

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