Asian Journal of Innovation and Policy (2020) 9.3:308-338
DOI: http//dx.doi.org/10.7545/ajip.2020.9.3.308

Successful vs. Failed Tech Start-ups in India: What Are the Distinctive Features?

Ganesaraman Kalyanasundaram[*], Sitaram Ramachandrula[**], Bala Subrahmanya MH[***]

Abstract The entrepreneurial journey is not short of challenges, and about 90% + tech start-ups experience failure (Startup Genome, 2019). The magnitude of the challenges varies across the tech start-up lifecycle stages, namely emergence, stability, and growth. This opens the research question, do the profiles of a start-up and its co-founder impact start-up success or failure across its lifecycle stages? This study aims to understand and identify the profiles of tech start-ups and their co-founders.
We gathered primary data from 151 start-ups (Status: 101 failed and 50 successful ones), and they are across different lifecycle stages and represent six major start-up hubs in India. The chi-square test on status and start-up's lifecycle stage indicates a noticeable correlation, and they are not independent. The Kruskal Wallis test was used to distinguish statistically significant profile attributes. The parameters distinguishing success and failure are identified, and the need to deliver customer experience is emphasized by the start-up profile attributes: Product/service, high-tech nature of a start-up, investor fund availed, co-founder experience, and employee count. The importance of entrepreneurial experience is ascertained with entrepreneur profile attributes: Entrepreneurial expertise, the number of prior and current start-ups, their willingness to start again in the event of failure, and age of co-founder, which is a proxy to learning and experience. This study has implications for entrepreneurs, investors, and policymakers.

Keywords Start-up, Failure, Entrepreneurial failure, Lifecycle, Ecosystem, India

I. Introduction

The entrepreneurial journey has an overdose of uncertainty, and entrepreneurs experience multiple challenges in executing the various tasks leading to

Submitted, November 28, 2020; 1st Revised, December 21, 2020; Accepted, December 25, 2020
* Corresponding, Senior Research Scholar, Department of Management Studies, Indian Institute of Science, Bengaluru, India; ganesaramank@iisc.ac.in
** Senior Director, [24]7.ai, Bengaluru, India; nagavenkata.r@247.ai
*** Senior Professor, Department of Management Studies, Indian Institute of Science, Bengaluru, India; bala@iisc.ac.in

product/service delivery. Is it why researchers wonder whether entrepreneurship and failure are natural siblings (Mantere et al., 2013)? Tech start-ups leverage innovation in product/service delivery to market and utilize the creative potential of entrepreneurs. Consequently, entrepreneurs experience multiple challenges with varying magnitudes in their entrepreneurial journey (Roininen & Ylinenpaa, 2009). The start-ups can encounter challenges at any lifecycle stage, and if entrepreneurs fail to address the challenges, start-ups experience failure (Watson & Everett, 1996). Lack of innovation led to 90% of start-ups' failure in the USA (Forbes, 2017), and the same rate of failure was observed in the first five years in India (Businessline, 2017), and similarly in other economies (Startup Genome, 2019). This opens up the research question, do the profiles of a start-up and its co-founder impact start-up success or failure across its lifecycle stages? This study aims to understand and identify the profile of tech start-ups and the profile of their entrepreneurs. This research paper attempts to answer these questions based on primary data gathered from 151 co-founders. The start-ups are from India's six major start-up hubs, and they are spread across the different lifecycle stages.

This paper has five sections besides this section. Section two deals with a review of literature relevant to start-up failure and start-up lifecycle stages. Section three describes the research objectives, scope, and methods of analysis. Section four presents analyses and discussion using univariate, bivariate, and Kruskal-Wallis test analysis. Section five summarizes the findings of the study, followed by contributions, in addition to their implications.

II. Literature Review

1. Definition of start-up failure

Failure is the inability of start-ups to achieve desired results (Politis & Gabrielsson, 2007). Failed start-ups would have experienced a decline in revenue, and an escalation in cost, coupled with their inability to raise external funds, which force them to experience bankruptcy/insolvency (Shepherd et al., 2009). The failure of a start-up represents the termination or cessation of its operations (Cotterill, 2012). When we consider a planned exit strategy (R. Carter & Van Auken, 2006) and forced exits (Headd, 2003), these definitions of failure seem inadequate. The failed start-ups take different exit routes (Jenkins & McKelvie, 2016). The start-up failure definition required additional strengthening, considering the multifaceted nature of start-up exits. Thus, it should scale beyond bankruptcy and include loss of identity to address planned and forced start-up exits. This calls for a comprehensive failure definition.

Failure is evident when the firm ceases its operations and loses its identity because of its inability to respond and adapt to changes in the market (Amankwah-amoah, 2016). We chose this definition of Amankwah—Amoah (2016) as it has key features like cessation of operations and loss of identity of start-ups that are critical to this study. This definition of start-up failure covers the dynamic nature of start-up exit in reality and goes beyond the traditional bankruptcy/insolvency definition. Notably, this objective definition of start-up failure covers the loss of identity due to planned and forced exits, and this is pictorially depicted in Figure 1.

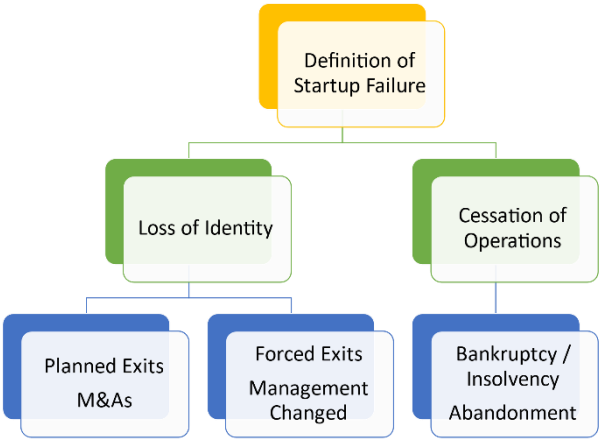

Figure 1 Startup Definition: Pictorial View

2. Definition of start-up lifecycle stages

Start-up evolution has lifecycle stages, as it goes through a series of phases and activities requiring a precise execution (N. M. Carter et al., 1996). We evaluated the following three options for start-up lifecycle stages: (i) Five stage model - Inception, Survival, Growth, Expansion, and Maturity (Scott & Bruce, 1987), (ii) Four stage model - Conception, Gestation, Infancy, and Adolescence (KESSLER et al., 2012), Conception & Gestation, Infancy, Adolescence, and Maturity (DeTienne, 2010) and (iii) Three-stage model - Emergence, Survival, and Growth (Bala Subrahmanya, 2017). Among these, the three-stage model was chosen, primarily because it provides an opportunity to establish distinct and mutually exclusive measurement criteria for each start-up lifecycle stage.

The critical activities involved in these three progressive stages are summarized with a focus of activities for each stage of start-ups, the key milestones they would have to meet, and the condition they are generally in before progressing to the next stage. In the emergence stage, the focus is on

developing a proof of concept (POC), a prototype, and a minimum viable product (MVP). The key milestones are customer testing and market identification. At this stage, start-ups do not earn revenue as product market fit (PMF) is yet to be established. During the stability stage, the focus gradually shifts to the retention of paying customers through consistent delivery of products/services. The key milestones are obtaining repeat orders from loyal customers and market penetration with prospective or potential customers. Start-ups try to establish an organizational framework for prompt delivery. Though it earns revenue, it continues to operate below the breakeven volume as it concurrently incurs losses. The survival challenge creeps in, forcing it to operate at the sub-optimal output. In the growth stage, when start-ups have gained ground, the focus shifts to increasing the market share. The key milestones of this stage are the scale of operations and market expansion. A start-up's market expansion effort fructifies in crossing the volume required to cross the breakeven towards earning a steady profit. The three-stage model measurement criteria, milestones, and key activities are depicted in Figure 2.

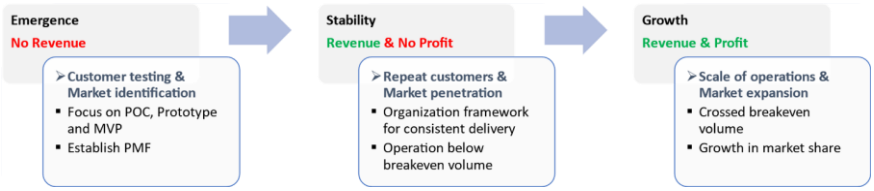

Figure 2 Startup Lifecycle Stages: Measurement criteria, Milestones, and Key activities

In summary, the lifecycle stages are briefly defined as follows to enable mutually exclusive measurement: (i) Emergence stage start-ups do operate but do not earn any revenue, (ii) Stability stage start-ups are those that do operate and earn revenue but are not yet profitable, and (iii) Growth stage start-ups have a well-established revenue stream and operate with profits. The key milestones are customer testing and market identification at the emergence stage while encouraging repeat orders from loyal customers and market penetration with prospective or potential customers at the stability stage. In the growth stage, the key milestones are the scaling up of operations and market expansion.

3. Start-up and entrepreneur profile attributes

Entrepreneurs identify and exploit opportunities by executing actions, which differentiate them from the rest of the crowd in their favor. Their experience and expertise help them identify the opportunity, while elements of opportunities may be recognized, and opportunities are made. They identify a business opportunity, create a start-up, and deliver value for stakeholders by solving a

perceived problem. We are exploring start-up profile attributes and entrepreneur profile attributes.

3.1 Start-up profile attributes

Researchers have emphasized the importance of start-up profile attributes. It is pertinent to examine these profile attributes as it provides the right pedestal for the start-up to get launched and effectively deliver and remain in the market. With this background, we focus on key areas such as customer offerings, co-founder profiles, external sources of funds, and human resources.

Firstly, the start-ups deliver innovative products/services to the market, and the following options are plausible. While the extreme ends can be products and services on a stand-alone basis, hardware-based products and products with service offerings have emerged in the market. The ability to break the constraints and not get limited has enabled start-ups to deliver products/services, which add value to customers (Bajwa et al., 2017; R. Carter & Van Auken, 2006).

Secondly, the target market constituents can be Global, Metro, Urban and Rural markets. The problem solved gets more significance to tap the global market as it attracts more customers. However, most start-ups start with metros and test the market before going global (Bajwa et al., 2017; R. Carter & Van Auken, 2006). The urban and rural markets are not yet tapped fully in India. The problem and quality of the solution have different rigors when the target market needs are addressed. The nuances of delivery can be understood if we go with the traditional categorization of value-centric and long sales cycle B2B vs. volume centric and relatively short sales cycle B2C (Bajwa et al., 2017; Cardon et al., 2011). The solution can be B2B2C or B2G centric. One more important aspect is the location of their operations. The city of operations provides the right ecosystem to deliver and validate the product/service acceptance in the market (Cardon et al., 2011; Headd, 2003). The ecosystem caters to the supply and demand side of start-ups' requirements at its formation.

Thirdly, it is better to have more than one co-founder so that the actions can be discussed and decisions are taken (R. Carter & Van Auken, 2006; Headd, 2003). From the business continuity perspective, it makes absolute sense as well. If the co-founders have complementary skill sets, they make a better team in driving the start-up ahead, and their experience and expertise come in handy in resolving the potential challenges (R. Carter & Van Auken, 2006).

Fourthly, the financial resource requirements increase as start-ups progress in their lifecycle. From the supply side, in the absence of self-generated funds not meeting the requirements, they are forced to look for external sources of funds. From the demand side, funds are required for technology development, protection through IPR, licensing, infrastructure for scale, market-entry, and expansion (Cardon et al., 2011; R. Carter & Van Auken, 2006; Headd, 2003).

Fifthly, human resources are a critical part of the delivery, and as the start-up progresses, they generate more employment opportunities (R. Carter & Van Auken, 2006; Headd, 2003). As the start-ups are technology-oriented, they prefer to have more STEM (Science, Technology, Engineering, and Mathematics) graduates as part of the resource pool. While we have output-based metrics, we preferred the recommended input-based metrics to be consistent for measurement (Goldschlag & Miranda, 2020). The start-up is marked as High Tech if STEM employees form greater than 50% of the workforce.

The discussion on start-up profile attributes has identified nine different start-up attributes as significant for our study. They are listed as follows: Product/Service, Target Market, Market Segment, City of Operations, No. of co-founders, Cofounders experience, Investor funds, High tech, Employee count. Having identified start-up profile attributes, we would like to explore entrepreneur profile attributes.

3.2 Entrepreneur profile attributes

Besides the start-up profile attributes, research scholars have identified a few entrepreneur profile information as significant in determining a start-up's success/failure. It is pertinent to explore these vital entrepreneur profile attributes as it plays an important role in entrepreneurial journeys. We explore the entrepreneurial background, educational profile, and financial stability profile attributes of entrepreneurs.

Firstly, professional entrepreneurs may be novices with their maiden start-up. Serial entrepreneurs, with a sequential start-up, might go on a spree. Portfolio entrepreneurs have a basket of start-ups. Hybrid entrepreneurs are the ones who engage in entrepreneurship while maintaining wage work (Khelil, 2016). Entrepreneurial exposure helps them differentiate themselves in steering the start-ups (Jenkins et al., 2014; Khelil, 2016; Ucbasaran et al., 2010). If they have handled prior start-ups, the experience gained, and the lessons learned may help them be better prepared for their entrepreneurial journey's potential challenges (Headd, 2003; Ucbasaran et al., 2010). The mere act of starting a venture enables entrepreneurs to see other potential venture opportunities they could neither see nor take advantage of until they had started their initial venture (Headd, 2003; Ronstadt, 1988; Ucbasaran et al., 2010). While this explorative nature of entrepreneurs is helpful, it can distract their attraction significantly. The nature of those entrepreneurs who have experienced failure but are willing to reenter the start-up ecosystem needs to be understood. The resilience of entrepreneurs to bounce back with their next venture is another critical component of entrepreneurial failure. Scholars view adaptive resilience as a process of recovery and transformation (Corner et al., 2017; Dias & Teixeira, 2017; Korber & McNaughton, 2018). Entrepreneurial spirit never dies, and resilient

entrepreneurship plays an important role in long-term sustainability and prosperity. Thus, the spirit of entrepreneurs who are willing to reenter the ecosystem contributes to their significant learning needs to be examined.

Secondly, higher education levels contribute favorably to technology creation, and diffusion and entrepreneurs' education level needs a review (UNDP, 2001). Research scholars have examined the significance of education level in various studies (R. Carter & Van Auken, 2006; Ding et al., 2014; Headd, 2003; Ucbasaran et al., 2010). This also opens a question on the impact of premier education and its impact on attracting investors for start-ups. India has many premier educational institutions such as the Indian Institute of Technology (IIT), Indian Institute of Science (IISc), Indian Institute of Management (IIM), and Birla Institute of Technology and Science (BITS), attracting the cream of talent across the country. If entrepreneurs had formal education with any of the IITs, IISc, IIMs, BITS, and reputed foreign university degree holders, they are classified as having undergone premium education, and many investors look at this attribute (Saxena, 2015; Unger et al., 2011). The age of an entrepreneur is another aspect to be observed. Age is a proxy to entrepreneurs' experience, and it has to be examined (Headd, 2003; Ucbasaran et al., 2010).

Thirdly, entrepreneurs' financial stability and security needs have to be explored, and it advances a couple of questions. Does the family income of entrepreneurs affect financial stability and enhance their risk-seeking ability needs to be examined (DeTienne, 2010). This opens up one more exploration in terms of the role spouse's earnings have to play in the entrepreneurial journey (DeTienne & Wennberg, 2015).

The discussion on entrepreneur profile attributes has identified nine different entrepreneur attributes as significant for our study. They are listed as follows: Entrepreneur Expertise, No. of prior start-ups, No. of current start-ups, Ready to do start-up again, Level of Education, Premier Education, Family Income, Spouse Earning member, Age of Cofounder.

We have identified nine attributes each for start-up profiles and entrepreneur profiles from the literature, as summarized in Table 1.

Table 1 Literature Reference of profile attributes

Category	Attributes	Reference
Start-up profile	Product or Service	(Bajwa et al., 2017; R. Carter & Van Auken, 2006)
	Target Market	(Bajwa et al., 2017; R. Carter & Van Auken, 2006)
	Market Segment	(Bajwa et al., 2017; Cardon et al., 2011)
	City of Operations	(Cardon et al., 2011; Headd, 2003)
	No. of Co-founders	(R. Carter & Van Auken, 2006; Headd, 2003)
	Co-founders experience	(R. Carter & Van Auken, 2006)
	Investor Funds	(Cardon et al., 2011; R. Carter & Van Auken, 2006; Headd, 2003)
	High_Tech	(Goldschlag & Miranda, 2020)
	Employee Count	(R. Carter & Van Auken, 2006; Headd, 2003)
Entrepreneur profile	Entrepreneur Expertise	(Ucbasaran et al., 2010)
	No. of prior start-ups	(Headd, 2003; Ucbasaran et al., 2010)
	No. of current start-ups	(Headd, 2003; Ucbasaran et al., 2010)
	Ready to do start-up again	(Dias & Teixeira, 2017)
	Level of Education	(R. Carter & Van Auken, 2006; Ding et al., 2014; Headd, 2003; Ucbasaran et al., 2010)
	Premier Education	(Saxena, 2015; Unger et al., 2011)
	Family Income	(DeTienne, 2010)
	Spouse Earning member	(DeTienne & Wennberg, 2015)
	Age of Co-founder	(Headd, 2003; Ucbasaran et al., 2010)

4. Gaps in the literature

The start-ups can encounter challenges at any lifecycle stage, and they can fail if the challenges are not appropriately addressed. More start-up failures happen in the emerging economy context and need exploration as only a minuscule of them succeed. The failure phenomenon is prominent despite a fast-growing economy compounded by supportive policies from the government. All the six established start-up hubs and their ecosystems are also experiencing rapid

emergence of infrastructure through accelerators, business incubators, and coworking spaces (ABC). This calls for a detailed examination of the start-up profiles and entrepreneur profiles' role to understand the start-up failure phenomenon.

Ⅲ. Research Objective, Scope, and Method of analysis

1. Research Objective

While there are many aspects to start-up failure, we are attempting to review the start-up failure phenomenon from the start-up profile and entrepreneur profile lens. The awareness of this profile information can guide the stakeholders of the start-up ecosystem to plan their actions proactively, thus minimizing the socio-economic cost of failure. With this background, we have set the following research objective.

Do the profiles of a start-up and its co-founders differentiate start-up success from start-up failure across its lifecycle stages?

2. Scope

India is a fast-growing emerging economy and the third-largest start-up hub globally, as per the National Association of Software and Service Companies (NASSCOM, 2019). This report classified six Tier-one cities as established start-up hubs: Bangalore, Delhi NCR, Mumbai, Pune, Chennai, and Hyderabad. This study focused on these six cities, which are the leading start-up hubs of the country (Startup Genome report 2020). The sample start-ups chosen are from NASSCOM, LinkedIn, and the Department of Industrial Policy & Promotion (DIPP) databases. Each sampling unit was a start-up piloted by a co-founder (CxO). Data were gathered from one of the co-founders, who served as a key informant (Jenkins et al., 2014) with complete information on their start-up's evolution, resulting in its success/failure. The semi-structured questionnaire had sections on start-up and entrepreneur profiles. The study comprises start-ups incorporated between January 2010 to June 2020, while the data collection period ranged from January 2019 to June 2020.

3. Method of analysis

The nonparametric Kruskal-Wallis test was deployed to identify the

statistically significant start-up and entrepreneur profile attributes that differentiated success from failure.

3.1 Kruskal-Wallis Test

The Kruskal-Wallis (KW) test is a rank-based nonparametric test, and it is distribution independent. While parametric tests have stricter assumptions and rely on the data's underlying statistical distributions, nonparametric tests do not rely on any distribution. Hence, nonparametric tests are more reliable and robust than parametric tests, and they are valid in a broader range of situations (Stephanie, 2016). The null hypothesis states the medians of all groups are equal. The alternative hypothesis states that at least one group's population median is different from the population median of at least one other group. Thus, the KW test can determine if there are statistically significant differences between two or more groups of a predictor variable on the outcome variable. Normally, the p-value (0.05) provides the significance level to assess the null hypothesis.

IV. Analysis results and discussion

1. Start-up profile Univariate & Bivariate analysis

The 151 start-ups studied in this study comprised 133 private limited, 10 Limited Liability Partnership (LLP), five registered partnerships, two proprietorships with tax registrations, and one One-Person Company (OPC). Thus, these entities' legitimacy as start-ups could be ascertained with their registration status with the relevant authorities. We have identified 101 failed start-ups marked with failure events as per our definition and 50 successful start-ups continuing their operations. The start-ups are spread across different lifecycle stages (Figure 4-1). The chi-square test on status and stage indicates a noticeable correlation, and they are not independent, and stage has an effect (0.234) on status, which is evident from $X2\ (2, N = 151) = 8.278$, $p = .016$.

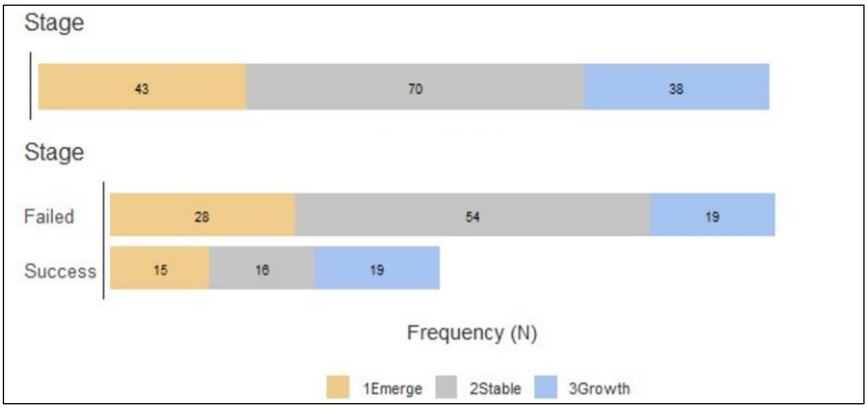

Figure 3 Landscape of Start-ups by status and stage

Figures 4 and 5 present the year of commencement by status and stage, respectively. We could observe that the start-ups are well distributed over the decade.

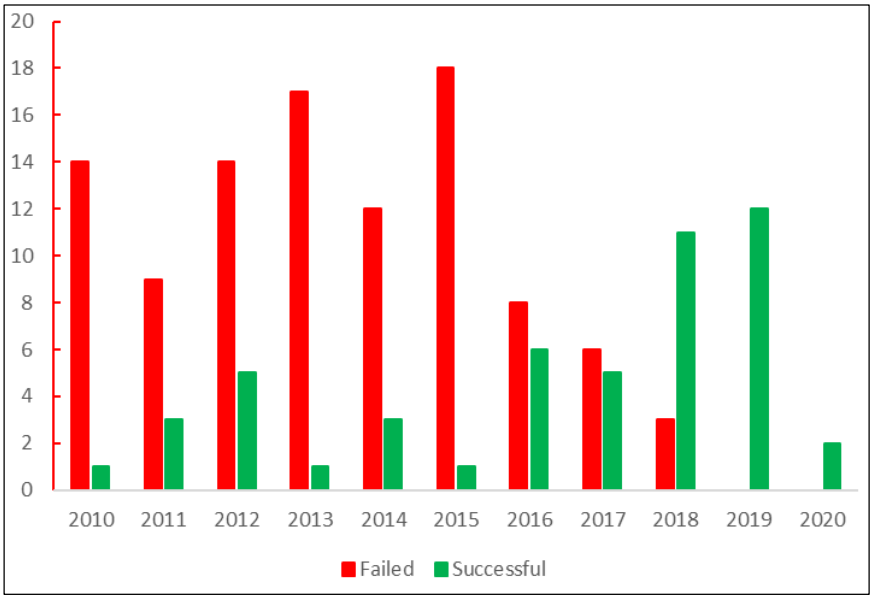

Figure 4 Year of commencement by Status

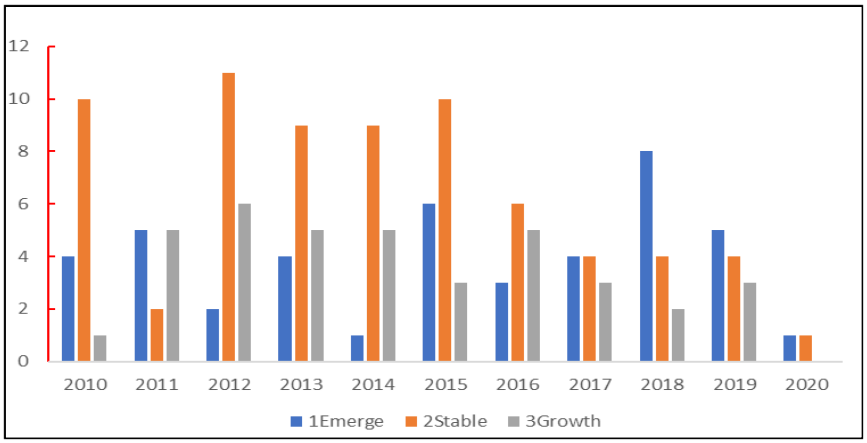

Figure 5 Year of commencement by Stage

We have analyzed the data using univariate, bivariate, and graphical analysis, and the interpretation of results and inferences are made accordingly.

1.1 Product/Service (Figure 6):

The start-ups prefer to remain product-focused, with technology as a differentiator. About 54% of them focused on technology-based products, 16% of them were on deep tech products involving hardware, firmware, and software. The pure service-centric offering was 21%, while the combo of product and service occupied 9%.

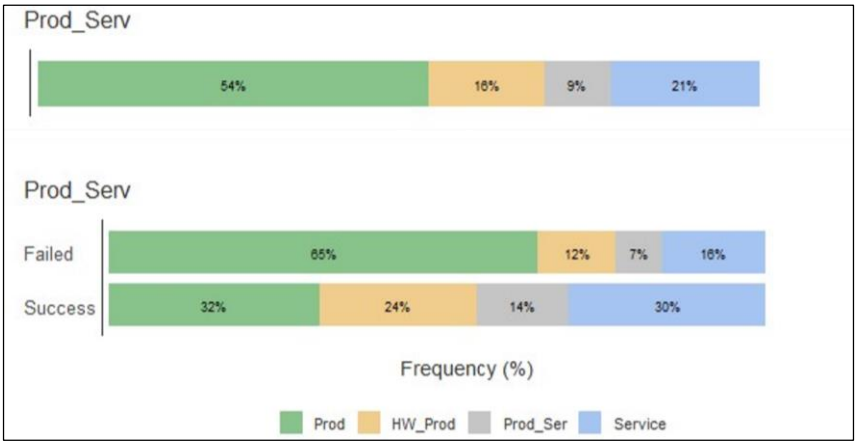

Figure 6 Profile of Product and Service

Failed start-ups relied more on technology and are product based (65% failed vs. 32% successful). On the contrary, the service focus was high on successful start-ups (16% failed vs. 30% successful). Entrepreneurs expressed that the portfolio of products and services together make start-ups stronger. They advised against over-reliance on technology without solving customers' actual problems, which could be due to failed innovation attempts.

1.2 Target Market (Figure 7):

The tech start-ups deliver products and services to different markets. The technology adoption is better, attracting more start-ups to global (41%) and metro (44%) markets. Despite the considerable volume available, we observed fewer start-ups in the urban (11%) and rural (4%) markets, as the technology adoption is poor. This is one area where the policy measures can be channelized to attract more start-ups leading to social upliftment.

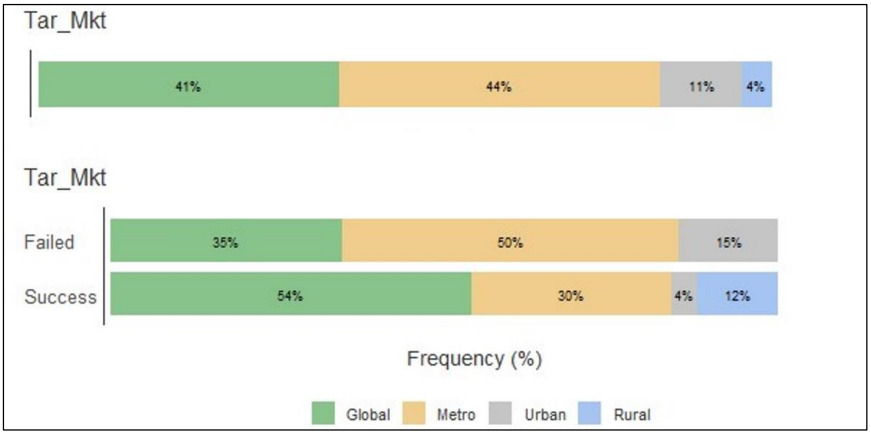

Figure 7 Profile of Target Market

Successful start-ups relied relatively more on the global market (35% failed vs. 54% successful) delivery. In contrast, the failed start-ups tried to solve a regional/local (50% failed vs. 30% successful) problem and do the opportunity conversion, which was not scalable efficiently for growth. It could be because global/national problems are more amenable for conceptualization and understanding relative to regional/local challenges.

1.3 Market Segment (Figure 8):

The value-centric offering of B2B (51%) has scored more against the volume centric B2C (28%). About 13% of the start-ups attempted to cater to both B2B and B2C segments. While the B2B2C offering was 7%, and B2G offering was

substantially minimal, which accounted for just about 1%.

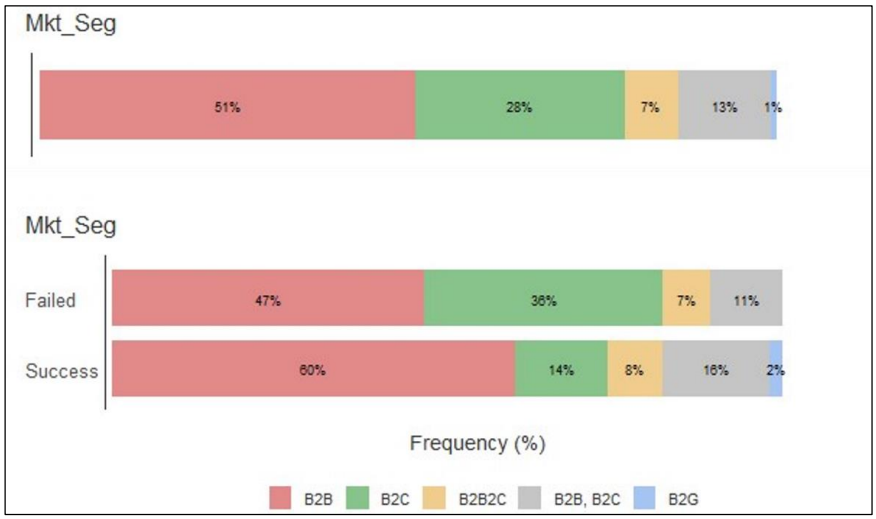

Figure 8 Profile of Market Segment

Failed start-ups relied more on volume-centric B2C (36% failed vs. 14% successful), and it involved significant product/market promotion activities. Most successful start-ups rallied behind B2B segment (47% failed vs. 60% successful), and it involved target marketing efforts and consumed relatively less cost.

1.4 City of Operation (Figure 9):

The six established start-up hubs of India are represented in our sample. Bangalore tops the list with 42% of the total start-ups, and Chennai follows with 16% of the total start-ups. Delhi, Hyderabad, and Mumbai have an equal share of 11% of the start-ups represented, while Pune has 8% representation in this study. Bangalore is home to many new start-ups and suffered more failures (47% failed vs. 32% successful) as the start-up ecosystem allows the "fail fast" feature. The ratio of success to failure was distinctly higher for Mumbai, Pune, and Chennai, both absolutely and relative to the rest.

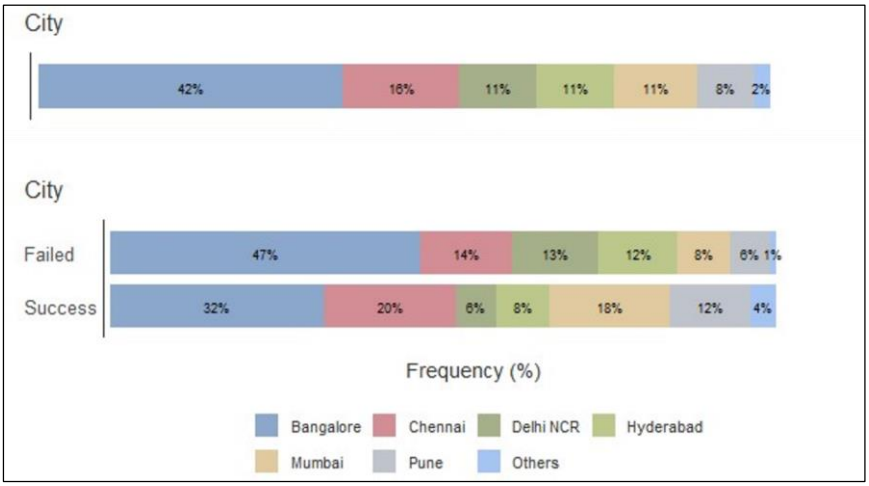

Figure 9 Profile of City of Operation

1.5 Number of Cofounders (Figure 10):

The co-founders require a complementary skillset in steering the start-up. About 32% of the start-ups had a single founder, while 37% had two co-founders, followed by 19% with three co-founders. Beyond three co-founders, it is difficult to make quick decisions, and this space of four and five co-founders had fewer occupants.

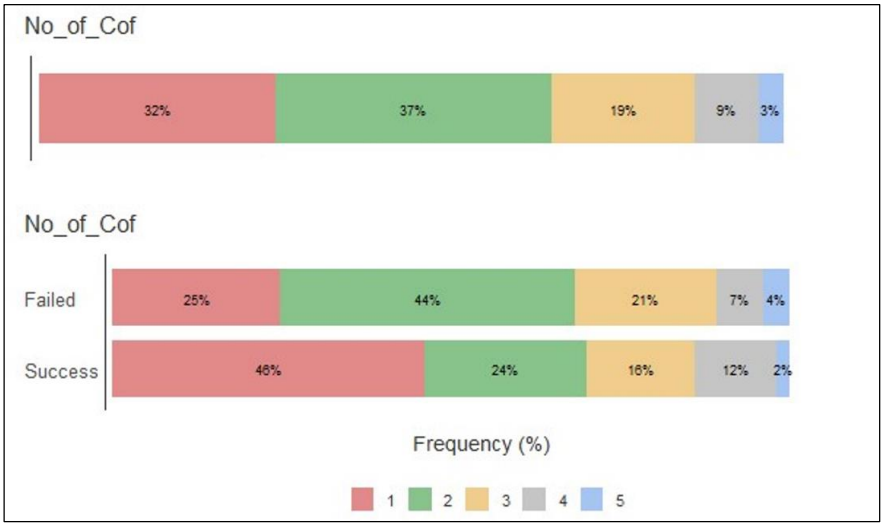

Figure 10 Profile of No. of Co-founders

Single founder start-ups (25% failed vs. 46% successful) offer more flexibility to the decision making process. The quest for independence and the ability to bootstrap plays a significant role in their success story. Successful start-up co-founders who have mastered managing investors while their counterparts had more conflicts with investors.

1.6 Cofounders Experience (Figure 11):

The experience of co-founders is an important ingredient in steering the start-up professionally. The average co-founder experience was arrived at by cumulative experience of co-founders divided by the number of co-founders. The first quartile is at five, while the median is at 10 years of experience and the third quartile is at 16 years of co-founder experience.

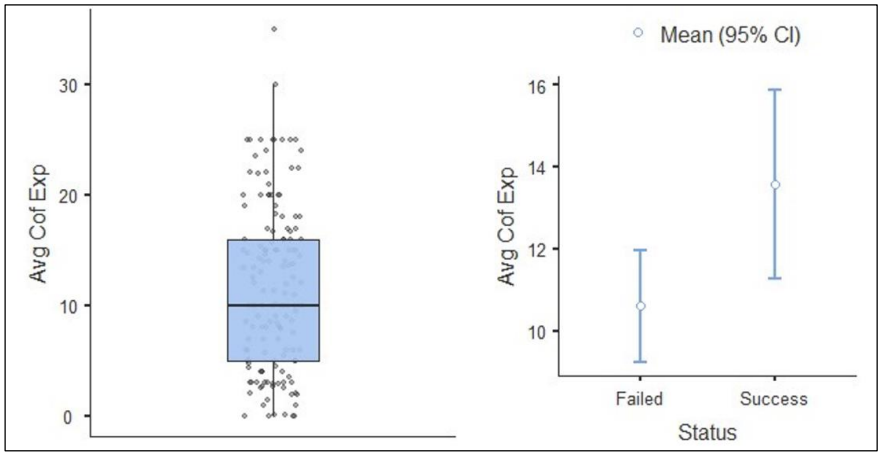

Figure 11 Distribution of Co-founder Experience

The successful start-ups had co-founders with more years of experience (10.6 years for failed vs. 13.6 years for successful). There is a statistically significant difference between group means as determined by one-way ANOVA ($F(1,85) = 4.94$, $p = .029$). The experience helps in navigating the various challenges in their entrepreneurial journey.

1.7 Investor fund (Figure 12):

Investor presence in the ecosystem and their support to start-up provides the required financial muscle power. It could be observed that 40% of the start-ups had obtained investor funds.

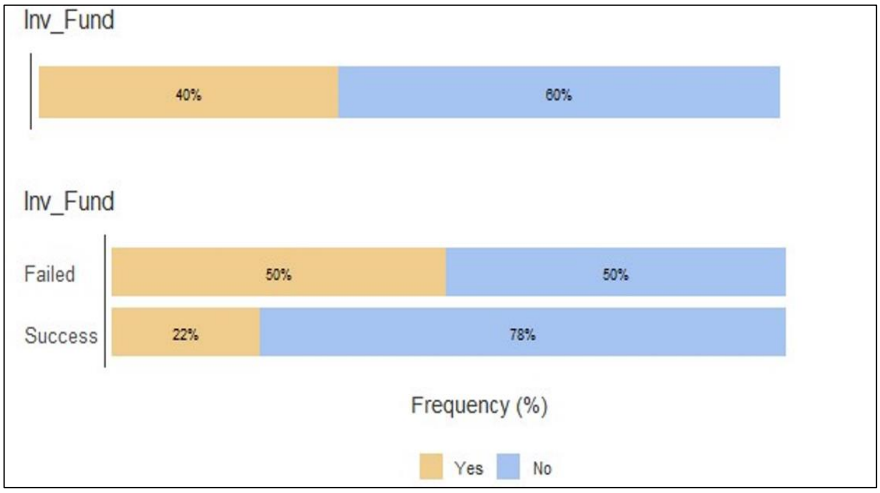

Figure 12 Profile of Investor fund availed by start-ups

Successful start-ups preferred to have their fund sources (50% failed vs. 22% successful) independent of investors. They inferred that the investors' external pressure is significantly higher than the benefits it accrues to start-ups. They advised focusing on product/service delivering to market requirements than chasing investors. The view from failed entrepreneurs was in contrast as they sought funds and had difficulty dealing with investors.

1.8 High-tech (Figure 13):

The high-tech is a ratio based on the input side. The numerator has the sum of Science, Technology, Engineering, and Mathematics (STEM) employees, while the denominator has the total number of employees. When the ratio is >0.5, the start-ups are classified as High-Tech. Our sample has 71% of the start-ups classified as High-Tech, which implies the ambitious nature of start-ups to deliver technology to market. No significant observation could be made here, as the delta is meager (69% failed vs. 74% successful).

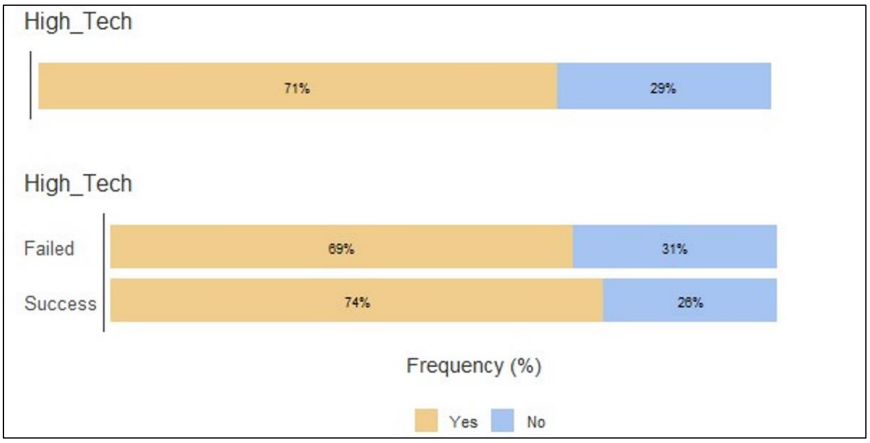

Figure 13 Profile of High-Tech classification of start-up

1.9 Employee Count (Figure 14):

The number of employees working in a start-up is explored here. The first quartile is at six employees, while the median is at ten employees, and the third quartile is at 21 employees. There is no statistically significant difference between group means as determined by one-way ANOVA ($F(1,121) = 0.00038$, $p = .985$)

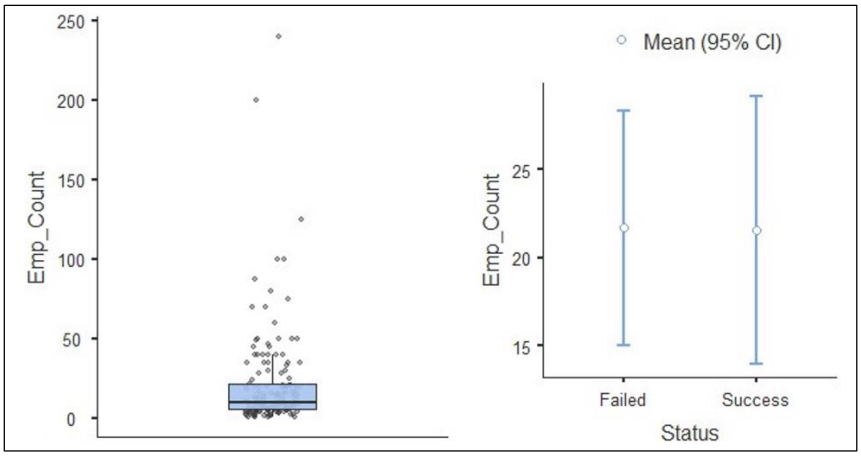

Figure 14 Distribution of Employee count in start-ups

2. Entrepreneur profile Univariate & Bivariate analysis

Entrepreneurs drive the start-up, and their profiles are explored. The inspiration to entrepreneurial journey is self-driven in 68% of them, while their father influenced in 21% of them, and others inspired the rest (11%). Closer to 80% of them had a positive trigger to get into entrepreneurship, while 20% had a mix of positive and negative triggers. Men dominate the start-ups with 94% (142 out of 151) and women at 6%. Out of the 324 co-founders across the 151 start-ups, split by men (93.8%,304), and women (6.2%, 20) showed a similar trend. There was no woman present at the co-founder level in 86.8% of the start-ups, i.e., 131 out of 151 start-ups.

2.1 Entrepreneurial Expertise (Figure 15):

As the entrepreneurs gain experience in handling the start-ups, it gives them an edge as they would be aware of the entrepreneurial journey's challenges. Maiden entrepreneurs may be novice (50%) with their first start-up. Serial entrepreneurs (29%), with a sequential start-up, might go on a spree. Portfolio entrepreneurs (9%) have a basket of start-ups. Hybrid entrepreneurs (12%) are the ones who engage in entrepreneurship while maintaining wage work (Khelil, 2016). The novice entrepreneurs are bold and ready to strike with innovative products and services. When it comes to handling crises, the entrepreneurial experience of entrepreneurs comes in handy.

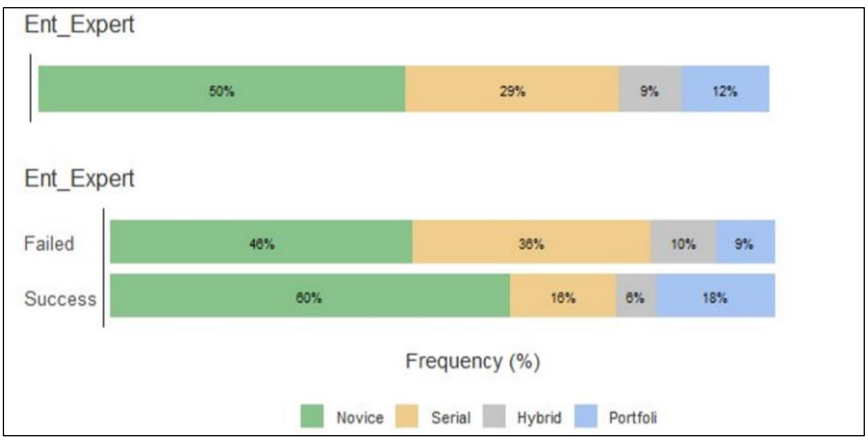

Figure 15 Profile of entrepreneurial expertise

Novice entrepreneurs (60% failed vs. 46% successful) could steer the start-up to success when they are backed with the right experience, as observed earlier.

2.2 No. of prior start-ups (Figure 16):

The learning increases when co-founders have prior start-up experience, but it is not a deterrent for start-ups' success. (55% failed vs. 70% successful).

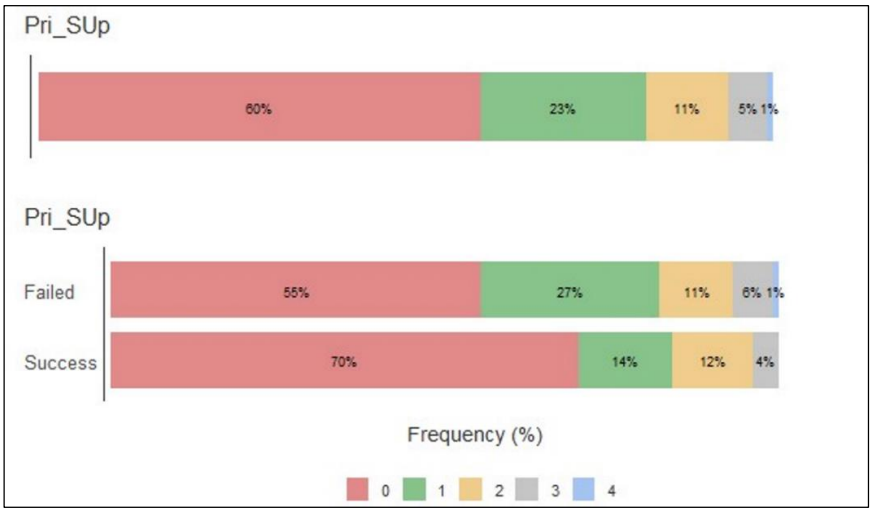

Figure 16 Profile of Prior start-ups

2.3 No. of current start-ups (Figure 17):

The number of current start-ups managed by the co-founder is explored. The co-founders focus on current start-ups is the differentiator with successful start-ups (41% failed vs. 70% successful).

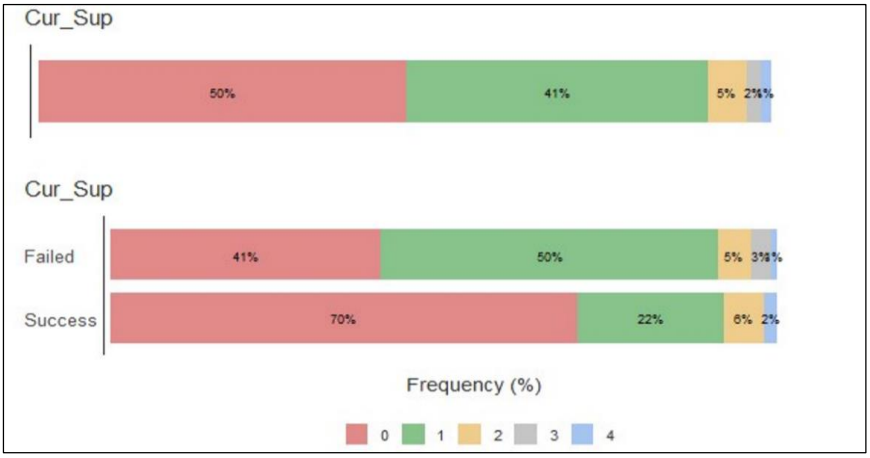

Figure 17 Profile of Current start-ups

2.4 Ready to do start-up again (Figure 18):

The entrepreneurs' willingness to return to the entrepreneurial ecosystem is examined. Failure does not impede an entrepreneurial journey, and 85% of the co-founders who experienced failure are willing to initiate their next venture. Regrettably, closer to 15% of the co-founders who experienced failure are unwilling to start again. This implies that the financial burden coughed up by them had forced them to shun their entrepreneurial journey.

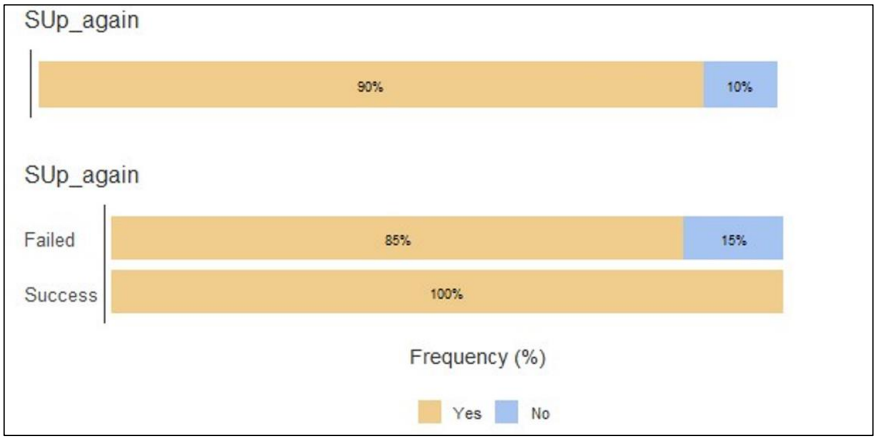

Figure 18 Profile of entrepreneurs ready to start again

2.5 Level of education of co-founder (Figure 19):

Higher education levels contribute favorably to technology creation and diffusion (UNDP, 2001), and education provides confidence and requisite clarity. The higher the level of education, the greater the co-founders' maturity, which prepares them to encounter mounting challenges in their entrepreneurial journey. The distribution of co-founders' educational background shows that 40% are undergraduates, while 55% are postgraduates, whereas the rest (5%) is doctorates. It is observed that postgraduates had a higher inclination to initiate start-ups and even succeed.

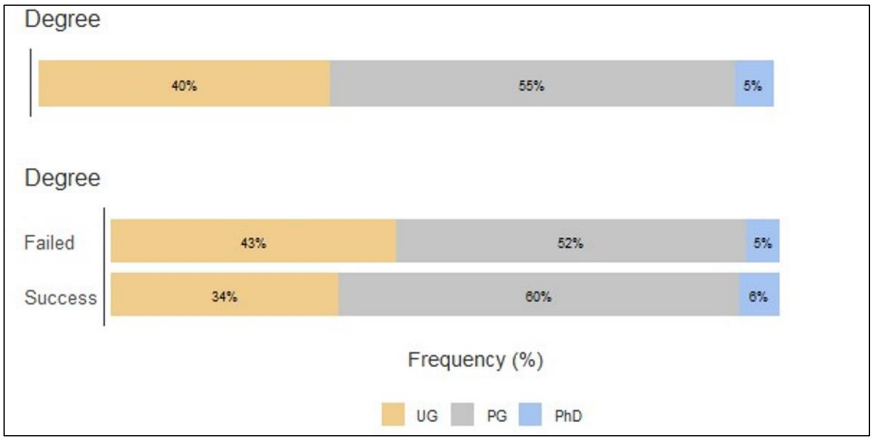

Figure 19 Profile of level of education of co-founders

2.6 Premier Education (Figure 20):

We notice 32% of our co-founders are from premier institutes. No significant observation could be made here, as the delta is marginal between failed and successful start-up co-founders.

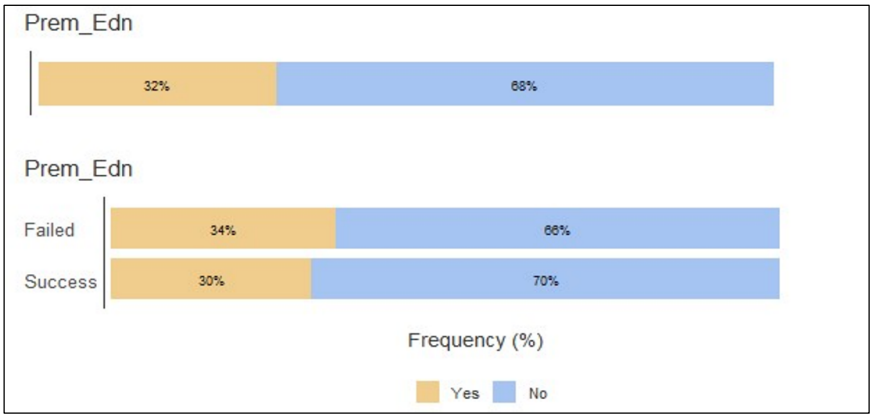

Figure 20 Profile of premier education background of co-founders

2.7 Family Income (Figure 21):

The co-founder's family income at the time of creating the start-up is examined. About 19% of the co-founders had less than INR 1 million as their family income, while the mode was at 50% with INR 1 to 5 million. About 16% of them had a family income higher than INR 5 million, and 16% did not want to disclose the family income as they considered it confidential. This variable

was introduced to understand the risk appetite of co-founders. There was no noticeable difference observed between success and failed start-up co-founders.

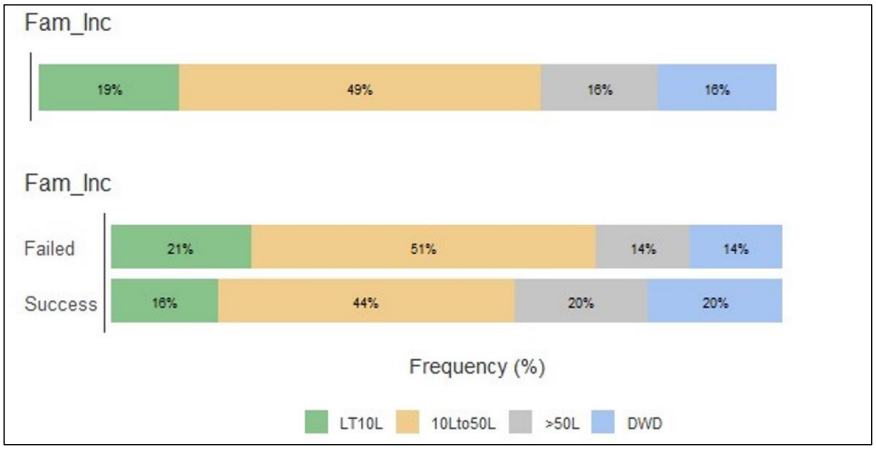

Figure 21 Profile of family income

2.8 Spouse earning (Figure 22):

We examined whether the co-founder's spouse was an earning member. No significant observation could be made here, as the delta is meager between failed and successful start-up co-founders.

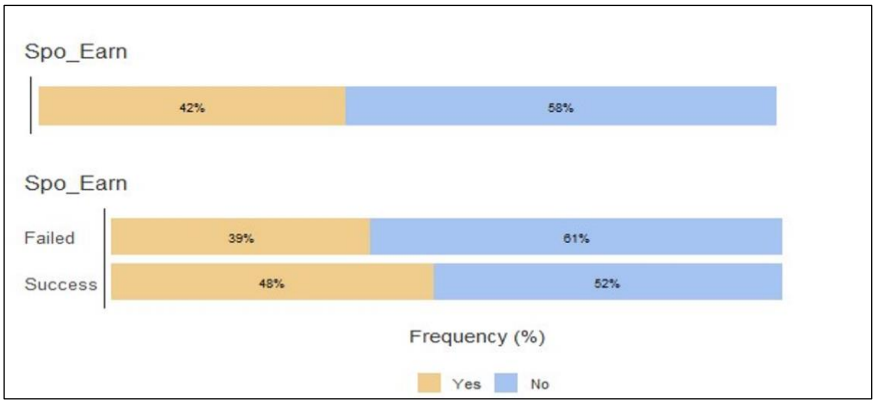

Figure 22 Profile of co-founder spouse is an earning member

2.9 Age of Cofounder (Figure 23):

The co-founder's age at the time of start-up establishment is explored here. The first quartile is at 29, while the median is 35, and the third quartile is at 42 years. Age is generally a proxy to the self-experience of the co-founder.

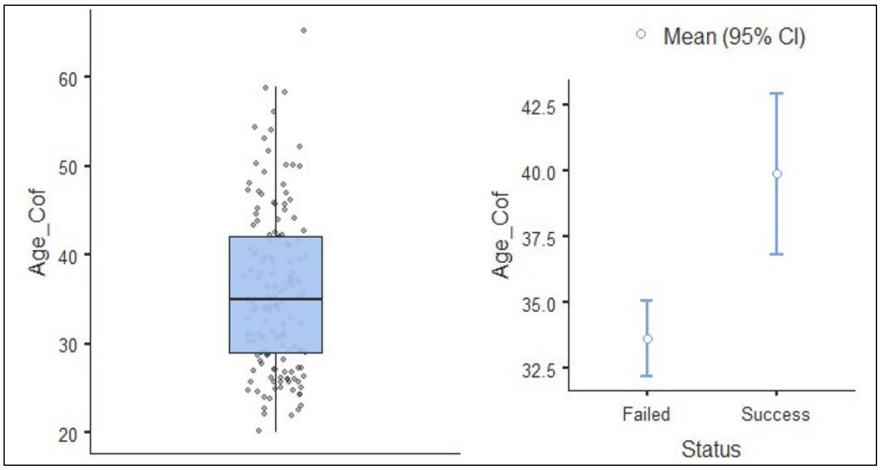

Figure 23 Distribution of Age of Co-founder

Successful start-ups' co-founders started late (33.6 years failed vs. 39.9 years successful) as age is a proxy to learning and experience. There is a statistically significant difference between group means as determined by one-way ANOVA ($F(1,71) = 13.89$, $p = .000$).

Having dealt with the univariate and bivariate analysis of start-up and entrepreneur profile attributes, we will proceed to understand how they distinguish success from failure across its lifecycle stages.

3. Attributes differentiating start-up success from start-up failure across the lifecycle stages

We have conducted a detailed statistical analysis to examine the research objective: Do the profiles of start-ups and their co-founders differentiate start-up success from start-up failure across its lifecycle stages? The nine start-up profile attributes and the nine entrepreneur profile attributes were coded (Table 2) as follows and subjected to further statistical analysis.

Table 2 Attributes coding

Start-up profile		
Prod_Serv	Binary	1: Product based and 0: Service based
Tar_Mkt	Ordinal	1: Rural 2: Urban 3: Metro 4: Global
Mkt_Seg	Binary	1: B2B and 0: Non B2B
City_Blr	Binary	1: Start-up from Bangalore and 0: No
No_of_Cof	Ordinal	No. of co-founders
Cof_Exp	Numeric	Average experience of co-founders in years
Inv_Fund	Binary	1: External fund Received and 0: No
High_Tech	Binary	1: 50% of employees are STEM and 0: No
Emp_Count	Numeric	No. of employees working in the start-up
Entrepreneur personal profile		
Ent_Expert	Binary	1: Serial or Portfolio or Hybrid entrepreneur and 0: Novice
Pri_SUp	Ordinal	No. of prior start-ups initiated by entrepreneur
Cur_Sup	Ordinal	No. of current start-ups executed by entrepreneur
SUp_again	Binary	1: Ready to return to the start-up ecosystem and 0: No
Degree	Ordinal	1:UG 2: PG 3: PhD
Prem_Edn	Binary	1: Studied at Premier institutes of India / abroad and 0: No
Fam_Inc	Ordinal	1: <LT 10L INR, 2: 10L to 50L INR and 3: > 50L INR and DWD
Spo_Earn	Binary	1: Spouse is an earning member of family and 0: No
Age_Cof	Numeric	Age at the time of initiating a start-up

The Kruskal Wallis (KW) test at a 0.05 level of significance was performed. The start-up and entrepreneur profile attributes distinguishing success and failure (Status) are identified. The start-up's lifecycle stage plays a significant role, as was ascertained with the Chi-square test earlier. Hence, we performed the KW test on stage independently, followed by the status_stage combination. In summary, we have three sets of KW test done: First by status, next by stage, followed by the interaction of status and stage, and the results are presented in Table 3. For the three numeric attributes, the results were validated with one way ANOVA test, and the results are presented in Table 4. The low p-value indicates statistical significance.

Table 3 Kruskal Wallis test

		Status				Stage				Status_Stage			
Category		x^2	df	p	ε^2	x^2	df	p	ε^2	x^2	df	p	ε^2
Startup Profile	Prod_Serv	7.16	1	0.007	4.8%	7.97	2	0.019	5.3%	13.27	5	0.021	8.9%
	Tar_Mkt	2.29	1	0.130	1.5%	6.72	2	0.035	4.5%	7.99	5	0.157	5.3%
	Mkt_Seg	2.41	1	0.121	1.6%	5.15	2	0.076	3.4%	6.55	5	0.256	4.4%
	City_Blr	2.89	1	0.089	1.9%	1.17	2	0.557	0.8%	5.61	5	0.346	3.7%
	No_of_Cof	2.45	1	0.117	1.6%	0.34	2	0.846	0.2%	3.44	5	0.632	2.3%
	Cof_Exp	12.35	1	0.000	8.2%	1.98	2	0.372	1.3%	15.59	5	0.008	10.4%
	Inv_Fund	10.44	1	0.001	7.0%	6.66	2	0.036	4.4%	18.52	5	0.002	12.4%
	High_Tech	0.35	1	0.552	0.2%	14.24	2	0.000	9.5%	16.54	5	0.005	11.0%
	Emp_Count	0.03	1	0.863	0.0%	31.94	2	0.000	21.3%	33.25	5	0.000	22.2%
Entrepreneur Profile	Ent_Expert	2.78	1	0.096	1.9%	0.99	2	0.610	0.7%	14.73	5	0.012	9.8%
	Pri_SUp	2.26	1	0.132	1.5%	4.26	2	0.119	2.8%	16.54	5	0.005	11.0%
	Cur_Sup	9.32	1	0.002	6.2%	1.69	2	0.430	1.1%	22.02	5	0.000	14.7%
	SUp_again	8.19	1	0.004	5.5%	6.78	2	0.034	4.5%	14.68	5	0.012	9.8%
	Degree	0.99	1	0.320	0.7%	1.65	2	0.437	1.1%	4.95	5	0.422	3.3%
	Prem_Edn	0.20	1	0.652	0.1%	4.95	2	0.084	3.3%	5.41	5	0.368	3.6%
	Fam_Inc	2.06	1	0.152	1.4%	0.36	2	0.837	0.2%	3.29	5	0.656	2.2%
	Spo_Earn	1.20	1	0.273	0.8%	0.23	2	0.892	0.2%	4.41	5	0.492	2.9%
	Age_Cof	12.45	1	0.000	8.3%	1.44	2	0.487	1.0%	16.16	5	0.006	10.8%

Statistically significant attributes at 0.05 level

Table 4 One-Way ANOVA (Welch's)

	F	df1	df2	p
Age_Cof	3.4	5	49.3	0.01
Avg Cof Exp	2.13	5	51.4	0.076
Emp_Count	8.47	5	52.9	< .001

3.1 Start-up profile:

The need to deliver customer experience is emphasized by the statistically significant start-up profile attributes (Figure 24): Product/service, high-tech nature of a start-up, investor fund availed, co-founder experience, and employee count. The market, city of operations, and the number of co-founders are not having a significant impact.

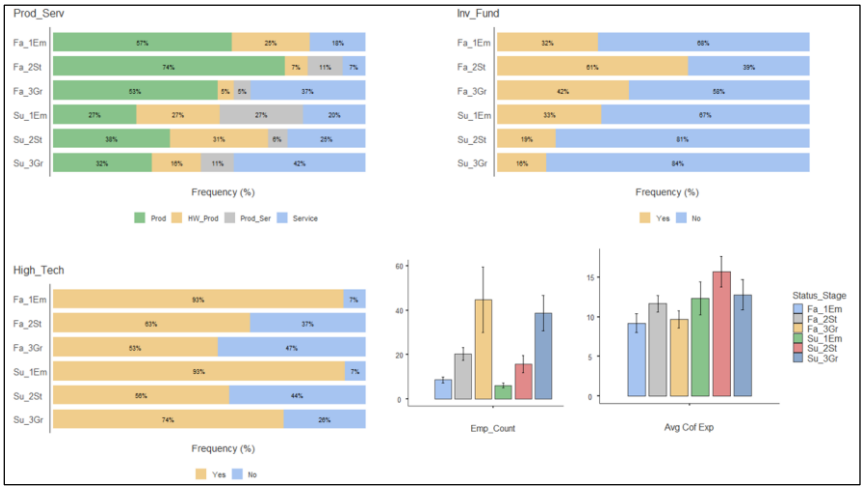

Figure 24 Start-up profile attributes by Status_Stage

The start-ups tend to rely more on technology, while their focus should be to deliver better customer experiences with reliable products/services (Prod_Serv). The successful start-ups are open to service offerings as well, and they had a basket of offerings. The early stage start-ups continue to focus more on technology (High_Tech) and miss on the key aspect of customer adoption, leading to failure. The successful start-ups have relied more on their own funds than relying on investor funds (Inv_Fund), and they choose to live that option. Though the failed start-ups have attracted and availed external investments, they were subjected to the after-effects, which do not favor start-ups when the return on investments was minimal. The co-founder experience (Cof_Exp) helps the start-ups to navigate to success. It brings socio-economic prosperity with an increase in employment (Emp_Count) and the power for start-ups to manage the challenges with more resources.

3.2 Entrepreneur profile:

The importance of entrepreneurial experience is indicated by statistically significant entrepreneur profile attributes (Figure 25): Entrepreneurial expertise, the number of prior and current start-ups, their willingness to start again in the event of failure, and age of co-founder, which is a proxy to learning and experience. The education and income-related profile components are not having a significant impact.

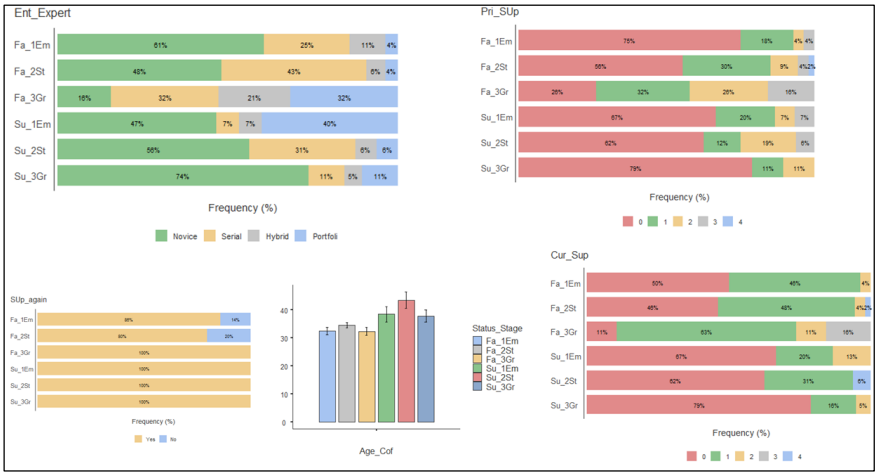

Figure 25 Entrepreneur profile attributes by Status_Stage

The age of co-founders (Age_Cof), a proxy to learning and experience, gives strength to even novice entrepreneurs (Ent_Expert) to steer the start-ups to success. The lack of experience and the absence of learning at the early-stage result in failure. The learning gets strengthened when the entrepreneurs have prior start-up experience (Pri_Sup), but it is not a deterrent for start-ups' success. The focus and attention on the current start-up (Cur_Sup) is a significant differentiator of successful start-up co-founders compared to their counterparts. If start-ups are considered the baby of entrepreneurs, they call for the undivided attention of co-founders. The desire to get back to the entrepreneurial ecosystem (SUp_Again) increases when they are at later start-up lifecycle stages, while it is an inhibitor at the early stages of failure.

V. Conclusions, contributions, and implications

1. Conclusions

We have identified the start-up and entrepreneur profile attributes from the literature and formulated the research objective: Do the profiles of a start-up and its co-founders differentiate start-up success from start-up failure across its lifecycle stages? The chi-square test on status and start-up's lifecycle stage indicates a noticeable correlation, and they are not independent. The KW test results distinguished statistically significant profile attributes and addressed the research objective. The need to deliver customer experience is emphasized by the start-up profile attributes: Product/service, high-tech nature of a start-up,

investor fund availed, co-founder experience, and employee count. The importance of entrepreneurial experience is ascertained with entrepreneur profile attributes: Entrepreneurial expertise, the number of prior and current start-ups that the co-founders are involved in, their willingness to start again in the event of failure, and age of co-founders, which is a proxy to learning and experience.

2. Contributions

This empirical study has identified start-up and entrepreneur profile attributes that distinguished failed start-ups from successful ones besides emphasizing the importance of start-up lifecycle stages.

3. Implications

This empirical study has identified the importance of start-up lifecycle stages and emphasizes the need to have policy support across all the start-up life stages. The identification of customer experience and entrepreneurial experience attributes would increase the stakeholders' awareness before they initiate their journey. This empirical study has practical implications for entrepreneurs and investors besides guiding the ecosystem's policymakers.

Entrepreneurs need to form the team with the required co-founder experience, complementary skill sets, and higher educational qualifications. Focus on a single start-up enhances engagement and increases the chances of success. The successful start-ups have more service orientation, and if we observe India's unicorns, virtually all the 34 unicorns fall in the services sector domain (Venture Intelligence, 2020). The awareness of entrepreneurs could be enhanced through training and mentoring.

Investors need to be aware of the start-up profile and co-founder profile and guide their funding strategy for future investments. Investors should accept the prior start-up failure as a learning experience and support the entrepreneurs' next start-up effort.

Policymakers must design and establish support mechanisms to prevent tech start-up failure across lifecycle stages as they are currently skewed towards early-stage support. However, there is a need to establish policies that guard the sustenance of start-ups during the stability and growth stages of start-up lifecycles. This will prevent late-stage start-up failures, thereby reducing the higher socio-economic costs associated with it.

References

Amankwah-amoah, J. (2016). An integrative process model of organisational failure. Journal of Business Research, 02(005). https://doi.org/10.1016/j.jbusres.2016.02.005

Bajwa, S. S., Wang, X., Nguyen Duc, A., & Abrahamsson, P. (2017). "Failures" to be celebrated: an analysis of major pivots of software start-ups. Empirical Software Engineering, 22(5), 2373–2408. https://doi.org/10.1007/s10664-016-9458-0

Bala Subrahmanya, M. H. (2017). HOW DID BANGALORE EMERGE AS A GLOBAL HUB OF TECH START-UPs IN INDIA? ENTREPRENEURIAL ECOSYSTEM - EVOLUTION, STRUCTURE AND ROLE. Journal of Developmental Entrepreneurship, 22(1), 1–22. https://doi.org/10.1142/S1084946717500066

Cardon, M. S., Stevens, C. E., & Potter, D. R. (2011). Misfortunes or mistakes ? Cultural sensemaking of entrepreneurial failure ☆. Journal of Business Venturing, 26(1), 79–92. https://doi.org/10.1016/j.jbusvent.2009.06.004

Carter, N. M., Gartner, W. B., & Reynolds, P. D. (1996). Exploring start-up event sequences. Journal of Business Venturing, 11(3), 151–166. https://doi.org/10.1016/0883-9026(95)00129-8

Carter, R., & Van Auken, H. (2006). Small firm bankruptcy. Journal of Small Business Management, 44(4), 493–512. https://doi.org/10.1111/j.1540-627X.2006.00187.x

Corner, P. D., Singh, S., & Pavlovich, K. (2017). Entrepreneurial resilience and venture failure. International Small Business Journal: Researching Entrepreneurship, 35(6), 687–708. https://doi.org/10.1177/0266242616685604

Cotterill, K. (2012). How do attitudes of habitual high-technology entrepreneurs to early-stage failure differ in Silicon Valley, Cambridge and Munich? December, 1–216.

DeTienne, D. R. (2010). Entrepreneurial exit as a critical component of the entrepreneurial process: Theoretical development. Journal of Business Venturing, 25(2), 203–215. https://doi.org/10.1016/j.jbusvent.2008.05.004

DeTienne, D. R., & Wennberg, K. (2015). Research handbook of entrepreneurial exit. Research Handbook of Entrepreneurial Exit. https://doi.org/10.4337/9781782546979

Dias, A., & Teixeira, A. A. C. (2017). The anatomy of business failure: A qualitative account of its implications for future business success. European Journal of Management and Business Economics, 26(1), 2–20. https://doi.org/10.1108/EJMBE-07-2017-001

Ding, Z., Sun, S. L., & Au, K. (2014). Angel investors' selection criteria: A comparative institutional perspective. Asia Pacific Journal of Management, 31(3), 705–731. https://doi.org/10.1007/s10490-014-9374-z

Goldschlag, N., & Miranda, J. (2020). Business dynamics statistics of High Tech industries. Journal of Economics and Management Strategy, 29(1), 3–30. https://doi.org/10.1111/jems.12334

Headd, B. (2003). Redefining Business Success: Distinguishing between Closure and Failure. Small Business Economics, 21(1), 51–61. https://doi.org/10.1023/A:1024433630958

Jenkins, A., & McKelvie, A. (2016). What is entrepreneurial failure? Implications for future research. International Small Business Journal: Researching Entrepreneurship,

34(2), 176–188. https://doi.org/10.1177/0266242615574011

Jenkins, A., Wiklund, J., & Brundin, E. (2014). Individual responses to firm failure: Appraisals, grief, and the influence of prior failure experience. Journal of Business Venturing, 29(1), 17–33. https://doi.org/10.1016/j.jbusvent.2012.10.006

KESSLER, A., KORUNKA, C., FRANK, H., & LUEGER, M. (2012). Predicting Founding Success and New Venture Survival: a Longitudinal Nascent Entrepreneurship Approach. Journal of Enterprising Culture, 20(01), 25–55. https://doi.org/10.1142/s0218495812500021

Khelil, N. (2016). The many faces of entrepreneurial failure: Insights from an empirical taxonomy. Journal of Business Venturing, 31(1), 72–94. https://doi.org/10.1016/j.jbusvent.2015.08.001

Korber, S., & McNaughton, R. B. (2018). Resilience and entrepreneurship: a systematic literature review. International Journal of Entrepreneurial Behaviour and Research, 24(7), 1129–1154. https://doi.org/10.1108/IJEBR-10-2016-0356

Mantere, S., Aula, P., Schildt, H., & Vaara, E. (2013). Narrative attributions of entrepreneurial failure. Journal of Business Venturing, 28(4), 459–473. https://doi.org/10.1016/j.jbusvent.2012.12.001

NASSCOM. (2019). Indian Tech Start-up Ecosystem.

Politis, D., & Gabrielsson, J. (2007). ENTREPRENEURS' ATTITUDES TOWARDS FAILURE – AN EXPERIENTIAL LEARNING. Frontiers of Entrepreneurship Research, 27(6).

Roininen, S., & Ylinenpaa, H. (2009). Schumpeterian versus Kirznerian entrepreneurship A comparison of academic and non-academic. Journal of Small Business and Enterprise Development, 16(3), 504–520. https://doi.org/10.1108/14626000910977198

Ronstadt, R. (1988). The Corridor Principle. Journal of Business Venturing, 3, 31–40.

Saxena, S. (2015). 8 Things Investors Look for in A Business While Investing/Funding Linkedin. https://www.linkedin.com/pulse/8-things-investors-look-business-while-shweta-saxena

Scott, M., & Bruce, R. (1987). Five stages of growth in small business. Long Range Planning, 20(3), 45–52. https://doi.org/10.1016/0024-6301(87)90071-9

Shepherd, D. A., Wiklund, J., & Haynie, J. M. (2009). Moving forward : Balancing the financial and emotional costs of business failure ☆. In Journal of Business Venturing (Vol. 24, Issue 2, pp. 134–148). Elsevier B.V. https://doi.org/10.1016/j.jbusvent.2007.10.002

Start-up Genome. (2019). Global Start-up Ecosystem Report. The Startup Genome, 199. https://doi.org/10.1096/fj.00

Stephanie. (2016). Kruskal Wallis H Test: Definition, Examples & Assumptions - Statistics How To. https://www.statisticshowto.com/kruskal-wallis/

Ucbasaran, D., Westhead, P., Wright, M., & Flores, M. (2010). The nature of entrepreneurial experience , business failure and comparative optimism. Journal of Business Venturing, 25(6), 541–555. https://doi.org/10.1016/j.jbusvent.2009.04.001

UNDP, 2001. (2001). Making new technologies work for human development.

Unger, J. M., Rauch, A., Frese, M., & Rosenbusch, N. (2011). Human capital and entrepreneurial success: A meta-analytical review. Journal of Business Venturing, 26(3), 341–358. https://doi.org/10.1016/j.jbusvent.2009.09.004