AKDENIZ UNIVERSITY

INSTITUTE OF SOCIAL SCIENCES

Aytakin MAMMADLI

BUSINESS FAILURE IN TOURISM ENTERPRISES LISTED IN BORSA İSTANBUL (BIST)

Department of Tourism Management

International Tourism Management Program

Antalya, 2019

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Supervisor

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Department of Tourism Management

International Tourism Management Program

Antalya, 2019

T.C.
Akdeniz Üniversitesi
Sosyal Bilimler Enstitüsü Müdürlüğüne,

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AUTHOR DECLARATION

I hereby declare that this study titled "Business Failure in Tourism Enterprises Listed in Borsa İstanbul (BIST)" presented by me as a masters' degree thesis has been written in accordance with academic rules and ethical values. I also declare and confirm with my honor that, all material I have benefited are shown in the bibliography and referenced in the thesis.

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TEZ ÇALIŞMASI ORİJİNALLİK RAPORU
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b.	: Bankrupt
BIST	: Borsa İstanbul
CBRT	: The Central Bank of the Republic of Turkey
COGS	: Cost of Goods Sold
EBIT	: Earnings Before Interest and Taxes
EBITDA	: Earnings Before Interest, Taxes, Depreciation and Amortization
et al.	: And Others
f.	: Failed
FP	: Failure Prediction
KAP	: Public Disclosure Platform
K-S	: Kolmogorov-Smirnov
MDA	: Multiple Discriminant Analysis
nb.	: Non-bankrupt
nf.	: Non-failed
OCF	: Operating Cash Flow
PNN	: Probabilistic Neural Network
r.	: Ratio
ROA	: Return on Assets
ROCE	: Return on Capital Employed
ROE	: Return on Equity
SME	: Small and Medium-sized Enterprises
TV	: Tolerance Value
VIF	: Variance Inflation Factor
viz.	: Namely

SUMMARY

Business failure is a very broad and complex concept from inability to pay short-term debts to bankruptcy. Every company can face failure regardless of its size and age. A huge number of stakeholders can be affected by this. Considering of all these, companies try to predict and take precautions against business failure. Researches on this subject have shown that companies don't fail suddenly or unexpectedly. Warning signals of financial failure may occur much earlier than its ultimate bankruptcy. Therefore, those signals can be useful in predicting failure before it actually appears. Financial ratios of a company are one of those warning signals. Researchers across the world have been trying to develop failure prediction models using these ratios for decades.

The aim of this thesis is to develop a failure prediction model for tourism enterprises in Turkey. For this reason, the annual financial statements of 17 tourism enterprises listed on Borsa İstanbul in the period of 2012-2017 were analyzed and 32 financial ratios were determined as independent variables. The companies were divided into two categories, and the dependent variable of criterion was failure. Firstly, multiple discriminant and logistic regression analyses were applied in order to develop the model. However, both methods failed in developing a model due to the small sample size. Then, the Mann-Whitney U test was applied to determine whether the median values of failed and non-failed companies differ. As a result of the Mann-Whitney U test analyses done for each year; It was determined that the most frequent (4 of 6 years) statistically significant differences were in terms of EBIT/current liabilities, quick ratio, EBIT/total debt, interest coverage ratio and economic rantability ratio. In terms of all these ratios the mean ranks of non-failed companies were higher than the failed companies.

Keywords: Multiple Discriminant Analysis, Business Failure, Logistic Regression, The Mann-Whitney U Test, Failure Prediction in Tourism

ÖZET

BORSA İSTANBUL'DA (BIST) İŞLEM GÖREN TURİZM İŞLETMELERİNDE FİNANSAL BAŞARISIZLIK

Finansal başarısızlık, kısa vadeli borçların ödenememesi durumundan iflasa kadar çok geniş ve karmaşık bir kavramdır. Büyüklüğü ve yaşı ne olursa olsun her şirket başarısızlıkla karşı karşıya kalabilir. Bu durumdan çok sayıda paydaş etkilenebilir. Tüm bunları göz önüne alarak, şirketler finansal başarısızlığı önceden tahmin etmeye ve ona karşı önlem almaya çalışır. Bu konu üzerine yapılan araştırmalar, şirketlerin aniden veya beklenmedik şekilde başarısız olmadıklarını göstermiştir. Finansal başarısızlık için uyarı sinyalleri, nihai iflastan çok daha önce gerçekleşebilir. Dolayısıyla, bu sinyaller gerçekleşmeden önce başarısızlığı tahmin etmek faydalı olabilir. Bir şirketin finansal oranları, bu uyarı sinyallerinden biridir. Dünyanın dört bir yanındaki araştırmacılar, yıllardır bu oranları kullanarak finansal başarısızlık tahmin modellerini geliştirmeye çalışmaktadır.

Tezin amacı, Türkiye'deki turizm işletmeleri için bir başarısızlık tahmin modeli geliştirmektir. Bu nedenle, Borsa İstanbul'da işlem gören 17 turizm işletmesinin 2012-2017 dönemine ait yıllık mali tabloları analiz edilmiş ve 32 finansal oran bağımsız değişkenler olarak belirlenmiştir. İşletmeler başarılı ve başarısız olarak 2 kategoriye ayrılmış olup bağımlı değişken kıstası başarısızlıktır. Öncelikle, modeli geliştirmek için çoklu diskriminant ve lojistik regresyon analizleri uygulanmıştır. Fakat küçük örneklem büyüklüğü nedeniyle her iki yöntem de model geliştirmede başarısız olmuştur. Daha sonra başarılı ve başarısız şirketlerin ortanca değerlerinin farklılık gösterip göstermediğini belirlemek için Mann-Whitney U testi uygulanmıştır. Her yıl için gerçekleştirilen Mann-Whitney U testi analizleri sonucunda; en fazla istatistiksel olarak anlamlı farklılıkların (6 yıldan 4'ü) FVÖK / cari borçlar, likidite oranı, FVÖK / toplam borç, faiz karşılama oranı ve ekonomik karlılık oranı açısından olduğu tespit edilmiştir. Tüm bu oranlar açısından, başarılı şirketlerin ortalama değerleri, başarısız şirketlere nispeten daha yüksektir.

Anahtar Kelimeler: Çoklu Diskriminant Analizi, Finansal Başarısızlık, Lojistik Regresyon, Mann-Whitney U Testi, Turizmde Başarısızlık Tahmini

INTRODUCTION

Due to some factors such as globalization, rapid changes in technology competition in markets is getting bigger and more serious. All these make the conditions more and more difficult. These difficulties appear in different ways for companies; everything may start for some companies by losing part of their customers and decreasing their profit. But as this situation continues, it becomes very difficult for the company to fulfill its obligations, to carry out its daily operations. Sometimes companies cannot even survive and end all their activities. All these refer to business failure which is a very broad concept from liquidity/solvency shortage to bankruptcy. Business failure can occur because of either internal (weak management, business life cycle, over borrowing, lack of cash flow or operating capital) or external reasons (economic, political and legal, social, natural or industrial). As a result of business failure, a company can lose its ability of solvency or go bankrupt. Additionally, business failure can affect the industry or country economy where companies operate negatively. As financial fluctuations affect and cause business failure, business failure can also lead to crises in the economy, especially a chain failure in the industry is very dangerous for the economy of the country.

All these issues make business failure a very crucial concept for several stakeholders such as managers, investors, creditor organizations, financial analysts and external auditors, regulatory bodies, governments and employees and labor unions. All these parties try to prevent business failure before it occurs. For that reason, as a tool they can use failure prediction models. These are statistical models including several ratios defined as most powerful in failure prediction. It has been almost six decades that researchers are investigating this issue and developing different failure prediction models. There are different models in literature because appropriate financial ratios for models vary among industries and countries where companies operate.

This study's purpose is developing a business failure prediction model for tourism enterprises in Turkey. For this reason, the annual financial statements of 17 tourism enterprises listed on Borsa İstanbul (BIST) from the period of 2012-2017 are analyzed.

This study is composed of three chapters. The first chapter defines several concepts related to business failure such as definition, types, internal and external factors affecting it, parties interested in it and precautions against it.

In the second chapter statistical models used in business failure prediction and studies on this topic are discussed. Firstly, univariate statistical models and several studies using

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these methods are described. Secondly, multivariate statistical models with a few prominent studies using these methods are described. Definitions for Multiple Discriminant Analysis (MDA) and Logistic Regression Analysis are also given in that section. This section also includes a table showing the business failure prediction studies related to tourism industry.

In the third and final chapter statistical analyses used for this study are discussed. While the dependent variable in this study is the failure of tourism companies, the independent variables are 32 ratios computed from the the annual statements of 17 tourism enterprises listed on BIST from the period of 2012-2017. Three statistical analyses such as MDA, Binary Logistic Regression and Mann-Whitney U test are applied to analyze the data. The results of these three statistical methods are clarified and discussed in the third chapter.

CHAPTER ONE
CONCEPTS OF BUSINESS FAILURE

1.1. Definition of Business Failure

Failure means an activity that needs to be carried out or a task that needs to be fulfilled does not take place as desired (Özdemir, 2011: 36). The main purpose of companies-not considering not-for-profit organizations-is to make a profit (Mirze, 2009: 36). But sometimes because of different internal and external reasons companies can fail to meet this purpose. Also, theoretically lifespan of a company-not considering special conditions like to be founded for a specific project-is assumed to be unlimited (Acar and Tetik, 2010: 14). But sometimes failure can even cause total dissolution of business activities. As it's seen, for companies, failure is a broad concept that can occur in different ways. Despite the fact that there isn't a universal definition for business failure widely accepted in the world, it generally describes when a company's payment obligations exceed its financial savings (Park and Hancer, 2012: 313).

Events such as decrease in dividends, business closures, losses, CEO resignations, sudden drops in stock prices, etc. are just e few of a huge number of events which can be considered as business failure (Ross et al., 2002: 854). Therefore, it is difficult to fully explain the concept of business failure. Several researchers defined it in different ways. For example, Beaver (1966: 71) defined it as for companies being unable to pay their maturing obligations. For Altman (1968: 593) and Ohlson (1980: 114) it's legally bankrupt company. Aktaş (1997: 98) added two criteria (negative net income for three consecutive years and operation shutdown due to financial crisis) to bankruptcy, accordingly, had three criteria for failure. Olsen et al. (1983: 189) in their studies related to restaurant failure defined it as restaurants that had cumulative negative cash flows for six consecutive months. Cho (1994: 84) in the study investigating failure in hotels and restaurants defined it as negative net income for three or more consecutive years.

1.2. Types of Business Failure

Despite of numerous different definitions and types of business failure, Altman (1993) classified three main types of failure. They are economic failure, insolvency and bankruptcy. Economic failure is a situation in which a company's return on investment is less than the

fixed level by industry standards (as cited in Park and Hancer, 2012: 313). The other two types are below.

1.2.1. Insolvency

Insolvency is a condition when due to lack of liquidity a company cannot meet its financial obligations. Concept of liquidity expresses the ability of being able to turn the assets of the business into cash quickly and easily (Ross et al., 2002: 29). Liquidity depends on a firm's cash flow (Subramanyam, 2014: 9). Even the companies with strong equity capital (in comparison to total assets) can face serious difficulties because of illiquidity (Subramanyam, 2014: 229). Thus, liquidity is very important for a company to carry on the activity

Long-term restrictions in cash flows may cause insolvency in a company (Subramanyam, 2014: 521). Insolvency is the situation when the book value of the debts of a company exceeds the market value of its assets. So, it's a negative net worth situation for a company (Ross et al., 2002: 855). This negative net worth causes low or negative net income.

A company with insolvency problem should not always be defined as financially failed. But there's no doubt that for a company insolvency is quite more dangerous than illiquidity. On the other hand, if insolvency becomes constant, this problem can create serious damages for the firm. After a while, low profit reduces the company's market value. For example; while investors are not interested in low profit areas, credit institutions such as banks etc. are not willing to give credit to low profit companies (Gülcan, 2011: 9). Permanency of such issues can cause bankruptcy in the end.

1.2.2. Bankruptcy

Bankruptcy is the last phase of the failure process, that begins with inability of enterprise to fulfill its obligations and is legally concluded in court. It differs from illiquidity and insolvency with its legal side (Doğrul, 2009: 29).

The concept of bankruptcy is often used in the same sense as business failure. Such use is often wrong. Because bankruptcy is quite narrower than business failure. Bankruptcy is the process that begins with financial difficulties and ends in court. It is the situation where all the activities of the business are terminated and the process of closure is started. Additionally, unless there's a court notice, a company cannot legally be considered as bankrupt. On the other hand, business failure is a process which begins with inability to pay short-term debt and ends with bankruptcy. As it is understood from these definitions; bankruptcy is the final

stage of business failure and occurs in line with the continuity of business failure. Not every business failure is bankruptcy, but every bankruptcy is business failure (Doğrul, 2009: 31).

In Turkey the concept of bankruptcy is held in Turkish Commercial Code and in Enforcement and Bankruptcy Law.

1.3. Factors Causing Business Failure

Generally, factors which cause business failure in companies can be gathered under two main groups which are internal and external reasons.

Here are some general reasons for business failure (Akgüç, 2010: 947);

- Inability to reach the expected level of sales,
- Excessive increase in costs,
- Failure to collect the receivables in a timely manner and the majority of receivables to be transferred to doubtful receivables,
- Very low speed and slowdown in inventory turnover,
- Excessive investment in fixed assets,
- Over borrowing,
- Incorrect determination of establishment location,
- Weakness in the market compared to competitors,
- Inaccurate fusion decisions,
- Illiquidity, being unable in fulfilling the obligations in time,
- Natural disasters,
- Strikes.

1.3.1. Internal Reasons

Internal reasons can be controlled by the company management. These reasons appear during the business activities; starting from the place of establishment can occur at every stage of the business. The importance of these factors is that some previous studies pointed out that factors affecting business failure in an enterprise are mainly internal reasons.

For a more detailed discussion internal reasons are gathered into three groups. They are weak administration, financial internal reasons and business life cycle.

1.3.1.1. Poor Management

Poor management problem often results from the manager's lack of talent and qualifications. These factors are the result of the fact that the management cannot analyze the

environment well and that it cannot see the possible opportunities and threats. Several studies revealed the significant importance of this problem comparing to other internal reasons in business failure. For example, in Whitaker's (1999: 127) study poor management had the most impact on business failure (77%). Gitman supported this thesis by arguing that the lack of management caused more than 50% of business failures (as cited in Doğrul, 2009: 28). The mistakes done by the manager that may lead the business to failure can be listed as follows (Akgüç, 2010: 948);

- Fail to establish a balance between financing requirements and resources due to insufficient financial planning,
- Excessive borrowing and lack of equity as a result of overexpansion,
- With the fixed costs soaring, the enterprises cannot bear these expenses,
- Failure to fulfill obligations on time,
- Inadequate coordination between sales and production units,
- The new products are not developed,
- The business activities are not diversified,
- Inability in following the developments in the field of activity,
- Increasing the credit sales without the necessary customer information,
- Insufficient importance is given to research on new markets,
- Sale of goods and services to one or a few customers, i.e. weak customer portfolio,
- Working with very few supplier companies,
- No consensus due to differences of opinions between the top level managers,
- Managers lack of technical knowledge,
- The managers' inability to take rapid actions against the negativity,
- All management is collected in one hand.

Tavlin et al. (1989: 73), investigated failure reasons of 12 bankrupt restaurants in the USA. Results revealed that in 9 of 12 cases weak management played a crucial role in bankruptcy. Such reasons are as high management turnover, ego of founder/CEO, poor management execution, management infighting and the most frequent one-overexpansion which is a result of wrong management decisions.

1.3.1.2. Financial Internal Reasons

Financial internal reasons can be divided into three types which are mutually related;
- Lack of cash flow

- Lack of operating capital

- Over borrowing

Dun & Bradstreet, in a study revealed that 47.3% of business failures are caused by financial reasons such as lack of working capital and cash flow (as cited in Brigham and Daves, 2007: 867).

Operating capital means the current assets of a company, which can be turned into cash quickly. It's also called working capital in literature (Şamiloğlu and Akgün, 2015: 285). Operating capital has a great importance for enterprises to operate at full capacity, to continue production uninterruptedly, to expand the volume of business, to reduce the risk of not meeting its obligations, to increase the credit worthiness, to prevent the financial situation from being difficult in extraordinary situations, and to carry out the operation in a profitable and efficient manner (Akgüç, 2010: 201). In short, businesses need adequate operating capital to be able to continue their activities properly. If the operating capital is insufficient, the enterprises cannot pay their short-term debts and continuity of this situation may lead to the liquidation of the enterprise.

When there is a decrease in cash flows of the company, this cause illiquidity and lack of operating capital. This situation may also lead to another financial internal reason called over borrowing.

Lack of operating capital cannot always cause over borrowing. Specially, managers' willingness to benefit from financial leverage is often the cause of over borrowing. Because, the enterprises aim to keep the return on equity rate high and benefit from financial leverage for obtaining that goal. The main issue emphasized here is how much the enterprises should borrow, in other words, to what extent they should benefit from financial leverage.

As long as income from the assets that the company bought with debt is greater than the expenditures of the company, financial leverage has a positive impact on the return on equity, i.e. the increase in the financial leverage will increase the return on equity. However, the possibility of consistently benefiting from financial leverage is not unlimited. Because, if the financial leverage ratio is very high, the increased risk due to the increase in the level of debt utilization will result in an increase in the cost of liabilities and equity, while the increase in the equity profitability will not continue or will decrease. Because even if the high rate of financial leverage brings an income on return on equity, it will cause the company to pay the principal and interest payments (Uzun, 2005: 163; Akgüç, 2010: 32).

1.3.1.3. Business Life Cycle

Although the lifespan for companies is considered unlimited, this doesn't mainly match with reality. There's a simple, but life-saving term division for companies. According to this division, the life cycle of a company is divided into four periods. They are launch, growth, maturity and decline (Cooley and Roden, as cited in Doğrul, 2009: 35).

Launch: A newly founded company has recently started its operations and is trying to introduce its new product to the market. As the product is new and lesser known in the market, the level of the sales is very low and promotional activities are very intense to increase sales. As the promotional activities are very costly, in this stage the new company often makes a loss. So, this period is the most critical and costly stage for companies. Besides promotion costs, newly founded companies are much smaller than the old companies in the market and their capital structure is worse. As credit institutions consider small enterprises to be riskier, they offer more restrictive conditions and apply higher interest rates when giving credits to these enterprises (Aktaş, 1997: 9). All these factors make the launch period very complex and the possibility of facing business failure in this stage is very high for companies. It was revealed in the studies that approximately 50% of the newly established enterprises had to end their activities within the first five years (Emery et al., as cited in Doğrul, 2009: 32).

Growth: During this period, the problems encountered in the launch period of the company remained behind. Sales and earnings increase rapidly, but current liabilities are high. In virtue of the increase in earnings, cash deficit that occurred in the launch period is closed but may occur again due to high short-term debt. In this period the company starts to make a profit. The approach of the management is also concentrated on sales parallel to this (Zinet, 2014: 26). Additionally, large enterprises also issue bonds and shares in this period. The possibility of business failure in this stage is generally low (Doğrul, 2009: 51). But in the case of not managing the loan effectively the situation may change.

Maturity: This period can be divided into two sections. The first section is quite stable. In this section sales continue to grow, as a consequence, debts are low and profit is high. In this section the possibility of business failure is minimum. But this situation is not endless. Because as time passes, there is a competition increase in the market and new competitors are emerging. The emergence of these competitors affects sales. So, the second section of this period which is stagnant starts. With this stagnancy firstly the growth in sales and profit stops. In this stage management policies are very important. Because after a while sales and profit may start to decrease and debts to increase. So, if an effective management policy is not implemented, the enterprise may rapidly pass to decline period (Zinet, 2014: 26). To sum up

the maturity period is both the best stage and the beginning of the failure for a company. While the first section of this period is the best phase in business life cycle with minimum possibility of business failure, in the second section the possibility of business failure appears and increases during the phase.

Decline: In this period, since the sales are extremely lower than the maturity period, the inventories and the cost are at their highest level. Therefore, the profit is very low and the debts are very high. Possibility of facing business failure is maximum in this period. Unless an action plan is foreseen, the growth rate of the enterprise may start to be negative, the operation can be quickly dragged into failure and may even close entirely (Doğrul, 2009: 51).

1.3.2. External Reasons

Everything that related to the enterprise but remains outside of the enterprise forms environment. Just like people, the enterprises are also in contact with the environment in which they operate in order to maintain their activities. Most of the managers usually have the tendency to focus on the internal activities and underestimate the effect of the external environment. That's because while they have the power to change anything they want within the organizations the same things cannot be told about the external environment. The managers don't have the enough power to control and change the events taking place in the external environment. But this isn't an adequate cause for ignoring external environment. To prevent failure and to be successful, managers should learn either how to adapt their organizations to the environment or to influence it if they see they can (Mirze, 2009: 41).

Some previous studies showed that internal factors are the biggest cause of failure, whereas external factors constitute one third of the failures. But it's not enough to underestimate the external factors. Because lots of things in the environment are rapidly changing which makes the environment unstable and unpredictable (Mirze, 2009: 41). Additionally, with the process of globalization external factors, such as interest rates and other economic indicators start to affect business failure much more, and therefore, enterprises should pay more attention to macro environmental factors (Everet and Watson, 1998: 372).

Fisher and Martel (2003), in their study on seven different industries between the period of 1981-2001, investigated the environmental causes of business failures and gathered them under three groups such as economic conditions, political and legal obstacles and technology. In addition, Dun & Bradstreet, in their research, stated that nature-related factors cause failure in business and nature should be evaluated within environmental factors (as cited in Doğrul, 2009: 18). Mirze (2009: 41) divided environment into two groups. They are

general environment (economic, political and legal, socio-cultural, demographic, technological, international) and industry environment (customers, suppliers, competitors, substitutes, labor market). Additionally, Doğrul (2009: 26) in his study wrote about industrial factors causing business failure.

In this study external factors causing business failure are grouped as economic, political and legal, social, natural and industrial.

1.3.2.1. Economic Factors

Economic factors are important external reasons that affect business failures, as businesses are part of the economic system and act according to the economic legislation of the country in which they operate. The Dun & Bradstreet company conducted a research on the factors affecting business failures and suggested that 37.1% of operating failures were due to economic reasons (as cited in Brigham and Daves, 2007: 867).

Some of the economic factors affecting failures can be listed as follows;

- Fluctuation in interest rates. There's the same direction relation between interest rates and business failure. In other words, the increase in market interest rates increases the likelihood of failure of enterprises and the decrease in interest rates decreases the probability of failure of enterprises. Because interest rates are borrowing costs for enterprises. As a lot of enterprises get into short or long-term debts for being able to continue their activities, high interest rates increase the costs of companies (Everet and Watson, 1998: 385).

- Economic Stagnation. Due to rapid decrease in sales, income decreases as well, and the company can have difficulties in meeting its constant costs (Doğrul, 2009: 35).

- Credit Terms. No matter how unsuccessful a business is, it does not go bankrupt as long as it has sufficient liquidity and the possibility of finding credit. Therefore, failures are increasing in times of liquidity shortage and difficulties in finding credit. In other words, there is an inverse relation between finding credit and business failures (Altman, 1983: 17).

- Inflation. Inflation is one of the most important economic factors affecting business failures. Increases in prices at the general level will adversely affect the environment in which the enterprises operate. Due to the decrease in purchasing power of money in inflationary periods, enterprises have to pay more to reach the products and services they need. This requires businesses to need more operating capital to carry out their daily activities (to pay workers' salaries, to meet raw

material costs, to pay for energy costs, etc.). Therefore, in periods of inflation, enterprises prefer to borrow debt more and more. This situation causes heavy financial expenses in enterprises (Tunçsiper and Köroğlu, as cited in Doğrul, 2009: 37).

1.3.2.2. Political and Legal Factors

Political risk; is defined as the possibility of different political events such as war, revolution, military coup, taxation, foreign exchange restrictions and import restrictions in foreign or native countries that cause loss of profits or tangible assets in international business movements (Root, 1972: 354).

Businesses are established within the framework of legal rules and continue to operate within these rules. Businesses violating these laws are subject to various penalties, loss of reputation and thus may fail (Türko, 1999: 600). For this reason, enterprises should adapt to the legal and political structure of the country they operate in.

1.3.2.3. Social Factors

Behavioral patterns adopted by the general public combine with the economic conditions to direct the operations of the enterprise (Büker et al., 1997: 524).

The socio-cultural changes experienced in the social environment in which the business operates, force the business to comply with these changes. Avoiding monopolistic practices, producing products of good quality, respecting consumer rights, being sensitive to the environment are some of the expectations of the social environment (Türko, 1999: 599).

The elements that generates the socio-cultural environment such as the value judgments of the society, the quantity and the combination of the population, the cultural level and the fashion sense offer some threats and opportunities to the enterprises. If businesses do not analyze this environment, they can face failure (Ataman, 2001: 279).

1.3.2.4. Natural Factors

The natural environment in which the enterprise operates can be handled in two different ways. The first type refers to the natural resources that the enterprise uses for production such as soil, water, air, climate, mines, underground resources, etc. Continuous changes and developments in the natural environment, while providing a number of facilities for businesses, also may cause failure (Büker et al., 1997: 600). As a result of the large-scale production of the enterprises, a number of undesirable wastes can emerge. These wastes,

which are left to the nature without taking the necessary precautions, pollute the environment and harm the nature. In recent years, governments, civil society organizations and consumers have begun to be sensitive to products and wastes harmful to the nature. Therefore, the enterprises with no environmentally friendly (eco-friendly) products and policies (preventive measures during production process) can face loss of trust by society and fail. Contrary to what is believed, being eco-friendly brings enterprises more profit rather than losses. It's possible by more expensive eco-friendly products or taking advantage of subventions[1].

Second type of natural environment factors refer to natural disasters such as flood, earthquake, etc. which cannot be controlled by enterprises. There is always the danger of facing natural disasters and they can cause losses to enterprises (Newton, 1989: 31). Since enterprises cannot change the environment in which natural disasters occur, they should try to get the least damage from these disasters. The best and only way for it is to have the enterprise insured.

1.3.2.5. Industrial Factors

One of the most important industrial factors affecting the financial success of the enterprises is competition. To be successful the competition factor should always be controlled. There're three types of competition for enterprises (Mucuk, 2010: 28);

- Brand competition with enterprises in its branch,
- Competition within another industry providing substitute goods or services,
- Competition with other businesses due to limited consumer purchasing power.

Being able to cope with the intense competition that exists today can be achieved by changing and renewing the enterprises according to the market conditions and desires. Some of the ways to make it possible are implementing new technologies, innovation, transition to new production and distribution methods, adaptation to the wishes of the customers. Previous sections of this study related to business life cycle showed that both newly established companies in launch period and quite old and experienced companies in maturity period can face competitors. These competitions both are very critical and unless to handle them effectively, the companies can experience failure.

In the study conducted by Tavlin et al. (1989: 73), competition was revealed as one of the important factors causing in some of 12 restaurant bankruptcies. If competition was so

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[1] https://www.theguardian.com/sustainable-business/environmentally-friendly-sustainable-business-profitable (accessed: 02.05.2019)

important even back then (despite small number), considering technological developments of modern world, there is no doubt that it became even more substantial.

1.4. The Importance of Predicting Business Failure

Foreseeing business failure means to determine whether the enterprise will fail or not, and in the case of failure, to determine the underlying causes of failure as well.

If the amount of financially failed businesses in a country increases, there may be serious economic problems in that country. The financial problems of the enterprises in the country can be reflected in the banking system and can cause a decrease in the capital of the banks and damage to the system and consequently the emergence of financial crises. The resulting financial crises reduce the ability of enterprises to take credit, prevent the use of assets for investments and result in the closures of enterprises resulting in increased unemployment rates (Zinet, 2014: 32).

Predicting business failure is very important for businesses. Because business failure can be prevented if it can be known beforehand, as well as strategies that may prevent the enterprises that may fail can be developed. Therefore, this situation is very important for the groups related to the business.

In this section the concept of failure prediction is examined separately in terms of all the people and organizations related to enterprises. They are;

Management: As it was discussed in previous section, poor management is the most important internal reason causing business failure. Considering that in causing failure internal reasons are far more significant than external ones, the managers' role gains even more importance. Thereby, prediction of business failure is very vital for managers.

Investors: Today, businesses may need capital. In order to meet their needs, they sell the securities to large number of small investors or obtain the capital required from some financial institutions. Large number of investors have emerged in the market. Investors want to be informed about the businesses that they intend to invest or invest in. It is especially valuable for them to have a model for predicting business failure in order to make the investment decisions correctly. For inexperienced investors new to the market, business failure prediction models are of great importance in order to cover their deficits due to lack of experience. With the help of business failure models, they will have the opportunity to make a profitable investment. The enterprises will not be in a shortage of funds due to the investments made and will be able to make new investments (Zinet, 2014: 34).

Creditor Organizations: The decision of the creditor organizations to make lending to their customers is the result of certain stages. Because these institutions should make sure that these credits will be returned to them when issuing loans. Otherwise, the number of irreversible loans increases and in this case the lender's credit volume will decrease. Thus, these organizations need some FP models to evaluate the default possibility of their customers when loaning new credit or extending credit maturity. Business failure forecasting models can be used not only to avoid problematic credits, but also to calculate the interest rate of the borrower in order to reflect the credit risk of the bank's loan portfolio (Atiya, 2001: 929).

Financial Analysts and External Auditors: Individuals or organizations that audit the accuracy of financial statements of companies are called independent auditors. Financial analysts and external auditors are not directly concerned with the work done to predict the business failure of a company. The prediction about business failure is only a tool for them to inform the related company. In this way, they can warn the companies to take measures to prevent failure. Predictions for auditors are especially very helpful in selecting their customers and seeing which risks they may have (Zinet, 2014: 23).

Regulatory Bodies: Regulatory bodies such as Central Bank of Republic of Turkey, Banking Regulation and Supervision Agency of Turkey, Capital Markets Board of Turkey and Savings Deposit Insurance Fund of Turkey control organizations such as banks and insurance companies because these organizations are concerned with a large part of the society and where large investments are made. The business failure forecasting models are very important for these organizations, as this will allow them to monitor companies with risk of failure and increase control (Zinet, 2014: 36).

Governments: The governments benefit from the financial statements in order to perform the functions of determining economic policies, taxation and monitoring. It is significant for them to have knowledge about structure and future of enterprises of the country because the enterprises constitute a country's source of income and economy (Zinet, 2014: 24). As it was stated above, the increase in number of failed companies may cause severe problems such as economic crisis. Another problem of company failure is the increase in unemployment rate; the more companies go bankrupt, the more people lose their jobs. On the basis of all these, for the governments predictions about the business failure will enable them to determine companies with risk and to make the necessary warnings to these enterprises and to save the national economy from the serious crisis. It is considered that some firms should not undergo business failure due to their importance in the sector, employment they create, their contribution to the country's economy, and in such cases the state provides funds to the

enterprises facing business failure. For example, the most important reason for the protection of banks and other financial institutions against bankruptcies is to prevent the erosion of trust and the public to withdraw their deposits from the banks (Doğrul, 2009: 33).

Employees and Labor Unions: By business failure prediction models employees can have opinions about their companies. If the entity's financial situation is good, they may request a salary increase. If the future of the enterprise appears to be troubled, workers and their organizations may discuss measures to be taken to ensure continuity of the business against bankruptcy risk (Keskin, 2002: 30).

1.5. Precautions Against Business Failure

Business failure within the enterprises can occur in many different ways and the effects on the departments and the interest groups related to the operations may vary according to the severity and type of failure. Since the market values of enterprises in business failure tend to decrease, determining the type and taking the necessary preventive steps are of vital importance for the enterprises. The first step in rescuing a business in business failure is to analyze the reasons of the failure. Measures should be taken after analyzing the reasons that lead to failure (Türko, 1999: 601). Sharma and Mahajan (1980: 88) suggested that failures can be predicted by two models; analyzing their causes or the performance indicators of companies. The former one indicates the causes which is advantage, but its biggest limitation is that the model inputs are managers' subjective judgments. The second model does not have this limitation, the inputs are totally objective. But with this, one cannot understand the causes of failure which is its disadvantage, there is only prediction of possibility or fail.

Some of the possible precautions against business failure are listed below (Akgüç, 2010: 950).

- Extend debt maturity
- Creditors to discontinue from some of their receivables
- Transactions of fixed assets into cash
- Capital increase
- Downsizing
- Merger
- Concordatum
- Liquidation
- Refinancing

- Changing the legal form of the company
- Management of the company by a committee of representatives of creditors

CHAPTER TWO

STUDIES ON BUSINESS FAILURE PREDICTION

Researches on failure have shown that companies don't fail suddenly or unexpectedly at all, factors that stimulate failure rarely erupt in a night. Warning signals of business failure may occur much earlier than its ultimate bankruptcy. Therefore, those signals can be useful in predicting failure before it really appears. A popular method for this reason is ratio analysis (Gu, 2002: 26). This can be done through analyzing firm's financial statements. After calculating these ratios researchers use several statistical methods to analyze them and reveal the most important ones in business failure prediction. Such statistical models can be classified in two groups:

- Univariate models,
- Multivariate models.

2.1. Business Failure Prediction Using Univariate Models

The univariate statistical models handle every financial ratio one by one and aims to determine the most important ratio that predicts the failure. As it's understood, in this approach there is only one independent predictor variable. Techniques using univariate models can be listed as below (Aktaş, 1997: 26);

- Simple regression test,
- Univariate discriminant analysis,
- Markov chains.

While univariate statistical models are easier to use in terms of their simplicity, there're also some inadequacies for these models. They can be listed as below (Aktaş, 1997: 29);

- Contradictory results may appear as the results of univariate models
- Some important distinctive ratios in failure prediction may be ignored in these models
- Univariate models don't have opportunities to calculate all the features of the companies and the relationships among these features, while multivariate models have.
- The prediction power of univariate model is weaker in comparison to multivariate model.

The prediction of business failure was first started due to company bankruptcies after Great Depression. Thus, researchers started using univariate methods in 1930's (Olsen et al., 1983: 187). However, there are no studies on how to interpret the ratios made in that period. (Altman, 1968: 589). The first study of business failure estimation was done in 1935. In this study, it was determined that net working capital ratio is the most important variable as a result of examining the financial statements of 133 enterprises. The other two ratios found to be important were total assets/total debt and total assets/total fixed assets (Aktaş, 1997: 27). Altman (1968: 590) states that the study by Charles Merwin in 1942 is the first detailed example on this subject. In this study 900 firms between 1926 and 1936 were analyzed, by being separated into two groups as continuing and non-continuing firms. For Merwin (1942: 137), current ratio, net worth/total debt and net working capital/total assets are the most important ratios in detecting the failure. This study shows the signs of the failure six years prior to the bankruptcy which is the other important result of the study (Aktaş, 1997: 27).

Some essential studies using univariate statistical models are discussed below.

2.1.1. Beaver (1966)

Beaver's business failure prediction model is the most known and referred research of univariate analysis. In this study, Beaver emphasized that the best method of classifying enterprises as successful and unsuccessful is the method of determining variables by using the binary classification test. In this study, in the period between 1954 and 1964, 79 failed and 79 successful enterprises were compared. The paired sampling method was applied and the assets and industry branches of the firms were used as the matching criteria (Aktaş, 1997: 28). This was done in order to minimize the possible effect of the differences in firm sizes and industries to the financial ratios (Beaver, 1966: 113). Because firm sizes and industries are largely related to the financial difficulties of the companies (Kiracı, 2000: 74).

The failure criteria in the study were as; bankruptcy, delinquent bond interest, the negative balance in the bank account, unable to pay the stock dividends. For each failed company, their financial statements prior to the year when their failures began were analyzed and compared to the financial statements of the successful companies from the same year. In his study Beaver, defined 30 financial ratios, gathered them in 6 different groups and selected only one ratio from each group. In selection process 3 criteria were used; popularity in the literature, the appropriate results for the purpose of the use in the previous studies, convenience to the cash flow concept. The selected ratios are as below;

- cash flow to total liabilities,

- net income to total assets,

- total liabilities to total assets,

- working capital to total assets,

- current ratio,

- quick assets / (operating expenses − noncash expenses).

 Beaver's study was performed in 3 phases. These are as follows;

- The comparison of the mean values of the failed and successful companies

- The classification test using dichotomous prediction

- The analysis of likelihood ratios

 The results of the study can be listed as below;

- The financial ratios of the failed and successful firms differ

- The differences in the financial ratios of the failed and successful companies start 5 years before the failure

- Cash flow to total liabilities is the most powerful ratio in predicting the failure 5 years before it.

Nevertheless, this study was criticized in some ways. The most important criticism was about the dichotomous sampling technique that was used. Controlling two important variables such as year and total assets, which might affect business failure, might have affect the prediction of business failure negatively. Additionally, the study was also criticized in terms of its definition of failure (Aktaş, 1997: 29). Another criticism was that the model used in the study included only liquidity related ratios (Zinet, 2014: 31).

2.1.2. Tamari (1966)

Another research using univariate model is Tamari's (1966) study. This is the first study out of the USA analyzing pre-bankruptcy conditions of the companies in Israel (Keskin, 2002: 40). The data of 16 industrial firms that had declared bankruptcy and 12 newly bankrupt companies from the period of 1956-1960 was analyzed in the study. The researcher claimed that it would be healthier to evaluate the risk status of firms based on an index of many variables instead of a single variable. He chose 6 of the financial indicators that were widely used and accepted by the previous studies and formed a 'risk index'. Every ratio in this index had a coefficient. The total of the coefficients was 100%. The selected ratios and their coefficients are as follows (in descending order).

- (Original Capital + Retained Earnings)/ Total Debts   0.25

- Profit Trend   0.25

- Current Ratio   0.20

- Production Value / Stocks   0.10

- Sales / Short Term Receivables   0.10

- Production Value / Operating Capital   0.10

The results of Tamari's study are as follows.

- While the 50% of the companies which got the point of less than 30 went bankrupt, for the companies with the point of more than 30 the bankruptcy percent was 3%.

- The ratios of the failed companies started to break down 5 years before the failure. The nearer the company was to its bankruptcy year, the worse the ratios were getting.

The criticism to the study may be that the coefficients were given subjectively, but its being a step to the multiple study is the unique side of this research (Aktaş, 1997: 27).

2.2. Business Failure Prediction Using Multivariate Models

To remove the disadvantages of univariate models, multivariate models can be used as statistical techniques in failure estimation. Differently from univariate models, multivariate models can use several financial ratios in failure prediction. Moreover, these methods can also define the coefficients of the ratios included in the analyses. Some of the statistical techniques used in multivariate models are; MDA, quadratic discriminant analysis, multiple regression, logit (logistic regression) and probit analyses (Aktaş, 1997: 30). MDA and logistic regression are among the most frequently used prediction methods in business failure studies (Aziz and Dar, 2006: 29; Kim, 2011: 443). Aziz and Dar (2006: 29) also confirm the reliability of MDA and logit by determining that their results are consistently high accurate in prediction. Considering the method of this research, only MDA and logistic regression analyses with the studies used these techniques will be discussed in this section.

2.2.1. Multiple Discriminant Analysis (MDA)

The discriminant analysis is a multivariate statistical method frequently used in management, social sciences, and humanities research (Verma, 2013: 389). This function analysis helps to determine the independent (continuous) variables which discriminate between two or more naturally occurring groups (Ho, 2013: 335; Verma, 2013: 389). When two groups are involved in analysis, it's called discriminant analysis. But if the number of the groups is more than two, the technique is referred as multiple discriminant analysis (Ho, 2013: 335). For instance, for this research discriminant analysis can be applied as it involves

two groups (failed and non-failed tourism enterprises). On the other hand, if a researcher wants to determine what variables distinguish among smokers, ex-smokers, and non-smokers, multiple discriminant analysis can be applied (Ho, 2013: 335). As is also understood from the definition, there are two types of variables in discriminant analysis. They are independent (predictor) and dependent variables. There is only one dependent and several independent variables in discriminant analysis. The dependent variable must be categorical (nominal) and a true dichotomy. It consists of two groups, viz., failed against non-failed or more than two groups, viz., children, youth, and adults. The independent variables are metric (continuous) and should never be dichotomized. The size of the sample directly impacts on the stability of the findings. Especially, the results may become unstable if the sample size decreases relative to the number of predictor variables (Ho, 2013: 336). As a guideline, the number of observations should be at least five to six times as much as independent variables (Verma, 2013: 396). Additionally, the sample size for each group must also be taken into consideration. As a guideline, each group should have at least 20 cases. Although unequal group sample sizes are acceptable, they should not differ to a great extent. If they are widely different, it may affect the estimation of the discriminant function and the categorization of cases, viz., the larger groups are, the more they have chances for accurate classification (Ho, 2013: 336; Verma, 2013: 396).

There are some assumptions should be met for applying discriminant analysis. They are as follows (Ho, 2013: 336; Verma, 2013: 396; Çokluk et al., 2012: 110);

Linearity-All relationships among all pairs of independent variables included each group are linear. However, violation of this assumption is not so serious as others.

Normality-Each predictor variables is normally distributed. There're several tests to check for normality. The graphical methods are histograms and The Normal Q-Q Plots. In the latter one the normal distribution forms a straight diagonal line, and if a variable is normally distributed, the data distribution will fall approximately on the diagonal. Statistical methods for checking normality are skewness and kurtosis coefficients. In normal distribution these coefficients are zero. But if their values are between ±1, it can be evaluated as not a significant departure from normality. In addition to these, Kolmogorov-Smirnov (K-S) and Shapiro-Wilk statistics can be applied for testing normality. In these tests, if the computed significance values are more than 0.05, then normality can be assumed. If the sample size is small (n<50) the Shapiro-Wilk statistic should be used (Ho, 2013:57).

Homogeneity of variance-covariance matrices-Variance/covariance matrices of variables are homogeneous in both groups.

Multicollinearity-This shows the situation where the predictor variables are highly correlated (r>0.90). In these cases, one independent variable is highly explained or predicted by the other variable(s). In this case, that variable will be less favorable for the explanatory power of entire set. So, it's recommended to remove such variables from the model. There are several methods to determine this kind of variables. One of them is examining the correlation rates between the independent variables. There is a widespread mind that the correlation rates between 0.00 and 0.30 are 'low', and between 0.31 and 0.70 are 'moderate'. If the correlation rate is 0.71 and greater, it's accepted as 'high'. While the rate is even greater than 0.90, this indicates to the multicollinearity problem. The other method in determining multicollinearity is Variance Inflation Factor (VIF) values. In the case of VIF≥10, there's a multicollinearity problem. Another method effective in detecting multicollinearity is Tolerance Value (TV). In the case of TV≤0.10, multicollinearity problem can be mentioned.

Outliers-As this analysis is highly sensitive to the existence of outliers, they should not be presented in the data. Their inclusion may substantially affect the classification accuracy of the results. Thus, if there are outliers, they should be eliminated before conducting MDA.

A discriminant function is a latent variable which is constructed as a linear combination of independent variables, such that

$Z = c + a_1V_1 + a_2V_2 + \ldots + a_nV_n$

Z - the discriminant function

V's - predictor variables in the model

c - the constant

a's - the discriminant constants of the predictor variables (Verma, 2013: 395).

Altman's (1968) study is the first one to use linear multiple discriminant analyses (Aktaş, 1997: 37). In his study, Altman included 33 bankrupt and 33 successful companies from the period of 1946-1965. The matched sample method was used in this study and as matching criteria industry (sector) and company size were selected. The research began with 22 financial ratios, the selection criteria for which ratios to include were based on:

- The popularity of the ratios in the literature
- The potential relevancy of the ratios to the study
- A few new ratios

Via several tests and analyses Altman defined 5 best ratios to discriminate between bankrupt and successful firms. The developed model including these ratios (predictor

variables) and their coefficients is called 'Z-Score Model' (in this study referred as Z_A-Score Model) and is as follows:

$$Z_A = 0.012A_1 + 0.014A_2 + 0.033A_3 + 0.006A_4 + 0.999A_5$$

Where the independent A variables are

- A_1=working capital/total assets
- A_2=retained earnings/total assets
- A_3=EBIT/total assets
- A_4=market value of equity/book value of total debt
- A_5=sales/total assets

Three conditions may happen in terms of Z_A score values. If they are;

- Greater than 2.99, this is safe zone with a very low risk of bankruptcy;
- Between 1.8 and 2.99, it means grey zone, there is no exact indication of a bankruptcy risk level, the enterprises here cannot be completely judged, a special decision-making guideline may be needed for them;
- Less than 1.8, it's distress zone, indicates a strong possibility of bankruptcy;

The accuracy rate of Z_A-Score model is 95% 1 year before and 72% 2 years before bankruptcy. The accuracy rates of 3, 4 and 5 years before failure are 48%, 29%, and 36% respectively. It's understood from the numbers that starting from 3 years and before the prediction ability of the model decreases.

This study is crucial because it reveals the advantages of ratio analysis and shows the importance of multivariate models. Furthermore, this study is the most referred one. But on the other hand, this study also has disadvantages. They can be listed as follows;

- The model was found appropriate only for 1 and 2 years before bankruptcy.
- The study couldn't develop a theoretical framework related to business failure.
- The fundamental hypotheses of the MDA were not tested in the study.
- The equal numbers of the bankrupt and successful firms don't suit the real life.

Later on, Altman (2000: 18) has redefined the Z_A score model as follows to correct any errors that may occur due to the misinterpretation of the percentage values when the score is found.

$$Z_A = 1.2A_1 + 1.4A_2 + 3.3A_3 + 0.6A_4 + 0.999A_5$$

Later on, Altman developed variations of the original model, the Altman Z_B-Score which can be applied on privately held enterprises and the Altman Z_C-Score which can be applied on non-manufacturing companies (Janssen, 2011: 8).

The adjustments for applying the model on privately held companies (Z_B-Score Model) is that Book Value of Equity replaces the Market Value of Equity and the coefficients in the model are different.

$$Z_B = 0.717B_1 + 0.847B_2 + 3.107B_3 + 0.420B_4 + 0.998B_5$$

Where

- B_1 = working capital/total assets
- B_2 = retained earnings/total assets
- B_3 = EBIT/total assets
- B_4 = book value of equity/total liabilities
- B_5 = sales/total assets

Three conditions may happen in terms of Z_B score values. If they are;

- Greater than 2.9, this means safe zone,
- Between 1.23 and 2.9, the company is in grey zone,
- Less than 1.23, this means distress zone.

The adjustment for applying the model on non-manufacturing companies as well as emerging market enterprises Z_C-Score Model is also that Book Value of Equity replaces the Market Value of Equity, but additionally the fifth coefficient is dropped (Sales / Total Assets) and the coefficients are different.

$$Z_C = 6.56C_1 + 3.26C_2 + 6.72C_3 + 1.05C_4$$

Where

- C_1 = working capital/total assets
- C_2 = retained earnings/total assets
- C_3 = EBIT/total assets
- C_4 = book value of equity/total liabilities

Three conditions may happen in terms of Z_B score values. If they are;

- Greater than 2.6, the firm is in safe zone,
- Between 1.1 and 2.6, this implies grey zone,
- Less than 1.1, this means distress zone.

2.2.2. Logistic Regression

Sometimes all the assumptions for the discriminant analysis can't be met (e. g. normality, homogeneity of variance or continuous independent variables). In such cases logistic regression can be applied as an alternative statistical method (Kalaycı, 2006: 273). Logistic regression is useful when we are interested in predicting the occurrence of any happening. It has wide application in the areas such as management, medical and social researches. It can be used for developing a model for financial prediction, bankruptcy prediction, buying behavior, fund performance, credit risk analysis, etc. (Verma, 2013: 414). Here similarly to discriminant analysis, two types of variables; dependent variable (outcome or target variable), and independent variable (predictive variable) are included. The dependent variable must be categorical (nominal) and it can be classified into two groups (binary) or more than two groups (multinomial). Differently from discriminant analysis, in logistic regression independent variables can be not only continuous, but also discrete, dichotomous, or a mixture of any of these (Ho, 2013: 384; Verma, 2013: 413). In the logistic regression analysis, there are no assumptions required for the predictors, viz., the independent variables do not have to be normally distributed, linearly related, or have equal variance/covariance across the groups. However, meeting the first two of assumptions, may enhance their prediction power (Ho, 2013; 384). Three principal uses of logistic regression:

- Prediction of group membership and outcome. The purpose is to correctly predict the category of the outcome of individual cases. Thus, the main question asked if it is possible to predict an outcome from a selected set of predictors.

- Logistic regression provides knowledge of the relationships and strengths among the variables. The aim is to determine which variables predict the outcome, viz., increase or decrease the probability of the outcome or have no effect.

- Classification of cases. The purpose is to understand how reliable the logistic regression model is in classifying observations for whom the effect is known (Ho, 2013: 384).

The sample size may affect model convergence. In the case of having too few observations in comparison with the number of predictor variables, this analysis can produce extremely large parameter estimates and standard errors, and possibly, failure of convergence when combinations of discrete variables result in too many cells with no cases (Ho, 2013: 384). Many authors suggest that at least ten cases per predictors should be included in this analysis. Some state that at least 50 data per predictor are needed for obtaining reliable findings. This feature makes the application of the logistic regression harder oppositely to its

conveniences about no restrictions on the predictive variables (Verma, 2013: 424). The logistic regression is also known as logit model or logistic model. The function for this model is as follow:

logit = ln (p/1 - p) = B0 + B1X1 + B2X2 + ………. + BnXn

Ohlson's (1980) study is the most important one to use logit model in business failure prediction (Aktaş, 1991: 52). For Ohlson (1980: 112) there're some disadvantages in using MDA for failure estimation. They can be listed as follows:

- The assumption of the normality and equal variation-covariation of the variables

- Unless the cost ratios of the Z values generated as a result of the discriminant analysis models are stated, it is almost impossible to determine a suitable critical point and make a correct interpretation about the operation.

- In MDA the firms are usually compared by matching methods. As a result of the matches made, companies are gathered under various criteria. But it's very difficult to find the appropriate criteria for the matches. So, it would be more appropriate to use the variables as the estimating variable instead of the matching criterion.

In his study Ohlson investigated 105 bankrupt and 2058 successful companies between the period of 1970-1976. The companies included in the analyses were kept to a very large scale. Namely, the companies from small and private firms to finance and insurance enterprises which three-year financial statements could be reached were analyzed. Only the companies which financial statements couldn't be reached and/or had little or no sales were excluded from the study. 4 variables were found to be significant in failure estimation. These ratios are; the size of the company, total debt/total assets, net income/total assets and/or cash flow from operations/total debt (performance measures), working capital/total assets and short-term debt/current assets (liquidity ratios). 3 models (1, 2 and 3 years prior to failure) were developed. For 1 year prior to failure the accuracy rates of the model are 87.6% (bankrupt firms) and 82.6% (non-failed companies).

The case of the greater value of the total classification error in comparison with the previous studies is due to the sensitivity about the defining the bankruptcy time. The author claims that the previous studies didn't pay enough attention to that issue, and in these studies the phrase of '1 year prior to failure' actually showed a shorter period of time. It was determined in this study that logit model was more successful than MDA (Aktaş, 1997: 52). This study is also important in terms of the fact that here the author tried to determine not only which companies were going to be bankrupt, but also what their bankruptcy probability were (Vuran, 2008: 65).

2.3. Business Failure Prediction Studies in Tourism

Business failure studies done in Turkey are also discussed in this section. The foreign failure prediction studies related to tourism industry are shown in Table 2.1.

Table 2.1 Tourism Related Business Failure Studies

Author(s) (Year Published)	Method	Sample	Sample Period (Country)	Substantial ratios in prediction
Olsen, Bellas and Kish (1983)	Graph Analysis	19 restaurants (12 successful and 7 total failure)	1979-1981 (USA)	current r., working capital/total assets, EBIT/total assets, EBIT/revenue, total assets/revenue, working capital/revenue
Gu and Gao (2000)	MDA	14 b. (4 hotel and motels, 10 restaurants) and 14 nb. firms (4 hotel and motels, 10 restaurants)	1987-1996 (USA)	debt r., EBIT/current liabilities, gross profit margin, long-term debt/total assets, sales/fixed assets
Gu (2002)	MDA	18 f. and 18 nf. restaurants	1986-1998 (USA)	debt r., EBIT/total debt
Kim and Gu (2006a)	Logit	15 b. and 15 nb. restaurants	1986-1998 (USA)	debt r., EBIT/total debt
Kim and Gu (2006b)	Logit	16 b. and 16 nb. hospitality firms	1999-2004 (USA)	operating cash flows/total debt
Youn and Gu (2010a)	The artificial neural network model (ANN), Logit	31 b. and 31 nb. restaurants	1996-2008 (USA)	ROA (1 year earlier), EBITDA/total debt (2 years earlier)
Youn and Gu (2010b)	ANN, Logit	33 f. and 33 nf. lodging firms	2000-2005 (Korea)	interest coverage ratio
Kim (2011)	Support Vector Machine (SVM), ANN, MDA, Logit	33 b. and 33 nb. hotels	1995-2002 (Korea)	profit margin r., ROE, ordinary income/owners' equity ratio, current r., quick r., account receivable turnover, fixed asset turnover, debt-to-equity r., fixed assets/long-term capital, growth in assets, growth in owners' equity
Park and Hancer (2012)	Logit, ANN	48 b. and 48 nb. hospitality firms	1990-2009 (USA)	working capital/total assets, liabilities/net worth, total liabilities/total assets
Kim and Upneja (2014)	Decision Trees, Adaboosted Decision Trees	826 financial distress observations	1988-2010 (USA)	debt-to-equity, growth in assets
Pacheco (2015)	Logit	941 active and 58 inactive SMEs from hospitality sector	2004-2014 (Portugal)	financial debt in percentage of total assets, equity in percentage of total assets
Fernández-Gámez, Cisneros-Ruiz and Callejón-Gil (2016)	Probabilistic Neural Network (PNN)	54 b. and 54 nb. hotels	2005-2012 (Spain)	EBITDA/current liabilities (1 and 2 years earlier) ROA (3 years earlier)
Cho (1994)	Logit	23 f. and 23 nf. restaurants, 15 f. and 15 nf. hotels	1982-1993	cash flow per share, total debt/invested capital
Gao (1999)	MDA	25 b. (8 lodging firms, 17 restaurants) and 25	1987-1998 (USA)	total debt/total assets, total equity/total assets, retained earnings/total assets, EBIT/total

		nb. (8 lodging firms, 17 restaurants)		debt, sales/fixed assets

Karaca and Özen (2017), investigated the impact of recent developments in Turkey's tourism sector, on the financial failure of the tourism enterprises listed in Borsa İstanbul. Using the financial statements of enterprises from the period of 2009-2016, with Altman Z Score Model it was measured whether they carried bankruptcy risk. At the same time, the exchange prices of the companies' stocks were compared with the Z-Score, and the price change was measured. As the result of the study it was found that problems in the years of 2015-2016 due to the plane crash incident between Turkey and Russia increased the risk of bankruptcy of the tourism enterprises. In addition, no significant change was observed in the stock prices of the enterprises for this period. As a result of the regression analysis, the effect of the probability of bankruptcy on prices was not significant.

Aktümsek and Göker (2018), did a failure prediction for the companies from three sectors (Technology Transportation Communication, Food Drink Tobacco and Wholesale Retail Hotel Restaurant) listed in Borsa İstanbul. They also aimed to reveal the sectoral differences in prediction. Data from the period of 2008-2017 were analyzed and logistic regression model was applied in the study. According to the results, inventory turnover ratio in the Technology Transportation Communication sector, current ratio in Food Drink Tobacco sector and EBIT/equity ratio in Wholesale Retail Hotel Restaurant sector were the main indicators of the financial distress.

Sevim and Paslı (2018) investigated the factors that cause business failure in accommodation enterprises in Turkey. Enterprises from the Eastern Black Sea region were analyzed through DEMATEL method. It was revealed that management mistakes were the most important factors causing business failure in accommodation enterprises. Company scale and reduction in sales and income were also important factors.

Karadeniz and Öcek (2018) measured the risk of business failure of lodging companies traded on stock exchanges of Turkey and Europe. For this reason, the data of 75 lodging companies from 21 countries from the period of 2012-2016 were analyzed through Altman Z Score, Altman Z' Score, Ohlson's O-Score, Springate, Fulmer and CA-Score models. It was revealed that the results obtained from Altman Z Score models and O-Score model were close to each other. Other close results were between Springate and Fulmer models. It was also determined that the highest number of the companies with risk of failure was obtained via Fulmer and Springate models.

Karadeniz and Öcek (2019), analyzed the data of 11 lodging companies listed in Borsa İstanbul for the period of 2012-2017 through Beaver's model. As a result of the analyses, it was revealed that some of the BIST lodging companies were insufficient to meet their long-term obligations, some of them had negative net working capital, low profitability, insufficient cash flows, and effective level of financial leverage.

CHAPTER THREE

A STUDY ON PREDICTING BUSINESS FAILURE IN TOURISM ENTERPRISES

3.1. Research Design

3.1.1. Aim(s)

The previous chapter of this study revealed that business failure is a very broad concept from being unable to pay short-term debt to bankruptcy. And every company regardless of its size and age can face business failure. A lot of internal and external factors can induce business failure in companies. This concept is very important for several stakeholders including managers, investors, governments etc. A widespread financial failure can cause critical results in a country economy. Considering all these issues and the importance of business failure itself, several researchers have been working on it for decades, a lot of studies have been done so far. In many studies the primary purpose of the researchers was to develop failure prediction (FP) models, because this is one of the most effective and important tools in prevention business failure.

In literature review for this study it was revealed that very few studies on this topic were done for tourism industry. And few business failure studies were done for Turkish tourism sector, whereas tourism is a very significant sector for Turkey. For several years Turkey has been in the top most visited and destinations in the world. Furthermore, tourism sector is much more dependent on and sensitive to external factors. For example, after the political crisis between Turkey and Russian Federation in 2015, the number of Russian tourists, correspondingly tourism income decreased. Table 3.1 shows some tourism related figures obtained from the website of Turkish Statistical Institute[2]. As seen from Table 3.1, in 2016 in comparison with 2015, the number of visitors decreased from 35,592,160 to 25,265,406 and tourism income decreased from 25,438,923,000 to 15,991,381. Similar factors make FP much more important for tourism sector. As tourism companies are already one step closer to failure because of their high dependence and sensitivity, considering this these enterprises should always care about their financial health.

In previous chapter some important studies with powerful prediction models were discussed. But as stated Edward Altman every country has its own characteristics and a FP model considering these features of the local economy and companies operating in it would

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[2] http://www.tuik.gov.tr/UstMenu.do?metod=temelist (accessed on: 10.06.2019)

be more useful[3]. For example, Diakomihalis (2012: 13), tested the accuracy of Altman's all three Z-Score models for Greek hotels. Interestingly, the Z_C model, which was designed and applied in the service sector companies, showed the lowest accuracy for this study (80%). The accuracy rates of other two models were 88.24% (Z_A) and 83.33% (Z_B). So, this study aims to develop a FP model for tourism enterprises in Turkey. For this reason, annual financial statements of tourism enterprises listed on BIST were analyzed via different statistical methods. This study also aims to gain more attention from the researchers to this field (tourism) in the future.

Table 3.1 Tourism Figures for Turkey

Year	Annual Tourism Income from Foreigners (000 $)	Number of Foreign Visitors (Annual)
2001	7 386 246	11 276 531
2002	9 235 506	12 921 982
2003	10 141 116	13 701 419
2004	13 061 118	17 202 996
2005	15 725 813	17 202 996
2006	13 918 757	19 275 948
2007	15 936 347	23 017 081
2008	19 612 296	26 431 124
2009	19 063 702	27 347 977
2010	19 110 003	28 510 852
2011	22 222 454	31 324 528
2012	22 410 365	31 342 464
2013	25 322 291	33 827 474
2014	27 778 026	35 850 286
2015	25 438 923	35 592 160
2016	15 991 381	25 265 406
2017	20 222 971	32 079 527

3.1.2. Importance(s)

- This study is important because it aims to develop a FP model for such an important sector for Turkey's economy.
- The other importance of this study that it tries to find out which financial ratios to include in the analysis, thus, to make a base in tourism related financial ratios.

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[3]https://blogs.cfainstitute.org/investor/2016/02/09/the-altman-z-score-after-50-years-use-and-misuse/ (accessed on: 20.04.2019)

3.1.3. Question(s)

Main Question:

Can this study develop a FP model for tourism industry in Turkey?

Sub-Questions:

- Which financial ratios are appropriate to tourism enterprises?
- Which financial ratios are the most important in predicting business failure in tourism enterprises of Turkey?
- How accurate is the developed prediction model of business failure for tourism enterprises of Turkey?

3.1.4. Hypothesis(es)

Several hypotheses similar to Zinet's (2014: 72) were developed for this study. They are as follows.

H1.0: Liquidity ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

H1.a: Liquidity ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

H2.0: Financial structure ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

H2.a: Financial structure ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

H3.0: Activity ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

H3.a: Activity ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

H4.0: Profitability ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

H4.a: Profitability ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

H5.0: Growth ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

H5.a: Growth ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

3.1.5. Limitation(s)

- The biggest limitation is the sample size of this study. Because business failure estimation is vulnerable to small sample problems (Aziz and Dar, 2006: 23). Notwithstanding the number of independent variables, 17 observations are too small in terms of several things, e.g. pairing of failed and non-failed firms in regard to their assets size, applying statistical models such multiple discriminant and logistic regression analyses. Because both these analyses require quite large sample size. So, in general, this sample size is inconvenient for developing a FP model.

- Six years (2012-2017) maybe a short period for such analyses, a longer period of time may increase the reliability of the developed model.

- Lack of bankrupt companies is another constraint. The other criteria are not so effective while developing a model (Aktaş, 1997: 97), because a company can make losses for a long time but still survive and continue its operations. On the other hand, bankruptcy is the final and most severe stage of failure. So, sample without bankrupt companies are less effective in developing a model, and the model developed by this kind of sample may be less reliable.

3.1.6. Method

Quantitative analyses with secondary data were done in this study. Data for this study was obtained from Public Disclosure Platform (KAP). While searching the literature about business failure in tourism, it appeared that all the few studies on this topic covered restaurants and hotels. Thus the 12 companies under 'Restaurants and Hotels' Sector of BIST Companies in KAP were the main sample of this study. However, it was stated above that sample size was very important for both the discriminant and logistic regression analyses. For achieving reliable results, the sample size should be as big as possible (as many observations per independent variables as possible). So, it was decided somehow to increase the sample size. For this reason, the whole BIST Companies were searched so that to find possible companies close to tourism sector. As the result of this search one company from 'Travel Agency, Tour Operator, Reservation Service and Related Activities' sector and two airline companies were included in the data set (Kamra, 1997; 156). In most previous studies investigating failure issue in several industries, holdings weren't added to the analyses. But in

this study in order to increase the sample size, two holdings which activities were related only to tourism were also included in the data set. So, the sample size of the study increased from 12 to 17. The study includes the financial data of these companies from the period of 2012-2017. For obtaining the financial data, the annual financial statements (the balance sheets, the income statements and the cash flow statements) from the given period were analyzed.

This study includes two type of variables; dependent and independent. The dependent variable of this study is the failure of the companies. It is a dichotomous variable with failed (coded as 0) and non-failed (coded as 1) categories. There should be some criteria to distinguish between the failed (f.) and the non-failed (nf.) companies. In consequence of investigating the literature, the criteria were defined as follows;

- Being in Watchlist Market
- Negative equity
- 2/3 reduction in assets value
- Loss for three consecutive years

After defining these criteria, the distribution of failed companies for each year is described in Table 3.2.

Table 3.2 Distribution of Failed Companies

Year	Failed Companies	Reasons of Failure
2012	2	loss for three consecutive years
2013	3	loss for three consecutive years, negative equity
2014	4	loss for three consecutive years, negative equity, 2/3 reduction in assets value
2015	4	loss for three consecutive years
2016	6	loss for three consecutive years, 2/3 reduction in assets value, being in Watchlist Market
2017	4	loss for three consecutive years, being in Watchlist Market

Independent variables of this study are various financial ratios calculated via the data collected from the annual financial statements of these companies. To define which ratios be included in the analysis the literature related to business failure topic was searched. During this it appeared that there were huge number of different ratios used in the studies. But the ratios differed among the industries. Additionally, there were some studies revealing the ratios convenient for different industries (Ağırman, 2015: 98). Considering this, tourism related

studies were investigated in detail. Not all ratios from those papers were chosen for this study. Only the ones which were thought to be appropriate for the Turkish companies and a few ratios thought to be important from the other studies were included. Consequently, 32 financial ratios were decided to be included in the analysis as the independent variables. They were calculated via Microsoft Excel. For some ratio formulas different types were met while investigating the literature. In such cases the formulas published by The Central Bank of the Republic of Turkey (CBRT) were guide during defining the ratio formulas.[4] These ratios can be discussed in five different groups. They are as follows (Akgüç, 2010: 19-163; Akdoğan & Tenker, 2004: 606-656; Şamiloğlu & Akgün, 2015: 424-443);

- Liquidity ratios: These ratios measure the availability of a company to meet its short-term debt and to determine whether the working (operating) capital is enough or not.
- Financial Structure ratios: These ratios help to measure how much of the assets are covered by short and long-term obligations, how much of it is covered by own resources and whether there is an appropriate balance between equity and debts. These rates also give important clues about whether a company can fulfill its long-term obligations (solvency) in the cases of loss, decrease in the value of the assets or if it cannot generate enough funds in the future years. The coverage ratios for constant expenses are also included in this group.
- Profitability ratios: Profit is an important criterion to demonstrate the success of a company. These ratios provide information about whether the targeted activity results have been achieved, the predicted profit level has been reached and the enterprise is managed effectively or not.
- Activity ratios: These ratios measure whether the assets are used effectively or not in the operational processes of a company.
- Growth ratios.

Information about all 32 ratios is shown in Table 3.3

Table 3.3 Independent Variables

Liquidity Ratios	
X1	Current Ratio=Current Assets/Current Liabilities
X2	Quick (Acid Test) Ratio = (Current Assets - (Inventory + Prepaid Expenses +Other Current

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[4] http://www3.tcmb.gov.tr/sektor/2017/Raporlar/oran.pdf (accessed on: 05.01.2019)

	Ratios))/ Current Liabilities
X3	EBIT/Current Liabilities
X4	Working Capital/Total Assets
X5	Operating Cash Flow Ratio (OCF)=OCF/Current Liabilities
Financial Structure Ratios	
X6	Debt (Leverage) Ratio=Total Debt/Total Assets
X7	Debt to Equity Ratio=Total Debt/ Shareholders' Equity
X8	Equity Multiplier=Total Assets/ Shareholders' Equity
X9	Short-term Debt/Total Assets
X10	Short-term Debt/Paid-in-capital
X11	Debt/EBITDA
X12	OCF/Total Debt
X13	EBIT/Total Debt
X14	Paid-in-capital/Shareholders' Equity
X15	Interest Coverage Ratio=EBIT/Interest Expenses
Profitability Ratios	
X16	Gross Profit Margin=Gross Profit/Net Sales
X17	Net Profit Margin=Net Profit/Net Sales
X18	Return on Assets (ROA)=Net Income/Total Assets
X19	Return on Equity (ROE)=Net Income/Shareholders' Equity
X20	Economic Rantability Ratio=EBIT/Total Liabilities and Shareholders' Equity
X21	Return on Capital Employed (ROCE)=EBIT/Capital Employed
X22	Operating Profit Margin=Operating Income/Net Sales
Activity Ratios	
X23	Assets Turnover Ratio=Net Sales/Total Assets
X24	Fixed Assets Turnover Ratio=Net Sales/Total Fixed Assets
X25	Inventory Turnover Ratio=COGS/ Average Inventory
X26	Accounts Receivable Turnover Ratio=Net Sales/Short-term Trade Receivables + Long-term Trade Receivables
X27	Equity Turnover Ratio=Net Sales/Shareholders' Equity
Growth Ratios	
X28	Growth in Assets
X29	Growth in Equity
X30	Growth in Revenue
X31	Growth in Operating Income
X32	Growth in Net Income

Statistical analyses were done through the IBM SPSS Statistics 22.0. Three statistical analyses (multiple discriminant, logistic regression and the Mann-Whitney U test) were applied in this study. They are explained in the next sections respectively.

3.2. Findings

3.2.1. Multiple Discriminant Analysis

In this study, to develop a FP model, firstly a discriminant analysis was selected. Before applying this analysis, assumptions written above were checked. First of all multicollinearity problem was checked. In consequence of testing 32 predictor variables, multicollinearity was determined among some of them. Predictors with high collinearity (VIF≥10, TV≤0.10) were removed from the analysis.

After eliminating multicollinearity problem, normality tests were done to the remaining independent variables. As a result of these tests it was determined that these variables were not normally distributed for any of the years. Thus, discriminant analysis couldn't be applied. An alternative statistical method called logistic regression analysis was tried instead.

3.2.2. Logistic Regression

Due to normality requirement, the discriminant analysis couldn't be applied in this study. Therefore, as an alternative method, logistic regression was chosen to develop a FP model. However, this analysis also failed to be applied. This time the reason was the sample size. As it was stated above for the logistic regression the required cases are even more than the discriminant analysis. Unfortunately, 17 companies in data set were too few for applying this analysis.

Consequently, this study failed in obtaining any model related to failure prediction.

3.2.3. Mann-Whitney U Test

The Mann-Whitney U test, also known as Wilcoxon-Mann-Whitney or rank-sum test, is a nonparametric test for a between-subjects design using 2 levels of an independent variables and scores. It is often used as an alternative for the Independent Sample T-test when there is an severe violation of the normality assumption or when the data are scaled at a level which is inappropriate for the T-test (Joaquim, 2007: 221; Ho, 2013: 518). Differently from T-test, Mann-Whitney U test compares not the mean, but the median of the two groups. In order to be applied, this test starts by ranking the continuous variables of two groups in

ascending order. Thus, the test evaluates if there are any differences between the ranking of the groups. As the variables are put in order, the actual distribution of the values is not important (Joaquim, 2007: 221; Kalaycı, 2006: 99).

Some assumptions for the Mann-Whitney U test are required. The data

- Has to be from independent random samples.
- Has to be measured at least at the ordinal level.
- Even though the actual measurements can be only naturally ordinal, the underlying dimension of dependent variable in naturally continuous.
- In order to be able to rank the whole sample uniquely, each case occurs only once in data set (Ho, 2013: 518; Landau, 2004: 41).

The hypotheses of this test are as below.

H0: The median values of independent variables in two groups are equal.

H1: The median values of independent variables in two groups are not equal.

The null hypothesis means that two groups being compared have identical distributions. On the other hand, the alternative hypothesis indicates that the group distributions differ in location (the median) (Çatak, 2012: 61; Landau, 2004: 41).

Some researchers used Mann-Whitney U test for comparing two groups in their business failure related studies (Gülcan, 2011: 89-101; Çatak, 2012: 67-72; Kim and Upneja, 2014: 358). In this study, firstly normality tests were done to all the variables of each year. According to the results of this test, all the variables do not follow a normal distribution. Because of the violation of the normality assumption, the Mann-Whitney U test can be applied in this study.

As it was described in previous section, the Mann-Whitney U test is for comparing two independent groups. So, for this test there is no need for 'as many companies as possible'. Because of this five extra companies added to the sample to make it greater were removed. Only twelve companies which were about 'hotels and restaurants' formed the sample for this test. Almost everywhere the Mann-Whitney U test is explained, the number of two groups are equal. But even with twelve firms, the difference between the number of failed and non-failed companies is great. For example, for 2012 there are ten non-failed and only two failed firms. This can negatively affect the results of the Mann-Whitney U test. To decrease the gap between the failed and non-failed companies, the criterion of 'loss for three consecutive years' was replaced by 'loss for the current year' (Gülcan, 2011: 86). So, the new criteria for failed companies are as follows;

- Being in Watchlist Market

- Negative equity

- 2/3 reduction in assets value

- Loss for the current year

And the new distribution of failed companies is as in Table 3.3.

Table 3.4 Distribution of Failed Companies for Mann-Whitney U Test

Year	Failed Companies	Reasons of Failure
2012	5	loss for the current year
2013	7	loss for the current year, negative equity
2014	7	loss for the current year, negative equity, 2/3 reduction in assets value
2015	4	loss for the current year
2016	7	loss for the current year, 2/3 reduction in assets value, being in watchlist market
2017	6	loss for the current year, being in watchlist market

In this study the Mann-Whitney U test helps to understand whether the median of failed and non-failed firms is statistically different or not. Hypotheses for the Mann-Whitney U test is as below:

H6.0: The median values of failed and non-failed companies are equal in tourism enterprises of Turkey.

H6.a: The median values of failed and non-failed companies are not equal in tourism enterprises of Turkey.

If the sample size is small, an exact test which does not rely on approximations is more appropriate (Landau, 2004: 70). SPSS provides exact Mann-Whitney U-tests from the Exact sub-dialogue box of the Two-Independent-Samples tests. These exact tests operate by constructing the distribution of the test statistic under the null hypothesis by permutation of the casesor pairs. The procedure is computationally intensive since it evaluates all possible permutations. SPSS sets a time limit and offers to sample a set of permutations. In the latter case, SPSS evaluates the precision of the p-value by a confidence interval (Landau, 2004: 70).

As the sample size in this study is small (twelve firms), Exact Sig. (2-tailed) were interpreted as p-values. In the significance level of 5%, if p-value is below than 0.05, then the null hypothesis is rejected, viz., there is a statistically significant difference between the median values of failed and non-failed companies, they are not equal. But on the other hand, if the result for p-value is as p>0.05, this means the study fails to reject the null hypothesis,

viz., there is no statistically significant difference between failed and non-failed firms, the median values of the two groups are equal.

For each year the results are described in tables (Table 3.5, Table 3.6, Table 3.7, Table 3.8, Table 3.9, Table 3.10) consisted of variable names, mean ranks (for both failed and non-failed firms), p-values and null hypothesis. The results are interpreted for liquidity, financial structure, profitability, activity and growth ratios respectively. Codes of (0) for failed and (1) for non-failed enterprises are used in tables and result interpretations.

3.2.3.1. Results for 2012

Table 3.5 The Mann-Whitney U Test Results for 2012

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	5.20	7.43	0.343	Failed to Reject
	Quick Ratio	4.80	7.71	0.202	Failed to Reject
	EBIT/Current Liabilities	3.00	9.00	0.003	Rejected
	Working Capital/Total Assets	5.60	7.14	0.530	Failed to Reject
Financial Structure Ratios	OCF/Current Liabilities	4.40	8.00	0.106	Failed to Reject
	Debt Ratio	7.40	5.86	0.530	Failed to Reject
	Debt to Equity Ratio	7.40	5.86	0.530	Failed to Reject
	Equity Multiplier	7.40	5.86	0.530	Failed to Reject
	Short-term Debt/Total Assets	7.20	6.00	0.639	Failed to Reject
	Short-term Debt/Paid-in-capital	6.80	6.29	0.876	Failed to Reject
	Debt/EBITDA	3.00	9.00	0.003	Rejected
	Operating Cash Flow Ratio	4.20	8.14	0.073	Failed to Reject
	EBIT/Total Debt	4.00	8.29	0.048	Rejected
	Paid-in-capital/Shareholders' Equity	5.40	7.29	0.432	Failed to Reject
	Interest Coverage Ratio	3.00	9.00	0.003	Rejected
Profitability Ratios	Gross Profit Margin	5.40	7.29	0.432	Failed to Reject
	Net Profit Margin	3.00	9.00	0.003	Rejected
	ROA	3.00	9.00	0.003	Rejected
	ROE	3.00	9.00	0.003	Rejected
	Economic Rantability Ratio	3.00	9.00	0.003	Rejected
	ROCE	3.00	9.00	0.003	Rejected
	Operating Profit Margin	3.00	9.00	0.003	Rejected
Activity Ratios	Assets Turnover	6.40	6.57	1.000	Failed to Reject
	Fixed Assets Turnover	6.80	6.29	0.876	Failed to Reject
	Inventory Turnover	4.00	6.50	0.257	Failed to Reject
	Accounts Receivable Turnover	4.20	7.50	0.126	Failed to

					Reject
	Equity Turnover	6.80	6.29	0.876	Failed to Reject
Growth Ratios	Growth in Assets	6.40	6.57	1.000	Failed to Reject
	Growth in Equity	5.40	7.29	0.432	Failed to Reject
	Growth in Revenue	5.00	7.57	0.268	Failed to Reject
	Growth in Operating Income	2.50	8.00	0.006	Rejected
	Growth in Net Income	2.00	7.00	0.017	Rejected

- Table 3.5 results for liquidity ratios show that there is a statistically significant difference between the failed and non-failed enterprises only in terms of EBIT/current liabilities ratio (p=0.003). The average rank values are 3.00 for failed (0), and 9.00 for non-failed (1) companies. There are no significant differences in terms of the other ratios such as current ratio (0.343), quick ratio (p=0.202), working capital/total assets ratio (p=0.530) and operating cash flow ratio (p=0.106).

- According to Table 3.5 results for financial structure ratios there are statistically significant differences between the failed and non-failed enterprises in terms of debt/EBITDA (p=0.003), EBIT/total debt (p=0.048) and interest coverage ratio (p=0.003). In Debt/EBITDA ratio the average rank values are 3.00 (0) and 9.00 (1). The same figures are seen for interest coverage ratio. And for EBIT/Total Debt ratio the mean ranks 4.00 (0) and 8.29 (1). The differences for other ratios are not statistically significant, which means the failure to reject the null hypothesis. The p-values for other ratios are as; 0.530 (debt ratio, debt/equity and equity multiplier), 0.639 (short-term debt/total assets), 0.876 (short-term debt/paid-in-capital), 0.073 (operating cash flow/total debt) and 0.432 (paid-in-capital/equity).

- Table 3.5 results for profitability ratios determine that there is not a statistically significant difference only for gross profit margin (p=0.432). For all the other ratios (net profit margin, ROA, ROE, economic rantability, ROCE, operating margin) the differences between two groups are significant (p=0.003). The mean ranks for these ratios are also the same; 3.00 (0) and 9.00 (1).

- It is understood from Table 3.5 results for activity ratios that there is no statistically significant p-values for any of activity ratios. Especially for asset turnover ratio the p-value is 1.000 which means there is almost no difference between the two groups. This is also supported by the mean rank figures for failed (6.40) and non-failed companies (6.57). The p-values for the other ratios are as; 0.876 (fixed assets turnover), 0.257 (inventory turnover), 0.126 (accounts receivable turnover) and 0.876 (equity turnover).

In the other hand p-values for inventory and accounts receivable turnover ratios are relatively closer to 0.05. This means despite of the fact that there is no significant difference, the gap between the average ranks is a bit greater. It can also be seen from the mean rank numbers for these ratios. For inventory turnover ratio they are 4.00 (0) and 6.50 (1). For accounts receivable turnover ratio, the figures are 4.20 (0) and 7.50 (1).

- Table 3.5 results for growth ratios reveal that among growth ratios statistically significant differences are relevant to operation income (p=0.006) and net income (p=0.017). For growth in operating income ratio the mean ranks are 2.50 (0) and 7.00 (1). For the other ratios the p-values are not statistically significant and are as; 1.000 (growth in assets), 0.432 (growth in equity) and 0.268 (growth in revenue). Another almost indifferent means with a 1.000 p-value can be seen for growth in assets ratio. The mean ranks of this ratio are 6.40 (0) and 6.57 (1).

3.2.3.2. Results for 2013

Table 3.6 The Mann-Whitney U Test Results for 2013

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	5.00	8.60	0.106	Failed to Reject
	Quick Ratio	4.43	9.40	0.018	Rejected
	EBIT/Current Liabilities	5.00	8.60	0.106	Failed to Reject
	Working Capital/Total Assets	5.86	7.40	0.530	Failed to Reject
	Operating Cash Flow Ratio	5.86	7.40	0.530	Failed to Reject
Financial Structure Ratios	Debt Ratio	8.00	4.40	0.106	Failed to Reject
	Debt to Equity Ratio	7.29	5.40	0.432	Failed to Reject
	Equity Multiplier	7.29	5.40	0.432	Failed to Reject
	Short-term Debt/Total Assets	7.29	5.40	0.432	Failed to Reject
	Short-term Debt/Paid-in-capital	6.43	6.60	1.000	Failed to Reject
	Debt/EBITDA	7.57	5.00	0.268	Failed to Reject
	OCF/Total Debt	5.57	7.80	0.343	Failed to Reject
	EBIT/Total Debt	5.29	8.20	0.202	Failed to Reject
	Paid-in-capital/Shareholders' Equity	6.86	6.00	0.755	Failed to Reject
	Interest Coverage Ratio	4.86	8.80	0.073	Failed to Reject
P r	Gross Profit Margin	5.14	8.40	0.149	Failed to

					Reject
	Net Profit Margin	4.00	10.00	0.003	Rejected
	ROA	4.00	10.00	0.003	Rejected
	ROE	4.71	9.00	0.048	Rejected
	Economic Rantability Ratio	4.86	8.80	0.073	Failed to Reject
	ROCE	4.71	9.00	0.048	Rejected
	Operating Profit Margin	4.71	9.00	0.048	Rejected
Activity Ratios	Assets Turnover	5.43	8.00	0.268	Failed to Reject
	Fixed Assets Turnover	5.57	7.80	0.343	Failed to Reject
	Inventory Turnover	5.29	7.25	0.412	Failed to Reject
	Accounts Receivable Turnover	5.71	7.60	0.432	Failed to Reject
	Equity Turnover	5.71	7.60	0.432	Failed to Reject
Growth Ratios	Growth in Assets	5.71	7.60	0.432	Failed to Reject
	Growth in Equity	4.29	9.60	0.010	Rejected
	Growth in Revenue	5.86	7.40	0.530	Failed to Reject
	Growth in Operating Income	4.00	5.80	0.413	Failed to Reject
	Growth in Net Income	2.00	6.00	0.036	Rejected

- It is understood from Table 3.6 results for liquidity ratios there is a statistically significant difference only in terms of the quick ratio (p=0.018). The mean rank values are 4.43 (0) and 9.40 (1). The p values for the other ratios are as; 0.106 (current ratio and EBIT/current liabilities) and 0.530 (working capital/total assets and operating cash flow ratio).

- The results of Table 3.6 reveal that in terms of financial structure ratios, there is no statistically significant differences between failed and non-failed enterprises, the null hypothesis is failed to be rejected for all the financial structure ratios. The p values of these ratios are as; 0.106 (debt ratio), 0.432 (debt/equity, equity multiplier and short-term debt/total assets), 1.000 (short-term debt/paid-in-capital), 0.268 (debt/EBITDA), 0.343 (OCF/total debt), 0.202 (EBIT/total debt), 0.755 (paid-in-capital/equity) and 0.073 (interest coverage ratio). The p-value of 1.000 for the short-term debt/paid-in-capital ratio means that there is almost no difference between the median values of two groups in terms of this ratio. It is also supported by the mean rank figures of for failed (6.43) and non-failed companies (6.60). Another almost indifferent median values are for the paid-in-capital/equity ratio with the p-value of 0.755 and the mean ranks for this ratio are 6.86 (0) and 6.60 (1). In terms of the interest coverage ratio, as the p-value of 0.073 is closer to 0.05, the

difference between the two groups is a bit greater despite of not being statistically significant. It can also be seen from the mean values which are 4.86 (0), and 8.80 (1).

- Table 3.6 results for the profitability ratios show that in terms of the gross profit margin and economic rantability, the differences between the two groups are not statistically significant and p-values are 0.149 and 0.073 respectively. In terms of the other profitability ratios, the differences are statistically significant and the p-values are as 0.003 (net profit margin and ROA) and 0.048 (ROE, ROCE and operating margin). The mean ranks for the ratios with significant differences are as 4 (0) and 10 (1) for net profit margin and ROA; and 4.71 (0) and 9 (1) ROE, ROCE and operating margin.

- Table 3.6 results of activity ratios show that in terms of all the ratios, there are not any statistically significant differences between the two groups, which means the failure of rejection of the null hypothesis for all the ratios. The median values of failed and non-failed companies are almost the same and p-values for these ratios are as; 0.268 (assets turnover), 0.343 (fixed assets turnover), 0.412 (inventory turnover), and 0.432 (accounts receivable turnover and equity turnover).

- Table 3.6 results of the growth ratios determine that there are statistically significant differences between the two groups in terms of growth in equity ratio (p=0.010) and growth in net income ratio (p=0.036). The mean ranks for the growth in equity ratio are 4.29 (0) and 9.60 (1). For the growth in net income ratio the mean ranks are 2 (0) and 6 (1). In terms of the other ratios there are not statistically significant differences and the p-values are as; 0.042 (growth in assets), 0.530 (growth in revenue) and 0.413 (growth in operating income).

3.2.3.3. Results for 2014

Table 3.7 The Mann-Whitney U Test Results for 2014

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	4.86	8.80	0.730	Failed to Reject
	Quick Ratio	4.43	9.40	0.180	Failed to Reject
	EBIT/Current Liabilities	4.00	10.00	0.003	Rejected
	Working Capital/Total Assets	5.43	8.00	0.268	Failed to Reject
	Operating Cash Flow Ratio	5.57	7.80	0.343	Failed to Reject
F i	Debt Ratio	8.86	3.20	0.005	Rejected

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
	Debt to Equity Ratio	8.14	4.20	0.073	Failed to Reject
	Equity Multiplier	8.14	4.20	0.073	Failed to Reject
	Short-term Debt/Total Assets	8.57	3.60	0.018	Rejected
	Short-term Debt/Paid-in-capital	7.86	4.60	0.149	Failed to Reject
	Debt/EBITDA	7.43	5.20	0.343	Failed to Reject
	OCF/Total Debt	5.43	8.00	0.268	Failed to Reject
	EBIT/Total Debt	4.00	10.00	0.003	Rejected
	Paid-in-capital/Shareholders' Equity	6.00	7.20	0.639	Failed to Reject
	Interest Coverage Ratio	4.00	9.50	0.006	Rejected
Profitability Ratios	Gross Profit Margin	4.50	7.80	0.126	Failed to Reject
	Net Profit Margin	3.50	9.00	0.004	Rejected
	ROA	4.00	10.00	0.003	Rejected
	ROE	4.71	9.00	0.048	Rejected
	Economic Rantability Ratio	4.14	9.80	0.005	Rejected
	ROCE	4.43	9.40	0.018	Rejected
	Operating Profit Margin	4.67	7.60	0.177	Failed to Reject
Activity Ratios	Assets Turnover	6.71	6.20	0.876	Failed to Reject
	Fixed Assets Turnover	7.00	5.80	0.639	Failed to Reject
	Inventory Turnover	4.43	8.75	0.042	Rejected
	Accounts Receivable Turnover	6.14	7.00	0.755	Failed to Reject
	Equity Turnover	6.86	6.00	0.755	Failed to Reject
Growth Ratios	Growth in Assets	5.29	8.20	0.202	Failed to Reject
	Growth in Equity	4.50	7.80	0.126	Failed to Reject
	Growth in Revenue	6.14	7.00	0.755	Failed to Reject
	Growth in Operating Income	3.50	5.50	0.343	Failed to Reject
	Growth in Net Income	1.00	4.00	0.333	Failed to Reject

- Table 3.7 results for liquidity ratios show that there are statistically significant differences between the two groups in terms of quick ratio (p=0.018) and EBIT/current liabilities ratio (p=0.03). For the quick ratio, the mean ranks are 4.43 (0) and 9.40 (1). For the EBIT/current liabilities ratio these ranks are 4 (0) and 10 (1). In terms of all the other liquidity ratios, the differences between the two groups are not statistically significant. The p-values for these ratios are as; 0.073 (current ratio), 0.268 (working capital/total assets) and 0.343 (operating cash flow ratio).

- Table 3.7 results for financial structure ratios reveal that statistically significant differences ($p<0.05$) are relevant to debt ratio ($p=0.005$), short-term debt/total assets ratio ($p=0.018$), EBIT/total debt ratio ($p=0.003$) and interest coverage ratio ($p=0.006$). It is also supported by the mean ranks for these ratios. Namely for debt ratio the mean ranks are 8.86 (0) and 3.20 (1). For short-term debt/total assets ratio the mean ranks are 8.57 (0) and 3.60 (0). For the other ratio which is EBIT/total debt ratio, these figures are as 4 (0) and 10 (1). And for the last ratio which is interest coverage ratio the mean rank values are 4 (0) and 9.50 (1). In terms of the other liquidity ratios, the differences between the two groups are not statistically significant. The p-values for these ratios are as; 0.073 (debt/equity ratio and equity multiplier), 0.343 (debt/EBITDA), 0.268 (operating cash flow/total debt) and 0.639 (paid-in-capital/equity).

- Table 3.7 results of profitability ratios show that for only two ratios there are not statistically significant differences between failed and non-failed enterprises are ($p>0.05$), and these ratios are gross profit margin ($p=0.126$) and operating margin ($p=0.177$). For all the other profitability ratios, differences between the two groups are statistically significant. For these ratios p-values are as 0.004 (net profit margin), 0.003 (ROA), 0.048 (ROE), 0.005 (economic rantability) and 0.018 (ROCE). It also appears via mean values of these ratios. For example, for net profit margin the mean ranks are 3.50 (0) and 9 (1). For ROA ratio these figures are 4 (0) and 10 (1). ROE ratio has average ranks of 4.71 (0) and 9 (1). For economic rantability ratio these figures are as 4.14 (0) and 9.80 (1). And finally, the mean ranks of ROCE ratio are 4.43 (0) and 9.40 (1).

- Table 3.7 results for activity determine that the only ratio with a statistically significant difference is inventory turnover ratio ($p=0.042$). The average ranks for this ratio are 4.43 (0) and 8.75 (1). In terms of all the other activity ratios, the differences between failed and non-failed companies are not statistically significant ($p>0.05$). The p-values for these ratios are as 0.876 (assets turnover), 0.639 (fixed assets turnover) and 0.755 (accounts receivable turnover and equity turnover).

- Table 3.7 results for growth ratios reveal that for none of these ratios there is a statistically significant difference between the two groups. It means the failure to reject the null hypothesis, viz., in terms of all growth ratios, the median values of failed and non-failed companies are almost equal. The p-values for these ratios are

as 0.202 (growth in assets), 0.126 (growth in equity), 0.755 (growth in revenue), 0.343 (growth in operating income) and 0.333 (growth in net income).

3.2.3.4. Results for 2015

Table 3.8 The Mann-Whitney U Test Results for 2015

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	3.5	8.0	0.048	Rejected
	Quick Ratio	3.75	7.88	0.073	Failed to Reject
	EBIT/Current Liabilities	2.50	8.50	0.004	Rejected
	Working Capital/Total Assets	4.00	7.75	0.109	Failed to Reject
	OCF/Current Liabilities	4.25	7.63	0.154	Failed to Reject
Financial Structure Ratios	Debt Ratio	8.25	5.63	0.283	Failed to Reject
	Debt to Equity Ratio	8.25	5.63	0.283	Failed to Reject
	Equity Multiplier	8.25	5.63	0.283	Failed to Reject
	Short-term Debt/Total Assets	7.00	6.25	0.808	Failed to Reject
	Short-term Debt/Paid-in-capital	8.50	5.50	0.214	Failed to Reject
	Debt/EBITDA	6.25	6.63	0.933	Failed to Reject
	Operating Cash Flow Ratio	3.50	8.00	0.048	Rejected
	EBIT/Total Debt	2.50	8.50	0.004	Rejected
	Paid-in-capital/Shareholders' Equity	6.50	6.50	1.000	Failed to Reject
	Interest Coverage Ratio	2.50	8.00	0.006	Rejected
Profitability Ratios	Gross Profit Margin	4.00	7.75	0.109	Failed to Reject
	Net Profit Margin	2.50	8.50	0.004	Rejected
	ROA	2.50	8.50	0.004	Rejected
	ROE	2.50	8.50	0.004	Rejected
	Economic Rantability Ratio	2.50	8.50	0.004	Rejected
	ROCE	2.50	8.50	0.004	Rejected
	Operating Profit Margin	2.50	8.50	0.004	Rejected
Activity Ratios	Assets Turnover	5.75	6.88	0.683	Failed to Reject
	Fixed Assets Turnover	5.25	7.13	0.461	Failed to Reject
	Inventory Turnover	5.50	5.50	1.000	Failed to Reject
	Accounts Receivable Turnover	6.50	6.50	1.000	Failed to Reject
	Equity Turnover	6.25	6.63	0.933	Failed to Reject
Growth Ratios	Growth in Assets	6.25	6.63	0.933	Failed to Reject
	Growth in Equity	5.75	6.88	0.683	Failed to Reject
	Growth in Revenue	4.75	6.71	0.412	Failed to Reject

Growth in Operating Income	1.50	6.50	0.044	Rejected
Growth in Net Income	0	4.50	-	-

- Table 3.8 results of liquidity ratios show that there are statistically significant differences between the two groups in terms of current ratio (p=0.48) and EBIT/current liabilities ratio (p=0.004). For current ratio the mean ranks are 3.50 (0) and 8 (1). For EBIT/current liabilities ratio these figures are 2.5 (0) and 8.5 (1). In terms of other liquidity ratios, the differences are not statistically significant as their p-values are greater than 0.05. The p-values of the ratios are as 0.073 (quick ratio), 0.109 (working capital/total assets) and 0.154 (operating cash flow ratio).

- Table 3.8 results for financial structure ratios reveal that statistically significant differences (p<0.05) between failed and non-failed firms are relevant for operating cash flow/total debt (p=0.048), EBIT/total debt (p=0.004) and interest coverage ratio (p=0.006). If have a look in mean ranks, these figures are 3.50 (0) and 8 (1) for operating cash flow/total debt ratio; 2.5 (0) and 8.5 (1) for both EBIT/total debt ratio and interest coverage ratio. For the other financial structure ratios, the differences between the two groups are not statistically significant. The p-values for these ratios are as 0.283 (debt ratio, debt/equity ratio and equity multiplier), 0.808 (short-term debt/total assets), 0.214 (short-term debt/paid-in-capital), 0.933 (debt/EBITDA) and 1.000 (paid-in-capital/equity). The p-value of 1.000 of paid-in-capital/equity ratio means that the null hypothesis is fully accepted, viz., the median values of failed and non-failed firms are the same (the mean ranks for both groups are 6.5). The p-values of short-term debt/total assets ratio (p=0.808) and debt/EBITDA (p=0.933) are also substantially greater than 0.05. It means that despite the median values of the two groups are not exactly the same, they are much closer to each other. For short-term debt/total assets ratio the mean ranks are 7 (0) and 6.5 (1). And for debt/EBITDA ratio these figures are 6.25 (0) and 6.63 (1).

- Table 3.8 result of profitability ratios show that the only statistically not significant difference is relevant to gross profit margin (p=0.109). For all the other profitability ratios the differences between failed and non-failed firms are statistically significant. The p-values of all these ratios (net profit margin, ROA, ROE, economic rantability, ROCE and operating margin) are 0.004. The mean ranks for all these ratios (with significant differences) are also the same, i.e. 2.5 (0) and 8.5 (1).

- Table 3.8 results for activity ratios determine that there is no statistically significant difference for any of these ratios as all the p-values are greater than 0.05. The p-values are as 0.683 (assets turnover), 0.461 (fixed assets turnover), 1.000 (inventory turnover and accounts receivable turnover) and 0.933 (equity turnover), so for all the ratios the null hypothesis is accepted. There are even complete indifferences for two ratios (inventory turnover and accounts receivable turnover) with p-values of 1.000. Thus, the mean ranks of failed and non-failed companies in these ratios are equal, i.e. 5.5 (inventory turnover) and 6.5 (accounts receivable turnover).

- Table 3.8 results for growth ratios reveal that there is a statistically significant difference ($p < 0.05$) between the two groups only in terms of growth in operating ratio (p=0.044). The mean ranks for this ratio are 1.5 (0) and 6.5 (1). For the other growth ratios, the differences between the two groups are not statistically significant ($p > 0.05$) and the p-values are as 0.933 (growth in assets), 0.683 (growth in equity) and 0.412 (growth in revenue). As seen from the output there are no results for growth in net income. It's because of the fact that all four failed companies have missing data for this ratio.

3.2.3.5. Results for 2016

Table 3.9 The Mann-Whitney U Test Results for 2016

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	5.57	7.80	0.343	Failed to Reject
	Quick Ratio	4.71	9.00	0.048	Rejected
	EBIT/Current Liabilities	5.71	7.60	0.432	Failed to Reject
	Working Capital/Total Assets	5.14	8.40	0.149	Failed to Reject
	OCF/Current Liabilities	6.14	7.00	0.755	Failed to Reject
Financial Structure Ratios	Debt Ratio	8.57	3.60	0.018	Rejected
	Debt to Equity Ratio	8.57	3.60	0.018	Rejected
	Equity Multiplier	8.57	3.60	0.018	Rejected
	Short-term Debt/Total Assets	8.14	4.20	0.073	Failed to Reject
	Short-term Debt/Paid-in-capital	7.43	5.20	0.343	Failed to Reject
	Debt/EBITDA	5.57	7.80	0.343	Failed to Reject
	Operating Cash Flow Ratio	6.14	7.00	0.755	Failed to Reject
	EBIT/Total Debt	5.86	7.40	0.530	Failed to Reject
	Paid-in-capital/Shareholders' Equity	7.43	5.20	0.343	Failed to Reject

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
	Interest Coverage Ratio	5.29	7.25	0.412	Failed to Reject
Profitability Ratios	Gross Profit Margin	5.67	6.40	0.792	Failed to Reject
	Net Profit Margin	4.17	8.20	0.052	Failed to Reject
	ROA	5.43	8.00	0.268	Failed to Reject
	ROE	5.43	8.00	0.268	Failed to Reject
	Economic Rantability Ratio	5.86	7.40	0.530	Failed to Reject
	ROCE	5.86	7.40	0.530	Failed to Reject
	Operating Profit Margin	6.83	5.00	0.429	Failed to Reject
Activity Ratios	Assets Turnover	7.14	5.60	0.530	Failed to Reject
	Fixed Assets Turnover	7.00	5.80	0.639	Failed to Reject
	Inventory Turnover	4.29	9.00	0.024	Rejected
	Accounts Receivable Turnover	5.60	5.40	1.000	Failed to Reject
	Equity Turnover	7.43	5.20	0.343	Failed to Reject
Growth Ratios	Growth in Assets	5.57	7.80	0.343	Failed to Reject
	Growth in Equity	5.43	8.00	0.268	Failed to Reject
	Growth in Revenue	6.14	7.00	0.755	Failed to Reject
	Growth in Operating Income	5.33	4.00	0.571	Failed to Reject
	Growth in Net Income	4.33	4.60	1.000	Failed to Reject

- Table 3.9 results for liquidity ratios show that there is a statistically significant difference ($p<0.05$) between the two groups only in terms of quick ratio ($p=0.048$). The mean ranks for this ratio are 4.71 (0) and 9 (1). In terms of all the other liquidity ratios, the differences between the failed and non-failed companies are not statistically significant ($p>0.05$). It means the acceptance of the null hypothesis, viz., the mean values of the two groups are indifferent (almost the same). The p-values of these ratios are as 0.343 (current ratio), 0.432 (EBIT/current liabilities), 0.149 (working capital/total assets) and 0.755 (operating cash flow ratio). For the last one the equality between the median values of the two groups are more than the other ratios as its p-value is substantially greater than 0.05 and closer to 1.000 ($p=0.755$).

- Table 3.9 results of financial structure ratios show that for three of them (debt ratio, debt/equity and equity multiplier) there are statistically significant differences (p<0.05) between the two groups (p=0.018). The mean ranks for all these three ratios are also the same, i.e. 8.57 (0) and 3.6(1). For the rest of the financial structure ratios, the differences between failed and non-failed firms are not statistically significant (p>0.05). Their p-values are as 0.073 (short-term debt/total assets), 0.343 (short-term debt/paid-in-capital, debt/EBITDA and paid-in-capital/equity), 0.755 (operating cash flow/total debt), 0.53 (EBIT/total debt) and 0.412 (interest coverage ratio).

- Table 3.9 results of profitability ratios reveal that for none of these ratios there are statistically significant differences between the failed and non-failed companies as all the p-values are greater than 0.05. The p-values are as 0.792 (gross profit margin), 0.052 (net profit margin), 0.268 (ROA and ROE), 0.53 (economic rantability and ROCE) and 0.429 (operating margin).

- Table 3.9 results for activity ratios show that there is a statistically significant difference between the two groups only for inventory turnover ratio (p=0.024). The mean ranks for this ratio are 4.29 (0) and 9 (1). In terms of all the other activity ratios, the differences between the two groups are all statistically not significant. The p-values for these ratios are as 0.53 (assets turnover), 0.639 (fixed assets turnover), 1.000 (accounts receivable turnover) and 0.343 (equity turnover). For accounts receivable turnover ratio, the p-value is 1.000 which means that the median values of failed and non-failed companies are nearly equal to each other, i.e. the mean ranks are 5.6 (0) and 5.4 (1).

- Table 3.9 results for growth ratios reveal that for none of these ratios there are statistically significant differences between the median values of failed and non-failed companies (p>0.05). The p-values are as 0.343 1 (growth in assets), 0.268 1.000 (growth in equity), 0.755 1.000 (growth in revenue), 0.571 (growth in operating income) and 1 (growth in net income). A mostly indifferent equality is relevant for the growth in net income ratio (p=1), i.e. the mean ranks are 4.33 (0) and 4.6 (1).

3.2.3.6. Results for 2017

Table 3.10 The Mann-Whitney U Test Results for 2017

	Variable	Mean Rank (0)	Mean Rank (1)	p-value	H6.0
Liquidity Ratios	Current Ratio	4.17	8.83	0.026	Rejected
	Quick Ratio	4.00	9.00	0.015	Rejected
	EBIT/Current Liabilities	3.50	9.50	0.002	Rejected
	Working Capital/Total Assets	4.67	8.33	0.093	Failed to Reject
	OCF/Current Liabilities	6.17	6.83	0.818	Failed to Reject
Financial Structure Ratios	Debt Ratio	8.00	5.00	0.180	Failed to Reject
	Debt to Equity Ratio	8.00	5.00	0.180	Failed to Reject
	Equity Multiplier	8.00	5.00	0.180	Failed to Reject
	Short-term Debt/Total Assets	6.67	6.33	0.937	Failed to Reject
	Short-term Debt/Paid-in-capital	6.00	7.00	0.699	Failed to Reject
	Debt/EBITDA	7.50	5.50	0.394	Failed to Reject
	Operating Cash Flow Ratio	5.67	7.33	0.485	Failed to Reject
	EBIT/Total Debt	4.00	9.00	0.015	Rejected
	Paid-in-capital/Shareholders' Equity	7.50	5.50	0.394	Failed to Reject
	Interest Coverage Ratio	3.50	9.50	0.002	Rejected
Profitability Ratios	Gross Profit Margin	5.33	6.80	0.537	Failed to Reject
	Net Profit Margin	3.50	9.00	0.004	Rejected
	ROA	3.50	9.50	0.002	Rejected
	ROE	3.50	9.50	0.002	Rejected
	Economic Rantability Ratio	3.67	9.33	0.004	Rejected
	ROCE	3.67	9.33	0.004	Rejected
	Operating Profit Margin	3.83	8.60	0.017	Rejected
Activity Ratios	Assets Turnover	6.17	6.83	0.818	Failed to Reject
	Fixed Assets Turnover	5.67	7.33	0.485	Failed to Reject
	Inventory Turnover	4.83	6.50	0.476	Failed to Reject
	Accounts Receivable Turnover	5.40	5.60	1.000	Failed to Reject
	Equity Turnover	6.33	6.67	0.937	Failed to Reject
Growth Ratios	Growth in Assets	7.00	6.00	0.699	Failed to Reject
	Growth in Equity	5.00	8.00	0.180	Failed to Reject
	Growth in Revenue	5.00	8.00	0.180	Failed to Reject
	Growth in Operating Income	2.67	5.00	0.229	Failed to Reject
	Growth in Net Income	2.00	6.50	0.024	Rejected

- Table 3.10 results for liquidity ratios show that for two of the ratios the differences between failed and non-failed companies are not statistically significant ($p > 0.05$) with p-values of 0.093 (working capital/total assets) and 0.818 (operating cash flow ratio). For the rest of the liquidity ratios the differences between the two groups are statistically significant ($p < 0.05$) with the p-values of 0.026 (current ratio), 0.015 (quick ratio) and 0.002 (EBIT/current liabilities). The mean ranks for these ratios are as follows; current ratio 4.17 (0) and 8.83 (1); quick ratio 4 (0) and 9 (1); and EBIT/current liabilities 3.5 (0) and 9.5 (1)

- Table 3.10 results for financial structure ratios reveal that statistically significant differences between the two group median values ($p < 0.05$) are relevant to only two of them with the p-values of 0.015 (EBIT/total debt) and 0.002 (interest coverage ratio). The mean ranks for these ratios are as follows; for EBIT/total debt ratio the figures are 4 (0) and 9 (1), while for the other ratio (interest coverage ratio) They are 3.5 (0) and 9.5 (1). For the rest of the financial structure ratios the differences between the two groups are not statistically significant with the p-values of 0.9 (debt ratio, debt/equity and equity multiplier), 0.469 (short-term debt/total assets), 0.35 (short-term debt/paid-in-capital), 0.197 (debt/EBITDA and paid-in-capital/equity) and 0.242 (operating cash flow/total debt).

- Table 3.10 results for profitability ratios show that except one of the ratios there're statistically significant differences between the two groups median values. The p-values and the average ranks of these ratios are as follows; net profit margin ($p = 0.004$) 3.5 (0) and 9 (1); ROA ($p = 0.002$) 3.5 (0) and 9.5 (1); ROE ($p = 0.002$) 3.5 (0) and 9.5 (1); economic rantability ($p = 0.004$) 3.67 (0) and 9.33 (1); ROCE ($p = 0.004$) 3.67 (0) and 9.33 (1); and operating margin ($p = 0.17$) 3.83 (0) and 8.6 (1). The only ratio with statistically not significant difference between the two groups is gross profit margin with the p-value of 0.537.

- Table 3.10 for activity ratios reveal that none of them have a statistically significant difference between the two groups. For all of them the null hypothesis is accepted, i.e. the median values of the failed and non-failed companies are mostly equal ($p > 0.05$). Their p-values are as 0.818 (assets turnover), 0.485 (fixed assets turnover), 0.476 (inventory turnover), 1.000 (accounts receivable turnover) and 0.937 (equity turnover). An almost equality in the median values of failed and non-failed companies can be seen for the account receivable turnover ratio with the p-value of 1.000, and the average ranks are 5.4 (0) and 5.6 (1).

- Table 3.10 results for growth results show that the only ratio with a statistically significant difference (p<0.05) between the two groups median values is growth in net income (p=0.024). The mean ranks of this ratio are 2 (0) and 6.5 (1). For all the rest growth ratios the differences between the two groups are not statistically significant (p>0.05). Their p-values are as 0.699 (growth in assets), 0.18 (growth in equity and growth in revenue) and 0.229 (growth in operating income).

3.3. Discussion of the Findings

The summary of the Mann-Whitney U test results for each year is shown in Table 3.11 and Table 3.12.

Table 3.11 Statistically Significant Ratios for Each Year

Year	Statistically Significant Ratios
2012	EBIT/current liabilities, debt/EBITDA, EBIT/total debt, interest coverage ratio, gross profit margin, growth in operation income, growth in net income
2013	quick ratio, gross profit margin, economic rantability, growth in equity ratio, growth in net income
2014	quick ratio, EBIT/current liabilities, debt ratio, short-term debt/total assets ratio, EBIT/total debt ratio, interest coverage ratio, net profit margin, ROA, ROE, economic rantability, ROCE, inventory turnover ratio
2015	current ratio, EBIT/current liabilities, operating cash flow/total debt, EBIT/total debt, interest coverage ratio, net profit margin, ROA, ROE, economic rantability, ROCE, operating profit margin, growth in operating ratio
2016	quick ratio, debt ratio, debt/equity, equity multiplier, inventory turnover ratio
2017	current ratio, quick ratio, EBIT/current liabilities, EBIT/total debt, interest coverage ratio, net profit margin, ROA, ROE, economic rantability, ROCE, operating profit margin, growth in net income

Table 3.12 Frequencies of Statistically Significant Ratios

Ratio	Frequency	Year(s)
Liquidity Ratios		
Current Ratio	2	2015, 2017
Quick Ratio	4	2013, 2014, 2016, 2017
EBIT/Current Liabilities	4	2012, 2014, 2015, 2017
Financial Structure		
Debt Ratio	2	2014, 2016
Debt to Equity Ratio	1	2016
Equity Multiplier	1	2016
Short-term Debt/Total Assets	1	2014
Debt/EBITDA	1	2012
OCF/Total Debt	1	2015
EBIT/Total Debt	4	2012, 2014, 2015, 2017
Interest Coverage Ratio	4	2012, 2014, 2015, 2017
Profitability Ratios		
Gross Profit Margin	2	2012, 2013
Net Profit Margin	3	2014, 2015, 2017
ROA	3	2014, 2015, 2017
ROE	3	2014, 2015, 2017
Economic Rantability	4	2013, 2014, 2015, 2017
ROCE	3	2014, 2015, 2017
Operating Profit Margin	2	2015, 2017
Activity Ratios		
Inventory Turnover Ratio	2	2014, 2016
Growth Ratios		
Growth in Equity	1	2013
Growth in Operating Income	2	2012, 2015
Growth in Net Income	3	2012, 2013, 2017

The interpretations below can be made about the Mann-Whitney U test results shown in Table 3.10;

- Activity ratios are the least distinctive between the failed and non-failed companies. Only inventory turnover ratio is twice (2014 and 2016) statistically significant in differentiation the two groups;

- Liquidity ratios are more distinctive, i.e. 2 out of 5 ratios in this group are both statistically significant in 4 out of 6 years. They are EBIT/current liabilities (2012, 2014, 2015 and 2017) and quick ratio (2013, 2014, 2016 and 2017). Additionally, current ratio is statistically significant in differentiation the two groups twice (2015 and 2017).

- Financial Structure ratios group can be called medium distinctive. In 2013 none of these ratios were statistically significant. 7 of 10 (operating cash flow/total debt, EBIT/total debt, interest coverage ratio, debt ratio, debt/equity, equity multiplier and debt/EBITDA) are at least once statistically significant. The most frequent ratios in this group are EBIT/total debt and interest coverage ratio (both in 2012, 2014, 2015 and 2017). Debt ratio is also statistically significant twice (2014 and 2016).

- In 2014, 2015 and 2017 the profitability ratios group is the most statistically significant in differentiation between the two groups (5,6 and 6 ratios respectively). But in 2016 this group is unresponsive to the Mann-Whitney U test. The most frequent statistically significant ratio in this group is economic rantability ratio (2013, 2014, 2015 and 2017).

- The distinctiveness of growth ratios group is more than activity ratios, but not so much as the others. 3 of 5 ratios are statistically significant in differentiation between the failed and non-failed companies. They are growth in net income (2012, 2013 and 2017), growth in operating income (2012, 2015) and growth in equity (2013). In 2014 and 2016 these ratios are unresponsive to significance in differentiation between the two groups.

- The overall number of statistically significant ratios increases in 2014 (12 ratios), 2015 (12 ratios) and 2017 (13 ratios).

- There is no ratio to be constantly statistically significant in differentiation between the two groups, all the most frequent ratios are statistically significant four times. They are quick ratio, EBIT/current liabilities, EBIT/total debt, interest coverage ratio, and economic rantability ratio.

CONCLUSION

Business failure is a very broad and complex concept from not being able to pay short-term liabilities to bankruptcy. Every company regardless of its size and age can face business failure. Several internal and external factors can cause business failure. A huge number of stakeholders such as managers, investors, creditor organizations, employees and labor unions, financial analysts and external auditors, governments and several regulatory bodies can be affected by business failure. A widespread business failure can even damage a country's economy as a whole. Considering all these, companies try to take precautions against business failure. But for being able to prevent business failure, companies should be able firstly to predict it. And this necessity has been directing researchers across the world to find out business failure prediction models for decades. Within these years a lot of valuable studies with precious prediction models have been done. The reasons why there are different prediction models may be listed this way; 1. not all the industry structures and operations are the same, so the predictive financial ratios will differ from one sector to another; 2. even companies from the same industries but different countries can show unlike results in analyses, because economic policies, conditions also vary across countries in the world.

This study aims to develop a FP model for tourism enterprises of Turkey. For this reason, the annual financial statements of 17 tourism enterprises listed on BIST from the period of 2012-2017 were analyzed. This study includes two types of variables; dependent and independent. The dependent variable of the study is failure which is a dichotomous variable with failed (coded as 0) and non-failed (coded as 1) categories. By literature review some criteria were defined to distinguish between failed and non-failed enterprises in this study. They are; 1. being in Watchlist Market; 2. negative equity; 3. 2/3 reduction in assets value; and 4. loss for three consecutive years. 32 financial ratios in five groups (liquidity, financial structure, profitability, activity and growth ratios) were included as independent (predictor) variables in the analyses. These ratios were selected as the consequence of literature review on this topic and investigation of tourism related studies in detail. While choosing ratios, the tourism related studies were priority, but not all ratios encountered were chosen for this study. Only the ones which were thought to be appropriate for the Turkish companies and a few ratios thought to be important from the other studies were included. The ratios were calculated via Microsoft Excel. While computing them the formulas published by CBRT were the guide. Statistical analyses were done through the IBM SPSS Statistics 22.0.

Firstly, multiple discriminant analysis was selected. But this method failed to be applied because the data set could not meet all the assumptions needed for discriminant analysis. The problem was that the independent variables included in the analysis (after eliminating multicollinearity problem) were not normally distributed.

The second try was done for developing a FP model. This time logistic regression analysis was applied. Because this method is an alternative for discriminant analysis in the case of not meeting some assumptions (i.e. normality). But the study failed to develop a prediction model again. This time the reason was the sample size of this study, viz., it was too small for applying logistic regression test.

After failing in developing a prediction model, another statistical test was applied and it was the Mann-Whitney U test. Although this test is not appropriate for developing a model, but it reveals whether there are differences between the median values of two groups or not. A few studies have applied this test in failure prediction topic before. With this test the study aims to find out in terms of which financial ratios there're statistically significant differences between the median values of the failed and non-failed enterprises. Before applying this analysis, several changes were done in the sample and failure criteria. Since in this test the sample size doesn't need to be as large as possible, the number of total companies was decreased from 17 to 12. The reason of this reduction was that all the previous failure prediction studies related to tourism industry used hotels and restaurants as samples. And it was thought that the ratios used in these studies were more suitable to these two types of enterprises certainly. Thereby 12 companies listed under the 'Hotels and Restaurants Sector' in KAP were included in the analysis. The other change was done regarding to failure criteria. As it was stated the sample size doesn't need to be large for the Mann-Whitney U test. But the number of the subjects of two groups should be close to each other for getting reliable results. With previous criteria the differences in company numbers between the failed and non-failed enterprises would be very deep (i.e. 2 versus 10). To eliminate this problem, one of the criteria (loss for three consecutive years) was replaced by a new criterion (loss for the current year). After these changes, the Mann-Whitney U tests were done for each year. Discussions of the results for each year are below.

- For 2012 there are statistically significant differences between the failed and non-failed companies in terms of the ratios such as EBIT/current liabilities (liquidity ratios), debt/EBITDA, EBIT/total debt, interest coverage ratio (financial structure ratios), gross profit margin (profitability ratios), growth in operation income and growth in net income (growth ratios).

- For 2013 there are statistically significant differences between the failed and non-failed enterprises in terms of the ratios such as quick ratio (liquidity ratios), gross profit margin, economic rantability (profitability ratios), growth in equity ratio, growth in net income (growth ratios).

- For 2014 there are statistically significant differences between the failed and non-failed enterprises in terms of the ratios such as quick ratio, EBIT/current liabilities (liquidity ratios), debt ratio, short-term debt/total assets ratio, EBIT/total debt ratio, interest coverage ratio (financial structure ratios), net profit margin, ROA, ROE, economic rantability, ROCE (profitability ratios), inventory turnover ratio (activity ratios).

- For 2015 there are statistically significant differences between the failed and non-failed enterprises in terms of the ratios such as current ratio, EBIT/current liabilities (liquidity ratios), operating cash flow/total debt, EBIT/total debt, interest coverage ratio (financial structure ratios), net profit margin, ROA, ROE, economic rantability, ROCE, operating margin (profitability ratios), growth in operating ratio (growth ratios).

- For 2016 there are statistically significant differences between the failed and non-failed enterprises in terms of the ratios such as quick ratio (liquidity ratios), debt ratio, debt/equity, equity multiplier (financial structure ratios), inventory turnover ratio (activity ratios).

- For 2017 there are statistically significant differences between the failed and non-failed enterprises in terms of the ratios such as current ratio, quick ratio, EBIT/current liabilities (liquidity ratios), EBIT/total debt, interest coverage ratio (financial structure ratios), net profit margin, ROA, ROE, economic rantability, ROCE, operating margin (profitability ratios), growth in net income (growth ratios).

In every year there are both statistically significant (H6.0 rejected), and not significant (H6.0 failed to reject) differences between the failed and non-failed enterprises in terms of various financial ratios. But if speak generally, 22 out of 32 financial ratios are at least once statistically significant distinctive between two groups. Considering this, for tourism enterprises in Turkey H6.0 can be rejected. In other words, the median values of the failed and non-failed tourism enterprises in Turkey are not equal.

If to assume being statistically significant in differentiation between two groups as a little effect in failure prediction, the other hypotheses of this study can be interpreted as follows;

- In liquidity ratios group (5 ratios) there are statistically significant differences in terms of EBIT/current liabilities (2012, 2014, 2015 and 2017), quick ratio (2013, 2014, 2016 and 2017) and current ratio (2015 and 2017). Every year at least one ratio of this group is distinctive between the failed and non-failed enterprises. Considering this, H1.0 can be rejected. In other words, liquidity ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

- 7 of 10 financial structure ratios (operating cash flow/total debt, EBIT/total debt, interest coverage ratio, debt ratio, debt/equity, equity multiplier and Debt/EBITDA) are at least once statistically significant. The most frequent ratios in this group are EBIT/total debt and interest coverage ratio (both in 2012, 2014, 2015 and 2017). Debt ratio is also statistically significant twice (2014 and 2016). But in 2013 none of these ratios were statistically significant. Considering all of these, H2.0 can be rejected. In other words, financial structure ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

- In 2014, 2015 and 2017 the profitability ratios group is the most statistically significant in differentiation between the two groups (5, 6 and 6 respectively). But in 2016 none of these ratios were statistically significant. The most frequent statistically significant ratio in this group in economic rantability ratio (2013, 2014, 2015 and 2017). In sequence of these results H3.0 can be rejected. In other words, profitability ratios have effect in the prediction of business failure in tourism enterprises of Turkey.

- Among activity ratios only inventory turnover ratio is twice (2014 and 2016) statistically significant in differentiation the two groups. Thus, this time H4.0 failed to be rejected. In other words, activity ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

- 3 of 5 growth ratios are statistically significant in differentiation between the failed and non-failed enterprises. They are growth in net income (2012, 2013 and 2017), growth in operating income (2012, 2015) and growth in equity (2013). In 2014 and 2016 these ratios are unresponsive to significance in differentiation between the two groups. This group ratios can be described as slightly distinctive in comparison to liquidity, financial structure and profitability ratios. So, this study can fail to

reject H5.0. In other words, growth ratios have no effect in the prediction of business failure in tourism enterprises of Turkey.

- The number of statistically significant ratios increases in 2014 (12 ratios), 2015 (12 ratios) and 2017 (13 ratios). There is no ratio to be constantly statistically significant in differentiation between the two groups, all the most frequent ratios are four times statistically significant and from liquidity, financial structure and profitability groups (quick ratio, EBIT/current liabilities, EBIT/total debt, interest coverage ratio, economic rantability). These 5 ratios are the most distinctive ones as the result of this study. In terms of all these ratios the mean ranks of non-failed companies are higher than the failed companies. It indicates that non-failed enterprises are more successful in paying their short-term debts via more liquid current assets (quick ratio), short-term and total debt obligations via annualized EBIT (EBIT/current liabilities and EBIT/total debt), interest expenses (interest coverage ratio) and in effectively utilizing funds invested in the company (economic rantability ratio).

This study suggests 5 ratios which stakeholders can use in evaluating the financial health of a company. Furthermore, except economic rantability ratio, other 4 ratios were revealed as important in business failure prediction by several previous studies. Quick ratio was revealed by Kim (2011: 455), EBIT/current liabilities by Gu and Gao (2000: 47), interest coverage ratio by Youn and Gu (2010b: 123). The most frequently determined ratio is EBIT/total debt (Gu, 2002: 34; Gao, 1999: 45; Kim and Gu 2006a: 483). However, the analyses used in this study (the Mann-Whitney U Test) are not so powerful in determining predictive ratios for business failure. Other statistical methods such as MDA or logistic regression can give more accurate results on this topic. Similar situations can be encountered in some of the previous studies on failure prediction in tourism (Gu and Gao, 2000: 47; Gu, 2002: 33; Kim and Gu 2006a: 483). For example, Gu and Gao (2000: 47), according to t tests revealed 9 ratios with statistically significant differences between two groups. While their MDA model included only 5 ratios. 2 of these 5 ratios (gross profit margin, sales/fixed assets) were not even determined as statistically significant in t test results. So, a failure prediction model can be more useful for stakeholders interested in business failure in tourism enterprises of Turkey. In days to come, this study expects more attention by other researchers to this field, to business failure prediction in tourism enterprises.

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ANNEX 1 – FINANCIAL RATIOS WITH DEFINITIONS

Variable	Liquidity Ratios	Definition
X1	Current Ratio Current Assets/Currents Liabilities	Measures a company's ability to pay its short-term obligations with its current assets.
X2	Quick (Acid Test) Ratio (Current Assets-(Inventory+Prepaid Expenses +Other Current Ratios))/ Currents Liabilities	Indicates the company's ability to instantly use its near-cash assets (that is, assets that can be converted quickly to cash) to pay down its current liabilities.
X3	EBIT/Current Liabilities	Measures a company's ability to repay short-term debt obligation from annualized EBIT.
X4	Working Capital/Total Assets	Expresses the current assets or working capital of a company as a percentage of its total assets.
X5	Operating Cash Flow Ratio (OCF) OCF/ Currents Liabilities	Measures how well current liabilities are covered by the cash flows generated from a company's operations.

Variable	Growth Ratios	Definition
X28	Growth in Assets	Annual growth in assets
X29	Growth in Equity	Annual growth in equity
X30	Growth in Revenue	Annual growth in revenue
X31	Growth in Operating Income	Annual growth in operating income
X32	Growth in Net Income	Annual growth in net income

Variable	Financial Structure Ratios	Definition
X6	Debt (Leverage) Ratio Total Debt/Total Assets	Indicates the proportion of a company's assets that are financed by debt.
X7	Debt to Equity Ratio Total Debt/ Shareholders' Equity	Shows how much greater or lesser a company's debt is than its equity.
X8	Equity Multiplier Total Assets/ Shareholders' Equity	Measures the portion of company's assets that are financed with stockholders' equity.
X9	Short-term Debt/Total Assets	Represents the percentage of a corporation's assets financed with short-term debt.
X10	Short-term Debt/Paid-in-capital	Shows the relation between a company's paid-in-capital and its short-term debt.
X11	Debt/EBITDA	Measures the amount of income generated and available to pay down debt before covering interest, taxes, depreciation and amortization expenses.
X12	OCF/Total Debt	Determines how long it would take a company to repay its debt in the case of devotion of all its cash flow to debt repayment.
X13	EBIT/Total Debt	Measures a company's ability to repay its total debt obligations from annualized EBIT.
X14	Paid-in-capital/Shareholders' Equity	Shows the equity structure in companies and also provides information on profit distribution or internal financing policy.
X15	Interest Coverage Ratio EBIT/Interest Expenses	Determine how easily a company can pay its interest expenses on outstanding debt.

Variable	Profitability Ratios	Definition
X16	Gross Profit Margin Gross Profit/Net Sales	Shows how much gross profit is generated as a percentage of revenue.
X17	Net Profit Margin Net Profit/Net Sales	Shows how much net income is generated as a percentage of revenue.
X18	Return on Assets (ROA) Net Income/Total Assets	Indicates how efficient a company's management is at using its assets to generate earnings.
X19	Return on Equity (ROE) Net Income/Shareholders' Equity	Measures the profits made for each unit from shareholders' equity.
X20	Economic Rantability EBIT/Total Liabilities and Shareholders' Equity	Measures how effectively the management utilize funds invested in the enterprise.
X21	Return on Capital Employed (ROCE) EBIT/Capital Employed	Measures how well a company is generating profits from its capital invested in the company.
X22	Operating Profit Margin Operating Income/Net Sales	Determine to what extent the entity is profitable from its main activities.

Variable	Activity Ratios	Definition
X23	Assets Turnover Ratio Net Sales/Total Assets	Indicates how efficiently a company utilizes its assets to generate revenue.
X24	Fixed Assets Turnover Ratio Net Sales/Total Fixed Assets	Measures a company's ability to generate revenue from its fixed-assets.
X25	Inventory Turnover Ratio COGS/ Average Inventory	Shows how many times a company has sold and replaced inventory during a given period.
X26	Accounts Receivable Turnover Ratio Net Sales/Short-term Trade Receivables+Long-term Trade Receivables	Measures a company's effectiveness in collecting its receivables or money owed by clients.
X27	Equity Turnover Ratio Net Sales/Shareholders Equity	Shows how efficiently the equity is used in a company.

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