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INSTITUTE of SOCIAL SCIENCES

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MASTER'S THESIS

AN EMPRICAL STUDY ABOUT CREDIT RATING FOR SMALL AND MEDIUM SIZED ENTERPRISES

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TEXT OF OATH

I declare and honestly confirm that my study titled "An Empirical Study About Credit Rating for Small and Medium Sized Enterprises", and presented as Master's Thesis has been written without applying to any assistance inconsistent with scientific ethics and traditions and all sources I have benefited from are listed in bibliography and I have benefited from these sources by means of making references.

../../ 2016

Gökhan IŞIK

Signature

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ABSTRACT

Master Thesis

AN EMPRICAL STUDY ABOUT CREDIT RATING FOR SMALL AND MEDIUM SIZED ENTERPRISES

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Recently, the growing competition in the markets results as the increase of capital requirements. Especially in developing countries which have limited capital resources, SME's generally provide their capital needs via credits. Credit institutions use complex credit rating systems in order to evaluate increasing credit demands. Credit rating is a statistical method applied to measure the customer's credit worthiness.

The factors and the effect of these factors influence on credit rating differ for each credit institution according to their policies. Hence, this study aims to answer which factors have significance for the determination of credit rating score. For this purpose, a data set obtained from a credit institution which operates in a developing country is evaluated by application of multiple regression method. According to the obtained results, evaluation is made about policies that SME's should apply.

Keywords: Credit Rating, Credit Scoring, SME, Multiple Regression, Credit Facility Process, Credit Analysis

ÖZET

Yüksek Lisans

KOBİLER İÇİN KREDİ DERECELENDİRMESİ HAKKINDA AMPİRİK BİR ÇALIŞMA

Gökhan IŞIK

Yaşar Üniversitesi

Sosyal Bilimler Enstitüsü

İşletme Yüksek Lisans Programı

Günümüzde piyasalarda artan rekabet sonucu sermaye ihtiyacı da artış göstermektedir. Özellikle sermaye kaynağı sınırlı gelişmekte olan ülkelerde KOBİ'ler sermaye ihtiyaçlarını ağırlıklı olarak krediler aracılığıyla sağlamaktadır. Kredi kuruluşları artan kredi taleplerini daha detaylı değerlendirmek için kredi derecelendirme sistemlerini kullanmaktadır. Kredi derecelendirmesi müşterinin kredi değerliliğinin ölçülmesi için uygulanan istatistiksel bir metottur.

Her kredi kuruluşunun derecelendirme sistemini oluştururken kullandığı veriler ve bu verilerin kredi derecesini etkileme oranları o kuruluşun politikalarına göre farklılık gösterir. Bu nedenle, bu çalışma kredi derecesinin belirlenmesinde hangi faktörlerin önemi bulunduğunu cevaplamayı hedeflemektedir. Bu amaçla, gelişmekte olan ülkede faaliyet gösteren bir kredi kuruluşundan alınan data seti çoklu regresyon methodu uygulanarak incelenmiştir. Elde edilen sonuçlar doğrultusunda KOBİ'lerin uygulaması gereken politikaların değerlendirilmesi yapılmıştır.

Anahtar Kelimeler: Kredi Derecelendirme, Kredi Skorlaması, KOBİ, Çoklu Regresyon, Kredilendirme Süreci, Kredi Analizi

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ABBREVIATIONS

CD	Credit Decision
DEA	Data Envelopment Analysis
EFT	Electronic Funds Transfer
EU	European Union
IDR	Issuer Default Rating
KKB	Kurumsal Kayıt Bürosu
KOSGEB	Küçük ve Orta Ölçekli İşletmeleri Geliştirme ve Destekleme İdaresi Başkanlığı
OECD	Organization for Economic Co-operation and Development
PD	Probability of Default
ROE	Return on Equity
SME	Small and Medium Sized Enterprises
TBB	Türkiye Bankalar Birliği
T.C.	Türkiye Cumhuriyeti
TCMB	Türkiye Cumhuriyeti Merkez Bankası
TSE	Türk Standartları Enstitüsü
UK	United Kingdom
USA	United States of America
VAR	Value at Risk
WOE	Weight of Evidence

INTRODUCTION

In organization of a healthy economy, usage of the factors of production has a huge significance. The availability of these factors is different in each country according to their structure. In this sense, grouping the world countries in two groups as developed countries and developing countries can help categorizing the importance of factors of production.

As a significant factor of production, capital is more available in developed countries. On the other hand, in developing countries which relatively have unfair distribution of income, capital is the main requirement of economy. As a result of this situation, units of economy demands credit in order to continue their existence. Naturally, this credit demand constitutes a supply. However, capital is also a limited source like entire sources in the economy. Therefore, credit suppliers have to provide the contribution of this source in a systematic structure. Credit ratings and credit scoring models are the main systems used by credit institutions in order to categorize their customers. These models help using sources for more effective customers and managing credit process in a healthier way.

In a general point of view, individuals, small and medium sized enterprises (SME's), commercial firms, and corporate companies are the common units of economy which requires credit. Additionally, governments and also credit institutions require capital and they are in need of credit. In this study, due to higher capital requirements, SME companies are examined.

Credit rating is a statistical model which measures financial and non-financial performance of debitor. These financial and non-financial criteria used by the rating model differ for each credit institution according to their credit policies, marketing strategies, regulations, economical conjuncture etc. On the other hand, companies must be aware of these multiple criteria and importance degree of them in order to increase their performance and scoring note. Although there are various factors effecting scoring note, in this study an alternative rating model is criticized.

Hence the study aims to answer the following research question;

- Which financial or non-financial factors have significance for the determination of credit score?

The study consists of three chapters. Chapter 1 is *Credit Facility Process*. This chapter briefly explains the pre assessment process which is including first interview with the customer, required documents from customers, negative factors in gathering information process and intelligence. It also analyzes the evaluation of credit (credit analysis); detailed credit analysis based on country, sector and customer analysis, financial statements used in financial analysis, the preparation of financial statements for analysis (transfer and decontamination process), financial analysis and lastly tracking and liquidation process after credit usage.

Chapter 2 discusses the *Credit Rating Factors and Methodologies.* Credit rating factors, definition of rating, types of rating, the aim of rating application and benefits of rating are included. It is also consisting of the benefits of rating to both financial institutions and business. The chapter continuous with the credit rating methodologies. In this part, the analysis of country, industry and business risks are discussed. Additionally, four credit rating institutions' methodologies are examined; Moody's Investors Services Company, Standard and Poor's Company, Fitch Ratings Company and JCR Eurasia Ratings Company. In the next part, a credit rating form is given as a sample and an overview is made about SME's. As the last part of Chapter 2, literature review is performed.

Chapter 3 contains the *Model and Empirical Evaluation* part. In the first section of Chapter 3, the subject and purpose of the analysis is discussed. In the following part, the definitions of data set are made, the hypothesis' are explained and the limitations of the study are highlighted. After all definitions and limitations, the analysis is performed with the help of Multiple Linear Regression and the statistical results are discussed. Chapter 3 ends with the conclusion part.

CHAPTER 1

CREDIT FACILITY PROCESS

Credit facility process is a detailed analysis and includes variable documentation and information. In this process, the analyst requires a group of sources in order to make a right decision about assessment of credit and also to monitor and manage the operation. This chapter examines the details of pre assessment, evaluation, tracking and liquidation processes of credit.

1.1 PRE ASSESSMENT PROCESS

In an economy that has modern work sharing, function of credit supply of the credit institutions to the business is consisting of the distribution of resource to the business or the special customers in a reliable way. Credit assessment process is also an important function for crediting the projects which in really need of funding according to importance degree. In other words, it is important for expressing the optimum resource distribution in the national economy (Berk, 2001).

The credit facility process in the banks is defined as the entire time period and the transactions that have been made in that time period starting with the first intercourse with the customer which is desired to be credit, continues with payment of whole credits capital, interest, commission and releasing the warrants by making additional payments (or with the warranty deadline) and ends with the liquidity of relationship (Şakar, 2001). In the credit facility process, the banks take action of:

- Credit demand
- Gathering information and financial data of customer
- Configuration of credit
- Making loan available and monitoring (Özen, 2006).

Importance must be given to the flow of this process which is nested. Credits maturity's effect on risk of failure to pay can be a good instance about mutual dependance of this credit work flow beside last payments effect on approval or rejection in the future (Aras, 1996).

A credit facility process may show an alteration for different credit institutions according to their credit policies. However, a basic credit facility process

was defined by Şakar (2002) as; the process starts with customer demand and analyst starts gathering information. A credit proposal is prepared with the help of financial tracking, intelligence and financial analysis. This credit proposal is presented to the credit committee that includes various credit analysts in order to make a credit decision. If the credit is approved documentation, warranty, extension, credit tracking process, liquidation of risk and releasing warranty process starts. If the credit is rejected, it may be presented to Board of Directors in order to make a final decision. In addition to this, Board of Directors can also get involved to the process even if the credit is approved.

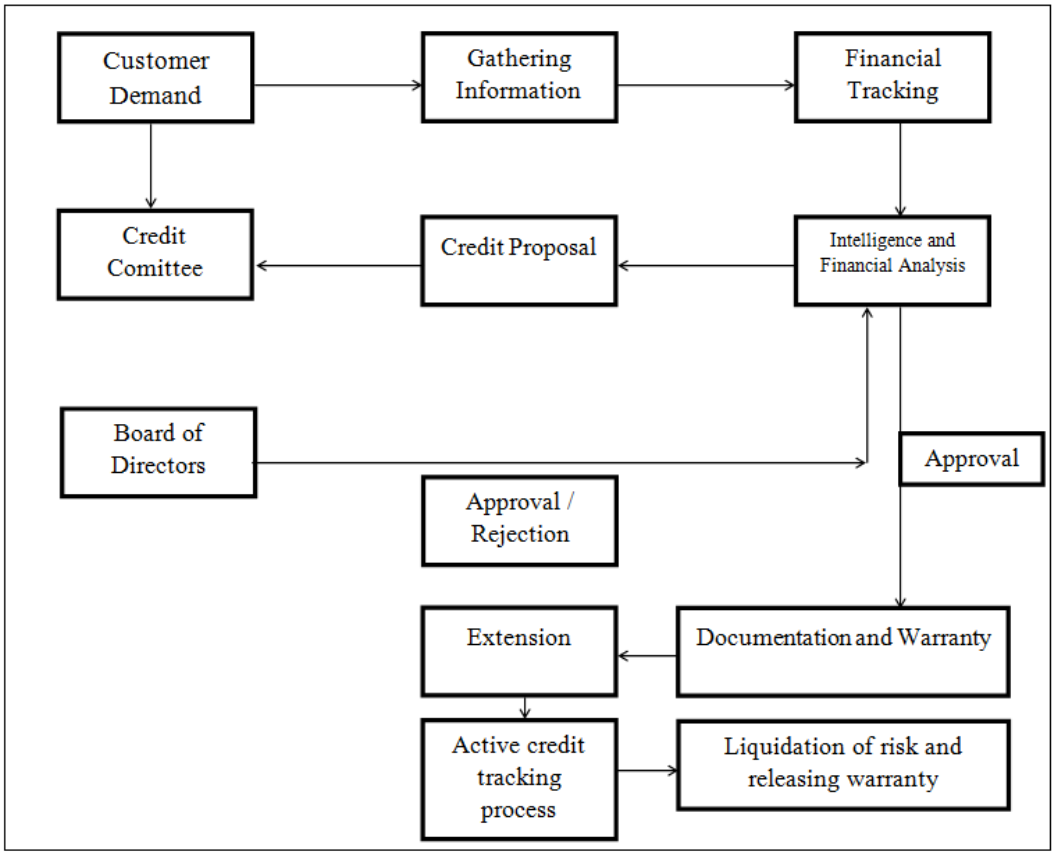

Figure 1: Credit Facility Process Schema (Şakar, 2002)

In the finance sector of Turkey likewise all world countries, the credit relation also starts by customer applying to the respective department or by the marketing attendant connecting to the customer in person and ends with putting out the credit payment plan's conditions. The credit relation is a process which is needed to be attentive to for both sides, because it contains risk for bank and interest expense factor for customer. In some cases, banks may reject the credit in the pre-interview stage, while in some cases; they may give up the credit relation even after the limit

allotment stage. Also in some situations, a customer may hinder the payments because he/she cannot be continuous on their income level and be exposed to legal proceedings (Görkem, 2005).

The recent global crisis increased the need of banks for a credit facility process which is powerful and balanced. Giving somebody a loan is a transaction that is controlled by the regulations. On the other hand, the mistakes which were made in the transaction of credit facility legitimated the huge investments for analyzing the credit facility process in different aspects (Davis, 1994).

The credit facility process starts with the credit demand and follows with the stages like analyzing, configuration and management stages in a rational line (Seval, 1990). In terms of operations that are made, the process can be segmented as follows (Şakar, 2001);

- The process of contacting with the new customer / The process of new credit interviews with the current customers,
- Gathering information about the credit facility operations,
- Financial analysis and intelligence / Process of research study,
- Rating process,
- Obtaining needed permission from the general directorate/ regional Office, process of limit facility,
- Agreement process,
- Documenting process and extension process,
- Monitoring process of active credits,
- Liquidation process of risk,
- Returning process of warrants,
- Cancellation process of credit.

The most substantial stage in the credit facility process which can protect the bank from the risk of credit is the financial analysis of the customer and credit monitoring process. Banks need to pursue the credit standing of the customer which was approved of giving a loan even after the financial analysis. In the time period between the assignment and return of credit, the credit standing of the customer may

change. Hence, the credit manager must check the credit customer's financial position regularly (Teker, 2006).

The credit application is usually made containing the purpose, amount and desired maturity. The credit application is usually supported by financial data which give information about customer's payback capacity and other non-financial information which enforces the credit application. In the credit application stage, the customer's credit standing is also investigated and evaluted in addition to the financial data. For instance, the customer's character, in other words, his/her desire to pay the debt back and his/her moral approach, the sector of the firm and market structure are examined. At this point, if credit manager detects that the aim of credit is contrarian to bank's credit policies he/she may reject the credit application. When he/she decides about continuing with the analysis, new additional information will be needed. The additional knowledge is closely depended to level of customer knowledge and sophistication of the application (Seval, 1990).

1.1.1 First Interview with the Customer

The credit facility process starts with the first interview with the customer. Interview is the first stage of the elimination process. At the end of the interview, credit manager decides on evaluating or not evaluating the credit application (Seval, 1990).

Interview is the most effective approach for gathering information about the personal qualifications, abilities and enterprise talents of the person or the firm managers in credit applications. By this way, the character of the applicant including honesty, knowledge level and approach standards can be observed. Interview plays a part in the first spot of resources for gathering information but it can cause subjective evaluations. The people's evaluations of other people may really drift with the tide of personal choices and tendencies, emotions, standards of judgment and the way of thinking. Because of this subject, when banks make interviews with the people or the high level managers of firms, they must be represented by multiple credit analysts. This is more suitable for having healthier outcome (Akgüç, 2006).

Paying visit to workplace of the customer can support making healthier decision on credit facility. By the visit, the following factors can be supplied (Linder, 1993):

- Determination of business' conditions and sufficiency,
- Determination of equipments condition,
- The workplace's locations suitability with the work,
- Gathering information about stocks quantity and quality,
- Examination of the debitors records,

Evaluating firms general conditions and works (Linder, 1993).

This process occurs with the transmission of credit application of firm which is in a need of fund to the bank, and as a result, bank managers visit to the firm. In the interview process, the credit applications suitability to the banks policies and the form of paying back is determined (Usta, 1994). On the other hand, the interview is not made only to the applicant firms. The bank also can have a visit for the pre-determined potential customers. The sources helping to decide on the credibility of the potential customers can be examined in two groups:

1.1.1.1 Intra-Branch Sources

- The drawers/debitors that are determined they have no problem about paying of large amount cheques/bills which were given for the collection
- The customers that makes large amount transfer and EFT
- Other firms which working with current customers
- The bearers of large amount cheques that have been drawn by the bank customers who are using cheque book

1.1.1.2 Over-Branch Sources

- Intelligence from current customers
- Industry and Commerce and Trade Associations publishes
- "The highest tax payers" list that been published by tax offices
- Tender advertisements (Sadık, 2001).

1.1.2 Required Documents from Customers

The information and documents that must be taken from customer during the visit and intelligence study are:

- Articles of Incorporation
- A Certificate of Authority matching with Articles of Incorporation
- Chamber Registration and Certificate of Registry for Association,
- Authorized Signatures List
- Trade Registry Gazettes (Initial capital expenditure)
- Tax Board
- Partners identity card photocopies
- Certified Public Accountant Reports (If available)
- Capacity Report (If available)
- Incentive reports (If available)
- TSE and other documents
- Distributorship Agreement (If there is a distributorship)
- Deed of real estate property photocopies (On firm and partners), Hypothec/pledge Documents, Insurance Policies, Partners Declarations of Property
- Central Bank of Turkey Information Return and Combined risk position
- Last 3 years Balance Sheets and Income Tables
- Last year’s trial balance
- Depreciation amounts that reduced from cost of sold goods
- In-group borrowing and lending amounts and In-group spread amounts (If there are group firms)
- Leasing Contracts
- Expertise
- Negative Information Reports (dud cheque/note renders)
- Contractor Card for Contracting Companies
- Activity Reports and Annual Bulletin (If available)
- Dividend Payment Table
- List of Participants
- Minutes of General Meeting

- Market Intelligence Bulletins (Organized for business and partners)

In Contracting companies these documents must be taken addition to list above:

- Last year's Merit Reports
- Last 5 years Completed Works Table
- Work in Progress Table
- Firms Equipment Pools Report (Oyakbank A.Ş., 2005).

During the information gathering process, the most dangerous situation to face is the information which is not true and reliable. The incorrect information which is taken in the beginning of the credit facility process effects the entire process and also the credit decision. Due to this reason, the Asymmetric Information Notion must be described.

1.1.3 Information Risk in Credit Facility Process

a) Asymmetric Information in Banks

Asymmetric information in banking can be described as the inequality of all information between the creditor and borrower. Asymmetric information states a situation in which the borrower is aware of all the risks and the yield of his/her project whereas the creditor only has knowledge of average risks and probable yield (Jaffe and Stiglitz, 1990). Thereby, asymmetric information refers to the information inequality between sides. Banks have less information than the borrower businesses about their projects to be carried out and about what they do as business. Asymmetric information in banks causes two main problems defined as Adverse Selection and Moral Hazard.

b) Adverse Selection

Adverse Selection is a problem which shows up before making the credit contract because of the situation of creditor cannot see all necessary characteristics of borrowers. Adverse Selection problem originates from hidden information which means one of the sides has more information than other (Stadler and Castrillo, 2001).

Borrowers may hide or show differently some of their negative characteristics that could prevent them from fund-raising. In such a situation, for instance entrepreneur has knowledge of his/her projects yield (hidden information), but the bank cannot have any information about the probable yield. Adverse selection can be described as banks selection of projects in poor quality instead of choosing well qualified business projects (Meza and Webb, 1987). The adverse selection problem is due to the existence of two types of firms which apply for a loan of fixed size. The two types of firms differ in their ability to repay the loan. The banks' problem is then to assess an applicant's ability to repay the credit. In the absence of self-selection or signaling devices, such as collateralization or credit rationing, banks have to rely on active monitoring when they decide on the firm's application (Broecker, 1997).

Adverse selection is the problem created by asymmetric information before the transaction occurs. Adverse selection in financial markets occurs when the potential borrowers who are the most likely to produce an undesirable (adverse) outcome—the bad credit risks—are the ones who most actively seek out a loan and are thus most likely to be selected. Because adverse selection makes it more likely that loans might be made to bad credit risks, lenders may decide not to make any loans even though there are good credit risks in the marketplace (Mishkin, 2009).

c) Moral Hazard

Moral hazard is the problem created by asymmetric information after the transaction occurs. Moral hazard in financial markets is the risk (hazard) that the borrower might engage in activities that are undesirable (immoral) from the lender's point of view, because they make it less likely that the loan will be paid back. Because moral hazard lowers the probability that the loan will be repaid, lenders may decide that they would rather not to make a loan (Mishkin, 2009). In order to describe moral hazard in a better way, an example from the credit markets can be given;

Let us assume firm X applied for loan to bank A for its project financing and bank found the project feasible and worth financing. Unless firm X uses the loan taken from bank a in payment of its loan debt to bank B out of the knowledge of bank A instead of using the credit in its projects financing, the moral hazard problem occurs.

Even the creditors are in full knowledge about if their loans may be used in risky areas or not, it is possible for debitors to show all behavior tendencies to increase the risk of the debt not to be paid. That behavior tendency occurs as the debitor prefers projects including high risk. The factor encouraging the debitor preferring the projects that have high yield and risk, is the liability of the firm to the creditor institution is limited with business' assets (Jaffe and Stiglitz, 1990).

Naturally, the debitor's characteristics and the projects they want to realize would not be expected to be fully free of problems. Nevertheless the debitors may think about getting high level of yield by exaggerating the positive sides of their projects. Therefore, confirming the real characteristics of the debitors by the third parties will not be possible or it will be costly (Leland and Pyle, 1977).

There is a strong connection between the behavior tendency showed by the creditor after taking the credit and the banks credit risk. For instance, the possibility to invest on the projects carrying high level of risk is higher for those who wants the credit immediately. The risky projects provide high yield when they are successful. On the other hand, high risk reduces the possibility of loan repayment. When the debitor obtain high yield when the risky project is successful, the creditor will only obtain the yield written on the credit contract. Therefore, the creditor must bear the loss when the project is unsuccessful (Mishkin, 2009)

In the moral hazard situation, bank prefers accrediting more trustable but limited number of creditors instead of losing the source it will credit. This situation prevents the financial system to work active. The market equilibrium deviates from it first best equilibrium (Müslümov, et al., 2003).

1.1.4 Intelligence

One of the most important actions during the credit facility process is the intelligence part. While making intelligence should not be adhered to limited resources, it should benefit from any source (Özen, 1998).

Lexical meaning of the intelligence is; news, information collection, research, investigation (Emlak Bankası, 1997).

On the other hand, in banking, intelligence has the meaning of gathering and evaluating information from various sources for either individuals or companies to identify correctly in terms of both moral and legal situations within the aim of determining the credit worthiness and decreasing the risk.

It is important that, a credit should be used safe, efficient, and fluid. The fluidity of the credit, efficiently and safely extension of the credit is possible with the recognition of business in credit demand (Çiloğlu, 1998). Aim of intelligence can be defined by Özen (2006) as;

- Determining if there is an objectionable situations or not for the credit process for the businesses who demand a credit, in terms of financial, legal, commercial morality and history. And while making this examination, market and economic conditions are taken into consideration,
- Continuous monitoring the status of credit customers and repayment ability,
- Collecting and evaluating the information of the companies which are reputable and have good morality and financial conditions and who have no credit relationship with the bank, but considering being a credit customer.

Banks need the intelligence in;

- Determination of the Firm's credit worthiness,
- Determination of the company place in the sector,
- The determination of the companies' morality,
- Investigation of the companies' managers knowledge, skills and experiences,
- Determination of actual use of the credit which is going to be allocated.

In general, the sources of the intelligence can be classified as qualitative and quantitative; however, basing a few sources and intelligence by limited sources is not a healthy approach. There are several sources, for the evaluation of the credit demands, which allow getting information about the morality of demanding credit, current financial strength, capital, the revenue-raising capacity. The most important of these sources are; private, official and semi-official sources (T.C. Ziraat Bankası A.Ş., 2003).

It is also possible to get information from the other traders, trade partners (the companies who have commercial relationship), debitors and the creditors about the

credit demander which is called *market intelligence.* However, since it may be influenced by the subjective factors like; a sense of friendship, as competition concerns, the information obtained in this way must be evaluated cautiously (Akgüç, 2006).

Banks should collect accurate, clean, and adequate data. Additionally, banks should determine data management policies and ensure the effective implementation of these policies. Data which is going to be use in risk measurement, must comply with the bank's operational area, structure and internal control environment and scale. Data collection process should be subject to the bank's internal control process. Processes for collecting data to be used in the risk measurement system should be established in written system and data on time, all the systemic and administrative measures, which are regarding the supplying data consistent, secure and on the right time, should be taken (Candan and Özün, 2006).

1.2 EVALUATION PROCESS

"An analysis of a company is initiated to determine whether the company qualifies as a potential customer. Information sources include management within the company and third parties such as other banks, the market, and credit institution reports. Evaluation of a borrower's creditworthiness focuses on the five Cs of credit; character, capacity, cash flow, collateral, and capital. A background check of a customer is conducted to assess (Citibank, 1996)

- Character
- Operations
- Management
- Strategy
- Industry as a whole
- Competitors of the company
- Prevailing business conditions".

Credit analysis – in the broadest sense, doesn't only include the process of evaluating the required information and factors to decide on the credit worthiness of the person or the company applying for a credit, but also the management of the

credit risks. Crisis management and the credits unpaid or outstand due to the borrowers' difficulty in repayment can also be included in this scope.

In credit analysis, not only the financial statements but also the previous, current and most importantly following years' results, all the factors that have impacted and will possibly impact on achieving the results should be reviewed. The essential target of the credit analysis is to define whether the credit applier has the capacity and willingness to repay the credit in accordance with the contract, and to decrease the credit risks. By means of credit analysis, credit risks of the demanded amount are tried to be determined. Not only the risk level of demanded credit is determined by the help of credit analysis, but also the financial status and movements, bank sources and credit policy of the credit customer are reviewed.

Banks are the financial advisors of the credit customers in one sense. Therefore especially the ones managing and directing the credit services of the banks and the credit analysts need to be trained on business finance (Akgüç, 2006).

The Concept of Financial Analysis: In the financial analysis process, the previous periods' performance and the forecasts for the following periods of the customer are reviewed and thus, the creditworthiness of the customer is tried to be determined. This analysis plays a fundamental role to determine all the required financing type and repayment sources (Seval, 1990).

Traditional tools of financial measurement used for credit evaluation are comparative financial statements, vertical percentages and ratio analysis. The other important points to consider in evaluating the financial analysis are the responsible and the structure of the analysis and the trustworthiness of the data used in analysis. In credit analysis (Çolak, 2005);

- Financial policies of the companies are evaluated,
- Potential growth and development possibilities are defined,
- The weakness of the company that are need to be developed or improved are defined,
- The financial sources needed by the company forecasted.

The process of credit facility and the process of credit evaluation are the two different concepts that need to be separated from each other. The process of credit

facility starts with finding the potential credit customer, providing the credit facilities, following the performance and ends up with the full redemption of the credit debt. However, the process of the credit evaluation is only one of those steps in which the approval or the decline for the application is decided.

Credit application evaluation consists of all the operations made for deciding on the creditworthiness of the natural or legal people / companies on credit demand. After reviewing the required information and documents, the result of the credit application is either positive or negative. There are some factors should be considered while evaluating the credibility of the company and making credit decision; (Çolak, 2005)

- Understand the features of the micro and macro environment of the business where the customer operates in,
- Defining the items of the working capital and the roles of those items within the operation cycle,
- Defining the market presences and competitive power of the customer,
- Defining the financial sources of the customer,
- Defining the role of the bank in being adequate for the financial needs of the customer,
- Defining the factors impacting the performance of the customer after analyzing the previous data and the control management of the customer on those factors,
- Determine how to change those factors by proforma analysis and forward forecasting methods,
- Evaluate the company management capacity of the customer,
- Plan the credit repayment scheme in line with the company financial agenda,
- Collateralize the debt in order to strengthen the credit and increase the security margin,
- Price the credit directly proportional to the risks that the bank undertakes.

1.2.1 Comprehensive Credit Analysis

Credit analysis, in the broadest sense, is the process of evaluating the required information and factors to decide on the credit worthiness of the person or the company applying for a credit and determining the conditions and the amounts of the

credit for the customers and the risks that can be undertaken by the bank (Akgüç, 2006).

"*To lend funds to a company, a commercial loan officer of a bank must first evaluate the prospective borrower's ability to repay the proposed loan at maturity. This evaluation typically involves financial analysis and includes the preparation of forecasted financial statements, "due diligence" (a qualitative assessment of the business, its customers and suppliers, and management's character and capability), and analysis of credit risk*" (Revsine, et al., 2005, p.300).

The financial analysis regarding the credit analysis aims to review the asset and source structures of the company on the issue date of the financial statements, the possibility of continuing the company solvency in the future, the propensity of the company incomes in the previous periods and determine whether the company will be able to create a fund to repay the credit in the following periods (Akgüç, 1995).

a) Country Analysis

The banks, as the fund supplying institutions, are supposed to evaluate the conditions of the country, where the customers demanding a fund live in, while trying to determine the creditworthiness of them. The banks analyze the political, economic and financial factors in the related country and determine the micro economic impacts of the macro instabilities on the sector or the company to be funded. The related country analysis also helps the bank estimate the country's possible future risks, as well (Günaydın, 2006).

b) Industry Analysis

Industry is where the customer company operates in. In the industry analysis, the impacts of macro economic conditions need to be reviewed. For instance, industries of technology and electronics are the ones that are not affected from the economic fluctuations and these industries are having a growing trend. The food and the health industries are the less-influenced sectors by the economic fluctuations whereas the automotive sector is one of the more-influenced one. A credit analyst needs to determine the potential current and future risks in accordance with the sector features (Eken, 2009).

There are some specific risks in each of the levels of the industry. If those risks can be estimated by the credit analyst in line with the industrial seasons, it provides the bank to supply a healthier credit and plan the repayment scheme in line with those risks (Arslan, 2008).

The banks prefer companies operating in stable industries to the ones operating in the industries having risks. The companies operating in the industries having risks can only eliminate this issue by having a strong financial status (Seval, 1990).

c) Customer Analysis

Credit analysis includes information gathering from internal and external sources and firms' financial data. Due to the credit analysis result, the loan applicant customer's credit worthiness is measured by bank. Evaluation of credit risk and productivity is made at the same time with credit analysis. Alongside, it is inspected whether the credit demand is suitable for bank aims, policies and regulations (Demirbank T.A.S, 1998).

In other words credit analysis is the determination of credit risk. By credit analysis, the risk of the credit that is going to be given to a customer for a period is measured (Akgüç, 2006). In the short term credit analysis, the short term prediction of the sales, receivables and borrowing policies etc. are evaluated; whereas in the long term credit analysis, sources of funds and utilization are analyzed more. Credit analysis aims to minimize the banks' risks. Basically, the aim of the credit analysis is to help making true credit decisions and to avoid improper credit allocations (Basu and Rolfes, 1995).

Generally, credit contract includes the information of where and for what purpose the applicant will use the credit. However, most of the time credit is not used as it was agreed. In order to understand where and how it will be used, the credit analyst must have the talent of analyzing business finance and accounting. Understanding the purpose of the credit helps the analyst to understand if the credit demand is rational and acceptable. The credit analyst's knowledge and experience on finance and accounting has big importance on how the credit will be repaid. Analyst

must carefully analyze the timing of cash flows and level. On the other hand, the decreasing trends in the cash flows.

1.2.2 Financial Statements Used in Financial Analysis

In the financial analysis process, detailed information like financial structure, weld and usage structure, negative-positive cash flows and liquidity policy, equity composition is obtained from the fundamental financial statements of the business, which are balance sheet, income statement. Supplementary financial statements such as statement of fund flow, cash flow, net working capital, and list of participants, minutes of general meeting are used to evaluate the financial health of the company. At this point of financial analysis, existing data is needed to be evaluated and interpreted. There are three basic approaches about financial analysis:

1- Traditional approach which provides a wide perspective about future situation of business by measuring financial power and market share.
2- Cash based approach which aims the return of credit on time by investigating business' cash flow in the maturity of the demanded credit.
3- Approach based on calculation of various accounts' net present value. These accounts are disclosed in the balance sheet and they can be hidden or open.

1.2.3 The Preparation of Financial Statements for Analysis (Transfer and Decontamination Process)

Transfer and decontamination transactions must be applied for a healthy analysis of financial statements.

Transfer Process: The amount which was subtracted from asset or liability is transferred to another account in order to provide balance sheet equation.

Decontamination Process: Mutual subtraction process between assets and liabilities.

The aim of transfer and decontamination process in the financial statements is to determine of real assets in the active side, real debts in liabilities and real profit and loss in the income statement starting from net sales amount (Arat, 2005). The principal transfer and decontamination transactions in preparation of financial statements are listed below:

1- The corrective accounts in the balance sheet are eliminated mutually.
2- Inter-cluster transfers are made (If needed).
3- Fictive debts and receivables are eliminated from assets and liabilities.
4- It is checked whether depreciations were separated from fixed assets.
5- Physical controls of stocks are made backwards periodically.
6- Indented and deedless receivables controls are made in terms of quality and quantity.
7- Apportionment is taken into consideration.
8- Fixed assets physical controls are made.
9- If there are cheques or notes which are taken or given without commercial purpose, correction is made.
10- If there are impaired inventory, correction is made.
11- Payments in advance to sellers or buyers are taken into consideration.
12- It is checked that if the obtained stocks and fixed assets are in the right entry.
13- Off balance sheet liabilities are evaluated and checked.
14- It is checked that if reconciliation is made with third person.
15- Purchase discounts are inspected (Acer, 2010).

1.2.4 Financial Analysis

Financial statements are the most significant data sources which provide base for the credit decisions of credit applicant firms. In this respect, financial statements analysis has a big significance for banks. Credit analysts demand at least three periods of financial statements in order to see growth trend and to make dynamic analysis. In this way, they get the knowledge about which way the financial situation is going and can make predictions about business' future by evaluating changes as of periods. Financial statements are base of the credit decision alongside with they are the primary data source about credit applicant firms. Reliability and accuracy of financial statements is important for banks. If financial statements are not prepared in a healthy way, it is impossible to obtain reliable results about credit applicant firm's financial position with analysis techniques (Polat, 1995).

1.2.4.1 Techniques Used in Financial Analysis

Generally, the connection between the accounts in financial statements and these accounts changes in years are evaluated by expert credit analysts in order to determine business' financial performance, operating results and to make predictions about future. In these evaluations, firm's level of meeting the obligations, level of profitability, liquidity position, financial structure and operational performance are determined. Financial analysis is one of the primary tool which is widely used by creditors to evaluate the mentioned factors (Göğebakan and Arda, 2003).

Financial analysis provides the quality of the credit by lending assistance measuring and comparing various indicators and evaluating business' financial structure, profitability and productivity in the credit decision phase. Some techniques commonly used in the financial analysis are *comparative financial analysis, percentage method (vertical analysis), trend analysis and ratio analysis* (Şakar, 2001).

a) ***Comparative Financial Analysis*** is the process of comparing and revealing the changes in balance sheet and income statement of a business' for following two or more fiscal periods. This method is commonly used because of indicating the amounts progress as of periods at first appearance and does not require many calculations. On the other hand, comparison for determination of amounts and differences is only possible for two fiscal periods. If the amounts to be compared are more than two years than one of the years is determined as *Base Period Amount* or *Base Year* (Söyler, 2003).
b) ***Percentage Method (Vertical Analysis)*** is also defined as "Tables degraded to common grounds". In the financial analysis, by the help of this method, each account's share in total is stated in the financial statements. When analyzing the financial statements with this method, more than one year's numbers are not taken as a basis. The calculation is made on one specific year's results. On the other hand, if there is data of more than one, it is also possible to make comparisons with percentage amounts. This method is mostly used to calculate averages in the industry and to make comparisons with other firms (Özer, 1997).

c) ***Trend Analysis Method*** is a method determining one year in the financial statements as a base year and taking all amounts belong to that year as 100. As a result, it is possible to calculate the percentage changes of the following periods' similar accounts. Trend analysis is also defined as index method, and it makes possibility of making business' dynamic analysis. In the trend analysis method, the increases and decreases of accounts in the financial structures are determined and improving functions of business are examined by revealing these changes importance according to base year (Akdoğan and Tenker, 2001).

d) ***Ratio Analysis*** is used in examination of business' financial position and operating results within the industry, different industries or comparing other industry results. Ratio analysis can be conducted for one or more periods. In this respect, the analysis helps inside or outside analysts to determine the current situation of the business, capability of the business or conceiving to evaluate the long-term expectation of the business while enabling managers, - to evaluate their operations, to correct their mistakes, to find a way to evade circumstances and decisions leading to the financial unstableness and commercial failures (Özdemir, 1999).

There are large number of ratios used in financial analysis that highlights companies' liquidity, productivity, indebtness, profitability, capital adequacy etc. These ratios help the analyst to examine different points of company. The Table 1 below shows these ratios that commonly used by commercial loan officers;

Table 1: Ratios Rated by Commercial Loan Officers (Gibson, 2013)

Cash ratio	Sales/working capital
Accounts receivable turnover in days	Sales/net worth
Accounts receivable turnover – times per year	Cash/sales
Days' sales in receivables	Quick assets/sales
Acid test	Current assets/sales
Inventory turnover in days	Return on assets:
Inventory turnover – times per year	Before interest and tax
Days' sales in inventory	Before tax
Current debt/inventory	After tax
Inventory/current assets	Return on operating assets
Inventory/working capital	Return on total invested:
Inventory/working capital	Before tax
Current ratio	After tax
Net fixed assets/tangible net worth	Return on equity:
Cash/total assets	Before tax
Quick assets/total assets	After tax
Current assets/ total assets	Net profit margin:
Retained Earnings/total assets	Before tax
Debt/equity ratio	After tax
Total debts a % of net working capital	Retained earnings/net income
Total debt/total assets	Cash flow/current maturities of long term debt
Short term debt as a % of total invested capital	Cash flow/total debt
Long term debt as a % of total invested capital	Fixed charge coverage
Funded debt/ working capital	Degree of operating leverage
Total equity/total assets	Degree of financial leverage
Fixed assets/equity	Times interest earned
Common equity as a % of total invested capital	Book value per share
Current debt/net worth	Dividend payout ratio
Net worth at market value/total liabilities	Dividend yield
Total asset turnover	Price/earnings ratio
Sales/operating assets	Stock prices as a % of book value
Sales/fixed assets	Earnings per share

Ratio analysis made in firms has various aims and it is calculated by using accountings ratios which states a simple rate using data in financial statements. According to aim of the analysis; only some specific ratios that can be calculated which are suitable among multiple alternatives given in Table 1. (Türko, 1994). For instance, liquidity ratios are widely used in the financial analysis made for giving short term credit to the firm. Timely repayment of complete debt is an important

factor for short term credit lenders. Firm's long term profitability is not of first priority for those who give short term credit. On the other hand, in the financial analysis of long term credit demand, firms operations productivity and profitability are the prior factors. Low level of productivity and profitability are signs for the no redemption of a debt in the long term. The ratios used in financial analysis are generally classified under four groups which are; *Liquidity Ratios, Profitability Ratios, Financial Structure Ratios and Operating Ratios* (Öztürk, 2005).

1.2.4.2 Credit Analysis Standardization: Rating

Ratings; are interpreting and adapting to a grade system of qualitative (linguistic) and quantitative (numerical) factors simultaneously. By the help of this organized system, the last decision is made about the firm to give credit. In the following periods of rating, as new financial statements are published, firms are subject to new rating again and they are examined for the changing conditions of the firm. Generally the aim of the rating procedures; is to measure risk degrees of the firms and with this information, according to board decision, holding the risk distribution of the banks portfolio in optimal level and minimize the problematical credit relationships. Rating provides the opportunity of more objective decisions and minimizes subjective evaluations of bank employees enabling the use of same standard structure. Therefore, rating allows determining the changes in the rating results of firms and making analysis in a shorter notice and allows identifying problematical credits more rapidly. Rating scores help to compare applicant companies and different pricing strategies can be applied for changing risk levels. Rating can also be defined as forming a base for credit risk management and building up a required historical data set for the next stages (Babuşçu, 2005).

1.2.4.3 Credit Approval Process

In the credit facility process, there are two different choices after making required evaluations. The firm's credit demand is either approved or rejected. The credit demand can be rejected due to causes and, poor financial and non-financial situation of the companies and the credit policy of banks. The credit facility process ends if the application of the company is rejected. After having interviews and analysis, if the bank decides on granting the loan, the allocation process gets started. Origination is the determination of suitable credit type, maturity, warrant, price and

other special conditions based on banks and firms mutual benefits and objectives. The essential principal for origination to be succeeded is to combine customers financing requirements and credit facility in a compatible figure, and also to present the right credit opportunities in a way to meet the customer needs. Even if the customer's credit standing level is high, in the credits which were not formed in right conditions, problems may occur in the loan repayment.

1.3 TRACKING AND LIQUIDATION PROCESS

1.3.1 Credit Tracking and Controlling

"Once a credit transaction has been approved, processes must be in place for monitoring the risk exposure and maintaining it at an acceptable level. Standard risk management procedures include:

- Controlling documentation and disbursement,
- Monitoring timely repayment,
- Controlling and valuation of collateral,
- Reviewing the status of an exposure" (Citibank, 1996).

Credit Tracking is defined as the determination of changes in the customer's credit standing in the period between credit assignment and loan repayment (maturity), designation of credits with problems and solving them by including into system. Credit tracking and controlling process consists of tracking the allocation and responsibilities or the aims that institution desires to achieve and ensuring them to be on time and effective by imposing sanctions and making corrective actions if needed (Berk, 2001).

After the credit assignment, customer must be regularly tracked by considering probable risks that may occur in the future and default possibility even if the credit repayment performance is regular. In the credit tracking, banks have benefit from various indicators and data including customer's current bank operations. Actions in bank deposit, value changes in credits warrant, amount in the credit demand and change of maturity, changes in credit capital and interest payments, intelligence requests about the debitor from other finance institutions and sector that it is operating must be regularly tracked and controlled if there is a problematical credit signal.

In the credit tracking process, current financial statements and financial data from the firms must be regularly procured and the financial analysis must be operated. Current TCMB combined records must be compared with firm capacity and previous combined records. Also, it must be checked if the credit is used in the relevant way by visiting the operating areas of the firm. It it impossible to forget the credit completely after the credit assignment and pretend as there is no problem. The credit customer's credit standing may increase, completely evaporate or may show some changes between these two limits in the period between the credit assignment and repayment. It is a very rare situation that the credit quality is never changing and it is stable. The responsible manager of the credit tracking must monitor a large number of customers with limited possibilities and review the current credit relationship. Coordinating these possibilities in an effective way requires a significant creative management talent (Seval, 1990).

1.3.2. Liquidation of Credit

Liquidation is repayment of capital, interest, commission, tax, fund, and other expenses at the maturity of the credit. In other words, credit completes its lifecycle and credit account is closed by the bank. In the accounting entries of the bank, interest amount of credit is recorded in interest income account whereas; credit commission and other expenses are recorded in non-interest income account. On the other hand, the principal of the credit account is recorded as receivable and as credit is repaid the account will give zero balance (Kavcıoğlu, 2003).

The credit risk is reset by completely collecting the principal, interest, commission, tax and fund share of credit. On the other hand, credit relationship liquidation is formed by limit cancellation of the credit account for not using once again. The credit relationship may be ended due to adverse changes occurred in legal entities such as levy, bankruptcy, concordatum, suspension of payment, interdiction, continuous protest, commercial abandonment, mortem, sentence, dissolution and liquidation in firms, high level of borrowing, etc. Likewise, credit may be liquidated by the bank according to covenants in the contract signed with the customer due to mismatch between credits usage area and banks credit policies or negative developments in bank liquidity (T.C. Milli Eğitim Bakanlığı, 2007).

CHAPTER 2

CREDIT RATING FACTORS AND METHODOLOGIES

2.1 CREDIT RATING FACTORS

2.1.1 Definition of Rating

"Basically ratings describe the creditworthiness of customers. Hereby quantitative as well as qualitative information is used to evaluate a client. In practice, the rating procedure is often more based on the judgment and experience of the rating analyst than on pure mathematical procedures with strictly defined outcomes." (Bluhm, et al., 2003, p.4).

Globalization trends increased the supply and demand for credit which created new opportunities for investors, issuers and other entrepreneurs. On the other hand, each opportunity brings operational complications and complexities along. When the issuer corporations expand to new national and international markets, they face huge difficulties because of the basic criterion in the determination of credit standing, differences between national economies, changing accounting applications and national language and culture barriers (Gürman, 1994). Additionally, investors have a need of financial information in order to determine business risk structure and current value. Therefore, pursuant to legal or volunteer declarations, announcing correct, reliable and detailed information to public has big importance. In order to provide more intelligible information about kinds of business and the sectors, they need to be prepared in specific basis and procedures (Aslan, 2004).

Credit rating is the techniques and decision-making models which have aim to assist creditors in order to guarantee repayment of principle and interest amount of credit. These techniques ensure making decision about whom to provide loan, what the credit limit must be and which operational activities will increase the profitability of debitor for lender. Credit rating techniques especially deputize risks at charging a consumer or investor (Thomas, et al., 2002).

By the lexical description of Turkish language society, scoring[1] is the each situation in a process, step, level, rank and grade. On the other hand, rating is the

[1] http://www.tdk.gov.tr

determination and aligning of companies and countries by the rating institutions according to their business risk of stock values and political risks.

Briefly, rating is a tool to set an independent standard, which measures debitors will of paying capital and interest liabilities and the ability to fulfill at the right time and completely, by the help of a serial financial analysis (Kılıç, 1989).

Loretta (1997) highlighted the credit scoring as "Credit scoring is a statistical method used to predict the probability that a loan applicant or existing borrower will default or become delinquent. The method, introduced in the 1950s, is now widely used for consumer lending, especially credit cards, and is becoming more commonly used in mortgage lending. It has not been widely applied in business lending, but this, too, is changing. One reason for the delay is that business loans typically differ substantially across borrowers, making it harder to develop an accurate method of scoring. But the advent of new methodologies, enhanced computer power, and increased data availability have helped to make such scoring possible, and many banks are beginning to use scoring to evaluate small-business loan applications" (p.3).

One of the credit rating institutions Standard and Poor's evaluates financial and business risk data as the rating criteria. Balance sheet and statement of profit and loss financial policies, return, capital structure, cash flow and financial flexibility are evaluated for financial risk. Additionally, industry code, competitive situation and management structure are evaluated for measuring the business risk. On the other hand, Moody's evaluates financial, business and competition risks as the rating criteria. Cash flow, liquidity, debt structure and equity and reserves are measured for financial risk. Relative market share, competitive position, diversification, turnover, costs, returns, sales and purchases are measured for competition and business risk (Krahnen and Weber, 2001).

In other words, rating is an objective determination of credit rating institution about a company's ability to fulfill its liabilities. This determination is stated by symbols (AAA, BB+, CCC- ..etc.) which are understandably explained in the rating report. Rating score is never an advice about making an investment on capital market instruments such as stock, holding, bond nor crediting a company or recalling the credits. Rating is a significant indicator for stocks and bonds traded in the secondary

markets. However, credit rating institutions cannot give service about investment banking or financial consultant to the issuers who apply for them. Rating institutions can only inculcate to the public opinion without making comments such as “buy”, “sell” or “hold” (Demirçelik, 1985).

Based on at least three years data of all commercial and other activities of the company, models are developed with statistical analysis. The aim is to make predictions about company’s future performance from the models that had been made. In determining the decision for companies, credit ratings are made according to corporate quality and financial value in their industry. In this type of credit rating, probability of loss is considered when the debitor is lapsed into default. When the decision is made, economic conditions, company’s reaction to those conditions, competition in industry which include various risks, national and international regulations, technological developments, adaptation and human resource quality etc. are considered (Şirvan, 2004).

The general rule for making comparison between each rating classes is to use enough criteria. Rating studies aim to measure the risk factor with continuous and repeatable observations by using historical data analyzed by a model. The credit score is the mathematical statement of risk which is taken when credit is granted to a firm or an individual. Calculating the credit score is the beginning stage of the credit risk management process in banks (Yaslıdağ, 2007).

2.1.2 Types of Rating

Rating process can be divided into two groups according to their purpose as the Borrower Rating (Issuer Rating) and Debt Rating. On the other hand, rating process can be classified as country, corporate, export and project ratings. Additionally, corporate ratings cover the rating process of banks and financial institutions, insurance companies, government agencies and institutions, industrial and commercial companies. Finally, the issue rating includes the grading of bonds and structured finance sources traded in capital markets (Şirvan, 2004).

2.1.3 The Aim of Rating Applications

Creditors are obligated to perform ratings to calculate the risk for the granted loans. The main objective here is to calculate the ratio for cost and risk of the allocated loans. Hence as risk increases, the cost of credit will also increase which will raise a protection for the bank. Because, low risk and high risk for credit worthy country or corporation are not the same for creditors (Apaydın and Erdoğan, 1990).

2.1.4 Benefits of Rating

In recent years, globalization of the world gained momentum and accelerated the change in economical environment. Furthermore, computer, tele-communication, internet etc. and information economy named as "info-com" (Kahn, 2002) are additional factors which contributed in acceleration of globalization and causing a big gap between developed and developing countries. Information and computer technology has become an essential factor of production. In the information society the concept of time is "the future" (Crew and Kleindorfer, 2002) so, without producing information and cutting in knowledge at all levels of production the companies will not be competitive in the international markets. The benefits of rating for financial institutions and corporation are discussed below.

a) Benefits of Rating to the Financial Institutions

The main benefit of the rating to the financial institutions is allowing the risk – interest ratio differentiation. Thus, credits will be provided to the lower risk groups with lower interest rates. Therefore, the effective and efficient use of capital, savings in the cost of deposits, confidence in the system and contribution to the development of relations with international financial institutions is achieved. Further, rating allows the use of low-cost source and determining the risks assumed in asset-backed securities issued by financial institutions and banks Rating limits the formation of the problematic credits and provides high quality assets (Şirvan, 2004).

b) Benefits of Rating to the Corporation

The benefit of rating for the corporation is to attract institutional and individual investors to expand the borrowing opportunities. It also provides access to alternative sources of funding and asset – liability maturity matching and allows them to conduct liquidity planning. (Türkiye Bankalar Birliği (TBB), 2004)

2.2 CREDIT RATING METHODOLOGIES

2.2.1 Credit Rating Process

Rating process is totally execution in credit analysis process based on the request of the country or the business which exports the securities. The subjects such as the financial data of the last three years and projections of future, company philosophy, strategies, objectives and goals etc. are subject to financial, technical and economic analysis.

The credit rating process may differ in different organizations according to their policy, workflow and methodology. According to Japan Credit Rating Agency (2009), the credit rating process starts with demand for rating in order to evaluate the customer. After determining the responsible analyst, gathering data process starts by interview, customer visits etc. After submission of gathered data, a rating degree is recommended by the responsible analyst for negotiation and making decision in the credit rating committee. After the evaluation of credit rating committee, both credit decision and credit rating are declared. Lastly, the re-examination process starts in order to update the related data and credit rating.

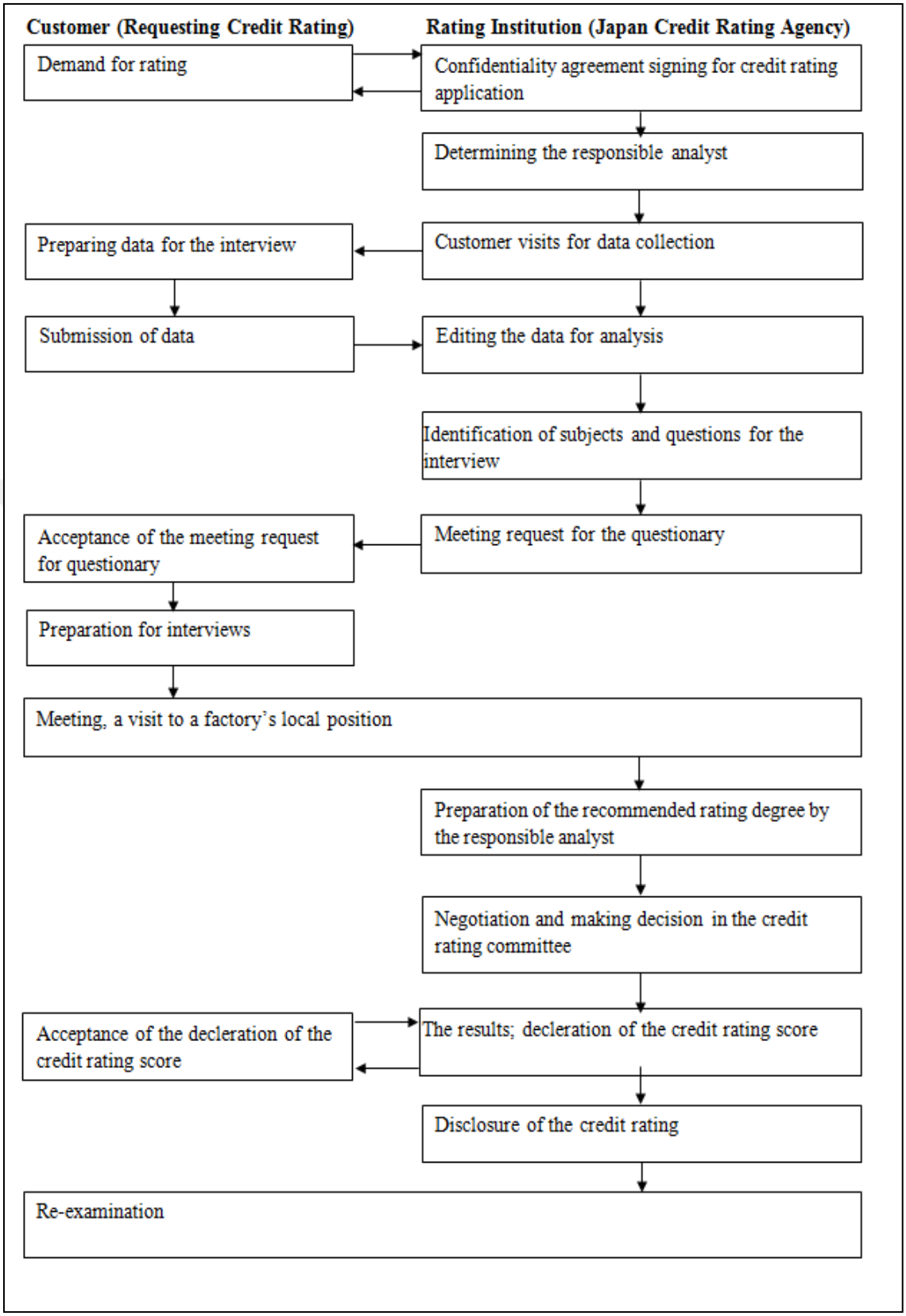

Figure 2: Credit Rating Process Workflow Diagram (Japan Credit Rating Agency, 2009)

In another words, credit rating process can also be defined as the process that led out the company's debt obligation, payments rules (probability of default) as a principle and interest; fully and just in time. This process includes;

- Customer relations and promotion meetings,
- Rating decision,
- The signing of convention text,
- The appointment of the rating expert,
- Conducted research and analysis before visit,
- Business visit and the ensure of data for qualitative and quantitative report,
- Investigation of the financial data and correction of the tables,
- Analysis and determination of data,
- Presentation of the recommended rating score to the rating committee,
- Appointment of the ratings committee chairman and committee members,
- Preparation of documents and studies deemed necessary by the rating committee,
- Presentation of the report to business managers before the official release,
- Deprecation for the rating score,
- The declaration of the rating score,

The revision of the rating due to the monitoring and/or extraordinarily situations (Babuşçu, 2008).

The scope of the analysis performed during the rating process varies depending on the conditions of issue or the issuer. Country rating and company rating requires different types of analysis and evaluation techniques. . Further, the scope and types of analysis differ from a specific credit facility operation to a common credit facility operation which covers issuers' whole processes. Rating companies are basically examining three main categories and a number of qualitative and quantitative criteria in their analysis of the rating process (Boyacıoğlu, 2005). These categories are;

The analysis of country risk: The general name of the risk of lending to a foreign government is called "country risk". Country risk occurs when a foreign government does not want to fulfill the overseas obligations and when the

government fails to fulfill these obligations on behalf of the borrowers, institutions and the individuals, who are residing in the country (Suhejla and Mcaleer, 2005).

The analysis of industry risk: Industry risk can be defined as; due to sectorial changes, cyclical fluctuations, aging of the products, changing consumer preferences, technological developments, narrowing of the markets and the decrease in market share and revenues. Industry risks cause an increase in competition or as a general definition, financial decline (Ganguin and Bilardello, 2005).

Another important issue to be considered in the industrial risk analysis is whether the client companies or organizations are operating in multiple industries. If they do so, the analysis should be conducted on industrial basis for realistic results (Babuşçu, 1997).

The analysis of business risk: The rating companies start to examine the business (enterprise) risk after determining country risk and industry risk. Enterprises which are even involved in the same industry will have different rating results. Consequently, in the risk rating, enterprise analysis is an important concept. In summary, enterprise analysis is the process of determining the current situation of business, assets and capabilities. The current situation and assets of the business is going to be emerged with this analysis (Ülgen and Mirze, 2006).

The systems which are developed for rating may show different methodologies from each other for the rating companies, financial institutions as well as other organizations. In this part of the research, the rating methodologies of the most famous four rating companies are going to be examined to create a general framework.

2.2.2 Methodologies of Credit Rating Agencies

a) *Rating Approach of Moody's Investors Services' Company*

Moody's analyzes all relevant risk factors and viewpoints guided by several analytical principles for rating decision. Moody's rating methodology is based on two important principles in analytical assessment;

Focusing on long-term; Moody's focuses on the key factors that can change the power of the long-term solvency of the debt issuer. These factors can be defined

as major economic recessions, management strategy change from basic or major regulatory developments such as the power to meet the long-term debt payments. Credit ratings are not intended to reflect the short-term market movements of the business or supply and demand cycle.

Emphasizing the stability and predictability of cash flow; Moody's one of the main analytical focuses is to understand the factors which direct the cash flow in terms of predictability and sustainability of it. Moody's performs financial analysis in order to determine an issuer's cash flow flexibility during an economic recession. In the process of rating, the measured risk factors show considerably varieties (Moody's Investors Services' Company, 2015).

b) Rating Approach of Standard and Poor's Company

To assess the creditworthiness of an issuer, Standard & Poor's evaluates the issuer's ability and willingness to repay its obligations in accordance with the terms of those obligations.

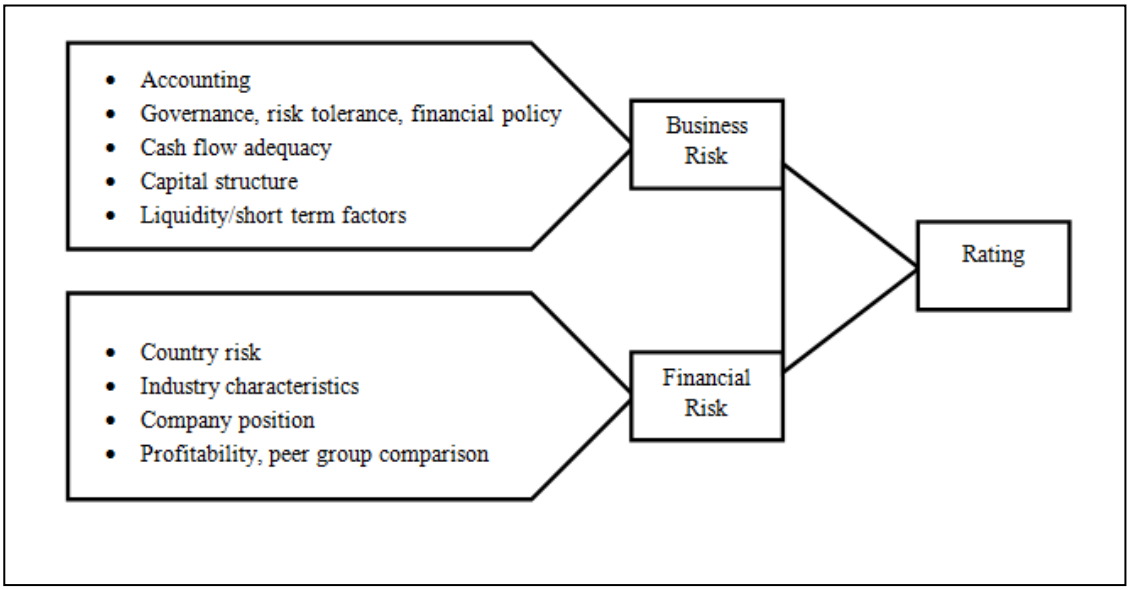

Figure 3: Standard & Poor's Corporate Rating Methodology (Standard & Poor's, 2009)

In the business risk analysis, the conditions of operating country and industry, company position (competition position) and profitability are examined. On the other hand, in the financial risk analysis, corporate management and risk perspective, financial policies, cash flow adequacy, capital structure, liquidity and short term

factors are examined. After business and financial risks of the company are determined, it is possible to reach the final rating decision.

c) Rating Approach of Fitch Ratings Company

The corporate ratings of Fitch make use of both qualitative and quantitative analysis to assess the business and financial risks of fixed-income issuers and individual debt issues.

An issuer default rating (IDR) is an assessment of the issuer's ability to service debt in a timely manner and is intended to be comparable across industry groups and countries. Because short- and long-term ratings are based on an issuer's fundamental credit characteristics, a correlation exists between them. The analysis of Fitch typically covers at least five years of operating history and financial data, as well as forecasts of future performance. A fundamental part of Fitch's approach is based on comparative analysis, through which the strength of each issuer's business and financial risk profile relative to others in its peer group is assessed. Further,, sensitivity analysis is performed through several "what if" scenarios to assess an issuer's capacity to cope with changes in its operating environment. A key rating factor is financial flexibility, which depends, largely, on the issuer's ability to generate free cash flow from its operating activities (Fitch Ratings Corporate Rating Methodology Criteria Report, 2006).

The qualitative and quantitative analysis performed by Fitch differs in terms of scope and examined variable in each sector as it shown in Figure 4. Fundamentally, qualitative analysis factors are based on industry risk, operating environment, market conditions, board of management and accounting standards. On the other hand, qualitative analysis factors are highlighted as focus on cash flow, income and cash flow, capital structure and financial flexibility.

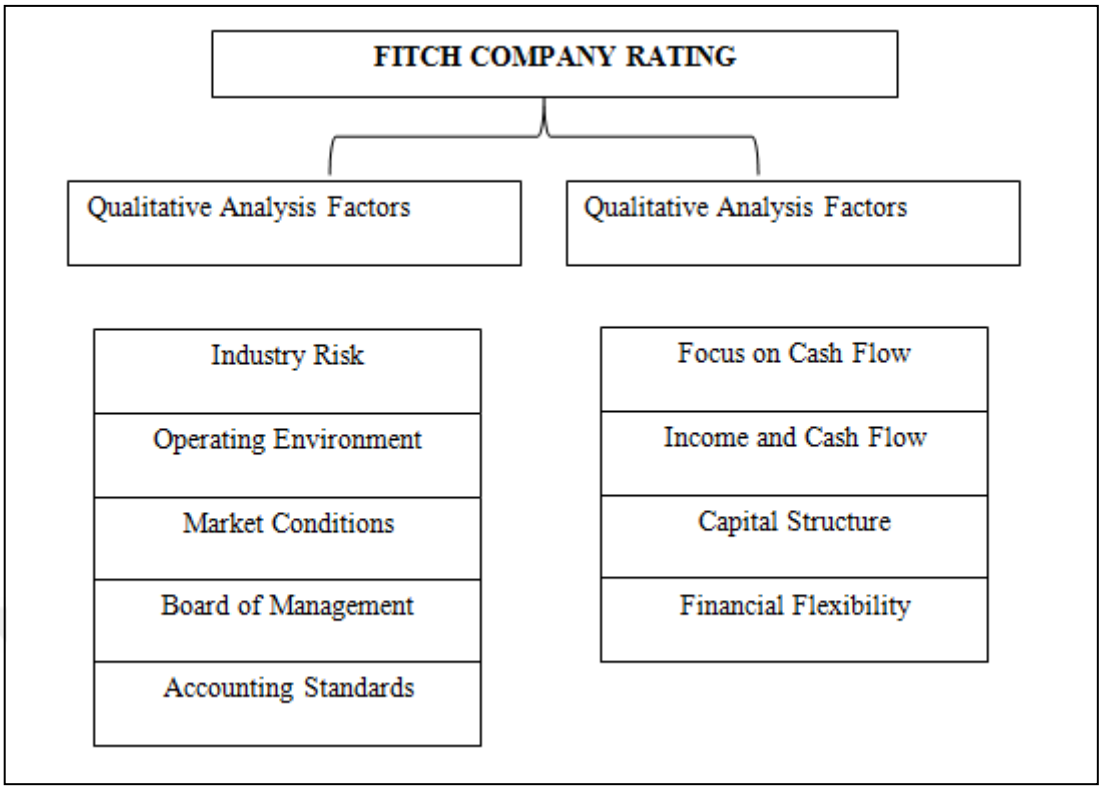

Figure 4: Fitch Ratings Corporate Rating Methodology (Fitch Ratings' Company, 2006)

d) Rating Approach of JCR Eurasia Rating Company

Company's minimum five years of historical operations and financial and non-financial data correspond with that period underpins the base of the analysis. This data provided by companies are the basis of future projections made by JCR Eurasia Rating. For individual and small-sized companies, scoring method is used. Those methods measurements are more standard and statistical based. On the other hand, for large-scale corporate firms, risk rating methods will gain importance (JCR Eurasia Rating Company, 2015).

As it is explained above, the credit rating methodologies may differ in various credit institutions according to their policies, strategies, operations etc. The factors that compose credit rating are selected by the organization who makes the credit evaluation. However, by using some commonly used variables, a credit rating form can be given as example as it is shown in Table 2.

2.2.3 X Credit Rating Agency's Rating System Sample

Credit Analysis is a subjective process. Therefore, each rating institutions' credit rating system differs from each other according to their credit policies, credit culture, marketing strategies, economical structure, customer needs, regulations etc. Credit Rating Agency's management has the freedom to pick which data to use in order to reach a rating result. Additionally, they also have the chance to make weighting among these data. Therefore it is impossible to draw a certain line to describe a rating system since it is a subjective process. In this section, a basic rating model of a credit institution is examined. This form is a very general view of a real rating form used in practical: however; data breakdowns and decision codes which forms the rating note are not shared.

Generally, a rating form is based on five main sections which are; financial structure, activity analysis, intelligence, capital structure and customer profile. Financial structure part includes financial statement data such as balance sheet, income statement and financial ratios. Secondly, activity analysis part includes data about operations of company. Intelligence part shows possible legal negations and other positive or negative information about company. The next part is capital structure which includes information about partners and their capital share. The last part is customer profile which is related with all information about customer such as; title, address, industry, short history etc.

Table 2: X Credit Rating Agency Rating Form

Score Date: ../../….
Customer Title: …
Score Note: …
Rating Note: …

Financial Structure
Balance Sheet
Income Statement
Ratios
Commercial Accounts Receivable Turnover Rate (day):
Inventory Turnover Rate (day):
Commercial Accounts Payable Turnover Rate (day):
Real Increase in the Net Sales:
Net Working Capital:
Current Ratio:
Total Payables / Total Liabilities:
Short Term Financial Debt / Net Sales:
Main Partner's Family Income / Expense Table
Main Partner's Property Holding / Family Income Ratios:
Cash Flow Ratios
Cash Generation from Main Activities: Y/N
Cash Deficiency or Cash Surplus

(Table 2 continued)

Activity Analysis
Import Status: Y/N
Export Status: Y/N
Most Weighted Conditions Used in Import & Export
Export Area
Weighted Domestic Buying Conditions
Weighted Domestic Buying Conditions (currency)
Weighted Domestic Sales Conditions
Weighted Domestic Sales Conditions (currency)
Seasonality: Y/N (if yes, describe the months)

Intelligence and Legal Negations
Firm's Legal Negations
Main Partner's Legal Negations
Credit Record Office Information
Combined Information
Intelligence Negation Information: Positive / Negative

Partner's and Capital Structure
Partner Name/s
Capital Share (%)
Main Partner
Total Work Experience (year)
Total Sector Experience (year)

(Table 2 continued)

Customer Profile
Customer Title:
Establishment Date:
Information Address:
Sector:
Number of Employee
Operating Period (year)
Short History
Firm's Branch Number
Main Partner's Name
Main Partner's Birth Date
Main Partner's Gender
Main Partner's Nationalities
Main Partner's Education Status
Main Partner's Address Information
Main Partner's Marital Status
Main Partner's Interests
Has the Firm Ever Changed Its Main Activity? Y/N
Who Has Ownership of the Workplace?
Workplace's Insurance Content
Firms & Partners' Movable and Real Estate Property Information

2.3 SMALL AND MEDIUM SIZED ENTERPRISES

With industrialization revaluation in the world, utilization from natural sources and mass production is increased. In the countries who adopted central planning based economy and liberal economical model, theory of perfect competition remains. In a market that has plenty of small business producing the same goods, it is considered that equilibrium and level of production will take place at the lowest average cost. For that reason, small scale businesses started to gain importance. However, development of economic relations brings also development of money and capital markets. Therefore, funding opportunities are increased and businesses are passed to larger-scale production. With the growth of business scale, the advantages of firm's size have begun. These advantages allow getting benefit from internal and external savings (Angilella & Mazzu, 2015).

The technologies that can help decrease the unit costs required large-scale of production. From this point, with the large-scale companies' competition power, the opinion about SME's will not be able to hold on to economy came into light. According to these developments occurred between 1930 and 1945; the opinion was occurred about small businesses will reduce their production with monopolist policies and determine high level prices. In that period, large scale companies were minimizing costs by operating high level capacity and maximizing the profit by cut back policies. However in the middle of 1960's, a new development on behalf of SME's started with the help of changes in consumer preferences, standards and highly increasing demand. As from 1970's "Small business ideology" started to become more popular in the whole world (Müftüoğlu, 2002). In today's world, SME's leading the market in either developed countries and also in developing countries. Additionally, SME's also have a big importance about society's socio-economic development, employment, and fair distribution of income (Akgemici, 2001).

SME's differ from other levels of economy in terms of production, marketing, financing, work power, management, number of employees, sales volume, capital structure, equipment pool value, amount of used energy, capacity level, added-value, profitability and share of market (Sarıaslan, 1996).

Countries operate a group of policies in order to increase SME's benefit to economy and making their own SME descriptions in order to determine their target

market (Alpugan, 1994). Description of "SME" differs in each country. Even the descriptions can differ within the same country (Müslümov, 2002). Countries determine their "SME" description according to the criteria such as policies, resources, capital scale, work force and turnover. Some countries sample of SME descriptions are listed in the Table 3 below;

Table 3: SME Definitions by Countries (Sanayi Politikaları Özel İhtisas Komisyonu Raporu, 2000)

Criteria	**Capital**	**#of Employee**	**Turnover + Capital + #of Employee**
Countries	Bangladesh Indonesia Gama India Nepal Nigeria Kenya Sri Lanka	Brazil Malaysia OECD Thailand	EU USA Philippines Japan Peru Sudan Turkey Venezuela

As it is shown clearly in the Table 3, generally three main factors are effective in the description of "SME". These factors are capital structure, workforce and turnover.

Because of the difficulties experienced during the cooperation with the European Union, the SME definition was harmonized by EU (http://www.ikv.org.tr). According to compliance laws to EU, %99 of operating companies in Turkey are described as SME (Cansız, 2008).

Table 4: Business Scale Comparison: EU and Turkey (Resmi Gazete, 2005)

Description Criteria	Micro Business	Small-Scale Business	Medium-Scale Business	
Number of Employee	≤10	≤50	≤250	**EU**
Annual Net Sales Revenue	≤2 Mio €	≤10 Mio €	≤50 Mio €	
Annual Financial Balance Sheet	≤2 Mio €	≤10 Mio €	≤43 Mio €	
Number of Employee	0-9	10-49	50-249	**TURKEY**
Annual Net Sales Revenue	≤1 Mio TL	≤5 Mio TL	≤25 Mio TL	
Annual Financial Balance Sheet	≤1 Mio TL	≤5 Mio TL	25 Mio TL	

As it is shown in Table 4 Turkey and EU use same factors defining SME's. These factors are workforce, annual net sales revenue and annual balance sheet. On the other hand, amounts within these factors differ from each other. It can be interpreted that these differences are because of the structure of entire economy, market and economic policies.

2.4 LITERATURE REVIEW

Credit rating is a critical subject in today's economy within the emerging market. However, determination of the credit rate can be examined in multiple systems. Each credit rating system has different dynamics within. In order to clarify these rating systems, there are some studies in the literature. These studies can be categorized as studies performed in developed and developing countries. On the other hand, since the studies about credit rating is limited because of the regulations about customer privacy, other similar topics in the literature is also reviewed such as Probability of Default (PD), Credit Decisions, Loan Quality and other credit risk measurements.

While making researches over the developing countries, Emel, et al. (2003) is one of the authors which emphasized the credit scoring methodology in Turkey. They used one of the Turkish Commercial Bank data -82 manufacturing companies' financial ratios. The study aimed to reach a single credibility score from the entire ratio (overall to single). While making this research, the Data Envelopment Analysis

(DEA), regression and discriminant analysis were used. While credit scoring was dependent variable, 46 ratios such as; liquidity, activity, financial structure, profitability, growth, funs flow aspects were independent variables. Similarly Min & Chan Lee (2008) from Republic of Korea examined the credit rating as the dependent variable. Additionally, growth, liquidity, activity, profitability, productivity and cost structure were selected as independent variables. DEA, regression and discriminant analysis were used in the study. However, there is a difference from the previous study; Min & Chan Lee (2008) also used the bankruptcy cases of 103 firms. Another study from Turkey was performed by Sezgin (2006) which analysed the credit rating (as a dependent variable) with 1649 observations data including 61 defaulted and 1578 non-defaulted firms from a Turkish bank. In order to improve the consistency of results, study was supported by four different models: Classification and Regression, Logistic Regression, Probit Regression and Linear Discriminant. By the help of data set, credit rates and companies default and non-default cases were compared. As a result of this comparison, 83% of obtained data was matched with the real life cases. From another perspective, quality of loan was examined by Abdou (2009). The study focused on the loan quality based on credit rates in Egypt. In this study, 1262 personal loans (851 good loans, 411 bad loans) from Egyptian commercial public sector banks were used and developed three different models by using Weight of Evidence (WOE), Probit Analysis and Genetic Programming; however, results are pointed out that WOE is the best method of three used methods. Bingöl (2009) examined the credit scoring over the SME's. In this study, 27 different financial data and ratios from 1497 firms of Turkey were used and as a result of three models (Factor Analysis, Cluster Analysis and DEA) some correlations were gathered as early warning signals. The result leaded that firms must have more transparent financial statements, reports and they must make required technological investments. Other study which conducted by Dinh & Kleimeier (2007) similarly highlighted the credit rating and loan decisions by using 14 financial and non-financial individual loan data from one of Vietnam's commercial bank. By the help of Logistic Regression Model, they resulted a relationship between credit rating and managing risk under huge competition and regulations. On the other hand, Zhang, et al. (2013) focused on the credit risk by using 17 financial ratios, and the authors developed a regression model which is named Cox Model. From the examined data they found out that the financial position, in particular, the current ratio, accounts

receivable turnover ratio, total asset turnover, Return on Equity have a significant impact on credit risk of high-tech enterprise.

There are also some other studies similar to credit rating examinations. For instance, Bekhet & Eletter (2014) from Jordan tried to analyze credit decisions through 12 Financial and non-financial data (Age, gender, total income, comp type, guarantor ..etc.) gathered from accepted and rejected applications from different Jordanian banks. The data set was examined by Logistic Regression Model and Radial Basis Function Scoring Model. As the result, they found out that Logistic Regression is more accurate model than Radial Basis Function and extending credit to customer who has high probability of default could lead to financial distress. While referring the probability of default, Louzada, et al. (2012) analyzed the PD and credit histories with a Naive Logistic Regression model which developed by Hosmer and Lemeshow in 1989 and aimed to compare via simulation the statistical technique which are generally used during credit rating and they stated that 'There is no statistically difference in terms of predictive capacity between naive logistic regression model and logistic regression model with state-dependent sample selection. However, there's strong difference between the distributions of the estimated default probabilities from these 2 statistical modelling techniques, with the naive logistic regression models always underestimating such probabilities, particularly in the presence of balanced sample' (p.1).

Except for credit risk, another focus of this study is SMEs. While reviewing the literature Vurur (2009) also developed a forecasting model of SME's probability of success through Logistic Regression. The research included 12 financial data which were gathered from KOSGEB loan records.

Credit risk is defined differently in each country according to their economic, political and social structures. Likewise, also credit rating methods and ideologies differ according to these structures. Developed countries may have different perspectives from developing countries. Reviewing similar studies in developed countries, Marshall, et al. (2010) from United Kingdom examined, credit decision and performance measurement (good or bad) with sstandard probit model using 25 individual financial data from UK's one of biggest commercial bank. As a result of this study, the authors claimed that "The result of the analysis support the findings of

earlier studies of credit scoring that there is significant error correlation in loan approvals and loan performance and that failure to correct this correlation leads to biased parameter estimates in models of loan performance" (p.509). Therefore, this idea addresses the topic to probability of default (PD). Ono,et al. (2014) emphasized that primary banks have a positive effect on its lending attitude during crisis times; however, secondary and other banks in market have negative effects because of their customer credit worthiness. The Regression and Questionnaire methods were used during this analysis and the data source was gathered from Japanese banks about SME's. Additionally, while PD and change in lending attitude of banks during the crisis (better/unchanged/worse) were dependent variables of the study, financial and non-financial data from SME's and banks (credit scoring, firm characteristics, bank characteristics, firm-bank relationship) were used as independent variable. Last of all, Jacobson and Roszbach (2003) from Sweden examined value at risk (VaR) and claimed that "VaR calculations indicate that an efficient selection (by means of a default-risk-based rule) of loan applicants can reduce credit risk by up to 80%".

Reviewing similar studies in the literature, this study differs from others in terms of data set and the scope. The differences can be explained in 3 steps. Firstly, this study aims to figure out a direct correlation between credit rating and the factors effecting it. The important point is the weight of factors in the scoring method. On the other hand, the study examines financial data and non-financial data as well. Thirdly, the data set was gathered from only SME's which has significant role in Turkey's economy.

Table 5: Literature Review

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Hussein A. Abdou (2009) Egypt	Genetic programming for credit scoring: The case of Egyptian public sector banks	Loan quality	25 financial and non financial data	1262 personal loans (851 good loans, 411 bad loans) from Egyptian commercial public sector banks	Weight of Evidence Measure Probit analysis Genetic Programming	WOE is the best method of 3 used methods
Arito Ono Ryo Hasumi Hideaki Hirata (2014) Japan	Differentiated use of small business credit scoring by relationship lenders and transactional lenders: Evidence from firm–bank matched data in Japan	PD (Probability of default) Change in lending attitude of bank during the crisis (Better/ Unchanged/ Worse)	Financial and non-financial data from SME's and banks (credit scoring, firm characteristics, bank characteristics, firm-bank relationship)	4103 questionnaire results from Japanese SME's and banks	Questionnaire Regression	Primary banks have a positive effect on its lending attitude in times of crisis. Secondary and other banks have negative effects because of the loan quality

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Mu Zhang Ying He Zong-fang Zhou (2013) China	Study on the Influence Factors of High-tech Enterprise Credit Risk: Empirical Evidence from China's Listed Companies	Credit risk	17 financial ratio (Including financial ratios)	Financial data from Chinese high-tech listed companies	Regression (Cox Model)	The financial position, in particular, the current ratio, accounts receivable turnover ratio, total asset turnover, ROE, have a significant impact on credit risk of high-tech enterprise
Thi Huyen Thanh Dinh Stefanie Kleimeier (2007) Vietnam	A credit scoring model for Vietnam's retail banking market	Score and loan decision	14 financial and non-financial individual data	Credit scoring data from one of Vietnam's commercial bank	Logistic Regression	Credit scoring has benefits about managing risk under huge competition and regulations

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Tor Jacobson Kasper Roszbach (2003) Sweden	Bank lending policy, credit scoring and value-at-risk	Value at risk (VaR)	Non financial and financial data	Swedish individual consumer credit data: both financial and non-financial (among 13338 individual credit applies)	Default risk based analysis	New method developed Author presents a new method with VaR calculation and with this calculations up to 80% credit risk decrease
Jae H. Min Young-Chan Lee (2008) Republic Of Korea	A practical approach to credit scoring	Credit score	Growth, liquidity, activity, profitability, productivity and cost structure	Using actual bankruptcy cases of 103 firms	DEA Regression and Discriminant Analysis	Aim to reach single credibility score from all the ratios to single (from overall to single)

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Bülent Bingöl (2009) Turkey	Türkiye'de Kobi Niteliğinde Faaliyet Gösteren Tekstil Üretim İşletmelerinin Basel II Kriterleri Çerçevesinde Kredi Derecelendirme Metodolojisi Uygulaması	Credit Score	27 financial data and ratios	1497 firms financial data operating in Turkey	Factor Analysis Cluster Analysis Data Envelopment Analysis	Financial data were analyzed in 3 methodologies in order to have early warning signals. Firms must have more transparent financial statements, reports and they must make required technological investments

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Andrew Marshall Leilei Tang Alistair Milne (2010) UK	Variable reduction, sample selection bias and bank retail credit scoring	Credit Granting (Accept/Reject) Performance measurement (Good/Bad)	25 individual financial data	Application data from UK's one of biggest commercial bank	Standard Probit model	There is significant error correlation in loan approvals and loan performance and that failure to correct for this correlation leads to biased parameter estimates in models of loan performance
Özge Sezgin (2006) Turkey	Statistical methods of credit rating	Credit score	29 financial and non-financial data (16 are the financial ratios)	1649 observations including 61 defaulted and 1578 non-defaulted firms from a Turkish bank	Classification and Regression Logistic Regression Probit Regression Linear Discriminant	Found a %83 relationship between evaluated data set and default/non-default cases

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Hussain Ali Bekhet Shorouq Fathi Kamel Eletter (2014) Jordan	Credit risk assessment model for Jordanian commercial banks: Neural scoring approach	Credit Decision (CD)	12 Financial and non-financial data (Age, gender, total income, company type, guarantor etc.)	Accepted and rejected applications from different Jordanian Banks (2006-2011)	Logistic Regression Model Radial Basis Function Scoring Model	LR is more accurate model than RBF. Extending credit to customer who has high PD could lead to financial distress
N.Serap Yolas Vurur (2009) Turkey	Basel uzlaşısı çerçevesinde kobilerde kredi derecelendirme notu uygulaması	Average of 3 years profit and loss	12 financial data (including ratios)	4937 firm data gathered from KOSGEB	Logistic Regression	A model was developed forecasting SME's probability of success.

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Francisco Louzada Paulo H. Ferreira-Silva Carlos A.R. Diniz (2012) (Brazil)	On the impact of disproportional samples in credit scoring models: An application to a Brazilian bank data	Probability of Default	Client type Gender Age Marital status Length of residence	Brazilian bank data (4504 client in portfolio)	Naive Logistic Regression (developed by Hosmer and Lemeshow in 1989) Logistic Regression with State-dependent Sample Selection	"There's strong difference between the distributions of the estimated default probabilities between Naive Logistic Regression and Logistic Regression

Table 5 (continued)

Author(s) Year Country	Name of Study	Dependent Variables	Independent Variables	Data Set	Methodology	Conclusion
Ahmet Burak Emel Muhittin Oral Arnold Reisman Reha Yolalan (2003) Turkey	A credit scoring approach for the commercial banking sector	Credit score	46 financial ratios (Liquidity, activity, financial structure, profitability, growth, funs flow aspects, ratios etc.)	Commercial Bank: 82 manufacturing companies' financial ratios	Data Envelopment Analysis Regression Discriminant Analysis	Aim to reach single credibility score from all the ratios to single (from overall to single)

CHAPTER 3

MODEL AND EMPIRICAL EVALUATION

3.1 SUBJECT AND PURPOSE

The credit rating system is one of the most common methods performed by credit institutions. This system is a statistical method helps credit institutions to categorize their customers, canalize their sources to less risky and more effective areas and track the risks more active. On the other hand, credit rating system is also beneficial for debitors to foresee their financial and non-financial negativities and take precautions for them.

In developing countries, capital is the scarcest factor of production in the economy. Therefore, less institutional SME's constitute a major part of many industries. These SME's are generally managed by less professional managers than corporate companies. At this point credit rating system has a significant role for those managers to analyze their company with the credit institutions' point of view.

Credit rating systems are specially designed methods for each credit institution according to their aims and priorities. Therefore, the operation of these systems is generally hard information to reach. The aim of this study is to analyze a credit rating system of a credit institution operating in developing countries capital market, and reveal which factor is more dominant in determination of credit rate. Thus, it is desired to emphasize which aspect the SME's need to develop. On the other hand, this study aims to be a useful source for the credit analysts to make evaluations more effective.

3.2 DATA SET

Each credit institution has different rating systems, which operate with different statistical factors. In order to examine credit ratings changes, SME loans' dataset was provided by one of the credit institution which operates in Turkish capital market. This consists of 17 financial and non-financial (10 non-financial and 7 financial) independent variables from 125 SMEs which have 0-20 million TL annual turnovers. The SMEs that have maximum 200 employees were included to the study. The evaluated data set is the credit institution's rating system results between 2012 and 2016.

Table 6: List of Dependent and Independent Variables

	Dependent Variable *(y)*	**Codes**
	Rating	RA
	Independent Variables *(x)*	
X1	Industry	IND
X2	Number of Employees	NOE
X3	Firm Age	FAGE
X4	Large Shareholder Age	LSAGE
X5	Large Shareholder Gender	LSG
X6	Large Shareholder Education	LSE
X7	Large Shareholder Marital Status	LSMS
X8	Export	EXP
X9	Import	IMP
X10	Large Shareholder KKB Score	KKB
X11	Cash Limit Risk Rate of the Company	CLRR
X12	Non-Cash Limit Risk Rate of the Company	NLRR
X13	Current Rate	CR
X14	Inventory Turnover Date	IT
X15	Cash Generation	CGCB
X16	Cash Surplus or Deficit?	CSD
X17	Debt Ratio	TATD
	* Turkish Corporate Registry Office	

The table 6 shows the list of variables and the codes of these variables used in mathematical model.

The variables used in the study can be categorized in two groups as; financial and non-financial;

Table 7: Financial and Non-Financial Variables

Non-financial Variables	Financial Variables
Industry (IND)	Cash Limit Risk Rate of the Company (CLRR)
Number of Employees (NOE)	Non-Cash Limit Risk Rate of the Company (NLRR)
Firm Age (FAGE)	Current Rate (CR)
Large Shareholder Age (LSAGE)	Inventory Turnover Date (IT)
Large Shareholder Gender (LSG)	Cash Generation (CGCB)
Large Shareholder Education (LSE)	Cash Surplus or Deficit? (CSD)
Large Shareholder Marital Status (LSMS)	Debt Ratio (TATD)
Export (EXP)	
Import (IMP)	
Large Shareholder KKB Score (KKB)	

3.2.1 Limitations, Variable Descriptions and Hypotheses

The dataset of this research was provided from one of credit institutions operating in Turkish capital market. Therefore, the first limitation of the study is, the number of evaluated credit rating system is restricted. Although there are more factors effecting credit rating, only 7 financial and 10 non-financial independent variables were chosen. This data set was gathered from credit rating evaluations between 2012 and 2016. The credit rating policy of the credit institution was stable during that period. Thirdly, the dataset were chosen among 125 SMEs operating in Turkey. Also, these SMEs are limited with 0-20 million TL annual turnovers. The companies, which have group firms, were excluded from the research.

Each dependent and independent variable's limitations and descriptions are listed below;

Credit Rating (dependent variable): The credit ratings in this dataset were chosen among 125 SMEs which were evaluated by Turkish credit institution's rating system between 2012 and 2016. In this rating system, the best credit performance is accepted as 1. As the rating score increases, the credit performance gets worse.

Industry: In this study, SMEs from only 2 industries were considered which are: Production and Merchandise. These two industries were chosen because they represent the majority of all sectors in Turkish market.

H_1: Rating scores for production companies are different than rating scores for merchandise companies.

H_0: Rating scores of the companies do not change according to the industry.

Number of Employees: This variable shows the number of employee working in the SME which is evaluated by the credit rating system.

H_2: There is a positive relationship between number of employees and credit rating.

H_0: There is no relationship between number of employees and credit rating.

Firm Age: The variable represents the year from the date of SME's establishment.

H_3: There is a positive relationship between firm age and credit rating.

H_0: There is no relationship between firm age and credit rating.

Large Shareholder Age: This variable refers to the age of shareholder with higher percentage of partnership.

H_4: There is a positive relationship between large shareholder age and credit rating.

H_0: There is no relationship between large shareholder age and credit rating.

Large Shareholder Gender: This variable refers to the gender of shareholder with higher percentage of partnership.

H_5: The gender of large shareholder has impact on credit rating.

H_0: There is no relationship between large shareholder gender and credit rating.

Large Shareholder Education: This variable refers to the state of education of shareholder with higher percentage of partnership.

H_6: If large shareholder has university degree, the credit rating will be effected positively.

H_0: There is no relationship between large shareholder education status and credit rating.

Large Shareholder Marital Status: This variable refers to the marital status of shareholder with higher percentage of partnership.

H_7: There is a relationship between large shareholder marital status and credit rating.

H_0: There is no relationship between large shareholder gender and credit rating.

Export: This variable indicates whether the SME has exports or not.

H_8: Companies which have export operations will have better scores of ratings.

H_0: There is no relationship between companies' export operations and credit ratings.

Import: This variable indicates whether the SME has import or not.

H_9: Companies which do not have import operations will have better scores of ratings.

H_0: There is no relationship between companies' import operations and credit ratings.

Large Shareholder KKB Score: Turkish Corporate Registry Office (KKB) is a credit data base corporation with 11 Turkish banks' founder membership. This corporation collects all Turkish citizens' individual credit data and generates a credit score according to their payment performance. That credit score is named KKB score and it is commonly used among Turkish banks in order to evaluate individuals' credibility. KKB score is numbered between 0 and 1900 (0 is the worst score while 1900 is best).

The variable refers to KKB score of shareholder with higher percentage of partnership.

H_{10}: Large shareholder's high KKB score effects company's credit rating positively.

H_0: Large shareholder's KKB score has no effect on the company's credit rating.

Cash Limit Risk Rate of the Company: The variable refers to company's percentage of total cash limit occupancy in all banks without distinction of maturity and currency. In this part, factoring and leasing debts are excluded.

H_{11}: Companies which have low cash limit risk rate will have a better credit rating.

H_0: There is no relationship between cash limit risk rate and credit rating.

Company's Non-Cash Limit Occupancy Rate: The variable refers to company's percentage of total non-cash limit occupancy in all banks without distinction of maturity and currency. In this part, factoring and leasing debts are excluded.

H_{12}: Companies which have low non-cash limit risk rate will have a better credit rating.

H_0: There is no relationship between non-cash limit risk rate and credit rating.

Current Rate: The financial ratio is calculated by;

Current Assets / Short Term Liabilities

Current rate is a liquidity ratio and shows companies' liquidity performance by percentage. The data is provided from company's last year-end balance sheet.

H_{13}: Companies which have high current ratio will have a better credit rating.

H_0: There is no relationship between current ratio and credit rating.

Inventory Turnover Date: The financial ratio is calculated by;

Cost of Goods Sold / [(Previous Year's Inventory + Current Year's Inventory) / 2]

The financial ratio indicates the number of days that company can sell all goods in its inventory.

H_{14}: Companies which have low inventory turnover date will have a better credit rating.

H_0: There is no relationship between inventory turnover date and credit rating.

Cash Generation: The variable refers if the company can generate cash from its core business.

H_{15}: Companies which can generate cash from core business will have a better credit rating.

H_0: There is no relationship between cash generation and credit rating.

Cash Surplus or Deficit: The variable indicates if the business has cash surplus or deficit at the end of the operation year. The ratio is calculated by;

Short Term Financial Debts / Total Cash Deficit

H_{16}: Companies which have cash surplus will have better credit rating.

H_0: There is no relationship between cash surplus or deficit and credit rating.

Debt Ratio: The variable indicates the coverage ratio of company's total assets to company's total debts (including leasing and factoring debts). The ratio is calculated by;

Total assets / Total debts

H_{17}: Companies which have higher debt ratio will have better credit rating.

H_0: There is no relationship between debt ratio and credit rating.

3.3. RESEARCH METHODOLOGY

This study focuses on credit rating by evaluating its correlation with multiple financial and non-financial data. Within this aim, multivariate (multiple) regression analysis has been chosen as the evaluation methodology since it is the best method to measure the correlation between multiple variables.

The multivariate regression is defined by Higgins, (2005) as "A statistical tool that allows you to examine how multiple independent variables are related to a dependent variable. Once you have identified how these multiple variables relate to your dependent variable, you can take information about all of the independent variables and use it to make much more powerful and accurate predictions about why things are the way they are". On the other hand, Joseph, et al. (2010) described multivariable regression as "The appropriate method of analysis when the research problem involves a single metric dependent variable presumed to be related to two or more metric independent variables". Additionally, they also mentioned on the aim of usage of the multivariable regression as; "The objective of multiple regression analysis is to predict the changes in the dependent variable in response to changes in the independent variables" (p.2).

It is appropriate to mention benefits and the usage areas of multivariable regression while defining it. Hence, Joseph, et al. (2010) defined the purpose of multivariate regression analysis in general as; "Some of that information can be analysed and understood with simple statistics, but much of it requires more complex, multivariate statistical techniques to convert these data into knowledge" p.3). According to Rencher (2002), "Multivariate analysis consists of a collection of methods that can be used when several measurements are made on each individual or

object in one or more samples" he also added this method can be used in education, chemistry, physics, geology, engineering, law, business, literature, religion, public broadcasting, nursing, mining, linguistics, biology, psychology and many other fields (p.1). "Multivariate analysis techniques are popular because they enable organizations to create knowledge and there by improve their decision making. Multivariate analysis refers to all statistical techniques that simultaneously analyse multiple measurements on individuals or objects under investigation. Thus, any simultaneous analysis of more than two variables can be loosely considered multivariate analysis" (Joseph, et al., 2010, p.17).

When making a literature review, it is seen that the types of multivariable analysis were discussed within different perspective by different authors. For instance Rencher (2002) defined as;

if *y* is considered as dependent and *x* is independent variable;

1. Simple Linear Regression: evaluating one *y* and one *x*
2. Multiple Linear Regression: evaluating one *y* and several *x*'s
3. Multivariate Multiple Linear Regression: evaluating several *y*'s and several *x*'s.

Table 8: The Relationship between Multivariate Dependence Methods

(Joseph, et al., 2010)

Canonical Correlation		
Y1+Y2+Y3+...+Yn	=	X1+X2+X3+...+Xn
(metric, non-metric)		(metric, non-metric)
Multivariate Analysis of Variance		
Y1+Y2+Y3+...+Yn	=	X1+X2+X3+...+Xn
(metric)		(non-metric)
Analysis of Variance		
Y1	=	X1+X2+X3+...+Xn
(metric)		(non-metric)
Multiple Discriminant Analysis		
Y1	=	X1+X2+X3+...+Xn
(non-metric)		(metric)
Multiple Regression Analysis		
Y1	=	X1+X2+X3+...+Xn
(metric)		(metric, non-metric)
Conjoint Analysis		
Y1	=	X1+X2+X3+...+Xn
(non-metric, metric)		(non-metric)
Structural Equation Analysis		
Y1	=	X11+X12+X13+...+X1n
Y1	=	X21+X22+X23+...+X2n
Ym	=	Xm1+Xm2+Xm3+...+Xmn
(metric)		(metric, non-metric)

As it is seen on Table 8 Joseph, et al. (2010) highlighted that the multiple regression analysis evaluates the correlation between a metric dependent variable *(y)* and multiple metric and non-metric independent variables (*x1, x2, x3…*).

As a multiple linear regression model case, Alexopoulos (2010) examined;

"As an example in a sample of 50 individuals we measured: Y = toluene personal exposure concentration (a widespread aromatic hydrocarbon); X1 = hours spent outdoors; X2 = wind speed (m/sec); X3 = toluene home levels. Y is the continuous response variable ("dependent") while X1, X2, …, Xp as the predictor variables ("independent"). Usually the questions of interest are how to predict Y on the basis of the X′s and what is the "independent" influence of wind speed, i.e. corrected for home levels and other related variables? These questions can in principle be answered by multiple linear regression analysis.

In the multiple linear regression models, Y has normal distribution with mean

$$\mathbf{Y = \beta 0 + \beta 1 X1 + \ldots + \beta \rho X \rho + \sigma(Y),\ sd(Y) = \sigma\ (independent\ of\ X's)}$$

The model parameters $\beta 0 + \beta 1 + \ldots + \beta \rho$ and σ must be estimated from data.

$\beta 0$ = intercept

$\beta 1 \ldots \beta \rho$ = regression coefficients

$\sigma = \sigma res$ = residual standard deviation" (p.24)

3.4 ANALYSIS

3.4.1 Basic Requirements of a Multiple Regression

In order to conduct a multiple regression, eight assumptions should be considered.

Assumption 1: There has to be one dependent variable that is measured at the continuous level. Rating Scores (measured in RA) is a continuous variable.

Assumption 2: There has to be two or more independent variables that are measured at the continuous or nominal level. In this study the independent variables measured at continuous and nominal level are given in Table 9.

Table 9: Independent Variables

Independent Variables Measured at Continuous Level	Independent Variables Measured at Nominal Level
Large Shareholder KKB Score (KKB)	Industry (IND)
Number of Employees (NOE)	Large Shareholder Gender (LSG)
Firm Age (FAGE)	Large Shareholder Education (LSE)
Large Shareholder Age (LSAGE)	Large Shareholder Marital Status (LSMS)
Cash Limit Risk Rate of the Company (CLRR)	Exports (EXP)
Non-Cash Limit Risk Rate of the Company (NLRR)	Imports (IMP)
Current Rate (CR)	Cash Generation (CGCB)
Inventory Turnover Date (IT)	Cash Surplus or Deficit (CSD)
Debt Ratio (TATD)	

Assumption 3: There should be independence of observations. Independence of observations can be checked using the Durbin-Watson statistic.

Table 10: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,780[a]	,609	,546	3,12415	1,877

a. Predictors: (Constant), TATD, NLRR, LSMS, LSG, EXP, FAGE, IND, LSE, CSD, CR, IT, KKB, NOE, IMP, LSAGE, CLRR, CGCB

b. Dependent Variable: RA

The Durbin Watson statistic can range from 0-4, and approximately 2 indicates that there is no correlation between residuals. The Durbin-Watson statistics for this analysis is 1,877. Therefore there was an independence of residuals.

Assumption 4: A linear relationship between the dependent variable and independent variables should exist. According to the scatterplot in Figure 5 linear relationships exist between the dependent and independent variables.

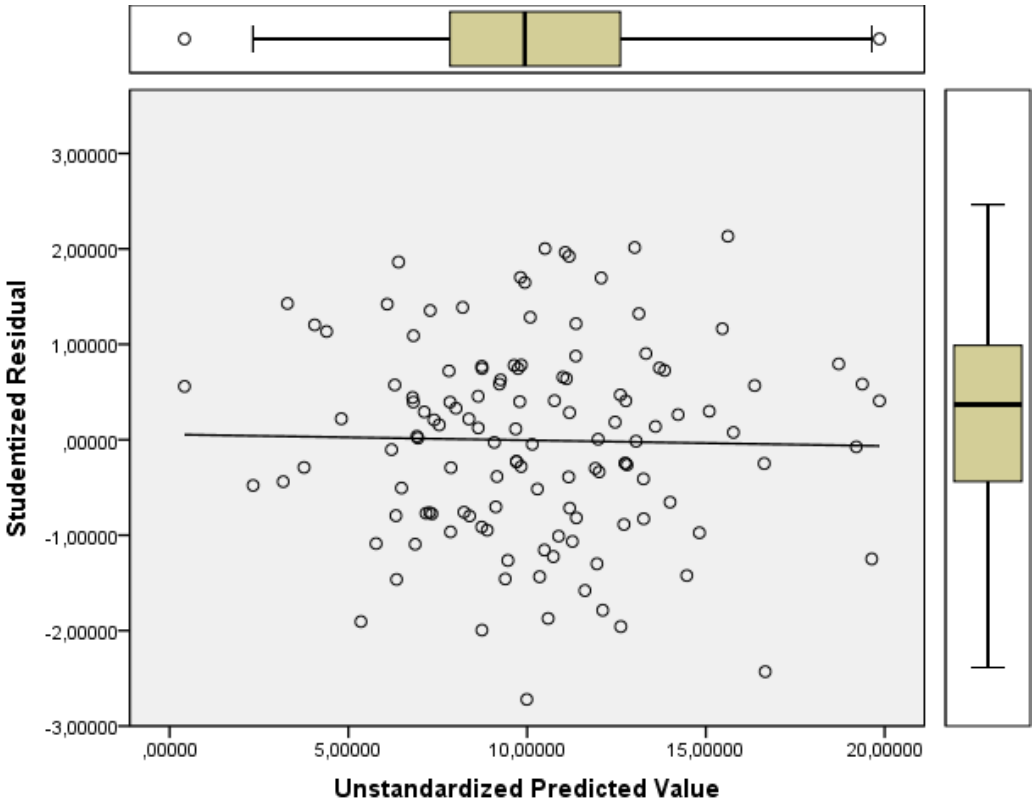

Figure 5: Scatterplot

Assumption 5: The assumption of homoscedasticity is that residuals are equal for all values of the predicted variable. The residuals in this study appear randomly scattered according to Figure 5.

Assumption 6: When there are two or more variables highly correlated with each other, multicollinearity occurs. There are two stages in identifying multicollinearity: inspection of correlation coefficients and Tolerance / VIF values. Correlations between variables are presented in Table 11. Correlations between independent variables should be less than 0,7. According to Table 11 there are no correlations larger than 0,7 in this study.

The Tolerance and VIF values are given in Table 12. If the Tolerance value is less than 0,1 and VIF value is greater than 10 than there may be a collinearity problem. In this study all the Tolerance values are greater than 0,1 so there isn't any collinearity problem.

Table 11: Correlations

		RA	IND	NOE	FAGE	LSAGE	LSG	LSE	LSMS	EXP	IMP	KKB	CLRR	NLRR	CR	IT	CGCB	CSD	TATD
Pearson Correlation	RA	1,000	-,175	-,255	-,373	-,343	-,005	-,034	-,064	,070	-,158	-,557	,246	,050	-,217	,032	,082	-,276	-,233
	IND	-,175	1,000	,312	,083	,068	-,026	-,046	,078	-,089	,075	,130	-,054	,063	-,131	,093	-,127	,012	-,039
	NOE	-,255	,312	1,000	,009	-,004	,128	,024	,011	-,122	-,024	,009	-,059	,103	-,033	,078	-,107	,029	,063
	FAGE	-,373	,083	,009	1,000	,228	-,056	-,043	-,004	-,110	,048	,260	,023	-,053	,062	-,058	-,141	,127	,072
	LSAGE	-,343	,068	-,004	,228	1,000	-,068	-,089	-,146	-,129	,061	,269	-,039	,067	,054	,015	-,073	,132	,236
	LSG	-,005	-,026	,128	-,056	-,068	1,000	-,082	,023	-,026	-,095	-,007	,108	-,020	,226	,281	,147	-,056	-,071
	LSE	-,034	-,046	,024	-,043	-,089	-,082	1,000	,109	-,065	,046	-,121	-,221	-,052	,002	-,076	,231	-,198	-,043
	LSMS	-,064	,078	,011	-,004	-,146	,023	,109	1,000	,017	,036	,034	-,062	-,030	-,028	-,017	,069	-,051	-,041
	EXP	,070	-,089	-,122	-,110	-,129	-,026	-,065	,017	1,000	,324	-,009	,086	,040	,008	,020	,050	-,083	-,068
	IMP	-,158	,075	-,024	,048	,061	-,095	,046	,036	,324	1,000	,082	,076	,055	-,055	,010	,085	-,111	,060
	KKB	-,557	,130	,009	,260	,269	-,007	-,121	,034	-,009	,082	1,000	-,077	-,066	,096	-,043	-,171	,128	,130
	CLRR	,246	-,054	-,059	,023	-,039	,108	-,221	-,062	,086	,076	-,077	1,000	,289	,006	,196	,078	-,141	-,220
	NLRR	,050	,063	,103	-,053	,067	-,020	-,052	-,030	,040	,055	-,066	,289	1,000	-,150	,100	-,043	,079	-,002
	CR	-,217	-,131	-,033	,062	,054	,226	,002	-,028	,008	-,055	,096	,006	-,150	1,000	-,023	,169	-,081	-,003
	IT	,032	,093	,078	-,058	,015	,281	-,076	-,017	,020	,010	-,043	,196	,100	-,023	1,000	,051	-,045	-,039
	CGCB	,082	-,127	-,107	-,141	-,073	,147	,231	,069	,050	,085	-,171	,078	-,043	,169	,051	1,000	-,594	-,056
	CSD	-,276	,012	,029	,127	,132	-,056	-,198	-,051	-,083	-,111	,128	-,141	,079	-,081	-,045	-,594	1,000	,074
	TATD	-,233	-,039	,063	,072	,236	-,071	-,043	-,041	-,068	,060	,130	-,220	-,002	-,003	-,039	-,056	,074	1,000

Table 11 (continued)

Sig. (1-tailed)	RA	.	,026	,002	,000	,000	,480	,352	,240	,220	,039	,000	,003	,289	,008	,363	,183	,001	,004
	IND	,026	.	,000	,179	,226	,388	,305	,195	,163	,202	,075	,274	,242	,073	,152	,079	,447	,333
	NOE	,002	,000	.	,460	,483	,077	,395	,452	,087	,396	,459	,255	,127	,357	,193	,118	,372	,244
	FAGE	,000	,179	,460	.	,005	,269	,317	,483	,112	,297	,002	,398	,278	,245	,260	,058	,079	,212
	LSAGE	,000	,226	,483	,005	.	,227	,162	,052	,076	,250	,001	,333	,228	,275	,432	,209	,071	,004
	LSG	,480	,388	,077	,269	,227	.	,182	,399	,388	,146	,468	,116	,410	,006	,001	,051	,268	,215
	LSE	,352	,305	,395	,317	,162	,182	.	,114	,236	,306	,089	,007	,283	,491	,199	,005	,014	,315
	LSMS	,240	,195	,452	,483	,052	,399	,114	.	,427	,346	,353	,245	,371	,378	,426	,223	,288	,326
	EXP	,220	,163	,087	,112	,076	,388	,236	,427	.	,000	,462	,171	,328	,466	,412	,289	,180	,227
	IMP	,039	,202	,396	,297	,250	,146	,306	,346	,000	.	,182	,200	,270	,271	,455	,173	,110	,255
	KKB	,000	,075	,459	,002	,001	,468	,089	,353	,462	,182	.	,196	,232	,142	,316	,028	,077	,074
	CLRR	,003	,274	,255	,398	,333	,116	,007	,245	,171	,200	,196	.	,001	,474	,014	,195	,059	,007
	NLRR	,289	,242	,127	,278	,228	,410	,283	,371	,328	,270	,232	,001	.	,048	,134	,317	,191	,491
	CR	,008	,073	,357	,245	,275	,006	,491	,378	,466	,271	,142	,474	,048	.	,398	,030	,184	,488
	IT	,363	,152	,193	,260	,432	,001	,199	,426	,412	,455	,316	,014	,134	,398	.	,285	,311	,334
	CGCB	,183	,079	,118	,058	,209	,051	,005	,223	,289	,173	,028	,195	,317	,030	,285	.	,000	,266
	CSD	,001	,447	,372	,079	,071	,268	,014	,288	,180	,110	,077	,059	,191	,184	,311	,000	.	,207
	TATD	,004	,333	,244	,212	,004	,215	,315	,326	,227	,255	,074	,007	,491	,488	,334	,266	,207	.

Table 11 (continued)

N	RA	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	IND	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	NOE	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	FAGE	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	LSAGE	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	LSG	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	LSE	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	LSMS	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	EXP	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	IMP	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	KKB	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	CLRR	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	NLRR	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	CR	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	IT	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	CGCB	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	CSD	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
	TATD	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125

Table 12: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	29,992	3,286		9,128	,000	23,479	36,506					
	IND	-,425	,620	-,046	-,685	,495	-1,654	,804	-,175	-,066	-,041	,819	1,221
	NOE	-,036	,010	-,242	-3,669	,000	-,055	-,016	-,255	-,334	-,222	,843	1,187
	FAGE	-,116	,037	-,203	-3,117	,002	-,190	-,042	-,373	-,289	-,189	,866	1,155
	LSAGE	-,052	,028	-,127	-1,885	,062	-,108	,003	-,343	-,179	-,114	,804	1,244
	LSG	,351	1,054	,022	,333	,740	-1,739	2,441	-,005	,032	,020	,810	1,235
	LSE	-,691	,612	-,075	-1,129	,261	-1,905	,522	-,034	-,109	-,068	,832	1,202
	LSMS	-,256	,308	-,052	-,830	,408	-,866	,355	-,064	-,080	-,050	,947	1,056
	EXP	,064	1,254	,003	,051	,959	-2,421	2,549	,070	,005	,003	,830	1,205
	IMP	-3,579	1,742	-,136	-2,055	,042	-7,032	-,126	-,158	-,195	-,124	,831	1,204
	KKB	-,005	,001	-,416	-6,233	,000	-,007	-,004	-,557	-,516	-,377	,823	1,216
	CLRR	2,862	1,377	,146	2,078	,040	,132	5,592	,246	,197	,126	,738	1,356
	NLRR	,000	1,472	,000	,000	1,000	-2,918	2,919	,050	,000	,000	,844	1,185
	CR	-,745	,271	-,178	-2,745	,007	-1,283	-,207	-,217	-,256	-,166	,868	1,151
	IT	-9,362E-5	,000	-,024	-,370	,712	-,001	,000	,032	-,036	-,022	,867	1,153
	CGCB	-2,028	,813	-,199	-2,496	,014	-3,639	-,417	,082	-,235	-,151	,577	1,734
	CSD	-3,361	,843	-,311	-3,987	,000	-5,032	-1,690	-,276	-,360	-,241	,603	1,660
	TATD	-,291	,257	-,074	-1,134	,259	-,800	,218	-,233	-,109	-,069	,867	1,153

a. Dependent Variable: RA

Assumption 7: There can be certain data points that are classified as unusual from the perspective of fitting a multiple regression model. These data points are generally detrimental to the fit or generalization of the regression equation. "Casewise diagnostics" option is selected to use unstandardized residuals in SPSS. If all the cases have standardized residuals less than +3 and -3, this table will not be produced as part of SPSS statistics output. In this study SPSS did not produce Casewise Diagnostics, so all the residuals are standardized.

Assumption 8: In order to determine statistical significance the residuals should be normally distributed. To check for the assumption of normality Linear Regression: Plots Historgram or a normal Q-Q Plot of the studentized residuals are used. According to the histogram in Figure 6 and P-P Plot in Figure 7 the residuals are normally distributed.

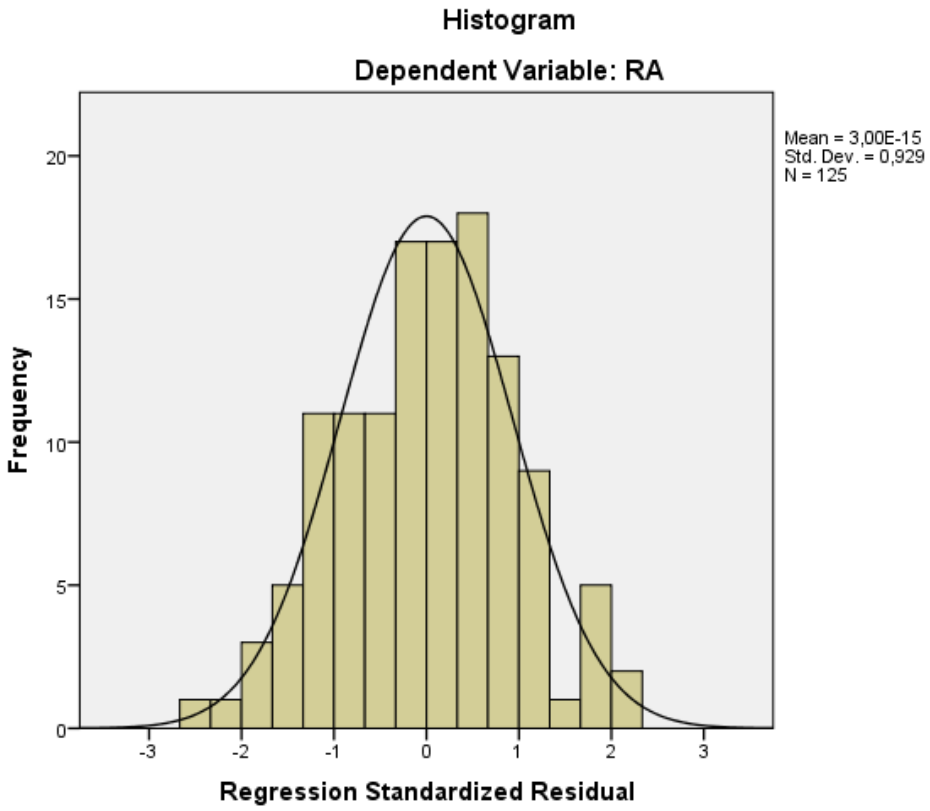

Figure 6: Linear Regression: Plots Histogram

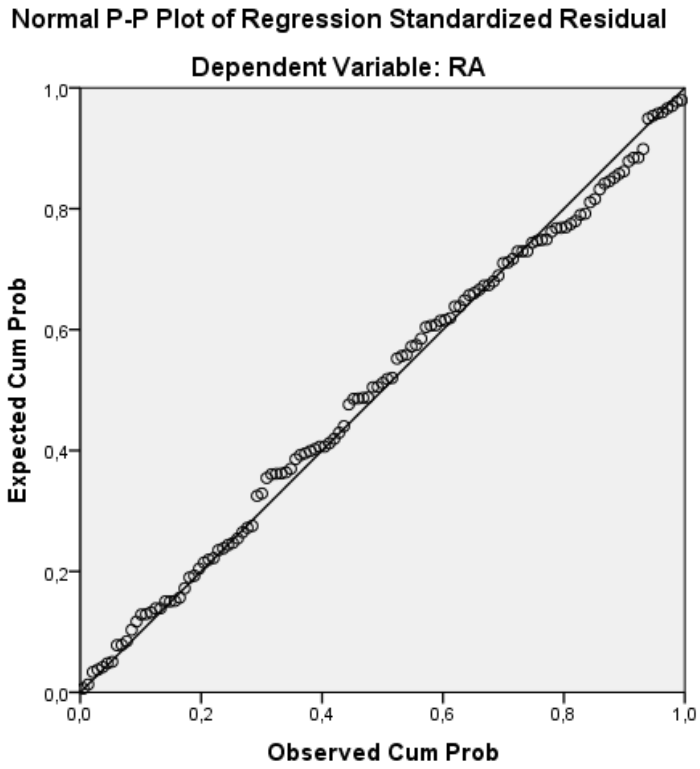

Figure 7: Linear Regression P-P Plot

3.5 RESULTS

In this part the model will be discussed using multiple correlation coefficients, percentage of variance explained, the statistical significance of the overall model and the precision of the predictions from the regression model will be discussed. The *R*" value in Table 10 is a measure of the strength of the linear association between these two variables and gives an indication of the goodness of the model fit with a value that can range from 0 to 1. Higher values indicate a stronger linear association. In this research *R* value is 0,780 indicating a strong level of association. The coefficient of R^2 is a measure of the proportion of variance in the dependent variable that is explained by the independent variables. There is another measure called adjusted R^2 which corrects the positive bias in order to provide a value that would be expected in the population. In Table 10, R^2 is 0,609 and adjusted R^2 is 0,546. R^2 for the overall model is 60,9 % and adjusted R^2 is 54,6%, a large size effect according to Cohen (1988).

The statistical significance of the overall model is presented in the "Sig." column of the Table 13.

Table 13: ANOVA[a] Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1623,922	17	95,525	9,787	,000[b]
	Residual	1044,350	107	9,760		
	Total	2668,272	124			

a. Dependent Variable: RA

b. Predictors: (Constant), TATD, NLRR, LSMS, LSG, EXP, FAGE, IND, LSE, CSD, CR, IT, KKB, NOE, IMP, LSAGE, CLRR, CGCB

"Sig." value is ,000 which actually means that $p < 0,05$. If p is $< 0,05$, the results are statistically significant. The coefficients and significance levels of independent variables are presented in Table 12.

According to results of multiple regression, 4 non-financial and 4 financial independent variables have correlation with credit rating from evaluated 10 non-financial and 7 financial independent variables.

Among 10 non-financial independent variable, NOE, FAGE, IMP and KKB has less than 0,05 "Sig." value. According to statistical results; NOE has positive correlation with RA and H_2 was accepted while H_0 was rejected. Similarly, FAGE has a positive relationship with credit rating and this result shows that companies with higher experience has better credit ratings. Therefore H_3 was accepted and H_0 was rejected. On the other hand, IMP has an inverse relationship with RA. An import firm requires higher level of foreign currency transactions and this result can be explained with currency risk. Therefore, H_9 was accepted while H_0 was rejected. The last non-financial independent variable that has a positive relationship with RA is KKB. "Sig." value of KKB is 0 and this result highlights that companies which have shareholders with higher level of KKB have better RA. In this case, H_{10} was accepted and H_0 was rejected. No direct correlation could be found between RA and 6 other non-financial independent variables. These independent variables are IND, LSAGE, LSG, LSE, LSMS and EXP. Therefore H_0 was accepted for these cases.

According to multiple regression model, 4 of financial independent variables have correlation with RA among 7 total financial independent variables. These variables are CLRR, CR, CGCB and CSD. Firstly CLRR has a negative relationship with RA. This result shows that companies with lower cash limit risk rate have better

credit rating scores and therefore H_{11} was accepted. In a different perspective, CR has a positive relationship with RA. Liquidity is a significant indicator for companies' financial performance and the statistical results show that it also has importance for credibility. Therefore H_{13} was accepted and H_0 was rejected for CR. Similarly, CGCB also has a positive relationship with RA and H_{15} was accepted while H0 was rejected. Lastly, as a dummy variable, CSD has a relationship with RA and this result shows that the companies have cash surplus can get better credit rating scores. According to this result H_{16} was accepted and H_0 was rejected. "Sig." values of NLRR, IT and TATD are above 0,05 and therefore no correlation between these variables and RA could be detected. As a result of this, H_0 was accepted for these 3 independent variables.

In this study, 125 samples were used in order to build regression model. Different results can be obtained by increasing the number of samples.

CONCLUSION

In developing countries which relatively have unfair distribution of income, capital is the main requirement of economy. SME's constitute a major part of these types of economies. Most of the SME's require credits in order to maintain their economic life because of the structure of economy. Therefore, as the credit demand increase, the capital supply remains limited and credit institutions require systems in order to categorize their customers. With the help of technological improvements in recent years, credit rating systems are one of the most common models used in credit institutions. These systems help the creditors to categorize their customers, track their risks effectively and determine their price and credit policies according to cyclical situations. On the other hand, credit ratings are also helpful for SME's in order to evaluate their own financial and non-financial performance. Hence the study aims to answer which financial or non-financial factors have significance for the determination of credit rating.

Each credit institution applies different credit policies in their credit rating systems. These policies may differ according to many factors. In the literature review, it is seen that there are not many studies which can help SME's about determination of their credit ratings. For most of the credit institutions, the credit policies applied in credit rating systems are not open to share information because of manipulation risk of the results. As a result of this, it is hard to obtain data from these corporations. Therefore, similar studies in the literature have limited data or limited coverage. The most important factor separating this study form the other studies in literature is the data set includes financial and non-financial factors and the evaluation is performed only on SME's

In this study, 125 SME samples that have 0-20 million annual turnovers were used in order to evaluate 10 non-financial and 7 financial independent variables' relationship with credit rating score. The dataset was gathered from a credit institution operating in Turkish capital market. The used non-financial variables are; industry, number of employees, firm age, large shareholder age, large shareholder gender, large shareholder education, large shareholder marital status, export, import, and large shareholder KKB score. The financial variables are; cash limit risk rate, non-cash limit risk rate, current rate, inventory turnover date, cash generation, cash surplus or deficit and debt ratio. The evaluated data set is the credit institution's

rating system results between 2012 and 2016. According to the multiple regression results, number of employees, firm age, KKB, cash limit risk rate, current ratio, cash generation and cash surplus or deficit has positive relationship with credit rating. On the other hand, import operations have negative relationship with the credit rating of the company.

In the analysis part, 10 non-financial and 7 financial factors were evaluated. According to the statistical results, 4 non-financial and 4 financial factors have positive or negative effect on credit rating. With an overall perspective, this result can be interpreted as the financial factors have more significance in terms of credit institutions since majority of the chosen financial data found related with credit rating.

In developing countries, SME's generally do not have healthy financial statements for analysis because of informal economy problem. These companies make non-invoiced sales because of tax advantage and they cannot represent these sales in their income statement. Therefore, credit institutions cannot measure these companies' real financial performance and this situation causes the company to get worse credit ratings. According to results, SME's should apply more balanced fiscal policies when conducting their activities and they should prepare their financial statements healthier in order to have more credibility.

According to financial factors that found related to credit rating, SME's should apply these fiscal policies;

Organization of borrowing strategy must be well planned and especially cash credit limits should not be used fully. Credits should not be seen like equity of company. The real financing requirements should be determined and borrowing structure should be organized according this factor.

Liquidity is an important performance measurement and current ratio has positive effect on credit rating. The liquid assets of company should be more than short term liabilities in the balance sheet. Company should not make huge investments on assets that cannot be converted into cash easily.

The income obtained from out of core business is not permanent. Therefore companies should focus on their main activities and obtain their profit from these activities.

Company's cash surplus shows that the company has financial power to fulfill its liabilities. It is especially significant for credit institutions in evaluation of a long-term project credit and a permanent credit limit.

The non-financial factors also have big significance about credibility evaluation. In the most of bankruptcy cases, companies' financial indicators do not show any early warning signal. However, firm's structural and operational weaknesses may cause serious problems and mostly these weaknesses are ignored. The study results showed that, these factors are also important and must be taken into consideration.

SME's generally maintain their operations with fewer employees as possible because of cost advantages. However this situation can cause heavy workload, jurisdiction uncertainty and interruption of operations. Therefore, credit institutions evaluate companies which have more employees with higher ratings. SME directors should plan their employee requirements realistically and hire optimal number of employees.

Experience is one of the most important factors in economy. Especially in developing countries which have more uncertain situations, industry experience gets more significance. Therefore credit institutions evaluate more experienced SME's with higher credit ratings.

Import operations can be effective for a company because of the cost advantages or quality or some other beneficial factors comparing with the domestic market. However these activities expose the company to currency risk. As a consequence, SME's should continue their operations with local currency as more as possible.

Shareholders' paying performance is one of the most significant evaluation criteria and it is generally ignored by companies. In most cases, shareholders have a sense that their personal credibility and company's credibility are evaluated separated from each other. However, a legal entity's morality is primarily measured with the natural entity's morality. Therefore, SME shareholders should be careful about their payment records.

Also, some interesting inferences can be made from the variables that are not related with rating according to study results. Industry of the company is a good

instance for this case. The credit rating system is not sensitive about if the SME is a production or a merchandise company. It can be interpreted that the evaluated credit institution did not have a credit policy specific on industry in the evaluated period. As mentioned before, the credit rating policies may differ according to many factors. For instance, if there is an economical crisis and merchandise companies were affected from this situation more than other units of market, credit institutions can change their credit rating policies and make merchandise companies have worse credit ratings. However, in cases where economy is in a better condition, credit institutions can apply less strict credit policies because of their marketing objectives.

Another interesting result is about shareholder's age, gender, education and marital status. Although these factors seem important at first glance because they are supplement factors for company's credibility, however they have no direct relationship with credit rating.

SME's and credit institutions have great importance in developing country economies. For the permanency of a healthy economy, this interrelation must continue effectively. Credit rating systems have critical role for both sides for this interrelation and these systems must be evaluated detailed. Consequently, the study reached the answers which it was aimed to answer at the beginning. The evaluation was made on one credit institution and specific variables. After this point, the literature can be improved by increasing number of credit institutions, samples and variables.

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