

Evaluating Credit Worthiness of Small and Growing Technology Businesses

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Abstract

This paper is meant to give an input to African banks, finance institutions and lenders to provide better models to evaluate creditworthiness for small but growing technology businesses. The researcher draws from the experience of technology businesses who many a times have inadequate widgets or inventories as collateral and end up being subjected to stringent requirements imposed by the financial institutions. Financial institutions lack appropriate models to evaluate credits of technology companies without collateral. This paper recommends a framework for design and implementation of a credit scoring model that is flexible to the emerging market trends and does not advocate for one methodology or technology but aggregates multiple factors to determine the credit worthiness of a small tech company.

Keywords: Credit Scoring, Credit Worthiness, Credit Access, Appraisal

Introduction

Access to finance is a major challenge to small and growing technology businesses (SGTBs). This hinders their growth because working capital (WC) is not only an important metric for all businesses regardless of their size, but also a catalyst for these firms' expansion. According to Ochido (2016), financial constraints slow down productivity and on, collateral, asset base, credit history, consistency of cash flows, fixed grace periods, guarantors among other bureaucratic appraisal procedures (Hussein, 2015). Owing to a number of reasons, these stringent conditions imposed by financial institutions put SGTBs to a disadvantage; Collateral may not be sufficient to secure a bank loan. Cash flows are project based, inconsistent and not predetermined periodically as the appraising banks want to see. Income is minimal, and all they have is talent and capacity which is a common feature among majority of Small and Medium Enterprises (SMEs) without tangible collateral.

This has led to many unanswered questions in the minds of borrowers, funders, and researchers on how best to value technology companies with inadequate collateral. For technology companies without tangible assets, there is a need to focus on other metrics to assess creditworthiness. For instance, the value of completed projects, secured projects in the pipeline and the active products in the market. This can be done with a view of leveraging on the value attached to them and ultimately secure credit facilities with lending institutions.

Credit valuation of tech companies may be done by considering the number of users of a product, whether web based or mobile based. This determines the probability of a product

success. Consequently, it can be a reliable indicator of the future cash flow likely to be earned from the product and its related lines. Product success is a good pointer towards the turn-over expected in the bank accounts of the SGTBs.

Most traditional valuation techniques are top-down with focus on projecting total revenues, subtracting total expenses and coming up with income and cash flows to value the company. This technique gives a lot of weight to collateral, guarantors and the asset base of a company which end up ruling out SGTBs during the credit appraisal process. A study conducted by the World Bank (2017) to identify the ease of credit access in different countries showed that it is extremely difficult to access bank credits in most East African countries.

The neo classical approaches are taking a paradigm shift where tech companies have violated all the principles of valuation by looking at value based on the number of users, subscribers, and members that they have. This calls for further development and consequent application of modern methodological schemes in the valuation of technology businesses. This is because financial institutions take a top down approach and fear that this technology companies also known as disruptors of tomorrow may take a long way from fruition when it comes to profits and cash flows. Therefore, a bottom up analysis in valuation considers the number of users a company has on its existing platforms, who is doing what now and being able to map profits and cash flows could be more useful. This is because the market can get ahead of itself, meaning that financiers could actually lose money in a company. It is evident that between now and two decades ago, there are genuine revolutions happening which is reason enough to stay invested in technology. It is against this background that this paper sought to recommend appropriate models for evaluating small and medium technology companies for credit advancement by financial institutions.

Literature Review

Credit Access for Tech Companies

Credit access refers to the ability for individuals and enterprises to obtain external funding to enable them to ease cash flow problems. Credit can either be short term or long term depending on the lender's assessment of the borrowers' ability to repay (Ndungu, 2016). Access for credit by SMEs in Kenya has been identified as a necessary condition for job creation and economic growth and it is a key ingredient to productivity and the growth of the Gross Domestic Product.

Access to credit is a practical necessity in today's economy. Much more than a means to make purchases, credit enables individuals and businesses to meet everyday needs. Its pain point reality comes in when its access by Small and Growing Technology Businesses becomes unusually limited. Small firms in every major survey point to credit access being a problem and a top growth concern for small firms during the recovery, including national surveys conducted by the National Federation of Independent Businesses (NFIB) and regional surveys led by the Federal Reserve (Mills & Brayden, 2013).

Access to credit is a catalyst to the growth of Small and Medium Technology Businesses which require the financial input to undergo the take-off stage and accelerate their production and provision of services. According to the *Office of Advocacy U.S (2016)*, the growth and survival of U.S. Small businesses depends on how depository lending institutions and other financial intermediaries are attending to the credit needs of small firms. The financing and credit needs of small firms vary by business size, type of lender, business owner, and age of the business.

Thus, all these components among others tend to contribute to the challenges small firms face when seeking access to credit.

The gross domestic product on any nation is highly dependent on the productivity and growth of SMEs in the Country. Therefore, the Small businesses are important to the national and local economy, but their existence depends on their ability to access credit. In the United States, Institutional depository lenders play a major role as suppliers of credit to small firms and have a key role in supporting the growth of these firms. For this reason, it is important for the authorities to create a conducive environment to promote the ease of credit access to SMTBs by making the appraisal process frictionless and reducing the bottlenecks faced by the SMTBs.

According to Rageb et al (2018), access to finance is one of the greatest obstacles facing SMEs all over the world. This research is vital as it presents new approaches that can be adopted by the credit decision makers in financial institutions for evaluating SGTBs. The purpose of this study is to provide better credit valuation criteria for tech companies. Approximately 70% of SMEs in developing markets lack access to finance markets and it is difficult to survive or scale. The reason behind this is that SMEs lack credit history, business transactions, financial performance, even with no official documents to trace and yet banks depend more on credit history, employee's efficiency and experience for enterprise assessment in the lending process.

The 5C's of Credit Analysis

According to Mills and Brayden (2013), credit analysis is the process of drawing conclusions from the available data both quantitative and qualitative regarding the credit worthiness of an entity and making recommendations about perceived risks and needs. The 5C's is a popular traditional technique that combines 5 critical factors into one indicator, character, collateral, capacity, capital and conditions. Credit assessment officers in many countries like Kenya, India, Jordan, Tanzania, Ghana, Lebanon, and Egypt use the 5Cs to inspect the reliability of the borrower. Inadequate assets to collateralize the loan makes credit worthiness of SGTBs difficult. This then leads to a myriad of questions; what are the key challenges that banks, financial institutions and leasing companies face when it comes to credit scoring? How do they do it and what pain points are they facing? How do we know who is credit worthy and who is not? What is AI based credit scoring model and what is a traditional credit scoring model?

The first C of credit analysis is used in reference to the character of the borrower. This is used to gauge the aspects of the reputation of the borrower and how well the borrower's conduct has been in repaying previous debts advanced to him. The track record of the borrower is relied upon to forecast a potential possible credit behavior of the borrower. The lender forms a very subjective opinion about the trustworthiness of the entity's ability to repay the loan. The general impression of the borrower is analyzed by looking at the experience level, market opinion, background and various other sources to obtain qualitative data used for final decision making.

Collateral is the second C of credit analysis, the assets that are given by the borrower to the lender as security for the loans. To appropriate the loan in case it is not paid, the borrower is supposed to provide a form of security to the lender. Additionally, the borrower also provides a guarantor (family or friends) to repay the loan if the borrower fails to repay. Collateral and guarantees used to mitigate default risk might be hard for SMEs without widgets or tangible assets as collateral.

Capacity being the third C of credit management measures the borrower's ability to repay a loan by comparing income against recurring debts. It refers to the ability of the borrower to service the loan from the profit generated by the investment. The lenders will calculate how the loan repayment process will take place and the cash flows from the business as well as the probability of success of the loan repayment. This ability is also measured by comparing the income of the borrower considering all income streams and the recurring debts of the borrower. This leads to the determination of the borrower's debt to income ratio. If the ratio is too high, the lenders are reluctant to advance new loans while others request for additional collateral which may disadvantage SMTBs.

The fourth C of credit analysis is an indicative parameter of the borrower's commitment to an investment. It is believed that it is difficult for a borrower who has high interest in an investment to default. The interest is measured by the amount of capital outlay contributed by the borrower compared to the borrowed funds. Capital is the proof of the borrower's commitment to the business. It shows how much the borrower is at risk if the business fails. A high proportion of owners' equity to his business strengthens the trust of the borrower to the lender because it shows that the borrowers have committed their own funds before asking for any funds. It also plays an important role in negotiating for interest rates to be charged, repayment period and grace period taken before commencement of repayment.

Conditions is the fifth C of Credit Analysis which refer to the terms under which the loan is approved, reasons for approval could be inventory, equipment or even working capital. The term is used to refer to how a borrower intends to make use of the borrowed funds. Some of these include interest rate which denotes the cost of borrowed funds, principal monies borrowed and the influence the lender's desire to finance the borrower. A loan applied for a specific purpose is more likely to be approved than a loan whose purpose is not stated. Lending institutions consider other macro-economic factors outside the control of the borrower like the prevailing economic conditions, the state of the economy and the trends in a certain industry. In Kenya, some conditions are as brought about by legislative changes. For instance, the capping of interest rates where the banks are not required to charge above 14% is a condition that lenders have to consider.

Besides the 5C's Financial institutions also look at the business model of the tech company in question. to give a snapshot of how tech company business models look like, most of them operate on project-based models. However, the lender is interested to find out how the revenue flows into the company, whether in phases or lump sum, where they buy their products, how they sell the products? Is it wholesale, or even credit based?

Proper credit analysis is key in this process where the lender focuses on the available data whether qualitative or quantitative in order to draw accurate conclusions regarding the credit worthiness of the entity. Traditional credit scoring models have been used for quite some time, but they are cumbersome to maintain. The reason is that a credit scoring model with no AI will keep adding rules as new trends appear meaning that it is not scalable. For example, when you deploy a system and it becomes operational, there are rules that govern how that system works. When new trends appear, a new set of rules needs to be drafted and updated into the system. This continues until you can no longer control, and it becomes cumbersome over time because too much data is captured every day in real time. This means that there will reach a time when nobody knows how well the system uses the set rules and whether they work or not. This is the situation in many legacy systems in place and we can consider them as extinct just as the

“dinosaurs” in the big data world which is summed up pretty well by the 7 Vs of Volume, Velocity, Variety, Variability, Veracity, Visualization, and Value. Sooner we will reach a point where no one knows which rule contributes to success or failure in the rule-based system. This is quite interesting because many banks are using the rule-based systems.

How then does AI based model deal with new trends? How does it know which rule to apply and which not to apply? A human based AI credit-based model is a mathematical model created based on the historical data. Machines will look at data which are the facts and come up with the rules whereas humans make those rules based on experience, history, and maybe the data. Therefore, ML model is a self-learning and a scalable model that is easy to maintain and continuously learning from new data, meaning that as the data is fed into the model, it keeps learning attaining higher levels of accuracy to predict with certainty. The other advantage of the AI based model is that it's very easy to track its performance and it can easily detect highly complex relationships from the data. In case of failure, one can easily back test the historical data and see where the model is working or not.

Information Asymmetry

Also referred to as ‘information failure,’ Information Asymmetry occurs when a party to an economic transaction is in possession of a superior material knowledge than the other party. Characteristically, it comes into revelation when a seller of a product or a service holds greater knowledge than the buyer; however, it is also possible to have the reverse dynamic. It is empirically clear that parties to a transaction possess different information and the information they possess affects their behavior in many situations. In the credit sector, many at times it is the borrower who has less information and in other instances, the information he has is not the same depth about the quality loans and their terms as the lender. Little information exists about the performance of SGTBs. The reason behind this is that SMEs do not publicly issue trade equity or debt securities. As Mills and Brayden (2013) indicate, many of these businesses lack updated and detailed balance sheets since they use sparse tax returns and keep inadequate income statements using proprietary risk scoring models.

According to Njoroge & Rotich (2016) Defaulters thrived in the information asymmetry environment that prevailed due to lack of a Credit Information Sharing mechanism and escalated non-performing loans. Non-performing loans have a direct effect in increasing the cost of lending and high collateral requirements Savings and Credit Cooperative Societies (Saccos) have recently faced many challenges among them misappropriation of funds and high default rates. This can be attributed to customers who were taking advantage of the information asymmetry in Saccos since Saccos were not sharing their credit information like banks.

However, this is not the case when it comes to lending to SMTBs since most of them have no borrowing history. Therefore, the reports from CRBs may not be useful in determining how well the potential borrower has serviced previous loans. As a result, the current mechanism of Credit Information Sharing can be said to be discriminative of SMTBs because its rating gives high weights to credit history. Further, it is important for the banks to disclose full information to SMTBs so that they can make decisions for credit uptake with relevant information thus minimizing the information asymmetry gap.

Study Findings and Discussions

Bank Appraisal Practices

Different financial institutions use several appraisal procedures to determine the value of a company, loan or whatever is being appraised. This process may differ from one bank to another depending on the credit risk appetite of the Bank.

Asset Base

Asset base refers to the assets owned by a company giving it value. This value is not fixed and might change as the company sells and buys new assets. This is the commonly used approach by financial institutions to evaluate companies that hold both tangible and intangible assets making it applicable to both asset holding companies and asset operating companies.

Credit History

Credit history is a record of a borrowers' (individual or institutional) ability to pay back debts, obligations and it is demonstrated responsibility in repaying debts. In borrowers' credit report, the credit history shows how the borrower has handled funds in the past and can be used to predict the financial future as mirror of a financial past of an individual borrower on institutional borrower. Osoro et al. (2016) studied the Credit Reference Bureaus (CRB) as a strategic control measure and its influence on the financial performance of commercial banks and found that there is a relationship between credit referencing in search of credit history and performance of the banks. This means that the credit history is given a lot of weight when making a decision on whether to approve loans or not by the financial institutions.

A consumer's credit report that summaries his credit history has a number of parameters including: The number and types of credit accounts that the borrower has, the period in which each account has been operated, Amounts owed, Amount of available credit used, Whether bills are paid on time, Number of recent credit inquiries, and the level of Non-performing Loans (NPLs) in the banks and other financial institutions. Further, it may also include information like how promptly one has paid off credit cards and loans and how reliably a borrower has paid other bills, like rent and utilities. A borrowers' credit history also contains information regarding whether a company or individual has any bankruptcies, liens, judgments, or collections.

From the credit history the borrowing institution or individual borrower, a credit score is a statistical number that evaluates a consumer's creditworthiness is developed. Financial institutions use these credit scores to evaluate the probability that an individual will repay his or her debts and can determine the level of trustworthiness of a person or corporate borrower in serving debts. These credit scores are generated by the Credit Reference Bureaus (CRBs) and are relied upon by lenders to determine risk levels of the borrower. In the United States, a Credit Reference Agency or Credit Bureau is a Credit Reporting Agency, an organization that collects and collates personal financial data on individuals, from financial institutions with which they have a relationship with. According to Njoroge and Rotich (2016), the data is aggregated and the resulting information in the form of credit reports is made available upon request to contributing companies for the purposes of credit assessment and rating

Potential creditors use the information in a consumer's credit history to decide whether to extend credit to that consumer. When creditors review an applicant's credit history in order to determine whether or not finance to them, recent activity is not the only factor being assessed. The length of time that credit accounts have been open and active is also taken into

consideration. Previous studies have indicated that there is an inverse relationship between numbers of credit checks done by the banks and the quality of debt portfolio in the banks as measured by the Portfolio at Risk (PAR).

However, the reliance of credit score which is based on the credit history of the borrower is a big blow to Small and Medium Technology Businesses since most of them have not been in existence for long. Others have no borrowing history that can be relied on produce credit scores used in the traditional rating process by the financial institutions. As a result, potential borrowers who have no credit history, for example, college-age young adults, starting businesses and SMTBs may have difficulty being accepted for substantial financing. In this traditional rating process, it is believed that the credit history of the borrower demonstrates how well they can manage their credit on a limited scale before taking on larger amounts of debt.

According to the Office of Advocacy U.S (2016), non-depository institutions have become another option for borrowers with less stellar credit. Non-depository institutions continued to provide financing to small business borrowers, who have difficulty obtaining credit from traditional lenders due to weak credit scores and inadequate credit history. Nevertheless, approval rates from these lenders have declined or remained flat compared to traditional lenders in the recent past. The most affected are the Small and Medium Technology Businesses who require financing to enhance their product offering. Ayieni (2014) indicated that the majority of the population are locked out of the formal financial sector due to the many strict requirements and stringent conditions required by the banks for one to open an account or access credit because their information is not captured.

Some financial institutions segment borrowers by credit history and offer lower rates to borrowers with good credit history (Michelle, 2019). Although many lenders have heavily relied on the use of credit history and the credit scores, it is worth noting that the decision to use a particular model or method depends heavily on the nature and availability of information from the business environment such as financial statements, a borrower's credit and payment history and news reports. As Karim (2019) notes, as such, the value of these models and their effectiveness can be limited by the availability of quality data which can be used to assess performance outcomes and implications. Hence, there is a need to make use of a different model to achieve the much-needed effectiveness when scoring SMTBs for credit advancement as opposed to the traditional method that makes over reliance on the credit history.

Cash Flows

Cashflows is the money coming in and out of the business that keeps the business afloat. Sometimes it may seem like its flowing in one direction, but it always flows in both directions. As part of credit appraisal, financial appraisal involves extensive analysis of cash flow and the account turn over before the loan award. In some financial institutions, the accounting ratios are carried out to test the fitness of a company. For instance, based on the cash flow of a company, correct ratio is used to test the ability of the company to meet its short-term obligations. This has been traditionally used by banks to evaluate the liquidity of borrowers.

However, this traditional method can be disadvantaging to SMTBs especially in instances where the cash flow is expected to be consistent. Most SMTBs may not have a monthly flow of cash in the account owing to the nature of projects these tech companies undertake. Some are paid after completion of a project which may take months to complete. This makes the

appraisal process of SMTBs difficult where the banks demand consistency of monthly cash flow as a requisite for advancing credit.

Further, most tech companies may not have sales or any customers who pay regularly due to the nature of the projects undertaken. Most IT projects are executed in phases and revenue flows in after project milestones are executed. IT projects are undertaken for clients whereby some of the clients have signed agreements for them to make payments in a lump sum after the handing over of a project bearing in mind that some enormous projects may take years to complete. Lending institutions should focus on evaluating the creditworthiness of SMTBs based on future expected stream of cash flows. They should adopt a project-based appraisal approach to these tech companies as opposed to the classical appraisal methods that rule their possibility of accessing credit.

Guarantors

In credit application process, a guarantor gives a promise to pay a borrower's debt in the event that the borrower fails to meet his debt obligation hence falling into the default category. A guarantor acts as a co-borrower because he is liable in the event of default. Guarantors are secondary borrowers and therefore their credit rating should also be high. A potential borrower whose guarantors are in default is a risky borrower. In her study on the strategies used to reduce default in student loans, Engede (2015) conclude that the use of guarantors has led to reduced default rates. A wide range of measures to reduce repayment default are available for use in various loans schemes. These include the use of loan guarantors, moral persuasion, barring access to further credit if in default and legal action against recalcitrant defaulters (Engede, 2015).

A guarantor will agree to co-sign the loan agreement and commit to pay in case the borrower defaults on agreed repayments. The bank seeks collateral from the guarantor and the collateral is a formal document stating that the guarantor steps in on behalf of the borrower for a certain percentage of the requested credit or loan. The guarantor is therefore expected to have a reasonable asset base, collateral, Character and ability in reference to the loan being applied. Most SMTBs are started by young entrepreneurs and innovators whose assets may be inadequate to guarantee their company as required by the banks. This alone is enough to deny the SMTBs access to the credit facility hence retarded growth of most of the SMTBs.

Accounting and Bookkeeping

Lenders prefer to lend to companies that are organized in their way of bookkeeping. Are the books accessible in case the lender wants to audit the company's financial records? The lender is interested to know whether the funds are used for the intended purpose or not and the bank is interested to know the current status of the business whereby they track the loan impact on the business using their monitoring period which 3 months for most banks. SMEs do not usually have proper bookkeeping, so during their credit valuation, the lender will impose them to certain conditions. For instance, for expenditure out the loan, the lender expects proper documentation detailing what the funds have been used for.

Company Management and Experience

The company management expertise and the business model are key. Do the leaders of the business understand the model of their business? Academic papers may be required to back up the management expertise or even question the managers to see whether they understand the company business model. The bank is interested to see whether the management understands

the business key areas that require funding and whether they perform proper market analysis to determine their most profitable customer segments.

Industry Analysis on Risky Sectors like Mining

Banks are interested to know the market trends (opportunities and challenges) and the current business strategies in place to outdo the existing challenges while leveraging on the opportunities to generate more revenue. Which sector the business is in and the risks associated with that sector, challenges facing the sector, the target market whether local or international? Where does the company get its raw materials to make their products? This is because most consumer companies make their revenue from the products. What is the price of the products? Under industry analysis, the lender wants to see if the business is legally accepted.

Current Developments in the Company

Is the company introducing a new product to the market? Or is it pursuing a merger with a bigger company? what are the ongoing projects in the company? Is there a change in management? In case of a new management, will the business model change? Will the contact person change especially the finance director?

Discussions

African banks are facing challenges on the implementation of appropriate models to evaluate credit worthiness. We discuss these challenges as follows:

Big Data

Data collection, storage, and support are integral parts to the development of a successful credit scoring model that is robust enough to handle intensive system stress levels in cases of voluminous data. With the onset of IoT and iIoT, there is an increase in the number of interconnected devices collecting terabytes of transactional data, credit repayments, and other customer behavior related data used to determine the probability of issuing a loan.

Evolving Market Trends

It is difficult to implement changes to existing systems which have been hard coded. In case there are changing parameters in the customer data for example, changes are made in the code instead of setting the systems to accept different variables.

Legacy IT Systems

Existing IT systems are not mature enough to allow fuller integration into the application processes. Existing database designs were not designed with the ability to scale and house huge datasets. Additionally, the core banking systems cannot evolve as fast as other industries due to the sensitivity of data that banks handle. For instance, if a bank decides to change their core banking system, they cannot leapfrog and pass over to the current banking technology due to the risks associated with such a move. This makes their evolution slow compared to other sectors.

New Target Markets and New Products

Technology businesses develop disruptive products geared to newer customer segments and market. This means that, the adoption rate is hard to predict, making it hard to assess the level of risk associated with new products and markets.

De-centralized Databases

Scattered databases make it hard to develop a credit scoring model. Data in those databases is unclean and not integrated. To integrate these DBs, banks need to invest in the tools and skills required to develop such models.

Recommendations

There are a broad range of alternative models emerging in the finance sector especially in the small business credit valuation segment:

We recommend innovative use of technology and big data analytics which is among the current trends disrupting all sectors in the world today. We are at the verge of the 4th industrial revolution also known as **Industry 4.0** where people, processes, and machines are interconnected. The extra layer of intelligence in the mode of operation means that things have taken a paradigm shift making the future of most SGTBs transparent. With this in mind, financial lending decision should be informed by predictive modelling and data aggregation to assess the health of a business. Development of an end-to-end credit assessment platform with a credit scoring model accessible to allow borrowers know the factors the lender looks at in order to align themselves accordingly. Firmographic is a less predictive measure to a tech firm's performance because risk does not correlate to revenue and profit level. Most SGTBs are small in size, age as well as customer but their revenues are on the higher side as opposed to consumer startups with impressive credit history. In this era of industry 4.0, we recommend the use of predictive AI algorithms to predict creditworthiness through alternative credit scoring in order to fill the technology void left by many banks and push innovation within the banking sector in the same ways that other sectors changed. This will potentially expand the marketplace to cover millions of unmet financial needs of small businesses with no credit data.

Banks need to get the big volumes of data required to build appropriate AI based models in order to better the way they perform the lending business. This shall indeed boost transparency in financial reporting and the banks' ability to do business with investors.

Recommendations for Further Research

Future work can be done on an appraisal tool -VI rich Credit Appraisal Model whereby weights are allocated to various variables that are considered during credit appraisal in order to have a fair if not a fit for all model.

Staying competitive in the future will depend greatly on the decisions banks make today because the events of the past few years have shown the price that they might have to pay for poor strategic decisions or from the adoption of similar business models in the retail banking industry. Today's demand of banking is anytime, anywhere banking which requires innovative and robust, secure, optimized, and ready to meet the expectations of empowered and tech savvy customers (Sumit, 2014).

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