Exploring the differences in early-stage incubator and accelerator startups across developed and developing countries: Evidence from the U.S., Israel, and Thailand

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Abstract

We investigate differences in the characteristics of early-stage startups associated with incubators or accelerators across three developing (Thailand) and developed (the U.S. and Israel) countries. Based on analyses of 90 startups, we found significant differences in fundraising and patent activity patterns—two characteristics that are fundamental for startups. The U.S. and Israeli startups patent their innovations to a greater extent compared to those in Thailand. While U.S. startups raise funds from local venture capital firms and Thailand from foreign ones, Israel uses both sources. We explain how these results are associated with entrepreneurial ecosystems.

1. Introduction

We are motivated by the increasing contribution of startups to local and global economies (Global Startup Ecosystem Report, 2019) and by the trend of fostering

startups within technology business incubators and accelerators (Crișan et al., 2021, Mian et al., 2016). Despite decades of research, scientists still strive to explain differences between startup characteristics (Stenholm et al., 2013) such as culture, market, and financial performance (Cumming and Zhang, 2019), and understand the impact of different incubators and accelerators on the development of entrepreneurial ventures (Mian et al., 2016), especially in developing countries (Crișan et al., 2021).

Startups operate within different entrepreneurial ecosystems around the world (World Economic Forum, 2014). According to the Global Startup Ecosystem Report (2020), a startup and its ecosystem are typically located within a 100-kilometer radius and include policymakers, accelerators, incubators, coworking spaces, educational institutions, and funding groups. Our focus is on early-stage startups, within the time interval between opportunity identification to roughly five years of venture launching, associated with incubators or accelerators. Incubators and accelerators play a critical role in supporting and growing startups, offering them the services needed to increase their survival chances during their formative years (Mian et al., 2016). Incubators have a long history since the first incubator was founded in 1959 at Batavia Industrial Centre in New York. Currently, there are more than seven thousand incubators globally (Galbraith et al., 2021). An accelerator is a relatively new incubator model (by 2016, over three thousand accelerators existed globally; Hochberg, 2016) that provides intense, targeted assistance over a limited period (Pauwels et al., 2016). The typical assistance includes education, mentoring, networking, monitoring, and connecting with investors (Crișan et al., 2021; Hausberg and Korreck, 2018).

Fundraising from investors is considered one of the main obstacles facing startup development (Patton et al., 2009). Venture capital (VC) represents a dominant source of funds for high-potential startups commercializing risky inventions and technologies

(Lerner and Nanda, 2020). Research has shown that VC-funded startups grow faster than non-VC-funded startups (Dutta and Folta, 2016) and that VC firms tend to invest differently depending on national culture (Li and Zahra, 2012). Zacharakis et al. (2007) argued that VC firms in developed countries rely upon market information, such as market size, market growth, competitor strength, to a greater extent than VC firms in developing countries, which frequently consider human capital information. Prior studies indicated that granted patents and patent applications might contribute to fundraising from VC investors, private investors (Hoenen et al., 2014; Zhou et al., 2016), and corporate investors (Cockburn and MacGarvie, 2009). Hereafter, we will use the term patent activity when a startup owns a granted patent or a patent application and investigate whether there is a difference in patent activity between startups in developing and developed countries.

The research gap on which we focus is the fundraising and patent activity of early-stage startups associated with incubators or accelerators in representative developed and developing countries, issues that are central to startups (Noelia and Rosalia, 2020). We adopt the World Bank classification of developed countries as high income economies (Israel and the U.S. in this research) and developing countries as low and middle income economies (Thailand in the context of this research) [1]. Thailand was selected to represent the developing countries by virtue of its emerging ecosystem (e.g., Bangkok was ranked among the top 100 startup emerging ecosystems; Global Startup Ecosystem Report, 2020).

This study is unique as most databases do not include early-stage startups (Bjornskov and Foss, 2016). Additionally, entrepreneurship scholars tend to focus on

[1] The U.S. population was over 328 million in 2019, with GNI per capita of 65,850 U.S. dollars. Thailand had more than 69 million with GNI per capita of 7,260 U.S. dollars; the population of Israel in 2019 was around 9 million people with GNI per capita of 43,110 U.S. dollars (https://www.worldbank.org).

activities in advanced economies (Cao and Shi, 2021), especially American and Western European countries (Aldrich and Ruef, 2018). The study conducts a comparative analysis using a sample of 90 startups that are operating (or operated) in an incubator or accelerator in one of the three countries named above during 2019 and 2020. This study offers new contributions to the literature about early-stage startup ecosystems in the context of fundraising and patent activity.

The paper is structured as follows. In Section 2, we develop three research hypotheses on fundraising and patent activity of startups across developing and developed countries. In Section 3, we describe the research methods, and in Section 4, we report the research results. In Section 5, we discuss the research results, propose practical implications, present research limitations and directions for future study, and in Section 6, we present the research conclusions.

2. Hypotheses development

2.1. Entrepreneurial ecosystems

The entrepreneurial ecosystem is a recent concept in entrepreneurship research (Brown and Mason, 2017), emerging from the cluster concept that refers to a geographic concentration of interconnected companies and institutions in a particular field such as Silicon Valley in microelectronics (Porter, 1998). Research revealed that the flow of knowledge and investment funding, and the existence of networks and partnerships between regional organizations, such as universities, public and private funding groups, and large and small firms, lead to innovative products, services, and technologies (Cooke, 1997; Granstrand and Holgersson, 2020).

Drawing an analogy from natural ecosystems, James Moore described how business ecosystems emerge from the capital, customer interest, and talent generated by innovations, similar to how plants develop when given sunlight, water, and soil

nutrients (Moore, 1993). The fundamental ideas of entrepreneurial ecosystems have, since the 1980s, moved from a focus on individual entrepreneurs towards an interdependent community perspective (Stam and Van de Ven, 2021), incorporating the social, political, economic, and cultural elements (Spigel, 2015) that have a critical role in reducing startups' innovation obstacles (Noelia and Rosalia, 2020). An entrepreneurial ecosystem includes eight pillars, two of which are essential for the growth of early-stage startups—access to funding and markets (World Economic Forum, 2014).

Cao and Shi (2021, p. 75) presented the prevalent definition of the entrepreneurial ecosystem as "a community of multiple coevolving stakeholders that provides a supportive environment for new venture creations within a region". Many governments are trying to support entrepreneurship since entrepreneurial ventures are considered an essential source of innovation, productivity growth, and employment (World Economic Forum, 2014). To build strong entrepreneurial ecosystems, governments need to engage the private sector early, modify cultural norms, remove regulatory barriers, and provide financing programs, among other steps (Isenberg, 2010).

Economic achievements support the reputation of entrepreneurial ecosystems, which, in turn, contributes to attracting investors into the ecosystem (Audretsch et al., 2019). According to Audretsch et al. (2019), the commercialization of knowledge is a crucial measure of success that could facilitate the conversion from invention to innovation in entrepreneurial ecosystems. The knowledge spillover process can be disclosed and protected by intellectual property rights (Jarchow and Röhm, 2019).

Silicon Valley is considered the "gold standard" entrepreneurial ecosystem (Isenberg, 2010, p. 43), facilitating conditions for long-term entrepreneurial success and

the development of advanced technologies (Lerner, 2020). Silicon Valley entrepreneurship revolves around high technology firms based on knowledge spillovers from university research, according to the United States Congress mandate for promoting innovation and economic growth through the Small Business Innovation Research (SBIR) program, and the emergence of financial entities, such as angel and VC investors (Audretsch, 2021). Isenberg (2010) argued that the Silicon Valley ecosystem evolved in an environment that includes a local aerospace industry, invention spillover from Fairchild Semiconductor Inc., Stanford University's supportive relationships with industry, and a culture that encourages collaborative innovation and tolerates failures.

The Israeli ecosystem emerged out of military research and development (R&D), which has been generating innovative technologies such as memory USBs since the 1970s (Isenberg, 2010). Since the mid-1980s, Israeli high tech has grown remarkably fast, probably due to government policies and extensive support (Trajtenberg, 2002). This government support has taken the form of a series of innovative programs beyond R&D grants: the Yozma government-sponsored VC fund; the "Incubators" program, which was a government response to the potential for innovative products presented by the mass immigration of scientists and skilled professionals from the Soviet Union; and the Magnet program, designed to support the development of generic technologies by groups of industrial firms and academic institutions (Trajtenberg, 2002). Capital markets were extremely limited in the early stages of Israeli high-tech development (Trajtenberg, 2002). Indeed, Athena Venture Partners was the only VC fund operating in Israel (Lerner, 2020).

The Israeli government launched Yozma (meaning initiative in Hebrew) in 1992, a fund of $100 million, funded by the Israeli government and local and foreign private

investors with proven funds management expertise (Isenberg, 2010), that created ten VC funds within three years. The goal of Yozma was to bring foreign VC investment expertise and contact networks to Israel. In fact, the ten VC funds were founded by groups from the United States, Western Europe, and Japan (Lerner, 2020). After five years, the private investors bought Yozma's shares in these funds at a predetermined price (Trajtenberg, 2002).

In parallel, the Israeli government signed bilateral R&D cooperation agreements with foreign governments to support Israeli technology and products in accessing global markets (Trajtenberg, 2002). The goal was to develop science-based, export-oriented industries, mainly to increase employment (Trajtenberg, 2002).

Since then, the Israeli VC industry has achieved self-sustainability and tremendous growth (Isenberg, 2010). It is interesting to note that the ratio of venture investment to GDP in Israel is consistently higher than in any other nation (Lerner, 2020). Additionally, Israeli incubators are considered essential for providing initial funding for startups (Conti et al., 2013).

The Kingdom of Thailand has a history of responsible and inclusive innovation pioneered by His Majesty King Bhumibol Adulyadej in water aeration and rainmaking, impacting the lives of millions (Thawesaengskulthai et al., 2020). Thailand's strategy to become an innovation-driven economy, highlighting investment opportunities and trends in targeted industries to address fundamental social challenges, as pioneered by the late King Rama IX, began in 2018 (Thawesaengskulthai et al., 2020). Compared to its neighbors, e.g., Singapore, the Thai startup ecosystem is relatively new and small and concentrated in Bangkok (Leung and Cossu, 2019). The promise of digital entrepreneurship has encouraged Thailand's younger generations to take risks (Leung and Cossu, 2019), resulting in Thailand's entrepreneurs being typically under 40 years

old; they also come from relatively wealthy backgrounds (Leung and Cossu, 2019). Thailand's entrepreneurial ecosystem benefited from a decade of public investment in innovation infrastructures such as science parks and accelerators (Thawesaengskulthai et al., 2020), and since the 1980s, substantial capital investment from Japan and the United States (Leung and Cossu, 2019). The most active VC funds in Thailand are 500 Startups from the United States and Cyberventure from Japan (Leung and Cossu, 2019). Thailand launched its business incubation process in 2002 to support startups with innovative technology-driven products, and nearly all Thai business incubators operate in universities and are publicly funded (Munkongsujarit, 2016). Nevertheless, Thai incubators struggle to support their entrepreneurs adequately due to insufficient funding and a lack of business incubation experience among staff and entrepreneurial skills of the startup companies (Munkongsujarit, 2016).

2.2. The number of investors in early-stage startups

Startups encounter severe barriers in their development because of a scarcity of financial resources (Noelia and Rosalia, 2020). For example, four out of every ten startups have only three months of capital runway (Global Startup Ecosystem Report, 2020). VC represents a dominant source of funds for high-potential startups commercializing risky inventions and technologies (Lerner and Nanda, 2020). Previous studies have investigated VC investment across developed and developing countries but have not examined, to the best of our knowledge, the number of investors that invested in an early-stage startup across developed and developing countries. Moreover, previous studies measured the number of investors that spread the risk of their investments in a specific VC round, given that the VC industry uses risk-sharing partnerships (Lerner and Nanda, 2020). However, previous studies have not examined these investments across countries (Hoenen et al., 2014; Zhou et al., 2016). Over the

last decade, the amount of funds deployed worldwide by VC investors has grown substantially (Lerner and Nanda, 2020). The U.S., which is considered the most advanced VC market globally (Li and Zahra, 2012), had more than 1,000 VC funds in 2019 (Lerner and Nanda, 2020). Both the U.S. and Israel, which represent the developed countries in this research, rank among the top 10 countries worldwide in the number of investment deals, including VC deals from 1977 to 2012 (Cumming and Zhang, 2019). The Israeli government's support for civilian R&D began in 1969 (Trajtenberg, 2000); nowadays, Israel ranks third in the number of artificial intelligence startups globally (Global Startup Ecosystem Report, 2020). Currently, the Thai high-tech industry specializes in a few products (https://www.worldbank.org). One reason for limited high-technology products derives from the evidence that the Thai entrepreneurial ecosystem experiences scarce resources (Cao and Shi, 2021), especially the limited number of angel and VC investors (Munkongsujarit, 2016; Scheela and Jittrapanun, 2012). From the above, we can see that startups in the U.S. and Israel have a higher number of potential investors interested in advanced technology compared to Thailand. Since Thai startups in our sample had a single VC round, we focus on the first VC round across countries (this applies to all hypotheses), given that we are interested in determining the number of investors that spread the risk of their investments in a specific VC round in developed and developing countries. This discussion leads to our first hypothesis.

Hypothesis 1. Startups in developed countries (the U.S. and Israel) are more likely to raise funds from a higher number of investors in their first VC round compared to startups in developing countries (Thailand).

2.3. The geographic proximity of VC firms to early-stage startups

Typically, VC firms reside in areas where VC investments have a high success rate (Chen et al., 2010). The geographic proximity between VC firms and ventures reduces information asymmetry and increases the likelihood of VC funding. Conversely, geographical distance and institutional differences affect the costs and risks of foreign VC firms (Tykvová et al., 2014). Therefore, geographically outlying VC firms should have experience investing from a distance (Shafi et al., 2020).

Foreign VC firms dominate the Asian VC industry and have a relative advantage over local VC firms in size and experience; however, in general, foreign VC firms have difficulties gathering information and monitoring due to geographical and cultural distances (Dai et al., 2012). Therefore, foreign VC firms often establish local offices (Devigne, 2016) and form partnerships with local VC firms to address the information asymmetry and monitoring complexity (Dai et al., 2012).

The U.S. is considered the most advanced VC market (Li and Zahra, 2012). The Israeli VC is self-sustainable and growing remarkably (Isenberg, 2010). The small size of Israel makes it a unique geographical cluster where information about new technologies is spread from one district to another within a short period of time (Conti et al., 2013). Both in the U.S. and Israel, startups have access to a higher number of geographically close VC firms than their counterparts in Thailand. Specifically, we are interested in determining the geographic proximity of VC firms to early-stage startups in developed and developing countries. We concentrate on the first VC round across countries and hypothesize that:

Hypothesis 2. Startups in developed countries (the U.S. and Israel) are more likely to raise funds from geographically close VC firms in their first VC round compared to startups in developing countries (Thailand).

2.4. Patent activity of early-stage startups

Patent activity, such as granted patents or patent applications, which is considered an innovation activity, is positively associated with survival (Zhang et al., 2020) and may signal quality in the early stages when technological uncertainty is high (Cockburn and MacGarvie, 2009; Hsu and Ziedonis, 2013). Indeed, patents contribute to fundraising and are typically required to enter foreign markets by blocking competitors (Neuhausler, 2012). Domestic patents are granted by national patent offices and international patents are granted by the World Intellectual Property Organization (WIPO). The applications are filed in those countries that are targeted for export (Grupp and Schmoch, 1999). For example, foreign companies that target the U.S. market file patent applications with the United States Patent and Trademark Office (USPTO).

Previous research has shown the differences in patent filing across developed and developing countries and found that developing countries' weak protection of intellectual property rights discourages innovation in those countries compared to developed countries (Allred and Park, 2007). The latter research, however, did not explore the linkage between patent activity and fundraising. In addition, research has shown that companies from developing countries are less likely to target foreign markets and, therefore, not apply for foreign patents or may be hindered by the high cost of patenting (de Rassenfosse et al., 2013) or low returns to R&D expenditure (Minniti and Lévesque, 2010).

The typically limited market size of developing countries that rely on incremental, adaptive, and imitative development (Allred and Park, 2007), accordingly, may offer little incentive for startups to protect their products from competitors. Research about critical success factors of Thai startups did not mention any patent activity (Nalintippayawong et al., 2018), although some Thai startups develop high-

technology products. On the other hand, the annual number of U.S. patents granted (both the total and those assigned to U.S. inventors) doubled during the 1990s (Trajtenberg, 2002). The number of U.S. patents granted to Israeli inventors has more than tripled since 1985 (the U.S. market is the primary target for Israeli startups), making Israel one of the leading countries holding patents per capita (Trajtenberg, 2002).

Studies have measured whether a startup filed at least one patent application before a specific VC funding round but not in the context of different countries (Hoenen et al., 2014; Zhou et al., 2016). In the context of this research, we are interested in determining the patent activity of early-stage startups before a VC round across developed and developing countries. We concentrate on the timing of patent activity in connection with fundraising in the first VC round across countries. Thus, we hypothesize that:

Hypothesis 3. Startups in developed countries (the U.S. and Israel) are more likely to possess patent activity before their first VC round compared to startups in developing countries (Thailand).

3. Methods

This section details the research setting and methods. We conducted a preliminary study in Israel between September 2018 and March 2019. We used this stage to collect data and feedback from startup founders, incubator and accelerator directors, VC directors, innovation authority directors, and for fine-tuning the research methods. In the next stage, we conducted the research in the U.S., Israel, and Thailand between May 2019 and August 2020.

3.1. Data collection

For data collection purposes, we established a collaboration with several international incubators and accelerators for early-stage startups. We collected the data through an online questionnaire,[2] databases, and interviews (see also Cohen et al., 2000). The use of a questionnaire is a common data collection method for startup research; for example, Davila and Foster (2007) developed a questionnaire to collect data about control systems for managing early-stage startups. Sullivan et al. (2021) employed the same approach for collecting data about learning activities and network ties of early-stage startups in incubators. The purpose of our questionnaire was to collect data about a variety of startup characteristics (e.g., founders' experience, fundraising, and product development stages). We contacted the startups' founders via email, provided them with the study overview, and included a web link to the questionnaire (when necessary, we sent a reminder via email). In addition, we collected complementary financial and patent data from databases such as CB Insights (https://www.cbinsights.com), IVC data and insights (https://www.ivc-online.com/) and PatBase (https://www.patbase.com). Collecting data through secondary sources is a common approach; for example, Devigne et al. (2016) and Greenberg (2013) collected data from commercial databases on VC firms and startups; Greenberg (2013) and Lerner and Nanda (2020) used complementary data from the U.S. patent and trademark office. Finally, we conducted a 30-minute interview with the founders to clarify the collected data.

3.2. Data analyses

[2] A literature review and the preliminary study facilitated the development of the questionnaire. The questionnaire was reviewed by an incubator director (Ph.D. and entrepreneur) and fine-tuned in selected topics following feedback from the first startups.

We employed zero-order Pearson correlation analyses for identifying correlations between variables, and Wilcoxon and Kruskal-Wallis nonparametric tests for assessing the differences between sample groups at a significance level of 5%. In addition, we performed a Qualitative Comparative Analysis (QCA) to explore similarities and differences across comparable cases by pooling similar cases and comparing them as configurations of causal conditions producing a particular outcome.

We verified the Pearson correlation assumptions by analyzing the distribution of each variable. The continuous variables—startup age, founders' experience, number of employees, and amount of funds raised—conform with the log-normal distribution; therefore, we used the natural logarithm of these variables. Additionally, we checked for normality by conducting a Shapiro-Wilk test, which supported the univariate normality assumption for all variables other than startup age. We considered one startup as an outlier since its founders were undergraduate students who had just started their venture. In addition, we used bivariate analyses to examine a linear distribution of observations. The continuous variables—annual revenue, startup experience, number of patents, and number of VC rounds—were non-linearly distributed with other variables; therefore, we used dummy variables for these variables as for countries and industry sectors. Further, we employed QCA, designed for small samples, as an alternative for linear regression analysis to explain the outcome of interest (Fainshmidt et al., 2020; Ragin, 2014). In QCA, causal conditions and outcomes are coded either as present (1) or absent (0). For QCA, we used categorical variables found to be significant in quantitative analyses—patent activity (PA), local VC firm (LVC), foreign VC firm (FVC), and VC firm proximity to startup (VCP)—as causal conditions to identify whether the presence or absence of causal conditions is consistent with the presence or

absence of the outcome, developed country (DC) in the analysis. We used JMP software for the quantitative analyses and QCA software [3] for the qualitative analyses.

3.3. Research sample

We contacted 150 early-stage startups. One hundred startups from the U.S., Israel, and Thailand responded to our questionnaire (66.6%). Of those, 90 were interviewed, resulting in a sample size of 90 startups (60%). We benchmarked our sample with that of the Sullivan et al. (2021) study about early-stage ventures in U.S. incubators and found it comparable (e.g., for startup age and size, industry sector, founder gender and education). Sullivan et al. (2021), however, did not concentrate on fundraising and patent activity, which are the focus of the current study.

Table 1 presents descriptive statistics of the sample. About half of the startups were from the U.S. (Panel A). Information technology and health care sectors accounted for 60% of the startups (Panel B). More than 25% of the startups were backed by VC firms (Panel C). The difference between the mean number of VC-backed startups across countries was insignificant. In the first VC round, the mean startup age was 2.34 years. The typical founder in the sample was male (86.8%), 38.5 years old (s.d.=10.4), had a Master's degree (most likely in engineering), had founded a company in the past, and had 13 years of entrepreneurial experience. The typical startup age was 3.5 years (s.d.=1.9), had raised $2 million (s.d.=$3.6 million), had an annual revenue of $0.5 million (s.d.=$2.2 million), and managed nine employees (s.d.=10.9). An insignificant difference existed in the mean number of employees and mean age of startups across countries.

[3] https://www.qca-addin.net.

Half of the startups were operating in an incubator or accelerator, and the other half has operated within at least one in the past (Panel D). An insignificant difference existed in the mean number of startups that were operating in an incubator or accelerator across countries.

Stam (2015) argued that entrepreneurs are important players in creating the ecosystem and keeping it healthy. The mean number of startup founders was 2.25. In about half of the U.S. and Israeli startups, at least one of the founders held a Ph.D. degree (23% in the Thai startups). Additionally, in about two thirds of the U.S. and Thai startups, at least one of the founders had an engineering education (88% in the Israeli startups). Generally, the Israeli founders had diverse experience. The mean number of Thai founders who had worked together previously was higher compared to the other countries. Additionally, the mean number of Thai startups that conducted internal monitoring and control (M&C) was relatively high; yet, low for external M&C than in other countries.

Table 1
Descriptive statistics on sample of startups.

Panel A: Country statistics

Country	Number of startups
U.S.	47
Israel	26
Thailand	17
Total	90

Panel B: Industry statistics

Industry sector[a]	Number of startups
Information technology	28
Health care	26
Industrials	19
Consumer discretionary	7
Other	10
Total	90

Panel C: Financing statistics

Primary financing type	Number of startups
Angel	26
VC	25
Grant	12
University	10
Corporate investor	7
Founder	4
Other	6
Total	90

Panel D: Research variables statistics

	All		U.S.		Israel		Thailand	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. Startup age[b]	3.28	1.97	3.06	2.08	2.96	1.28	4.40	2.24
2. Number of founders	2.25	0.85	2.12	0.87	2.42	0.80	2.35	0.86
3. Single founder	0.18	0.39	0.25	0.44	0.07	0.27	0.17	0.39
4. Technological experience[c]	16.12	16.12	14.56	17.34	20.90	16.12	13.11	11.01
5. Industrial experience[c]	16.20	16.51	13.40	15.30	22.50	19.88	14.29	11.35
6. Business experience[c]	19.90	18.37	16.79	16.64	23.80	20.86	22.52	18.49
7. Managerial experience[c]	17.03	17.18	14.97	15.69	23.48	21.59	12.88	10.39
8. Entrepreneurial experience[c]	13.32	12.25	11.71	10.43	17.53	16.29	11.29	8.20
9. Startup experience[d]	1.56	1.81	1.55	1.77	1.80	2.07	1.23	1.52
10. Founders worked together	0.36	0.48	0.34	0.47	0.34	0.48	0.47	0.51
11. PhD	0.48	0.50	0.59	0.49	0.46	0.50	0.23	0.43
12. MBA	0.26	0.44	0.21	0.41	0.34	0.48	0.29	0.46
13. Engineer	0.71	0.45	0.61	0.49	0.88	0.32	0.70	0.46
14. Formal internal M&C	0.57	0.49	0.53	0.50	0.53	0.50	0.76	0.43
15. Formal external M&C	0.32	0.46	0.34	0.47	0.34	0.48	0.23	0.43
16. Number of granted patents	0.63	1.58	0.72	1.93	0.69	1.28	0.29	0.77
17. Number of pending patents	1.40	2.12	1.46	2.56	2.00	1.57	0.29	0.68
18. Incubator as patent applicant	0.21	0.41	0.42	0.50	0.04	0.21	0.00	0.00

	All		U.S.		Israel		Thailand	
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD
19. Incubator as patent assignee	0.21	0.41	0.42	0.50	0.04	0.21	0.00	0.00
20. Number of employees	8.94	10.92	9.82	13.84	6.26	4.37	10.58	8.10
21. Attending incubator/accelerator	0.50	0.50	0.59	0.49	0.38	0.49	0.41	0.50
22. Several incubators/accelerators	0.38	0.49	0.36	0.48	0.50	0.50	0.29	0.46
23. VC finance	0.27	0.45	0.25	0.44	0.26	0.45	0.35	0.49
24. Number of VC rounds	0.38	0.74	0.40	0.82	0.38	0.75	0.35	0.49
25. Total funds raised[e]	1.89	3.68	2.37	4.87	1.89	1.60	0.55	0.73
26. Annual revenue[e]	0.48	2.19	0.65	2.93	0.08	0.20	0.64	1.21
27. Revenue[f]	0.48	0.50	0.36	0.48	0.46	0.50	0.88	0.33
28. Health care	0.28	0.45	0.29	0.46	0.23	0.42	0.35	0.49
29. Information technology	0.31	0.46	0.36	0.48	0.19	0.40	0.35	0.49
30. Industrials	0.21	0.41	0.10	0.31	0.50	0.50	0.05	0.24
31. Artificial intelligence	0.30	0.46	0.29	0.46	0.42	0.50	0.11	0.33
32. Time to product delivery[b]	2.24	1.99	2.25	2.05	2.53	1.33	1.80	2.59
33. Patent activity in 1st VC round	0.56	0.50	0.58	0.51	0.85	0.37	0.16	0.40
34. Funds raised in 1st VC round[e]	1.89	1.47	2.77	1.55	1.27	0.61	0.84	0.97
35. Time to 1st VC round[b]	2.43	1.44	2.44	1.29	1.57	1.05	3.41	1.66
36. Num of investors in 1st VC round	3.48	1.96	4.16	2.28	3.85	0.89	1.66	0.81
37. Geographic proximity of VC	0.64	0.48	0.75	0.45	0.85	0.37	0.16	0.40
38. Product[g]	0.64	0.48	0.57	0.49	0.57	0.50	0.94	0.24
39. Local VC in 1st VC round	0.76	0.43	1.00	0.00	0.85	0.37	0.16	0.40
40. Foreign/faraway VC in 1st VC	0.60	0.50	0.25	0.45	0.85	0.37	1.00	0.00

Legend:
[a] Industry sector follows the global industry classification standard (https://www.msci.com/gics).
[b] Age in years.
[c] Experience of founders in years refers to the current founders.
[d] Startup experience refers to previous companies established by the current founders.
[e] Funds raised in millions of dollars.
[f] Revenue refers to a startup that produces annual revenue.
[g] Product refers to a startup that owns a product.

4. Results

Table 2 presents the means, standard deviations, and Pearson correlations of startup variables. Table 3 shows possible configurations for the conditions PA, LVC, FVC, VCP, and outcome DC. Table 4 presents the QCA of causal conditions sufficient for DC (High DC) and ~DC (Low DC) outcomes since, unlike correlational

relationships, the relationships between causal conditions are asymmetric (Ragin, 2014).

4.1. General findings

The results concerning patents were consistent with previous research (Hoenen et al., 2014; Zhou et al., 2016), which added to our confidence when analyzing the differences across countries (see Section 4.2). There was a positive and significant correlation between startups that held a patent and the amounts of funds raised. In addition, startups that owned both a product and a patent had a significantly higher mean amount of funding and mean annual revenue compared to the other startups. In line with the findings of Dutta and Folta (2016), we see that VC investments contributed to startup growth. For example, the VC-backed startups had significantly higher mean amounts of funding, mean annual revenue, and mean number of employees compared to non-VC-backed startups. Further, the mean number of VC-backed startups that produced at least $1 million annual revenue was significantly higher than the non-VC-backed startups. Before the VC investment, half the startups had at least a minimum viable product (MVP), and the other half at least a proof of concept.

4.2. Differences and similarities across countries

The results indicate three basic types of startups in developed countries: those combining patent activity and local VC funding (the majority of U.S. and Israeli startups); those combining local VC funding and lack of VC geographical proximity (a minority of U.S. startups); and those lacking foreign VC funding (the majority of U.S. startups and a minority of Israeli startups). Additionally, the results indicate one type of developing country startups: those that combine a lack of both patent activity and local VC funding (the majority of Thai startups).

The study revealed that the U.S. and Thai startups target their domestic market, while Israeli startups target the global market, mainly the U.S. and the European Union. Among startups with granted patents, the U.S. startups and all but one of the Israeli startups held patents granted in the U.S., whereas the Thai startups held patents granted in Thailand and a neighboring country. The results regarding Israeli startups are similar to those in Conti et al. (2013), who examined a dataset of 787 Israeli startups, 16% operated in incubators, and showed the percentage of startups granted a patent. Among startups with patent applications, more than 45% of the Israeli startups, 25% of the Thai startups, and less than 19% of the U.S. startups held international patent applications.

According to World Economic Forum (2014), there is a difference in the initial revenues of an early-stage startup with regards to timing and magnitude. To gain insight into the role of incubators and accelerators across countries, we analyzed the proportion of startups that generated revenue while operating in an incubator or accelerator and found that all Thai startups produced revenue compared to 28% and 10% of the U.S. and Israeli startups, respectively. Accordingly, the mean number of Thai startups that owned a product was significantly higher compared to U.S. and Israeli startups. Additionally, the results revealed that more than 69% and 46% of Israeli and U.S. startups, respectively, received initial funds from an incubator or accelerator compared to less than 24% of Thai startups. The results may indicate that Thai startups perceive incubators and accelerators as an opportunity to achieve networking support (Crișan et al., 2021; Hausberg and Korreck, 2018) and improve their chances to grow, while U.S. and Israeli startups see them as places to learn and validate their products.

The U.S. incubators and accelerators were more involved in patent applications (in more than 24% of the U.S. startups that showed patent activity) compared to less than 7% of Israeli startups and none of Thai startups. That is an important finding due

to the positive contribution of patents to fundraising and revenue. The results suggest that the startup population in the U.S. and Israel are aware of the positive impact of patents with more than 85% and 58% of Israeli and U.S. startups, respectively, demonstrating patent activity before their first VC funding round compared to less than 17% of Thai startups. Moreover, all but one of the U.S. and Israeli startups that owned patents had at least one granted patent before the first VC round.

We also found that 100% of U.S. startups and more than 85% of Israeli startups received funding from local VC firms in the first VC round compared to less than 17% of Thai startups. We confirmed these findings by the QCA that indicated the presence of a causal combination of patent activity and local VC firms for the majority of the U.S. and Israeli startups and the absence of both for the majority of the Thai startups in the first VC round.

In the context of the first VC round, the mean amount of funds raised was significantly higher for U.S. startups compared to Israeli and Thai startups ($2.7 million, $1.2 million, $0.8 million in U.S., Israeli, and Thai startups, respectively). Additionally, the mean time to the first VC round was significantly shorter for Israeli startups compared to Thai startups (1.57 months, 2.44 months, 3.41 months for Israeli, U.S., and Thai startups, respectively). Also, in the first VC round, the mean number of investors in U.S. and Israeli startups was significantly higher compared to Thai startups (4.1, 3.8, 1.6 per U.S., Israeli, and Thai startups, respectively). It is reasonable to assume that U.S. startups require more time to raise a higher amount of funds from a higher number of investors than Israeli and Thai startups. The results regarding Israeli startups are similar to those in Conti et al. (2013), who examined a dataset of 787 Israeli startups with external funding from 1994 to 2011 and showed the average number of investors participating in each round and the average amount invested in the first round.

Additionally, we analyzed the location of startups and their investors in the first VC round. We found that most local investors resided in the approximate area of their startups (100% of Israeli and Thai startups, and 75% of U.S. startups, were financed by local VC firms whose headquarter reside within a 100-km radius from the startups). Our results are consistent with those of Lerner (2020) and Li and Zahra (2012). We also found that in the first VC round, 100% of Thai startups and more than 85% of Israeli startups received funding from foreign VC firms, versus 25% of U.S. startups by faraway VC firms residing outside a 100-km radius from the startups. Our results are in line with Cumming and Zhang (2019), Dai et al. (2012), and Lerner and Nanda (2020). Notably, we found that more than 83% of Thai startups were financed by a single foreign VC firm operating in Bangkok and less than 17% by both local and foreign VC firms. Since foreign VC firms are less likely to invest in early-stage companies, it may indicate that this foreign firm invests in information-transparent startups (Dai et al., 2012) residing close to its local office in Bangkok (Devigne, 2016).

Interestingly, in the first VC round, more than 33% of the U.S. startups and 28% of Israeli startups were supported by government grants versus none of the Thai startups. The results are in line with the World Economic Forum (2014), which showed differences across countries in how government policy promotes the development of early-stage startups. Results regarding Israeli startups are similar to Conti et al. (2013), who measured the percentage of startups awarded government grants. Moreover, the results indicate a significantly higher number of Israeli startups that operated in several incubators or accelerators before the first VC round compared to the other countries. The result may further indicate that Israeli startups perceive incubators and accelerators as an opportunity to achieve knowledge, product validation, and networking support (Crișan et al., 2021; Hausberg and Korreck, 2018).

For validation purposes, we reanalyzed the results using a subsample of 79 startups more than a year old (we assumed here that very young startups are less likely to have had substantial financial and patent activity). The results of these analyses were similar with regard to the findings obtained using the entire sample.

Overall, consistent with Hypothesis 1, we found that startups in developed countries (the U.S. and Israel) raise funds from a significantly higher number of investors in their first VC round compared to startups in developing countries (Thailand). Regarding Hypothesis 2, we found that startups in both developed (the U.S. and Israel) and developing countries (Thailand) raise funds from geographically close VC firms in their first VC round. Consistent with Hypothesis 3, we found that a significantly higher number of startups from developed countries (the U.S. and Israel) possess patent activity before their first VC round compared to startups in developing countries (Thailand).

Table 2
The means, standard deviations, and Pearson correlations of startup variables.

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Startup age[a]	1.33	0.50	1											
2. Single founder[b]	0.18	0.39	-0.01	1										
3. Technological experience[c]	2.50	0.82	0.35***	-0.23*	1									
4. Industrial experience[c]	2.47	0.89	0.42***	-0.33**	0.74***	1								
5. Business experience[c]	2.65	0.92	0.39***	-0.37***	0.49***	0.69***	1							
6. Managerial experience[c]	2.50	0.88	0.43***	-0.33**	0.54***	0.73***	0.80***	1						
7. Entrepreneurial experience[c]	2.35	0.78	0.50***	-0.27**	0.58***	0.76***	0.76***	0.78***	1					
8. Startup experience[d]	0.62	0.48	0.11	-0.09	0.36***	0.43***	0.37***	0.40***	0.54***	1				
9. PhD[e]	0.48	0.50	-0.00	0.09	0.18	0.08	-0.09	-0.10	-0.10	-0.06	1			
10. MBA[f]	0.26	0.44	-0.02	-0.17	0.01	0.13	0.34***	0.20	0.16	-0.04	-0.00	1		
11. Engineer[g]	0.71	0.45	-0.10	-0.19	-0.02	0.15	0.02	0.11	0.08	0.05	0.03	-0.02	1	
12. Patent[h]	0.24	0.43	0.32**	-0.07	0.27**	0.24*	0.18	0.18	0.22*	-0.09	0.06	0.04	-0.20*	1
13. Number of employees	1.90	0.85	0.42***	-0.28**	0.34***	0.34***	0.35***	0.31**	0.39***	0.17	-0.08	0.05	-0.06	0.26*
14. Incubator/accelerator[i]	0.50	0.50	-0.31**	0.02	-0.16	-0.15	-0.27**	-0.21*	-0.28**	-0.04	0.04	-0.05	0.09	-0.25*
15. Formal internal M&C[j]	0.57	0.49	0.24*	-0.21*	0.10	0.27**	0.23*	0.25*	0.21*	0.16	-0.06	-0.06	-0.04	0.06
16. Formal external M&C[k]	0.32	0.46	0.14	-0.15	0.20	0.27**	0.21*	0.33**	0.14	-0.00	0.03	-0.09	-0.03	0.21*
17. VC finance[l]	0.27	0.45	0.25*	-0.17	0.30**	0.26*	0.17	0.20*	0.24*	0.12	-0.11	-0.00	-0.04	0.28**
18. Total funds raised[m]	13.22	1.74	0.28**	-0.23*	0.54***	0.50***	0.33**	0.41***	0.40***	0.15	0.13	0.20*	-0.03	0.36***
19. Revenue[n]	0.48	0.50	0.42***	-0.01	0.14	0.27**	0.35***	0.24*	0.34***	0.02	-0.06	0.03	-0.11	0.32**
20. Health care[o]	0.28	0.45	0.06	0.06	-0.06	-0.01	0.00	-0.04	-0.06	-0.21*	0.16	0.11	-0.18	0.09
21. Information technology[p]	0.31	0.46	-0.25*	0.04	-0.15	-0.10	-0.08	-0.16	-0.12	0.12	0.11	0.04	0.05	-0.21*
22. Industrials[q]	0.21	0.41	-0.05	-0.18	0.10	0.06	-0.04	0.00	0.02	-0.10	-0.07	-0.14	0.20*	-0.04
23. Artificial intelligence[r]	0.30	0.46	-0.08	-0.13	-0.13	0.04	0.04	0.18	0.02	0.06	0.08	-0.02	0.14	0.02
24. U.S.[s]	0.52	0.50	-0.18	0.17	-0.14	-0.23*	-0.16	-0.15	-0.15	0.08	0.22*	-0.19	-0.21*	-0.02

25. Israel[t]	0.28	0.45	-0.01	-0.18	0.22*	0.27**	0.10	0.23*	0.18	-0.00	-0.03	0.24*	0.24*	0.09
26. Thailand[u]	0.18	0.39	0.26*	-0.01	-0.07	-0.01	0.08	-0.07	-0.02	-0.09	-0.24*	-0.02	-0.00	-0.07

Variable	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13. Number of employees	1													
14. Incubator/accelerator[i]	-0.22*	1												
15. Formal internal M&C[j]	0.30**	-0.00	1											
16. Formal external M&C[k]	0.19	-0.26*	0.34***	1										
17. VC finance[l]	0.53***	-0.37***	0.22*	0.36***	1									
18. Total funds raised[m]	0.63***	-0.26*	0.15	0.29**	0.55***	1								
19. Revenue[n]	0.37***	-0.26*	0.20	0.03	0.13	0.12	1							
20. Health care[o]	-0.22*	0.09	-0.05	-0.01	-0.12	-0.16	0.01	1						
21. Information technology[p]	0.04	-0.04	-0.05	0.00	0.01	-0.02	-0.03	-0.42***	1					
22. Industrials[q]	0.06	-0.02	0.16	0.05	0.04	0.13	-0.01	-0.32**	-0.34***	1				
23. Artificial intelligence[r]	0.08	-0.02	0.16	0.22*	0.08	0.13	-0.00	-0.09	0.13	0.13	1			
24. U.S.[s]	-0.08	0.20	-0.09	0.04	-0.05	-0.00	-0.26*	0.02	0.11	-0.26*	-0.00	1		
25. Israel[t]	-0.04	-0.14	-0.05	0.03	-0.01	0.23*	-0.03	-0.08	-0.16	0.45***	0.17	-0.66***	1	
26. Thailand[u]	0.16	-0.08	0.18	-0.08	0.08	-0.27**	0.37***	0.06	0.04	-0.18	-0.19	-0.50***	-0.30**	1

Legend:

[a] Startup age in years.

[b] Single founder – dummy variable that takes the value of 1 if the startup has a single founder (n=17), and 0 otherwise.

[c] Experience of founders in years refers to the current founders.

[d] Startup experience – dummy variable that takes the value of 1 if at least one of the current founders established a company in the past (n=56), and 0 otherwise.

[e] PhD – dummy variable that takes the value of 1 if at least one of the current founders has a PhD degree (n=44), and 0 otherwise.

[f] MBA – dummy variable that takes the value of 1 if at least one of the current founders has an MBA degree (n=24), and 0 otherwise.

[g] Engineer – dummy variable that takes the value of 1 if at least one of the current founders has engineering education (n=64), and 0 otherwise.

[h] Patent – dummy variable that takes the value of 1 if a startup has at least one granted patent (n=24), and 0 otherwise.

[i] Incubator/accelerator – dummy variable that takes the value of 1 if a startup is attending an incubator or accelerator (n=45); and 0 otherwise.
[j] Formal internal M&C – dummy variable that takes the value of 1 if a startup has formal internal monitoring and control (n=52); and 0 otherwise.
[k] Formal external M&C – dummy variable that takes the value of 1 if a startup has formal external monitoring and control (n=29); and 0 otherwise.
[l] VC finance – dummy variable that takes the value of 1 if a startup raised funds from venture capital (n=25); and 0 otherwise.
[m] Funds raised in total in millions of dollars.
[n] Revenue – dummy variable that takes the value of 1 if a startup has annual revenue (n=44); and 0 otherwise.
[o] Health care – dummy variable that takes the value of 1 for those startups in the health care sector (n=26).
[p] Information technology – dummy variable that takes the value of 1 for those startups in the information technology sector (n=28).
[q] Industrials – dummy variable that takes the value of 1 for those startups in the industrials sector (n=19).
[r] Artificial intelligence – dummy variable that takes the value of 1 for those startups applying artificial intelligence (n=34).
[s] U.S. – dummy variable that takes the value of 1 for U.S. startups (n=47).
[t] Israel – dummy variable that takes the value of 1 for Israeli startups (n=26).
[u] Thailand – dummy variable that takes the value of 1 for Thai startups (n=17).

N = 90.
*p < .05
**p < .01
***p < .001

All continuous variables are natural log transformed.
The table presents correlations for dummy variables with at least ten startups.

Note:
The correlations results are similar when dummy variables are replaced with the natural logarithm of the variables: startup experience, number of patents, number of VC rounds, and annual revenue.

Table 3
The truth table of configurations for the conditions PA, LVC, FVC, VCP**,** and the outcome DC.

Configuration	Condition				Outcome	Number of startups
	PA	LVC	FVC	VCP	DC	
1	0	0	1	0	0	1
2	0	0	1	1	0	3
3	0	1	0	0	1	1
4	0	1	0	1	1	3
5	0	1	1	0	1	1
6	0	1	1	1	C	2
7	1	0	1	1	C	2
8	1	1	0	0	1	1
9	1	1	0	1	1	5
10	1	1	1	0	1	1
11	1	1	1	1	1	5

Legend**:**
PA – patent activity, LVC – local VC firm, FVC – foreign VC firm, VCP – geographic proximity of VC firm to startup, DC – developed country.
1 = present, 0 = absent, C = contradiction (an identical configuration of conditions is linked to both the presence and absence of the outcome, treated as does not exist).
N = 25.

Table 4
The qualitative comparative analysis of causal conditions sufficient for DC and ~DC outcomes.

Condition	Outcome			
	DC			~DC
PA	●			Θ
LVC	●	●		Θ
FVC			Θ	
VCP		Θ		
Solution	SO1	SO2	SO3	SN1
Configurations	8,9,10,11	3,5,8,10	3,4,8,9	1,2

Legend**:**
PA – patent activity, LVC – local VC firm, FVC – foreign VC firm, VCP – geographic proximity of VC firm to startup, DC – developed country, ~DC – developing country.
● = present, Θ = absent.
N = 25.

5. Discussion

This study analyzes the differences and similarities of two important early-stage startup characteristics—fundraising and patent activity—across three countries (the U.S. and Israel, which are developed countries; and Thailand, a developing country). Table 5 summarizes the main findings.

Notably, we found that U.S. and Thai startups target their domestic markets while Israeli startups target the international market. One explanation may be that U.S. and Thai startups have access to a broad domestic market; in opposition, Israeli startups have a limited local market and enjoy free trade agreements with the U.S. and the European Union (Trajtenberg, 2000).

Concerning the funding, the study highlights the tendency of U.S. and Israeli startups to raise funds from a higher number of investors in their first VC round compared to Thai startups. Cumming and Zhang (2019) showed that legal, economic, and cultural differences could explain the number of investments. In the context of this research, these differences between developed and developing countries may be attributed to the advanced U.S. and Israeli VC markets (e.g., Li and Zahra, 2012) and the Israeli and U.S. government funding incentives. Our results are in line with Feldman and Kelley (2006), Guerini and Quas (2016), and Islam et al. (2018), who noted that the U.S. and Israeli governments support startups through grants, which may signal to investors the startups' technological innovation and business viability. In contrast, the Thai entrepreneurial ecosystem suffers from scarce resources (Scheela and Jittrapanun, 2012), especially having a limited number of angel and VC investors (Munkongsujarit, 2016). Consequently, Thai startups we examined raised funds only from a few investors in their first VC round and underwent insufficient external monitoring and control, which may impact their future growth. The results suggest that Thailand has a different

entrepreneurial ecosystem in the sense that Thai early-stage startups have revenue and are less dependent on a high amount of funding at this early stage.

Regarding the first VC round pattern, the study indicates that U.S. startups typically raise funds from geographically close VC firms, Israeli startups from both geographically close and foreign VC firms, and Thai startups from a single foreign VC firm operating in Bangkok. Possible explanations for this finding are that the U.S. startups have an abundance of local VC funds (Lerner and Nanda, 2020) and Israel is one of the worldwide leaders in the number of VC deals (Cumming and Zhang, 2019), attracting both local and international investors. Since local VC firms regularly make the first startup investments (Berger and Köhn, 2020), most likely Israeli startups get funds from local and foreign VC firms in their first VC round due to the interest of international VC firms in Israeli startups. We note that Israeli startups operated in more incubators or accelerators before their first VC round compared to startups in the U.S. and Thailand, which may improve their chances of surviving and acquiring access to additional investors.

Since Thai startups suffer from an insufficient number of local VC investors (Munkongsujarit, 2016), and it is known that local VC investors in developing countries are typically less experienced (Chemmanur et al., 2016), these startups are encouraged to reach out to international investors (Cao and Shi, 2021). Indeed, there are specific international VC firms that target Asian startups and often open local offices. Another explanation may be related to the risk-averse nature of Thai local VC investors who require sustainable revenues from Thai startups before investing. Therefore, incubators and accelerators in Thailand may serve as an opportunity for early-stage startups to achieve global networking (Crișan et al., 2021) and acquire access to local and international investors (a pillar of entrepreneurial ecosystems) and consequently

improving their chances of growing (versus Israeli and U.S. startups that see them places to learn and validate their products).

Concerning patent activity, U.S. and Israeli startups patent their innovations, protect them and signal quality significantly more than Thai startups. These results can explain findings from prior studies about the contribution of patent activity to fundraising from VC firms (Hoenen et al., 2014; Zhou et al., 2016). Signaling quality through patent activity may serve startups in the early stages when technological uncertainty is high (Cockburn and MacGarvie, 2009; Hsu and Ziedonis, 2013). In line with Zhang et al. (2020), who argued that patent activity impacts the chances of surviving, our study points out that U.S. and Israeli startups patent their advanced and high-risk technologies, which, in turn, may help them to reach more investors. As discussed earlier, Thai startups that specialize in a few high-technology products may not withstand the high cost of patenting or encounter difficulty demonstrating novelty in their invention. Similar to Minniti and Lévesque (2010), who argued that startups in developing countries tend to engage in imitative entrepreneurship rather than research-based entrepreneurship associated with patenting, our results demonstrate that Thai startups lack patent activity.

5.1. Practical implications

This research offers practical implications for startups, incubators, and accelerators, regardless of a specific country. Entrepreneurs should consider the value of patented technology and assess the potential of a patent application. Further, entrepreneurs should realize the significance of government grants as a source of finance and quality signaling and assess the potential and required conditions to attract VC investors. Incubators and accelerators are encouraged to understand the impact of early-stage startup characteristics on the startup outcome and adjust their management

processes accordingly, for example, by promoting patent applications, applying for grants, and facilitating VC access.

5.2. Limitations and future research

This study has several limitations. As mentioned previously, there is a lack of databases and studies on early-stage startups across countries, and specifically in developing countries. Thus, the sample size is a limiting factor towards drawing additional insights. A larger sample, covering multiple entities that differ in culture, life cycle, technology, or institutional context would enable discovering how particular conditions influence startup characteristics and facilitate a generalization of the results. Future research could benefit from extending the current study by 1) examining early-stage startups from developing countries, and 2) investigating incubators' and accelerators' support in promoting patent applications and facilitating VC access to their startups.

Table 5
The main findings on early-stage startups across countries.

Early-stage startup characteristics	U.S.	Israel	Thailand
Target market	Domestic market	International market	Domestic market
Patent activity in 1st VC round	Common	Common	Uncommon
Investors in 1st VC round	Several investors	Several investors	A few investors
Funded by local VC in 1st VC round	Common	Common	Uncommon
Funded by foreign VC in 1st VC round	Uncommon	Common	Common

6. Conclusions

The findings indicate different types of startups in developed and developing countries; therefore, one solution does not fit all. The results highlight the importance of the entrepreneurial ecosystem on fundraising and patent activity, both of which are key to startups' survival and growth. Specifically, early-stage startups in developed

countries require geographically close VC firms, and incubators and accelerators and early-stage startups in developing countries need foreign VC firms with local offices. The results reveal that incubators and accelerators play different roles in supporting early-stage startups across countries. It appears that incubators and accelerators in the U.S. and Israel provide a wide range of services beyond the initial funding, including training, product validation, networking to access investors, while in Thailand, the last characteristic is the most important, especially networking to access international investors with local offices. It turns out that more than 33% of the U.S. and 28% of Israeli startups received governmental support before the first VC round. Policymakers, especially government authorities in developing countries, may consider enhancing startup support using government grants that may provide an incentive for future support from local VC firms. Developing countries may also consider partnering with the private sector for startup capital, similar to Israel's Yozma fund, since funding enables entrepreneurial ecosystems to grow.

The research sheds light on two unique ecosystems: Israeli startups operating in a relatively small developed country within a developed entrepreneurial ecosystem and Thai startups acting in a broad developing economy within an emerging entrepreneurial ecosystem. Specifically, the Israeli startup funding, most likely derived from a combination of government policies, patented high-technology products, incubator and accelerator support, local VC funding, and access to the international market and foreign VC investors, is particularly noticeable. The Thai startup product development, although relying on scarce resources, is exceptional and most stems from domestic economic conditions and a focus on national customer needs.

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