A mathematical analysis of corporate reputation and SME financing

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Purpose: The objective of this paper is to understand the impact on SMEs' reputation on its candidature of seeking funds from financial institutions. This mathematical study explores the relationship between corporation's market reputation and its impact on alleviating constraints in accessing finance. In this manner, SMEs ought to take activities to fabricate low repute to determine financing challenges. This paper has also analysed the significance of entrepreneur's reputation and its influence on building corporation's repute.

Methodology: The methodology adopted for this research is based on mathematical simulations. The basic mathematical model is built on assumptions which were extracted from specific industry of SMEs and their access to start up financing situations.

Findings: The results demonstrate that entrepreneur's market reputation has a huge impact on firm financing actions. As such, business individual's low repute prompts lower financing imperatives. Results showed that second round of financing for project in start-up firm got influenced positively by the instant revenue been generated by the firm and built up positive reputation of the business i.e., $F^{*} < F$, where F denotes the first round of financing and F^* is the funds renewed after first cycle of project completion.

Research implications: This study has a noteworthy effect in helping managers and investors to understand the vitality and significance of building and maintaining high corporate's reputation or brand image in capital market.

Originality: This manuscript is original and not has been submitted or published at any publisher or conference.

Methodological limitation: Findings are limited to use of simulation methodology.

Limitation of Scale and Scope: The study is limited to the sector of SMEs working on income enrichment.

Future research: Future research can be done by the use of other methodologies that would further enhance the scope of study.

Keywords: Small and medium sized enterprises (SMEs), Financing, Corporate reputation, Mathematical model

Article classification: G20, G30, G32, M14, C63

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1. Introduction

Ever since the beginning, business sector expands development of SMEs'. Financial organizations and banks assumed vital part in funding those sectors. Still there are number of reasons that are hampering the growth of this sector and among all those reasons, enterprise's reputation also has a huge impact on investment decision making or accessing financial support from bank or financial institutions. Today, one of the forces speeding up corporate reputation's quality to firms is the vast requirement for capital. In various events financial professionals admits that reputation coveys' significant information about the profit and long term capability of an organization (Shanley & Fombrun, 1990). Chajet believes that the reputation of a firm progressively influence its bid as a financing decision (Chajet, 1997).

While this paper further discussed that SMEs plays vital role in economic development but financial institutions and financial markets inability to provide required support slowing down their growth. Numerous studies have explored the major reasons for SMEs not flourishing as expected is the access of sufficient finance, the studies also explored the key question that how to improve the status of SMEs in order to make better platform for financial support and what new entrepreneurial plans needs to be considered? Small and medium sized enterprises are more unfortunate in terms of financial support than larger firms. In other words the smaller the size of the firm the less likely they will get financial sources to look up to. Also SME needs both internal and external financing at different stages of development. (Majluf, 1984) Believe that internal and external financing can replace each other and their costs are different and the degree of constraints and the information asymmetry has the positive correlation. Although perfect capital market does not exist in the real world because lack of symmetrical information, agency problems and transaction costs but improving the information asymmetry would definitely make the provision of finance easier.

Later in the related literature along with documenting importance of symmetrical information, other number of reasons which makes it harder for the firms to get debt financing from financial institutions has also been discussed. (Berger, 1995) showed that smaller firms when get credit from banks usually have short banking relationship and gets credit with higher interest rates as compared to lager established firms and are much likely to be required to pledge collateral. (Stiglitz, 1981) Found that poor documentation and asymmetric information prevents banks from supporting SMEs financially deprived because banks need proper documentation and historical record and collateral to pledge before lending money to any business. Furthermore, conclusion by (Levy.B, 1993), the reason of SMEs slow growth is the reason of restricted financial support and services.

Yet, another angle to consider while exploring reasons for SMEs restriction to credit is a firms' reputation in market. Negative historical record of any company and absence of collateral wears down enterprise's reputation. Bad reputation of SMEs' is not favourable for accessing external financing from a formal source. In subsequent literature this paper enlightens the standpoint of how a good or bad reputation can affect SMEs to progress and survive in long run and how important it is to build a corporate reputation in order to get access to financial avenues for credit support.

1.1 Problem discussion:

The principle issue of the small scale businesses is the trouble for access to finance which is needed for running a smooth business. Finance is important to give machinery, change in the foundation of the firm, buy modest raw material, and enter marketing and sales. The absence of market image due to newly established enterprise, challenge in capital provision on delicate terms and conditions by investors for running a unit or survive are not in favour of small scale businesses.

1.2 Problem Formulation and Purpose:

This paper explores the impact of corporate reputation on financial support and how business owner's and workers' high level effective effort help building that reputation.

1.3 Objective:

The objective of this paper is to understand the impact on SMEs' reputation on its candidature of seeking funds from financial institutions.

1.4 Research Questions

Can the corporate reputation be the effective influence for the SMEs when dealing with issues of financial services from investors?

Hence, the explanations behind SMEs' challenges of raising financing formally from the perspective of corporate reputation by creating mathematical models has been analysed.

2. Literature

In general the small firms usually generate finance or capital by personal savings or informal sources; whereas debt financing is provided by the major financial source of economy, banks. Consistent with (Aristeidis & Dimitris, 2005), 12% of firms see finance as major constraints than those 19% of firms who gets loans from banks in east European countries. However getting credit from bank is not always accessible for the small and medium sized firms; it also does not satisfy the financial requirements of these firms due to limited volume of credit.

This study addresses the impact of corporate reputation of SMEs in order to find external financing from formal banks and financial institutes. There certainly are other informal financing avenues which can be considered for future research examination. According to the (Bari, et al., 2003), the main source of informal capital for SMEs can be owners' capital considered as "Seed Financing". It is used when external financing options are limited and considered as a primary source for start-up (Alicia, et al., 2012). Nevertheless, banks as a major source of financing for the start-up firms are the most well-known source of money after owner's capital. Banks are financial institute that gives support to all kind of firms independent of their size. Some other avenues are relationship lending, angel investors; venture capital is also been considered as an alternative, and leasing. It is an alternate formal sort of external financing choice close to trade credit. It may be observed that small start-up firms normally don't use the alternative of renting back unevenly as compared to larger firms. Further in the literature the main focus is over the most acknowledged and established source of financing such as formal banking channel and exploring the reasons why banks are reluctant to invest in SMEs or lending money to start ups.

Traditionally the business banks work as the custodian of the country's money circulation structure that practices among business sectors. This sector is scarcely the most developed reproducing area for the level of improvement and of risk taking that is required for the development of SMEs. For the accomplishment of adequate lending of money and the financial products to the SME division, there ought to be more financial suppliers that are eager to take risks and be more inventive. Access to credit supplied by non-bank financial intermediaries, (for example, retailers and micro-banks) is also a vital source of account for SMEs. Generally enhanced financial divisions with sound banks and in addition non-banking financial intermediaries (NBFIs) are necessary to support to greater job creation, increase economic growth, and better standard of living. Banks and NBFIs are both key components of a solid and stable money related framework that compliments one another and offer collaborations. While banks support the liquidity rule in managing an account, the non-bank financial organisations must match their credits against their store profile. But inspite of the sources available SMEs are still deprived of finance to flourish. The issue of restricted financial excess to SMEs is not only in developing countries. According to the recent survey conducted by World Business Environment in which 54 countries including 4000 firms has been facing the issues of limited financial access and this unviability is a major factor in restricting growth of this factor. SMEs are categorised by data inequality, the debtors' exploration cause, data attainment and processing rates more than the returns. (Husain, 2005)

Most of the financial institutions are reluctant to invest in SME by providing them financial access due to setback with weak or negative historical record and not an attractive reputation in the market which restricts the provision loan requirements by SMEs. Banks are deficient in skills to categorize needs and structuring the provision of financial support to SMEs. Also poor documentation by SMEs, narrow information of financing options for SMEs and lengthy and difficult procedure for loan application to follow is also an issue (Policy and Planning, 2005). (MacGregor, et al., 2000), claimed that an affective evaluation and strong reputation of SME makes huge impact on investment decision of buyer in each initial public offering. According to (Brown, 1998), bad reputation firms signals the buyers that the firm is vulnerable to perform badly in shares and if the disaster hits the firm than there will not be much public support to the firm to deal with it.

SMEs are the significant provider to the financial improvement in economy. Because of un-archived economy and absence of data, information is not effortlessly accessible to weigh the patterns in SME financing. Now-a-days SME financing is a significant issue (Hamid & Abaidullah, 2006). Money is important to buy machinery, change in the foundation of the firm, buy modest raw material, and enters into marketing and sales. The absence of own financial assets, challenge in credit chances on delicate terms and conditions for running a unit or to survive will not be in favour of small scale businesses. Those enterprises who neglected to get loans did not have their own particular money related assets or have strong reputation in the market with positive historical performance background. Also they are unable to furnish money related necessities consistent with the need and extension of their business. Inspite of high risk and return prospects, firms with strong reputation profits from investors who are willing to pay more for their shares than those who have shares in less reputable firm (Larsen, 2002). Nonetheless, plus major money related issues, confronted by the small scale enterprises are; lack of government backing, lengthy and confused courses of action for bank credits and high stamp up on advances. Also heavy government imposes and complex charge principles and regulations, heavy duty and exorbitant utility bills, less capital for every labourer, inadequate access to financing organizations and high credit expenses owning to insufficient guarantee. It has been observed that limited financial access is because of the constraints on both entities' sides which are SMEs and financial institutions.

Financial access has been the major impediment to SMEs growth and development (Haq, et al., 2002). (Bank/SMEDA, 2003), commercial banks provided only 7%-8% of the total financial requirement of SMEs. A (Meghana & Thorsten, 2007), World Bank survey found that for 76 developing and developed countries, SMEs accounted for the largest number of companies and, in most countries, more than half of all non-agricultural employment and close to 60 percent of manufacturing employment. Still they don't have similar fractional access of funding from formal banking channels, due to the reasons stated earlier, therefore reasons of financial institutions' reluctance to lend credit to SMEs needs to be explored along with the possible corrective measures to build up corporate reputation of the SMEs to get financial support.

(Hunt, 1952) claimed that bad corporate reputation serves as an execution indicator, however, as well as can turn into a decision basis itself as individual speculators are not only intrigued by high profits or offer appreciation. The more stockholders there are; the more individuals will be sensitive to the bad reputation of the organizations in which they are contributing (Chajet, 1997). As (Stuart & Hanson, 2001) comment, shareholders may be intrigued by benefit yet they will likewise shares the disgrace and declining benefits connected with a collapsing corporate reputation which is currently progressively the subject of media and open scrutiny. A decent reputation permits it to charge premium costs, draw in better aspirants for its workforce, attract investors, and bring down its cost of capital, making it one of the enterprise's most significant tangible assets. According to signal theory, researchers found that reputation has effective signal transmission in terms of functionality which helps reducing the information asymmetry and would help both parties in investment transactions.

(Larsen, 2002), claim that organizations try to build their reputation basically for financial motives. The current literature on SMEs financing demonstrate that corporate reputation is one of the imperative elements affecting external financing access.

Methodology

This study intends to follow the interpretivism method of philosophy with the inductive approach and explicative strategy. Considering the fact that this study situation is unique including a particular fact of SMEs sector, the time horizon for developing the mathematical simulation falls under the cross sectional study due to the specific period of study design. Convenience sampling plan with probability has been used in this study and the data is based on mathematical simulations methodology and constructed the model.

This paper applies simulation on situation of access of finance by SMEs during financing stage and derives strategy to answer the question of the financing issues for SMEs and start-ups.

As going further, this paper tries to analyse the possible impact of business reputation or its owner's market image in seeking funds for starting a project.

Construction of a mathematical model

Assume a new firm (enterprise) consist of an owner (entrepreneur) and the human resource (workers). For starting any project in the new firm, an owner of the firm needs to have funds which are called "Financing stage". If owner has funds to invest than let's take it as I at the beginning, if funds are not sufficient to start the project than firm's owner needs to seek funds from external source i.e., commercial banks. After financing stage there is "Production Phase" in which there are two more stages, (stage 1) in which consuming the funds in hiring a workers as human resource and (stage 2) is by the help of those workers start utilising the assets on project implementation. At the "Outcome phase" enterprise may or may not be generating verifiable sufficient revenue. Revenue generation is influenced by a lot of different factors involved in the whole procedure of the project but here we are considering another important determinant in a success or failure of any project is corporate reputation or market image of the company. Since for any success or failure the sufficient financing plays a vital role which is significantly associated with the firm's reputation in market and owner's image for investors. The higher the firm's reputation in the market the lower the financing constraints they will be facing. (Schiff & Kennes, 2002), in their research believe that, any enterprises' reputation also dependent on the historical transactions information, so it is a vital aspect in search mechanism. According to research, enterprises with assets which are not easily accessible in market have competitive advantage over other firms which eventually gets better financial sustainability (Barney, 2001). Whereas there are SMEs' intangible assets like goodwill or market image or reputation of a business name is usually more challenging to compete with or analyse because of the replication factor.

Let's assume a project of the firm started with investment I generating a revenue and become a success $R>0$, or if it is a failure with negative income $R<0$. Here we are considering a probability scenario; project P which is dependent on the market reputation A. If the firms market reputation is strong than the probability of a project's success would be higher and vice versa so the probability will be function of market reputation i.e., $P= f(A)$, and $\partial P/\partial A > 0$ or fP> 0. Here the partial derivative is used to study one single dependent variable with independent variable. If graph is plotted it will be positive for one and negative for another half i.e., success and failure of the project.

Since the reputation of the enterprise in general is dependent on the high reputation of its owner and higher efforts their workers put in the business i.e., $A_h = f(H_o, H_e)$ where A_h represents the high market image based on high level efforts of owner denoted by H_o and employees H_e. Whereas low business image in market A_l can be write as $A_l = f(L_o, L_e)$. Subsequently as mentioned $A_h > A_l$ and $\partial P/\partial A > 0$, we can get $P(A_h) > P(A_l)$. Now another factor to consider before drawing a conclusion of project's success or failure is the cost incurred during the process for both the owner of the enterprise and the workers working on specific project i.e., on every stage c_o and c_e (quasi-rents share).

Considering all the variables we assume that the equation will becomes,

$$P(A_h)R - c_o - c_e - I > 0 \text{ and}$$

$$P(A_l)R - I < 0$$

That explains that if there will not be a sufficient effort put by the owner of the firm and the employee in a project and market reputation is not high than the investment contract will not be renewed and if that happens than both the workers and the owners will have to start working towards building a market repute. When project passed its initial phase till outcome the revenue it generates has the portion of investor as liability and for continuing the project till all debts be paid, firm will need more finance from the investor and for that reputation of the firm will make significant difference. Another point to elaborate here is, if the firm gets to renew the contract with its employees than there will be a wage to pay to every worker , denote as salary S , i.e., $P(A_h)R - c_o - I > S \geq c_e$. That will make owner income after (stage 2) is $R - S$ in case of project's success and $I + S$ in case of failure.

Supposedly owners does not have enough funds at the beginning after renewal of contract of employees and funds need to be raised by bank i.e., F, $F = I + S - OE$ by the commercial bank, where OE denotes the owners' equity. Considering that the efforts of owner and the employees at the first stage of project were high and project generated instant income, this will help in alleviating the financial constraint at (stage 2) and investors believe in the promise of future profits from this enterprise. Now in order to continue the financing provision, investor needs to make sure that the net income of the project would not be less than the disbursements *F*. let's suppose the net income for the project is $N - S$ in case of project's success and $- S$ in case of failure, the owner of the firm need to increase the level of efforts they put in project if, $[P(A_h) - P(A_l)]\, N \geq c_o$ or $N \geq \frac{co}{([P(Ah) - P(Al)])}$ than the investor will get $R - N$ in project's success and zero in case of failure. Thus only in the case where

$$P(A_h)\,[R - \frac{co}{P(Ah)-P(Al)}] \geq F \ldots\ldots\ldots\ldots\ldots\ldots\ (1)$$

the investor will be interested to renew the investment contract with the owner of the firm. Let's suppose $\Delta P(A) = P(A_h) - P(A_l)$, *since* $\frac{\partial P}{\partial A} > 0$ and $A_h > A_l$ so we can consider that $\Delta P(A)$ as the success probability of the project under the influence of higher market reputation of corporation. Subsequently $F = I + S - OE$ so we can get,

$$P(A_h)\,[R - \frac{co}{\Delta P(A)}] \geq I + S - OE \ldots\ldots\ldots\ldots\ldots\ldots\ (2)$$

Equation (2) explains that self-funding in early stage *OE*, the probability of increased reputation $\Delta P(A)$, and the revenue generation expectation *R* influence positively over the possible investment provision by the capital suppliers. Whereas the incurred cost c_o by the owner, investment *I* and the salary wages payment *S* to the workers impacts negatively on the external financing possibilities. If we hold the above equation with inequality than the expected net income for owner would be

$$P(A_h)\,[R - F] - S$$

where owner from project's revenue would pay funding share to the investor also the salary to the employees. If we apply the same logic as mentioned above the investor will be willing to provide financial support and renew the long term contract up to the value mentioned below without the threat of liquidation and short term contract of financing:

$$F^* = P(A_h)\,[R - \frac{co}{\Delta P(A)}] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (3)$$

Which shows that the amount of $F^* < F$. Hence the more constraint firms of financing will be able to raise more funds for long term.

Analysis of insufficient SME finances and reasons by using model results:

For enterprise's success there are many factors involved. With the help of the model results, equation (2) explains that the possible revenue generation *R* influence positively on the enterprise success though the revenue generation expectation is less in small and medium sized enterprises than the larger firms. So considering this fact it causes difficulty for the SMEs to generate adequate fund in order to compete in the market. Secondly in equation (2) it is also shown that the probability of success of a project $\Delta P(A)$ is associated with higher market reputation of the firm and its owner and it also has a significantly positive impact on the provision of finance from formal financial institutions. The higher the market reputation and corporate image of the firm the lesser constraints they need to face to raise funds. Thirdly, the investment by the owner capital *OE* in equation (2) tells that it has positive impact on the enterprise project but honesty speaking the new firms owned by entrepreneurs does not have enough capital to start working with or to invest so they need to raise funds by external sources which eventually need them to build a repute in market to get funds from formal external sources easily. Hence the firm owners and managers need to start thinking of building up an image to make financing their projects possible.

There are a lot of researches on SME financing talks about the idea of impact of market image of business on funds provision. Also the information asymmetry hinders the financing access. (Masahiko, 2001) also believes the entrepreneur information are hard to qualify and mostly used in decisions of business, like the past experience, skills, ability to mage the business and utilise the funds efficiently etc. The investors are only willing to invest in firms with a promise of positive future profits and that decision is mostly based on the entrepreneur reputation information. Promising reputation gives the idea of better management skills and ability to generate profits and eventually build up the market image of the business this is why it is considered as an intangible asset for companies.

Conclusion:

Entering into the challenging market and surviving is the utmost task for new firms with not a larger scale enterprise structure. For any SME start-up, owner of firm needs financing which can only be made available by the support of external financing along with the personal savings of the owner of the firm. Since smaller firms are usually started by entrepreneurs and they do not have a sufficient capital to start with so they need to make a competitive proposal to seek funds from commercial formal financial institutions.

This paper analysed the reasons mathematically by constructing a model in order to figure out the significant difference a business market reputation make in finance provision. Result shows that the reputation of the firm plays a vital role in accessing finance from external sources. (1) The reputation is an intangible asset and makes the firm investment worthy for long term. (2) Also if in the beginning of the project financing, owner and employees working under the owner put effective effort to build enterprise repute would help the business gets renewed financing contract and opens up possibilities to survive in the market for longer duration. (3) the impact of market reputation also tells us about the amount of funds business needs is also tricky for smaller firms because of asymmetry in information and unavailability of collateral which can also be overcome by building up a strong reputation of a firm's name in market so that investors are not considering investing in that firm a threat of failure but a good prospect for future profits. The whole paper is pointing out the market reputation of the firm along with the manager's reputation who is responsible for the business practice. Therefore SMEs should take into account the significance of building up the repute and meanwhile motivate the managers to take actions to manage long term relationships with investors.

Recommendation:

The discoveries of the study agree that there is a prominent challenge of SMEs has been compelled in their improvement on account of inadequate capital. Since the managers does not manage the complete risk of failure and work wholeheartedly to improve the business reputation in the market. Utilizing positive cash flows and organization trustworthiness or support in the business sector requirement should be acknowledged as proportionate to accepted prerequisite of guarantee/ mortgage property. Subsequently equation (2)

$$P\ (A_h)\ [R - \frac{co}{\Delta P(A)}] \geq I + S - OE$$

Explains that self-funding in early stage *OE*, the probability of increased reputation $\Delta P\ (A)$, and the revenue generation expectation *R* influence positively over the possible investment provision by the capital suppliers This will be particularly suitable for SMEs with track record of accomplishment.

In impact investors to take "sensible risks", we suggest that enterprises should make alliance with some incentives to investors incorporated in SME financing. This will urge others to contemplate the decision of progressing to this range. Furthermore banks (that are not into SME financing) could ponder setting up an SME division or area to give particular support to SMEs. Remarkably established SMEs' loan division could administer such unit in the bank.

Methodological limitation: Findings are limited to use of mathematical simulations methodology.

Limitation of Scale and Scope: The study is limited to the sector of SMEs industry.

Proposed area for future research:

This model can be extended by exploring the factor, if owner's efforts in a business project are not equal to the efforts of employees i.e., $H_o \neq H_e$

Future research can also be done by using other research methodologies with real facts and figures from the market, since this study is based on mathematical simulations and proposed future options of other research methods on the same business sector.

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