

Present Situation of Tech Startups in Bangladesh: A Case Study

Plabon Kumar Saha

Institution of Information Technology, University of Dhaka, Dhaka, Bangladesh
E-mail: pkumarsaha71@gmail.com

Md. Ezaz Raihan

Department of Computer Science and Engineering, American International University Bangladesh, Dhaka, Bangladesh
E-mail: ezazraihansaif@gmail.com

Md. Tanvir Anjum

Department of Computer Science and Engineering, American International University Bangladesh, Dhaka, Bangladesh
E-mail: mdtanviranjum21@gmail.com

Md. Kishor Morol

Department of Computer Science and Engineering, American International University Bangladesh, Dhaka, Bangladesh
E-mail: kishor@aiub.edu

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Abstract: In contemporary times startup is a very popular and growing entity, especially for the software industry as the technology field continues to grow. However, the failure rate of software startups is extremely high, and many reasons are behind this failure. There are many different variables behind the success or failure of a company. The purpose of this study is to mainly identify the possible reasons behind why the startups can't reach the promise they are presumed to reach. To identify the reasons, company and employees of the company data were collected and analyzed using sentiment analysis and statistical correlation. Based on the analysis, some constructive suggestions were proposed accordingly. The discussion will enable the company employees and employers to bring out a transparent relation to ensure productive and satisfactory work environment. All the collected data for the study and the codes that were used to analyses the findings are attached below [28].

Index Terms: Software Startups, Startup Failure, Software Engineering, Sentiment analysis.

1. Introduction

Startups are newly created companies that aspire to grow under extreme uncertainty. In recent years, there is a significant increase in the number of software startups, which is a key driver in creating new businesses and jobs [1]. The environment of software startups is extremely dynamic, unpredictable, and chaotic. Despite good early achievements, over time and during scaling up, software development and organizational management increase in complexity [2,3] causing deterioration of performance over time. According to Giardino et al. [4], 60% of the total startups in the world don't survive in the first five years of their inception. And this creates a scope for researchers to work on the reasons behind the failures or success of startups [5,6,7]. Generally, startup companies develop software on an ad-hoc basis and most of the time, with very limited resources and less experienced people in the team. So there are no specified practices/methodologies being followed [7]. There are several kinds of research of software development methodologies but very few researches covered the dynamic and uncertain development method of startups. From a software engineering perspective, startups are dynamic and have uncertain situations where they develop software in a context where processes can hardly follow any prescriptive methodology [8]. Characteristics of startup companies are not similar to established and regular business companies that's why they have different workflows. Sutton [9] provides a characterization of software startups, defined by the challenges they are facing in their regular workflow. Some of key characteristics involving startups are discussed below.

Youth and immaturity: The basic characteristics of most startups are that they are relatively young and inexperienced compared to established developed companies, and typically they have very little industry experience.

Influences: In a startup, there are many influences and pressures from investors, stakeholders, customers, and continuous fear from competitors that affect decision-making. Because of the multiple influences, their decision might not be structured or robust. Instead, creating a product becomes more priority instead of following proper methodologies.

Dynamic market and continuous innovation: Most startups usually work with new ideas and they are required to develop and operate with disruptive technologies to enter the high-value market and be upward from the competitors.

The success and failure of any software startup depend on the growth and the way they are retaining their customer base, and what value they are adding to the customers with their particular service or product. But most of the software processes don't have a customer-focused option. In this research [10] the researchers describe how very few startups failed due to a lack of technology; rather, they almost fail due to a lack of customers. Multiple types of research are there on the process model of startups. Regardless of being a rising place of software startups, Bangladesh lacks proper research on software startups. As Bangladesh is emerging in the IT sector and the government has attention to nurturing this sector, it is expected to add 7.28 percent to GDP growth by the end of 2021[11]. But most of the startups don't follow the existing and already proven effective SDLC methods for developing software products. In this study, the authors have covered the necessity of a new and dedicated software process model for startups and how the present model is failing to fulfill the requirement of software company startups. The scenario is covered in the context of Bangladesh but this study will be applicable for other countries as well as provided that they have the same economic and environmental standards. From the above context it is evident that the software industry is a very competitive and prone to be vulnerable. It is true especially in the startup phase where the failure frequency is tremendously high. There are many unforeseeable variables that can lead toward either failure or success of a startup tech company. In this conducted study the probable reasons why a startup fails to live up to its potential is attempted to understand. Also, the communication gap between the employee and employer in this field is also taken into consideration. With that in mind data set was collected in to better understand the situation. The collected data was analyzed based on correlation and Natural Language Processing (NLP).

2. Related Work

The software industry is not a very new industry. However, it is one of the most lucrative field in modern times. So naturally many startups were formed in contemporary time. Many researches were conducted based on startups where some of them also empathized on failure of software startup companies. The authors of this study [15] look to identify the strategy of software startups. The authors have developed a model named "Greenfield Startup Model (GSM)" that elaborates how technical depth influences the future growth of startup companies. The study looks to learn how a startup operates and the errors from the development point. The aforementioned model was developed by conducting in-depth semi-structured interviews with many startups' higher authorities. Again, in this study [16], the authors have upheld the scenario of startup hubs in the eastern part of Africa. The study has identified how these hubs deal with the new startups in the growing ecosystem and how the hubs keep track of the progress of the startups. To gather information semi-structured interviews were conducted with the hubs that were mainly dealing with startups who were established within the last two years. From the interview, the authors have found various kinds of value-adding services such as resources, incentives, incubation, technical help, customer handling guidelines, and other benefits were received by the startups from the hub but the main value-adding element was identified to be business training. In this study [17] the authors have demonstrated the phenomena of 'trust' in the early days of a software company startup. The study has briefed how trust impacts the MVP and how it can be achieved by the startup. In this research, the author [18] upholds the scenario regarding software engineering practices in software startups. The study showcases the use of software engineering in startups in the early stages and also in the growth stage of the company. Additionally, the study also includes academic trends for software engineering education, industry trends, the impact of software startup engineering in the curriculum for students, and proposed a model that integrated strategy suited for both academic and industry levels in the scope of the research. In this study, the authors [19] have labeled technological startups as highly innovative yet in uncertain and risky scenarios. They have identified some possible reasons behind the failure of a startup, such as lack of pivoting, cost/ price issue, unsuitable location, customer ignorance as some of the critical reasons behind the failure. In this study [20] the researchers have mainly focused on the external factors such as political, legal, economical, and social reasons that can lead to the failure of a software startup. They have also briefed about other factors that have an impact on the success or failure of a startup. Some of the factors are namely competitors, team, marketing strategy, product fit, etc. The authors of this study [21] have collected data of 22 different failed startups and analyzed them. Upon analyzing the data, they have identified the mistakes that the failed companies have made. In this study [22] the authors have demonstrated how testing can impact the success or failure of a startup. Testing is a very important phase in a software development Lifecycle. An absence of this phase or inadequate testing can lead to the failure of a startup. This notion was established based on collected data. In the study [23] the important of thinking about the design before making the software, was briefed. This ensures the robustness and proper quality of any software product.

3. Methodology

The purpose of this study is to find out why the startups in sub-container regions fail to find success in the long run. In order to find evidence about the success or failure of the startup companies, a survey was conducted. The survey had both qualitative and quantitative questions. Two individual google forms were created for the survey. One of the forms was for the companies, and the other form was for the professionals who were working for the company for a while. The company-based survey form was given to the companies who were product-based, service-based companies, or the hybrid of both product and service-based companies. The company-based survey form was given to the management of the companies such as the CXOs, Project managers who could provide in-depth ideas about the company. The form mainly collected data about the company, the number of people working in the company, technology stack, mentorship, or incubation.

3.1. Survey question description

The survey question was a bit different for companies that were either service or product-based companies. Product-based companies are basically the companies who have a single product, or multiple products that are sold to various types of companies for a particular type of work or business or they have a wide range of customers who are using the same software. From the product-based companies, the survey sought out details mainly focusing on their product uniqueness and their overall impact in terms of market. So product-based companies were asked about where funding sources like investors who have provided money before the company was making revenue, expenditure on marketing to understand their branding and making the product recognizable to probable users, projected customer data, and why the product was unique from the nearest competition. Again, service-based companies are those that build software based on customer requirements. They don't rely on a single product instead work on various types of software depending on client demand. Thus, the service-based companies were asked for data like the type of service provided by the company, whether the company follows software engineering rules and principles, the revenue stream of the company, operating cost, company situation like if the company is in growth stage or higher stage.

Additionally, in this survey, the professionals who are working for the company were also considered. On the forms for software company professions, the questions tried to gather information about their role in the company like their role in the company, year of experience with the company, overall year of experience, happiness with the working hours, whether they were happy with salary and increment. Also, they were asked their opinion on the management of the company. They have provided information about management's attitude towards the professionals and how many persons in the management were previously involved as software professionals.

3.2. Data analysis

The collected data was analyzed thoroughly to get some insides. To classify different criteria of the data, different measurements were taken. The first one is the satisfaction of employees regarding the office environment. Previous studies indicate that the environment directly correlates with an employee's performance, growth, and interests in work [24]. Along with the previously mentioned criteria, this research shows that positive office culture, directly impacts the satisfaction of the employee and their performance [25]. Similarly, another study [26] analyzed the impact of compensation or salary and the importance of keeping promises or commitments of the organization. Upon analyzing their collected data, it was proven that compensation and keeping organizational commitment have kept the employee satisfaction level upwards, which also helped the organization's turnover. In this study, the companies were categorized using criteria such as salary satisfaction, keeping promises, working hours, office environment, and organizational commitment (Figure 1).

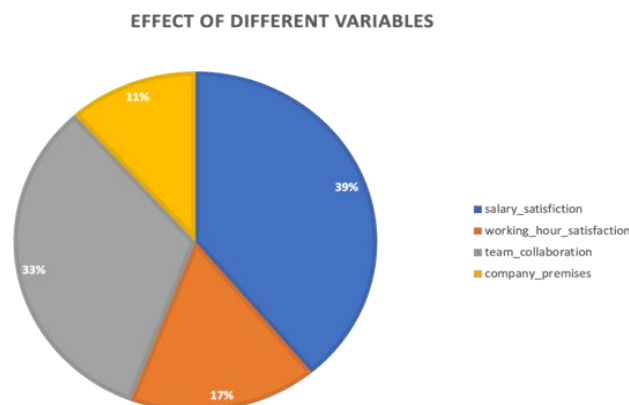


Fig.1. Effect of different variables in companies.

Using these criteria, a total of 142 service-based and product-based companies were categorized. Out of the collected data from the workers, most people had the experience of 3-5 years, and the next big portion had experience below one year (Figure 2).

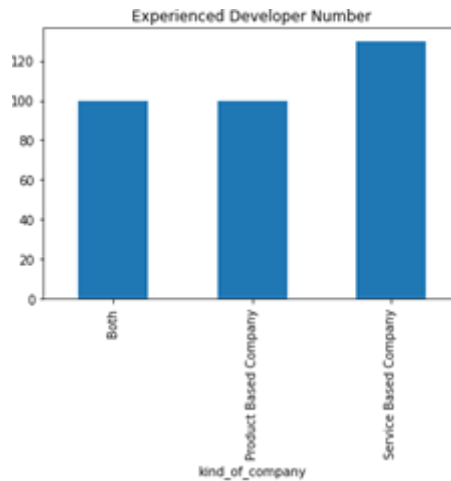


Fig.2. Number of experienced developers according to kind of company

To analyze the companies based on the answers, the answers were decoded with an evaluating method. Here, the salary satisfaction value was either yes or no, which means the employees were either happy with the salary or unpleasant. A similar process was maintained for the work hour parameter. For work environment and organizational promises, the considered value ranges from not good, good to best. After calculations, it was found that 23 companies were found to be meeting the best score where they have accumulated 6 out of

6. Out of the 23 companies, 9 companies were product-based, 12 were service-based, and two were hybrid companies. Sequentially the average companies have accumulated 4 to 5 points. Only three companies have met this standard. Out of the four companies, two were service-based companies, and one was a product-based company.

Usually, the companies that have European or American regional clients or companies having outside investments from first world countries have better cash flow. With that in mind, a correlation of companies that have foreign investment, stage of business, and salary satisfaction values were analyzed. If companies with both service and products had global clients and were in the growth stage, the salary satisfaction was high in most cases. Similar upward characteristics can also be found when the companies are product-based and in the profit stage. Oppositely the service-based companies that were reliant on the local market had struggling salary satisfaction also. Many service companies that were in the profit stage also had similar conditions (Figure 3).

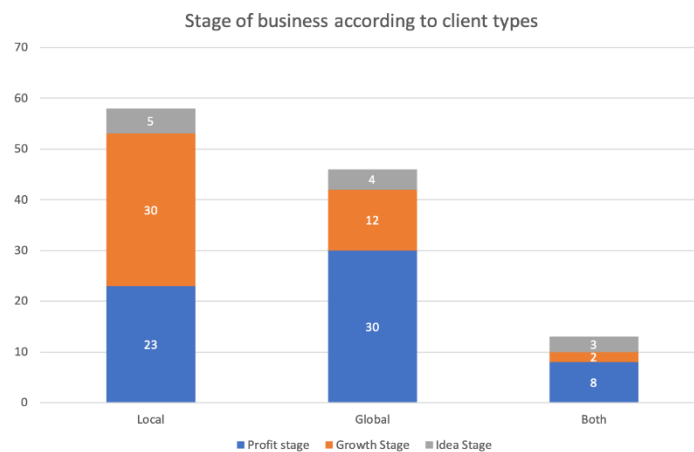


Fig.3. Stage of business according to client types.

3.3. Finding correlation

Popular Machine learning library pandas were used to find the correlation among the dataset. Upon getting the correlation matrix (figure x) some interesting correlations were found among the factors; firstly, it is evident that the factor whether the companies follow any systematic method while running the development process, has a strong correlation with the state of the actual developed product (for the product-based companies), have dedicated testing phase (the product-based companies), company operating technique, have a minimal viable product (the product-based companies). Secondly, another interesting discovery is that the stage of business of the company and having a dedicated testing phase has a good correlation with establishing the minimal viable product of the company. The term company environment refers to the facilities, food, and other beneficiaries provided to the employee by the company. Next, salary satisfaction has a correlation to the working mindset of the developer and team collaboration. Additionally, it was observed that the onboarding process of the company and work hour rate has some correlation with team collaboration. Notably, company premises has also correlation with the work hour rate (Figure 4). In the following table (Table 1), the top 10 variables which are correlated more than the 0.5 marks are given below.

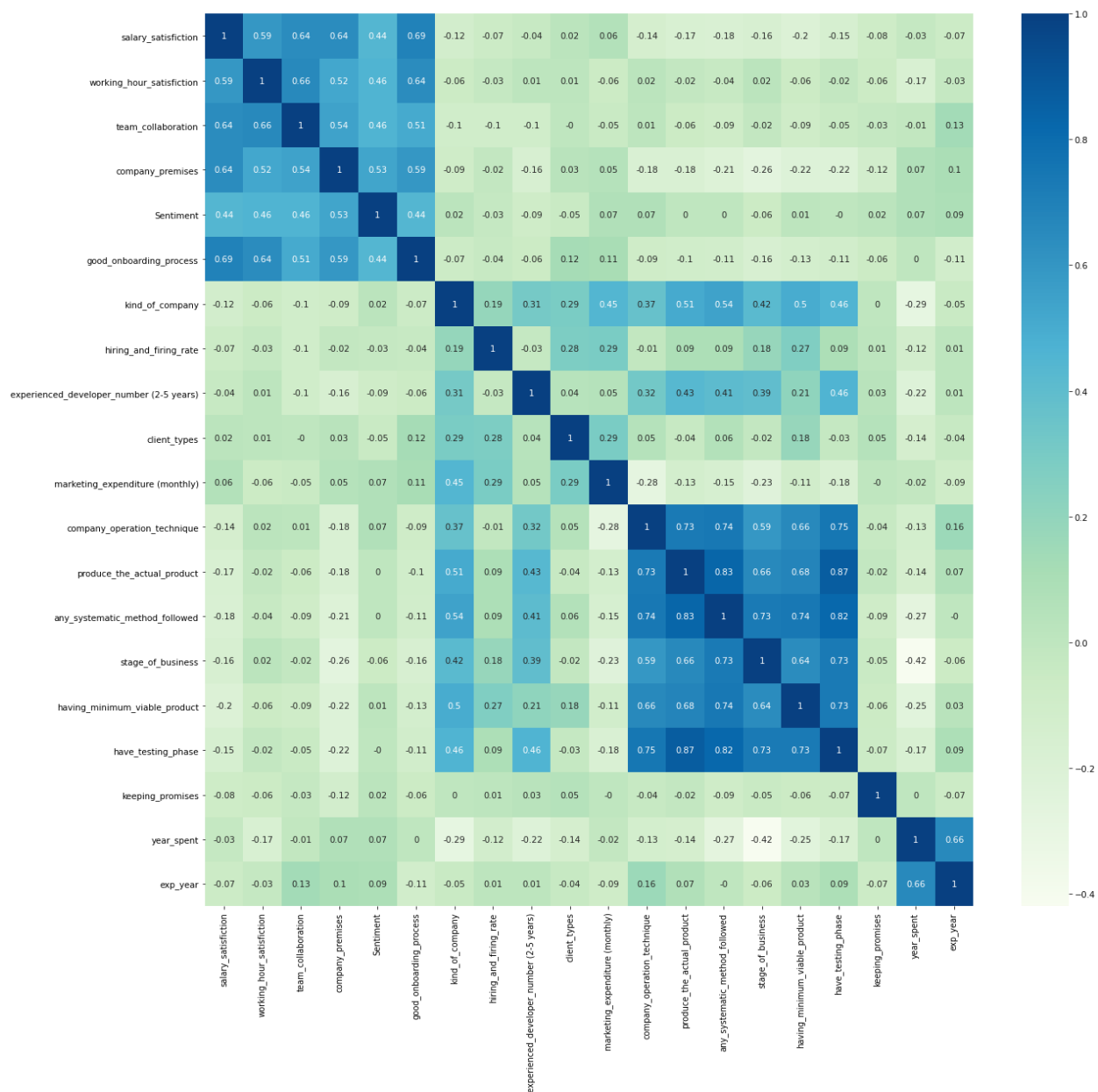


Fig.4. Correlation heatmap of all variables.

Table 1. Top ten correlated variables

Variable 1	Variable 2	Correlation point
Team_collaboration	good_onboarding_process	0.552
Company_premises	working_hour_satisfaction	0.576
team_collaboration	Company_premises	0.589
team_collaboration	working_hour_satisfaction	0.709
team_collaboration	Salary_satisfaction	0.695
Produce_the_actual_product	having_testing_phase	0.851
Having_minimum_viable_product	Any_systematic_method_followed	0.818
Company_operation_technique	Stage_of_business	0.703
Good_onboarding_process	Salary_satisfaction	0.744
Stage_of_business	Any_systematic_method_followed	0.828

3.4. Sentiment analysis

Sentimental analysis is a term that incorporates numerous undertakings, for example, conclusion extraction, assessment characterization, subjectivity arrangement, rundown of suppositions, or spam detection [27]. In this research, the NLTK package, Pytorch, and Bert were used. Bert is a pre-trained model. The Bert model was used to analyze the sentiment of collected data of the management attitude column. BERT stands for “Bidirectional Encoder Representation with Transformers.” In simple words, BERT extracts patterns or representations from the data or word embeddings by passing them through an encoder. And as it is a bidirectional transformer, during training, it considers the context from both left and right of the vocabulary to extract patterns or representation. To perform the sentiment analysis on our required column at first labeling was done on our management attitude column. The labeling was done manually. Then, the cleaning process was done by making the whole text in lowercase, removing texts in square brackets, removing links, punctuation, removing words containing numbers, and removing NA values. The encoded sentiment labels are, Bad = 0, Good = 1, Moderate = 2. After encoding, the token and attention mask has been created. The Attention Mask here is an array of 1s and 0s indicating which tokens are padded and which are not. Then representation comes in tensor format. Then the maximum length for the sentences was set to 150. The data loader with 64 batches has been created to put in the Bert model.

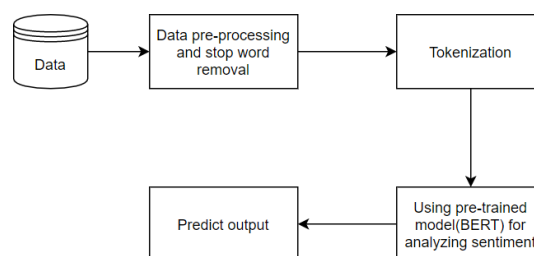


Fig.5. The process of sentiment analysis using Bert

Table 2. Prediction output

Class	Good	Moderate	Bad	total
management attitude	33	84	31	148

So, from the dataset, 33 good comments, 84 moderate one, and 31 bad ones came as output. The accuracy was found 78.69%, and misclass was 21.31%.

4. Discussion and Future Work

Following the detailed study, many important analogies were discussed. It was evident that both the industry and workers need to change a lot. Therefore, based on that, some constructive suggestions must be proposed. The first suggestion will be that the companies must empathize on keeping their promises, ensure the workers are properly rewarded, and have adequate compensation reflecting their efforts and skills. Also, diversity in working place and ensuring a proper working place is mandatory. Also, the employees are advised to trust the companies and switch jobs less frequently to gain the trust of the companies. Overall a well-balanced mutual understanding must be encouraged to satisfy the needs of both parties in order to ensure the sustainable growth of any developing software organization. However, the feasibilities of the proposed findings and mentioned points must be tested. In order to test the points, it must be implemented in a startup and check how the company is doing after implementing the findings.

5. Conclusions

Acknowledging the impact of startups in society, many possible reasons behind the failures of startups were evident after the study. This study collected the data of both company profiles and company employees and explored various possibilities behind the failure of startup companies. The causes were discovered from the analysis of data and the opinions of the company people. Based on the observations, some measurements are suggested accordingly. However, there could be many other variables related to why a particular startup failed. The possibilities are endless. Sometimes despite following all the hard and fast rules, the start-up companies could not survive. But evaluating the criteria of how many existing startups are doing it could pave the way for the new startups to make better decisions.

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Authors' Profiles



Plabon Kumar Saha is doing is Masters in Software Engineering from the University of Dhaka. He has received his B.Sc. of Computer Science and Engineering from American International University Bangladesh. His research interests include, Machine Learning, Deep Learning, AI, Software Engineering and IoT.



Md. Ezaz Raihan is doing is Masters in Computer Science and Engineering from American International University Bangladesh. He has received his B.Sc. of Computer Science and Engineering from American International University Bangladesh. His research interests include AI, Machine Learning, Deep Learning, Computer Vision, Sentiment Analysis and Software Engineering.



MD Tanvir Anjum has received his B.Sc. in Computer Science and Software Engineering from American International University, Bangladesh. His research interests include software methodology and process, Human computer interaction, Machine learning, Statistical modeling and methods, product management process.



Md. Kishor Morol received his B.Sc. and M.Sc. Degrees in Computer Science from American International University-Bangladesh (AIUB) in December 2016 and December 2018, respectively. Currently He is working as a Lecturer in Computer Science department at AIUB since September, 2018. His research interests are Applied Machine Learning, Natural Language Processing, Deep learning and Data and Medical image processing.

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