# STARTUPS VS TECH TRANSFERS: A FAIR COMPARISON

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*The purpose of this paper is to provide guidance in selecting an appropriate approach for idea development based on individual needs. While start-up companies may experience disordered and slow development processes, potential benefits may outweigh the efforts if the start-up is successful. In contrast, tech transfer programs can allow for a more focused approach to tech development by providing access to marketing and management experts. The study will utilize metrics that reflect business success rates, the impact of external factors, and risk management. Results of the study demonstrate varying outcomes for individuals with diverse interests and objectives. Overall, the findings suggest that a tech transfer program may be a more favorable option for most individuals due to its relatively lower risk.*

**Keywords:** intellectual property, idea development, product quality, startup, tech transfer, risk management, external factors, success rate

## 1. Introduction

Despite the proliferation of blog posts, news articles, and other forms of literature [1][2][3] discussing the emergence and potential of tech transfer, there is a dearth of studies comparing this business model with the more traditional Startup approach. Although these two models may appear similar on the surface, closer examination reveals a number of significant differences that can impact the process of idea development. Most existing studies emphasize the benefits of tech transfer in driving technological innovation, but they often neglect the perspectives of

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students and developers who participate in this process regarding their autonomy in development and management of risk. To address these gaps, we conducted a comprehensive study that examines all of the aforementioned aspects. Startups are defined by Mitchel Grant [4] as companies that are in the initial stages of operation. Typically, startups are founded by one or more individuals who have identified a problem they believe can be solved through a new product or service. These companies often have significant expenses and limited revenue, necessitating funding from various sources, such as venture capital, grants [5], or bootstrapping [6]. On the other hand, Twi Global [7] characterizes technology transfer as the transfer of data, designs, inventions, materials, software, technical knowledge, or trade secrets from one organization to another or from one purpose to another. It is important to note that technology transfer involves a process that is typically driven by internal policies, company procedures, and the culture and values of the involved organization. When comparing startups and technology transfers, it becomes apparent that startups have a slower growth trajectory due to the need to establish the business from scratch, often with limited initial funding. However, startups offer more flexibility in the idea development process. Conversely, participating in a technology transfer provides a stronger foundation in terms of business, marketing, or management, with support from the transferring company and potentially better financial resources. In terms of idea development, two types of technology transfers exist Vertical and Horizontal Transfers. The former comprises four transfer stages arranged in a chain-like order, starting with basic research, and ending with production, while the latter involves the transfer and use of technology that is already established within one organization to another place.[8]

## 2. **Defining the problem**

The aim of this study is to compare startup and technology transfer companies in order to highlight the unique opportunities and challenges faced by each type of business. Moreover, this study seeks to identify key factors that entrepreneurs should consider when pursuing the development of an idea, such as success rate, risk management, and external influences. In addition, the study aims to provide definitions of important terms such as Intellectual Property (IP), Return on Investment (ROI), and Technology Transfer Offices (TTOs). According to the World Intellectual Property Organization (WIPO) [9], IP refers to creations of the mind such as inventions, literary and artistic works, designs, symbols, names, and images used in commerce. Protection of IP is ensured by legal means such as patents, copyright, and trademarks, which allow innovators to earn recognition or financial benefit from their creations. The protection of IP enables a balance between the interests of the innovator and the wider audience to prioritize creativity and innovation [10]. The study defines Return on Investment (ROI) as the difference between the total current valuation of the business and the funding value. Starting a new business is a challenging and risky endeavor, and entrepreneurs need to consider several factors that will influence their success. This study emphasizes the importance of considering

success rate, risk management, and external influences when developing a business idea. Technology Transfer Offices (TTOs) [11] are organizations that manage and protect research and findings made by universities and other research institutions. These offices help with the commercialization of intellectual property gathered by research-based results through licensing, patenting, or management of sound-off creations.

## 3. Metrics

### 3.1. Success Rate

In this study, we will introduce a metric that combines the return on investment (ROI) with the time required to reach the seed stage, which is the first growth stage. This metric was chosen due to its relevance to the majority of startups and technology transfers in our dataset. Specifically, the seed stage is the point where the business has already launched its product [12] and is focused on revenue growth rather than product development.

### 3.2. Risk Management

The second metric we examined was Risk Management, which we operationalized by assessing the proportion of tech transfers that necessitated a board seat in the spinout to undertake management or business-related activities.

The rationale behind this metric is that it allows students more time to concentrate on developing their ideas while transferring their risks to the University/TTO, which typically appoints someone with substantial expertise and knowledge in the relevant domains to manage the process.

### 3.3. External Factors Influence

When comparing the influence of external factors on business development, we observed that startups generally have greater latitude to explore new ideas and technologies, while tech transfer companies are subject to the influence of the institutions that license their product or service.

Additionally, startups often prioritize the development of innovative and proprietary solutions, which can provide them with a competitive edge in the market. In contrast, tech transfer companies may have a lower percentage of intellectual property ownership due to the influence of their partnering universities or TTOs, but they can still succeed by effectively managing their intellectual property and leveraging the resources and expertise of their partnering institutions.

## 4. Data collection

In our study, we utilized two publicly available databases to gather data on both startups and tech transfer companies. To examine the available tech transfer data, we used the `spinout.fyi` database[13], which provided comprehensive information on tech transfer projects conducted by universities or other TTOs. We used

data such as total profit made and profit until the last financing round to calculate the return on investment metric, the requirement of a board seat for risk management, and the contribution of the founding team for the IP, along with the percentage of the University/TTO owned before any investment was raised to analyze the influence of external factors[13].

For startups data, we employed the LaunchVic database[14], which provided information on more than 2500 companies from all over the world. We used valuation and funding data to compute ROI data, as well as the number of companies in the seed stage and their year of founding. We collected the data manually from the two databases mentioned forehead and then preprocessed it by removing duplicates, removing newline characters from input, and setting different formats for different fields[14].

Subsequently, we compared startups and tech transfer companies based on these metrics, using the data we extracted from these sources.

## 5. Comparisons

### 5.1. Success Rate

To carry out a comparison using the ROI metric, we classified the ROI values into four distinct categories, namely 'Bad Investment,' 'Good Investment,' 'Very Good Investment,' and 'Unicorn.' The categorization was determined based on the value of the ROI in US dollars. The Bad Investment group refers to the ROI values that were less than $50,000, while the Good Investment group comprises ROI values between $50,000 and $250,000. ROI values above $250,000 but less than $1,000,000 were classified as Very Good Investment, and ROI values exceeding $1,000,000 were categorized as Unicorn. As the Startups database used Australian

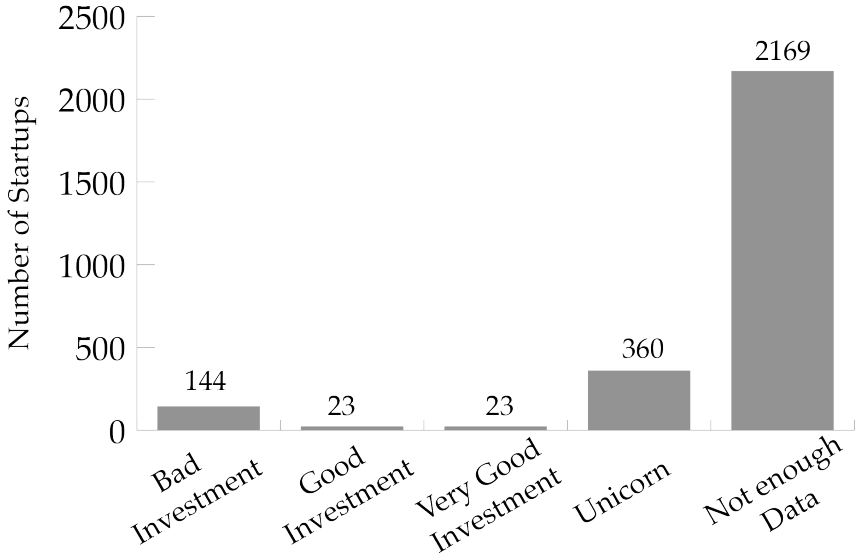


FIGURE 1. ROI among Startups

Dollars to measure valuations and fundings, we had to convert the data to United States Dollars to ensure an accurate comparison. We utilized the conversion rate of 1.00 Australian Dollars = 0.68864781 US Dollars, based on the rate at the time of analysis. Additionally, we encountered instances of incomplete data, such as missing valuations or fundings, within both the Startups and tech transfers databases. To account for this, we established a separate category to group these entries.

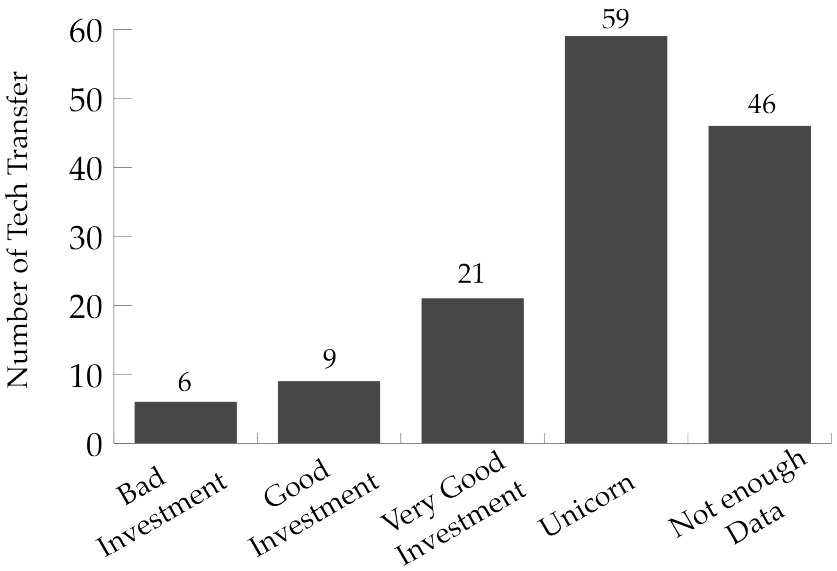


FIGURE 2. ROI among tech transfers

In analyzing the ROI data of Startups and tech transfers, we have found that Startups have a high rate of failure, with a significant number of them falling into the bad investment category. However, 13.24% of Startups have achieved Unicorn status, indicating a high potential for returns. It should be noted that a large portion of the Startups in our database had incomplete data, which when accounted for, increased the percentage of successful Startups to 52.86%. The distribution of ROI categories for Startups is also uneven, with many falling into the extremes of failure or success.

In contrast, tech transfers have a much higher rate of success, with 41.55% of them achieving Unicorn status. After accounting for incomplete data, the percentage increases to 62.77%. The distribution of ROI categories is more evenly distributed for tech transfers, with a larger number falling into the Very Good Investment category. However, the ROI for tech transfers is generally lower compared to Startups, with the largest entry in our database having an ROI of 850 million US dollars.

Based on our analysis, investors have a higher probability of success when investing in tech transfers compared to Startups, but the potential returns may not be as high as those of successful Startups.

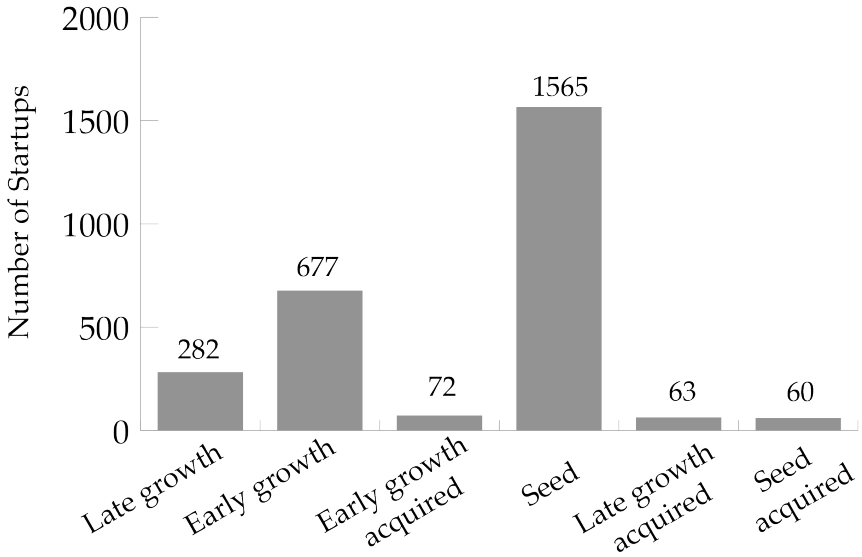


FIGURE 3. Number of Startups for each Growth Stage

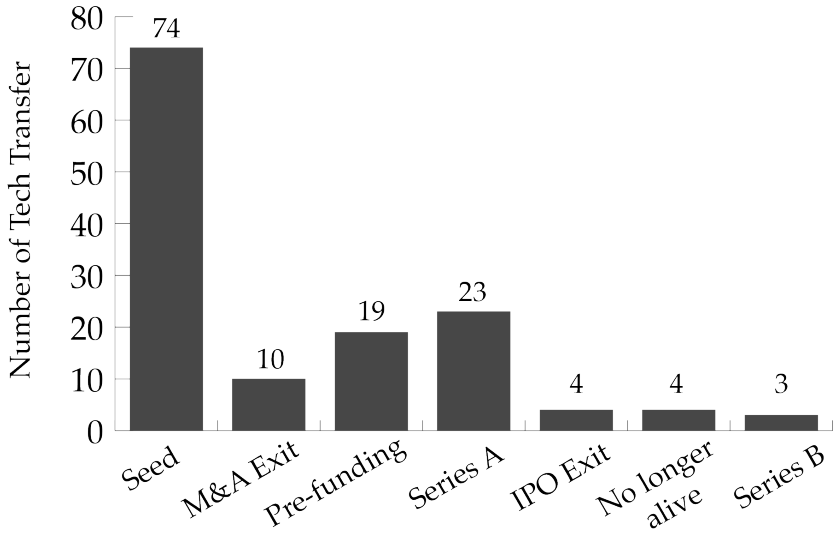


FIGURE 4. Number of tech transfer for each Growth Stage

According to our analysis, the success of both startups and tech transfers is strongly linked to reaching the seed growth stage[12]. Our data set comprises over 2700 startups and almost 150 tech transfers from 2000 to 2022. During this period, the percentage of tech transfers achieving success was constant at 0.66%. However, this number increased to 5.33% after three years and then spiked to a range of 11.33% to 13.33%, which is particularly noteworthy given the economic crisis

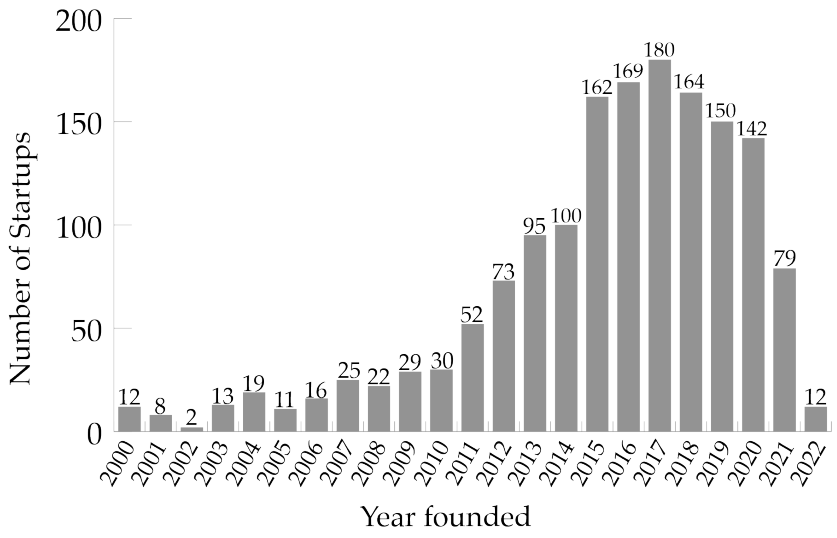


FIGURE 5. Number of startups founded in each year that reached seed growth

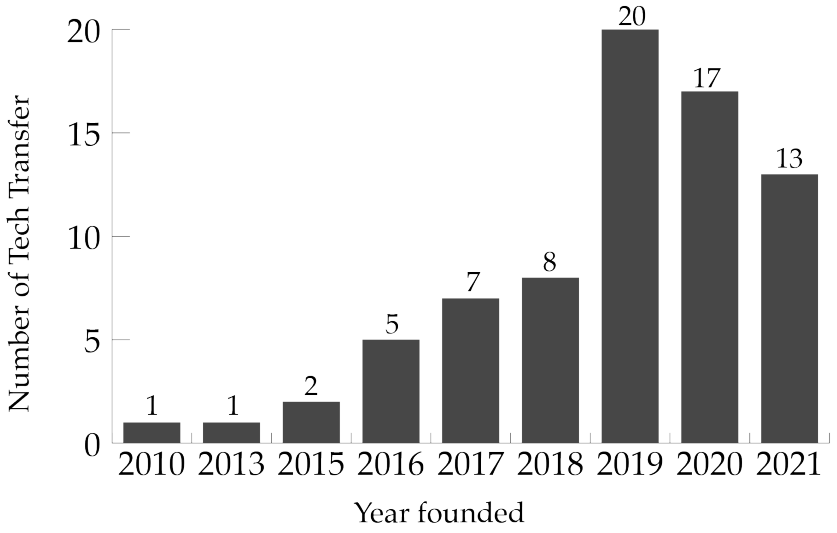


FIGURE 6. Number of tech transfers founded each year that reached seed growth

caused by the COVID-19 pandemic. In 2021, the success rate of tech transfers started to decline to 8.66%.

In contrast, the success rate of startups grew steadily from slightly above 1% to a respectable 3.7% in 2014. Between 2015 and 2017, the success rate spiked up to about 6% - 6.5%, indicating a period of prosperity for startups to achieve

success, which then declined slightly until 2021. However, in 2022, the success rate of startups plummeted from 5.2% to below 0.5%.

Considering this information, our data suggests that tech transfers have a higher chance of reaching the seed growth stage and a more stable success rate than startups, particularly during times of economic crisis.

### 5.2. **Risk Management**

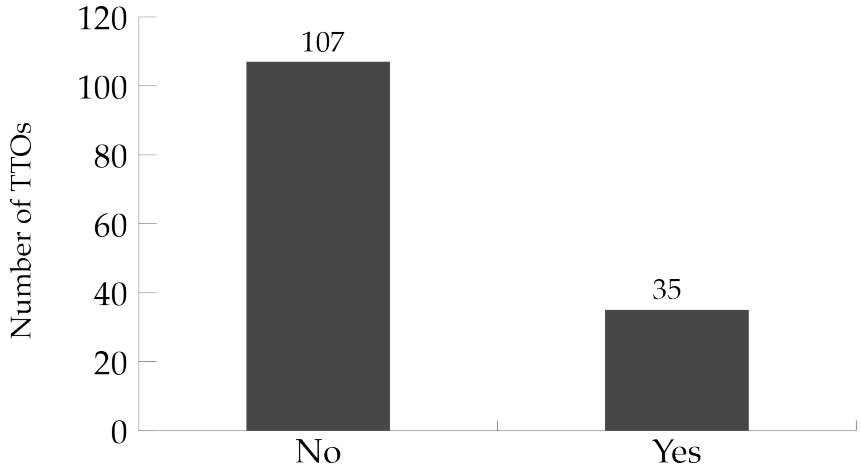


FIGURE 7. Did your university/TTO require a board seat in your spinout?

Upon analyzing the tech transfer data, we have discovered that approximately one-fourth (24.65%) of TTOs required a board seat in the spinout, indicating that they have taken control in the business/management domain of the enterprise. If an individual prefers not to have any involvement in this area and is content with developing their idea under the guidance of an experienced person, then this percentage may seem reasonable.

However, when an individual chooses to participate in a startup as a student/developer, they will likely encounter numerous situations where they must make business/management-related decisions that could have a significant impact on the startup's success. Examples of such decisions include losing an essential investor or team member due to poor management, accepting a minimal percentage of shares, or receiving a low salary. Such events can be demoralizing and hinder an individual's productivity, particularly when compared to working in a tech transfer managed by an experienced individual.

Nevertheless, engaging in riskier ventures may also provide valuable lessons. For instance, if one joins or establishes a startup at a young age, where a failure

does not significantly impact their life, they may use such situations to learn and better adapt to future projects/startups when facing similar threats.

### 5.3. External Factors Influence

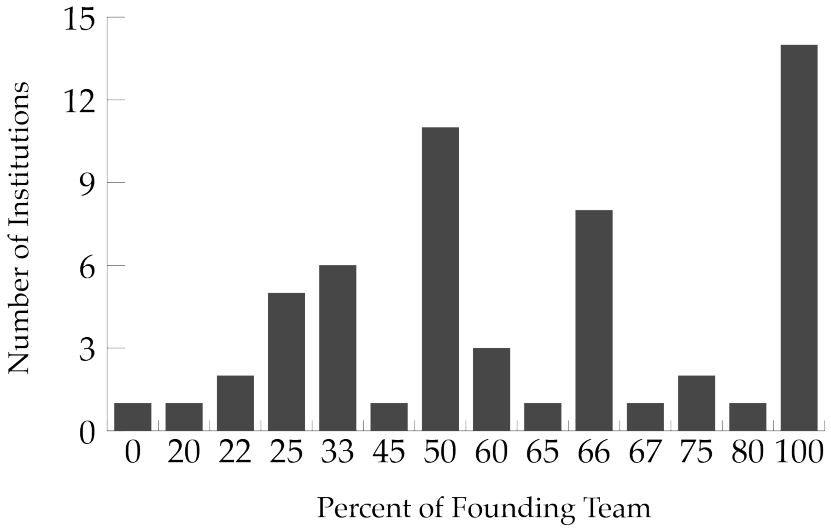


FIGURE 8. Distribution of founding IP by the percentage of the founding team

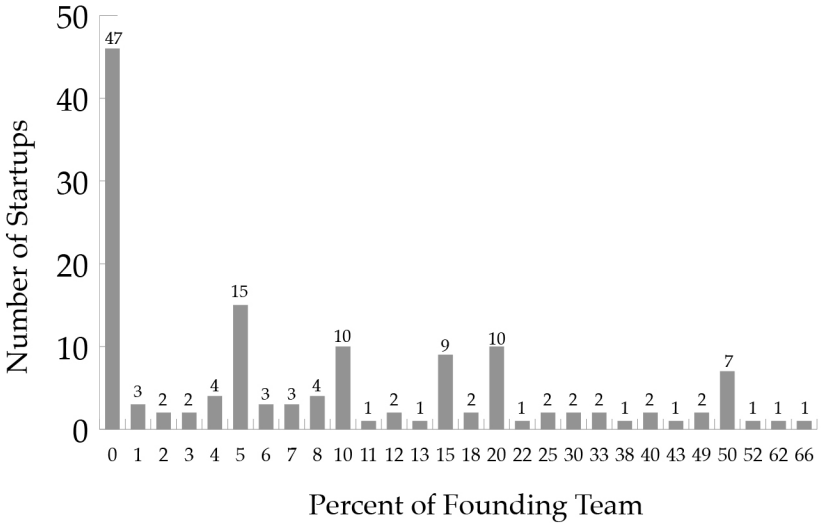


FIGURE 9. Number of startups founded in each year that reached seed growth

Drawing from the above data, it can be inferred that tech transfer companies often share ownership or intellectual property with other institutions, with a significant proportion opting to retain the entire IP or provide only a small portion. Interestingly, a majority of tech transfer companies do not allocate any share of ownership to their partner institution, while a smaller fraction relinquishes majority ownership. Conversely, startups have been found to make substantial contributions to intellectual property, driven by their focus on commercializing innovations within IP-intensive industries such as technology and pharmaceuticals, as reported by the World Intellectual Property Organization (WIPO). It is important to acknowledge that external factors such as market demand, government policy, and social trends can significantly impact both startups and tech transfer companies, although their influence is challenging to quantify. In conclusion, the tech transfer approach appears to strike a beneficial balance between independence and institutional support, while the startup model offers complete autonomy but may pose greater challenges, particularly for individuals lacking adequate experience or capital.

## 6. **Conclusions**

After analyzing the presented data and comparisons, several conclusions can be drawn that will help individuals make informed decisions about which approach best suits their needs.

For investors seeking to support new ideas through Startups and tech transfers, the data suggests that investing in a tech transfer would be a safer option, while a Startup may offer greater profit potential, especially for those willing to take on higher risk. However, ROI alone does not guarantee business success, and the time required to reach the seed growth stage should also be considered. Based on these factors, tech transfers may be the better alternative, as they showed better stability even during economic crises.

For students with little experience in the business/management area who wish to focus only on the technical development of their idea, tech transfers may be a better fit, as approximately 25% of TTOs require a board seat in the spinout, resulting in expert management to provide the best development environment possible. However, for students passionate about management and business and seeking to learn to become experts in these areas, a Startup may be a better choice. Even if the Startup fails, valuable lessons can be learned that can be applied to future ventures.

Finally, for individuals who wish to retain full control over their intellectual property (IP) or do not want to be influenced by others, a Startup may seem like the obvious choice. However, the data suggests that tech transfers do not typically take a significant percentage of IP, and the tradeoff of some independence may provide additional support and guidance when difficult decisions arise or when facing obstacles.

TABLE 1. Comparation between startups and TTOs on succes rate, risk management, external factor influence

| | **Succes Rate** | **Risk Management** | **External Factor Influence** |
|---|---|---|---|
| **Startups** | 52.86% Unicorns | Higher | Complete autonomy<br>IP owned |
| **TTOs** | 62.77% Unicorns | Lower<br>24.65% requires a board | IP shared<br>with other companies |

## 7. Future work

In order to improve the accuracy and depth of our studies, it would be beneficial to not only increase the size of the database for tech transfer companies but also to collect more detailed information on their financial metrics such as profit, Research and Development expenses, advertising expenses, and other relevant data. This would provide a more comprehensive and nuanced understanding of how these companies choose to allocate their resources and ultimately impact their success rates. Furthermore, we observed a significant increase in the number of tech transfer companies founded in 2019, almost tripling the number from the previous year, which then decreased the following year. This trend may be influenced by the COVID-19 pandemic, which could have affected the growth and decline of these companies during this period. However, our data on Startups did not show a similar spike during this period, but rather followed a downward trend from 2017. This finding underscores the need for a larger database of tech transfer companies from the period of 2018-2020 to better understand the impact of the pandemic on the formation and growth of these companies.

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