# Avvir: Do or Do Not, There Is No Try

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**Lessons Learnt**

Throughout the past 10 months in Avvir and having buried myself into the research and understanding of Avvir's product management and development, operations, and sales execution, there were 3 key lessons learnt which could be classified into 2 aspects – entrepreneurial and strategy aspect, technical aspect.

The entrepreneurial and strategy aspect pertained to how the life of an employee or founder of a startup would be like, and the strategies teams and companies can employ to journey through different stages or difficulties. The technical aspect pertained mainly to the technical frameworks which would help in ensuring a better success of product development or the success of founding startups.

**Do or do not, there is no try** (Entrepreneurial and Strategy)

Drawing from how Raffi decided to be an entrepreneur and founded Avvir, Raffi made sure he was not half-hearted about running Avvir. This was emanated during major decisions and outcomes such as the decisions pertaining to leaving his comfortable job as a product manager of Pivotal Labs, product development of the photograph product, and the hiring of experienced team members. This belief could be seen as one of the contributing factors to the rapid development of Avvir's products and growth of the generated revenue which led to the respectable seed funding of $2.5 million raised led by Khosla Ventures, a reputable Venture Capital firm. After writing the case study which required thorough research into the early beginnings and entrepreneurial journey of Raffi and Avvir, this quote by Yoda of Star Wars would be something I believe everyone should strive to achieve.

**Be constantly in touch with the market** (Technical)

To catch onto the opportune moments in the market or industry, one got to be constantly in touch with the ongoing and potential market opportunities and competitors. Raffi and his team were always on the lookout for opportunities and competitors. Being in touch with the market trends allowed them to catch onto the growing demand for Digital Twin solutions with a predicted CAGR of 45.4% over five years – a high CAGR when typical CAGR approximates at 15-45%. The constant lookout for potential and existing competitors allowed Avvir to retain their unique selling point of the deviation analysis (3D) while understanding the need to expand into a new product. The constant lookout also allowed Raffi and his team to stay affordable and useful amidst the Covid-19 pandemic where budgets for the construction industry were speculated to be

cut.

**Be constantly in touch with the demands and wishes of the customers or users** (Technical)

The constant identification of the demands and wishes of the customers would allow their problems to always be resolved or mitigated. This meant the solution would always remain desirable. Knowing that desirability was an essential trinity to the sweet spot of innovation, Raffi and his team knew that a customer-centric solution can only be maintained by constantly listening to its customers. This would allow Avvir to always stay relevant and be able to monetize. That was how Raffi and his team decided whether to develop the photograph product, Autodesk Forge, or algorithm accuracy. Seeing how Avvir constantly practiced this was relevant to the importance of constantly listening to demands and wishes.

## Case Synopsis

Raffi Holzer, being trained as an engineer from B.A in Physics to M.ENG in Bioengineering and Mechanical Engineering, found his passion in entrepreneurship and connected the dots to his interest and determination in solving pain points in the construction technology industry. It was during then when the spirit of Yoda, "Do or do not, there is no try", was emulated. Raffi felt that it was time he committed fully to solving the pain points in that industry and left his position as a Product Manager in Pivotal Labs. Soon, Raffi then met Vamsi through an advisor and founded Avvir together with Vamsi in July 2017 where Avvir strived to act as a living digital twin that brings internet of things and building automation systems to life. In September 2017, Raffi managed to rope in Tira Odhner to build Avvir together. A series of happy occasions followed suit such as the customer Avvir onboarded half a year later.

However, in April 2018, Vamsi left in pursuits for his passion for academia. Fortunately, this did not affect the growth of Avvir greatly and soon, Avvir was being enrolled into an accelerator program, URBAN-X, in New York, the state with third highest construction activity in US. More team members started to join Avvir and a new management team was formed. In March 2019, Avvir managed to raise a respectable seed funding of $2.5 million.

After further market validation, listening to its existing and potential clients, and further product development, Avvir redefined itself into a more targeted and specific startup as a Software as A Service (SAAS) which uses laser scans and Artificial Intelligence to capture construction deviations, monitor construction progresses, as well as produce updated and accurate digital

twins. Knowing that there was going to be a strong demand in the digital twin industry, Raffi and his team quickly focused into the development and refining of three main products - Deviation Analysis (3D element), Progress Analysis (4D element), Cost Analysis (5D element).

With the increased funding and having moved into their second office space in New York, the Urban Future Lab of New York University Tandon School of Engineering, Raffi and his team used the funding raised to continue to develop its product features, build its sales pipeline and hire more resources. With the additional funding, they felt a greater responsibility for prudent spending and was stuck among three choices of product developmental directions. After listening to its existing and potential clients as well as performing market research and analyses, the management team decided on their product developmental directions.

In March 2020, Covid-19 struck the New York, and the construction industry was affected badly. Avvir, being a construction technology startup, was directly impacted by the shutdown of construction activities. With approximately 15 months of financial runway, Avvir had to thread even more carefully on their operations and developments. After 3 months of uncertainty, construction projects started resuming. Fortunately, there was a burgeon in sign up rates with Avvir. Out of the two main developmental directions, one of which was doing well. However, the other did not reap promising results after devoting a substantial amount of resources into it over the past 3 months. Raffi and his management team were left with the dilemma if they should pull the plug on this development or should they bite the bullet and persevere through it?

**Teaching Objectives**

Throughout the case, the reader should be able to identify and resonate with these teaching objectives which revolve around entrepreneurship, business strategies, as well as product development and management decisions.

1. Identify and appreciate the importance of listening to pain points of the customers while ensuring that the solution always stays relevant to the customers. The severity of the pain points can be a key factor in the decision of product developmental plans and the company growth strategy. From the case, the reader will be exposed to how pain points in traditional industries, like the construction industry, to understand how these pain points could be resolved or mitigated. The additional information provided in the exhibits should further provide a clearer overview and better understanding of the construction industry.

2. To underscore the likely challenges entrepreneurs may potentially face while starting up

their own companies or employees might face while working in early stage startups with very limited time and human resources – both of which often boil down to the available funding. The responses and strategies adopted by Raffi and his management team were also lessons which could be learnt and emulated in terms of necessary expansion of startups, e.g building what was required, to expansion of engineering/development team, to the operations team, followed by the sales and marketing team.

**3.** To shed light on how product development is done from ideation phase to seed funding and leading up to Series A funding, especially for B2B businesses which Avvir is in. In addition, due to the Covid-19 pandemic which caused construction projects to shut down, the resources a construction technology company like Avvir were further drained. This meant that the management team had to react quickly and reconsider the product developmental plans amidst the challenges and changes on a global scale.

After reading and analyzing the case, the reader should be able to formulate possible solutions and evaluate these solutions by analyzing the pros and cons. The way Raffi and his management team decided on how to tackle the problems faced were based on factors such as the duration the product development would require, the benefits of the product and the benefitted group of the product. These moments should be looked into to help reader formulate a more informed analysis.

**Analysis of the case**

In this case study, the reader must understand and weigh the positives and negatives of both growth strategies in order to decide on the proper strategy to proceed with. The reader must also take into consideration the assumptions made for each option. Finally, the reader should strongly consider the operational feasibility and viability of the alternatives.

**SWOT Analysis**

To understand the current position of Avvir, a SWOT Analysis is used. This serves as a quick overview to assess the internal and external environments of the company. The SWOT Analysis should encapsulate the vital information required for the subsequent methodologies to analyze and decide on the choices for the dilemma presented in the case.

| INTERNAL | STRENGTHS | WEAKNESSES |
|---|---|---|

| | | |
|---|---|---|
| | • Deviation (3D) Analysis a Unique Selling Point of Avvir<br>• Using Digital Twin to analyze progress (4D) & cost (5D) elements of a higher accuracy compared to other product offerings in the market<br>• Algorithms behind the analyses.<br>• Respectable funding from seed funding and track record.<br><br>• A team of experienced employees in the team. Almost everyone has had PhDs, MBA, Masters and/or more than 4 | • Limited human resources for developmental and operational work<br>• Means to measure analyze progress (4D) & cost (5D) elements is relatively more expensive compared to other product offerings in the market<br>• Algorithm accuracy could still be further improved as it could still be time consuming for the Operations Team to perform Quality Assurance checks before presenting the final product to clients. |

| | | |
|---|---|---|
| | years of professional working experience. | • Inability to store complex models in a single view of the Building Information Model.<br>• Lack of intuitive user experience while assessing information on Avvir's model viewer product. |
| **EXTERNAL** | **O**PPORTUNITIES | **T**HREATS |

| | • Potential and existing customers were interested in the photograph product.<br>• Continuous emerging interest in the digital twin industry and products.<br>• Not many competitors in the North American market which utilizes Digital Twin to analyze progress (4D) & cost (5D) elements | • Lowered budget from potential and existing customers to invest in Avvir's products due to Covid-19.<br>• Emerging competitors targeting the construction industry.<br>• Depleting funding which is required for company to continue to build on its products. |
|---|---|---|

**Fig 1. Swot Analysis Table**

**Method 1: Pros & Cons Analysis**

After reading the case, the reader should be able to identify the two options that Raffi and his management team could opt for:

Option A: Continue developing the photograph product

Option B: Halt development of the photograph product, and focus on other developmental plans, i.e. algorithm accuracy

This Pros & Cons Analysis Method serves as an organized form to compare the two options by simply looking at the pros and cons of each option. Although some advanced Pros & Cons Analyses include two important additional factors, namely consequences and risks, the presented analysis in Fig 2 embeds these two factors into the pros and cons sections.

Option A is for the development team to persevere and continue developing the photograph product. As explained in the case, although this has not reaped significant results, this would bring about huge positive impacts to Avvir and its funding for Series A, as well as the growth potential of Avvir subsequently. However, this has a higher risk compared to Option B.

Option B is for the development team to focus on other developmental priorities. The most immediate priority would be to improve the accuracy of the algorithms used for deviation analyses. Although this has a lower risk of success compared to Option A, this would reap

significantly lesser positive impacts to Avvir and its funding for Series A.

To be able to evaluate which option would be the better choice, readers can list down the pros and cons of each choice in a similar format as seen in Fig 2 while encapsulating the consequences and risks of each options for a clearer overview for comparison.

|  | PROS | CONS |
|---|---|---|
| OPTION A - Continue developing the photograph product | • Lowered cost for customers which do not require high level of accuracy.<br>• Potential significant increase in market share and revenue.<br>• Able to raise a significantly larger funding if it reaps success over next few months. | • Slow down the progress of other developmental plans.<br>• Medium risk of not succeeding or very slow progression compared to other product developments.<br>• Requires lots of resources, i.e. time and manpower. |
| OPTION B - Halt development of the photograph product, and focus on other developmental plans, i.e. algorithm accuracy | • Satisfy existing customers<br>• Reduced cost of operations<br>• A potentially faster developmental velocity | • Only a small increase in capture of market share |

**Fig 2. Pros & Cons Analysis Table**

**Method 2: Decision Tree Analysis**

After the Pros and Cons Analysis, readers should be able to understand the benefits, consequences, and risks of each option. Subsequently, readers are encouraged to hypothesize the outcomes of each decision made for both Options A and B. To do so, the Decision Tree Analysis is a suitable tool as it offers a clear overview of each decision, the potential consequences of each decision, as well as end outcomes of each option.

The end outcomes for options A and B should allow readers to appreciate how impactful and beneficial the options would affect Avvir while understanding the likelihood of the impacts based on the reader's understanding of the case. For example, the positive outcome of Option A

in the case where a good amount of series is more beneficial than the positive outcome of Option B as shown in the Fig 3 and Fig 4.

In addition, readers can consider assigning probabilities to the likelihood of each outcome. The purpose is to allow for further critical thinking and a more detailed identification of the details provided in the case so that well-considered outcomes and decisions can be achieved. Alternatively, if readers find that there are insufficient details to be assign probabilities, that can be omitted such that only the outcomes to each decision are developed.
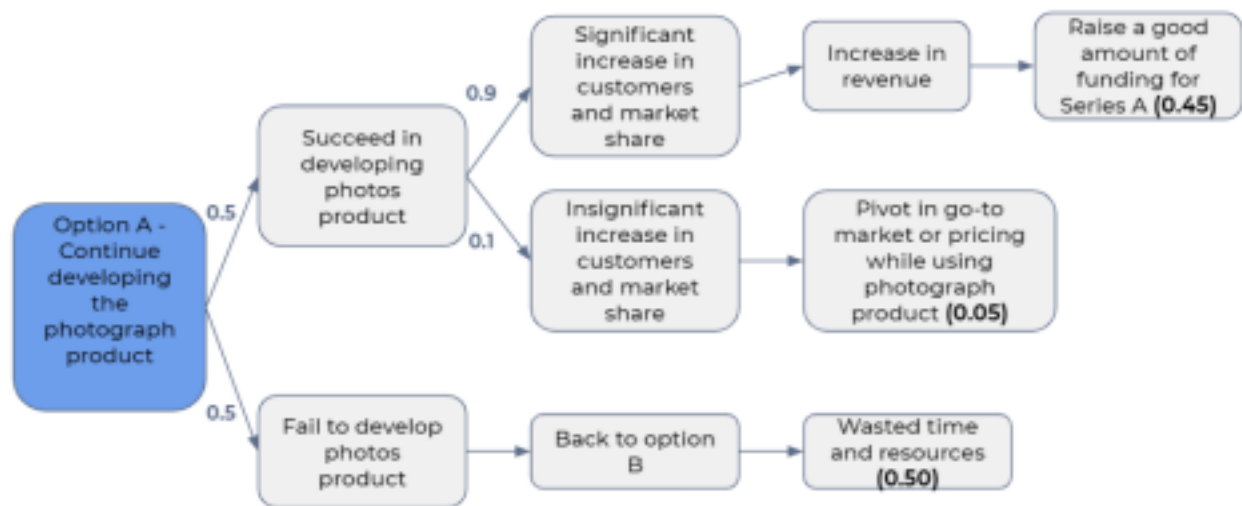


**Fig 3. Decision Tree Analysis for Option A**

From the starting point in blue, if Raffi and his team were to continue developing the photograph product, there would be two possible outcomes. The first outcome would simply be a success and the other the vice versa. Bearing in mind the difficulty and the capabilities of the experienced team in Avvir, the outcomes could swing either way with an equal likelihood each. Hence, a 50-50 probability of each outcome from occurring.

If the development team succeeds in developing the photograph product, it would either lead to a significant increase in customer adoption as well as capturing a greater market share. As the photograph product was well received amongst potential and existing customers when Raffi and his team validated during the sales calls, there is a very high likelihood that the success of this development would lead to a significant increase in customer adoption. This would naturally lead to an increase in revenue. Hence, allowing a good amount of funding raised for Series A. The probability for such an occurrence, based on the assigned probabilities, would be 0.45.

However, in the event that there is an insignificant increase in customer adoption following the success of this development, the possible outcome would be to pivot its go-to market into

another market such as the infrastructural projects or underground projects which has a demand for photographs analyses too. Another possibility would be to adjust the pricing to an ideal one to fit the customers' budget. The probability of such an occurrence, based on the assigned probabilities, would be 0.05.

In the event that the development team fails to develop the photograph product, the likely outcome would be for Avvir to fall back to Option B with the outcome of wasted time and resources. The probability of such an occurrence, based on the assigned probabilities, would be 0.5.
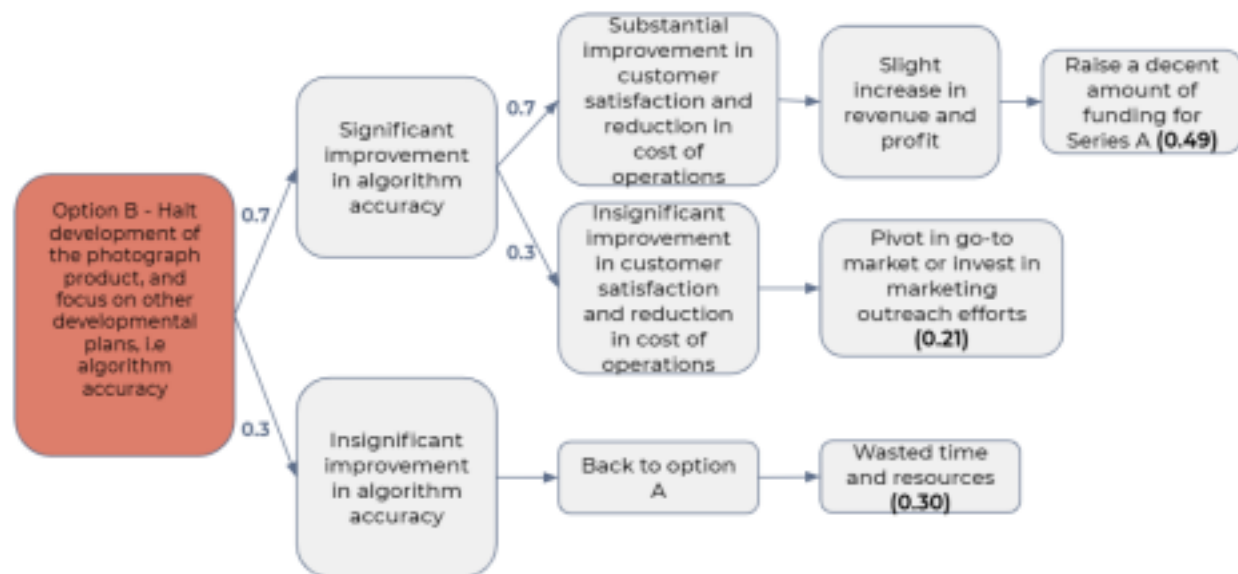


**Fig 4. Decision Tree Analysis for Option B**

From the starting point in red, if Raffi and his team were to halt the development of the photograph and focus on the development of other products such as the algorithm accuracy, there would be two possible outcomes as well. The first outcome would be a significant improvement in algorithm accuracy with a rather high likelihood of occurrence as the developmental team had a rather high level of confidence in this development succeeding. Hence, a probability of 0.7 and the reverse outcome a probability of 0.3.

If the development team succeeds in improving the algorithm accuracy, Raffi and his team had gathered feedback from existing customers that they would be rather satisfied with the improvement. In addition, there was a rather high likelihood of a reduction in cost of operations as stated in the case as well. Hence a probability of this outcome to be 0.7 and the reverse 0.3. If there was a substantial improvement in customer satisfaction and reduction in cost of operations,

this would lead to an outcome of a slight increase in revenue since existing customers would be more confident in signing more contracts with Avvir. In addition, with the reduction in cost of operations, profit would be bound to increase. As such, a decent amount of funding for Series A could be raised albeit not a significant one compared to the Option A. The probability of such an occurrence, based on the assigned probabilities, would be 0.49.

If there was an insignificant improvement in customer satisfaction and reduction in cost of operations, Raffi and his team would likely pivot in their go-to market to infrastructural projects or underground projects which was similar and elaborated for Option A. The probability of such an occurrence, based on the assigned probabilities, would be 0.21.

In the unlikely event that the development team fails to improve the algorithm accuracy, Raffi and his team should fall back to option A or pursue other developmental goals with the outcome of wasted time and resources. The probability of such an occurrence, based on the assigned probabilities, would be 0.30.

**Method 3: Product Scoring Matrix**

After the analyses of potential outcomes of the two options while bearing the likelihood of the final outcomes, a slightly more quantitative analysis can be performed to evaluate the two options based on key criteria. A suitable tool would be the product scoring matrix by first listing the key criteria. Following which, a score should be awarded to each option based on the respective criteria. As shown in Fig 5: Product Scoring Matrix Table, a score of 1,2 or 3 are awarded to each criterion. A. The granularity of the scores for the example provided in Fig 5 was kept to a low granularity, i.e. maximum score of 3 for each criterion, as readers might find that there might be insufficient information provided in the case or beyond to provide a more granular score. Nonetheless, readers should be able to find sufficient detail from the sections which described each product in the case. Certain keywords such as "resources" required, "duration" of product development, "customer", and "revenue" could be found in that section which has a level of cross comparison among the three product features – Autodesk Forge, Algorithm Accuracy, and Photograph Product.

The final score of the respective options should then be tabulated to identify the better option based on the criteria decided assuming an equal weightage of each criterion. In addition, each criterion was assumed to be of an equal weightage as these were factors Raffi and his team considered without clear distinction as seen in the case. Hence, a weighted scoring matrix is

encouraged to be avoided.

| Criteria | Option A | Option B |
|---|---|---|
| Manpower resources required (More manpower resources required = lesser ticks) | 1 | 3 |
| Speed of development (Faster speed = more ticks) | 1 | 2 |
| Customer satisfaction (Higher level of customer satisfaction = more ticks) | 3 | 1 |
| Customer acquisition (More customer acquisition= more ticks) | 3 | 1 |
| Profit potential (Higher profit potential = more ticks) | 3 | 1 |
| Total Score | 11 | 8 |

**Fig 5. Product Scoring Matrix Table**

For the first criterion, it was mentioned that a heavy investment of resources would be required for the Photographs product. Hence, a low score of 1 was assigned to Option A. On the other hand, the manpower resources were stated to be comparatively low for the improvement in the algorithm accuracy. Hence, a score of 3 for Option B.

For the second criterion, the case included that a long duration would be required for the development of the photograph product. Hence a score of 1 and 3 for Options A and B respectively.

For the third criterion, the case included that the pitch for the photograph product was well received by potential and existing customers. Hence, a high score of 3 was assigned to Option A. On the other hand, the existing customers found that it would still be valuable to see an improved level of accuracy albeit a much lesser enthusiasm compared to the photograph product. Hence, a low score of 1 was assigned to Option B.

For the fourth criterion, the case included that the photograph product would provide Avvir with a lot more customers with the lowered cost, albeit the lower accuracy, which would in turn allow potential and existing customers to have more choices and price points for the suite of products Avvir offer. Hence, a score of 3. On the other hand, the focus on Option B was on existing

customers who were comfortable with investing in the benefits of Avvir and laser scanning. Hence, an assigned score of 1 for Option B.

For the last criterion, the case included that there would be a significant increase in potential customers for the photograph product and only a slight increase in potential customers with an improvement in algorithm accuracy (Option B). Hence a score of 3 and 1 for Options A and B respectively.

Summing the number of ticks, Option A, with a total score of 11, would be the better option based on the criteria defined in Fig 5.

**Recommendations**

After conducting the analyses, readers should be able to make an objective and informed decision with the information provided in the case. The personal recommendation would be for Raffi and his team to pursue Option A: Continue developing the photograph product.

The Pros & Cons Analysis offered a good starting point to weigh the benefits and costs of each option. A deeper dive was then provided in the Decision Tree Analyses where Option A could be valued as an option to have almost a 50-50 chance of a huge return of investment, 45% chance to be exact as seen in Fig 3, whereas Option B also almost has a 50-50 chance of success, 49% chance to be exact as seen in Fig 4. However, the outcome for Option B has a low return of investment. As the slightly higher probability of success for Option B would only result a much lower return of investment compared to Option A, Option A would be my preferred choice.

In addition, Option A was further favored as seen in the Product Scoring Matrix as seen in Fig 5, based on the key criteria. Furthermore, from the SWOT Analysis, Avvir could be identified to be in a position where the digital twin industry was on the rise with a high CAGR as seen in Exhibit K: Market Analysis of Digital Twin Market. Hence, the good market opportunity presented a good strategy to opt for a larger potential growth and the choice of Option A since the return of investment would be much higher for Option A.

**Epilogue**

At the end of June 2020, Raffi and his management team made the decision to go with Option A: Continue the development of the photograph product. This was due to the high return of

investment in the photograph product. Once again, the spirit of Yoda was displayed – Do or do not, there is no try. The high risk, high return option was selected eventually after discussions amongst the management team.

However, the development of the photograph MVP (Minimal Viable Product) was simplified. This would allow the engineering team to develop the product in a shorter duration and lesser resources required. This also meant that the probability of successfully developing the photograph product would be increased.

Three months later during September 2020, positive results were shown in the development of the photograph product. A Minimum Viable Product was quickly put together so that it could be launched and used by clients. In October 2020, a paid pilot project was launched rapidly with a previous client of Avvir which expressed its interest in the photograph product months ago during a sales call.

During a check in call with the first client of the photograph product at the start of November 2020, the client was very satisfied with the photograph product and exclaimed:

*"This is great! These (information) would be really useful."*

With the positive outlook of the photograph product and more signed contracts for the photograph product and other product features, Avvir managed to hit its revenue goal by a stretch and look all ready for another respectable round of funding for Series A.