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**FINANCIAL DISTRESS PREDICTION OF  
AIRLINES IN ASIA**

**BY**

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**Research Paper Submitted to  
Othman Yeop Abdullah Graduate School of Business,  
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**Pusat Pengajian Ekonomi,  
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SCHOOL OF ECONOMICS, FINANCE, AND BANKING

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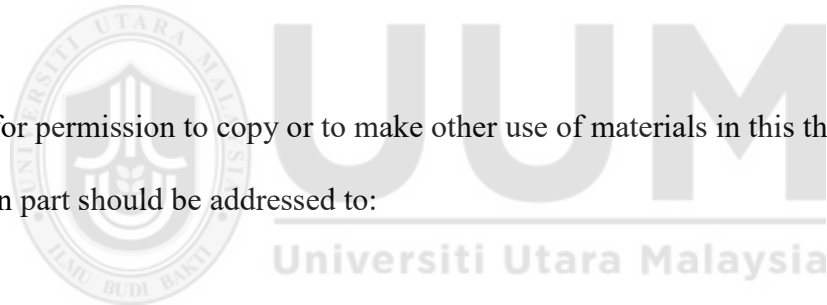
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## ABSTRACT

The objective of this study is to identify financial distress of airlines in Asia using three different method namely Altman Z-Score model, Springate model and Zmijewski Model. The study was conducted using quantitative research method based on secondary data and obtained from Bloomberg Terminal during 2016 until 2020 on a quarterly basis. Descriptive and comparative analysis method has been used for the study and these models is developed to compare the independent variables. Descriptive analysis in this study indicated that Altman Z-Score model is the most significant model to predict financial distress of the companies. The comparative analysis shows there is significant difference between Altman Z-Score model and Zmijewski model also between Springate model and Zmijewski model. However, Altman Z-Score model and Springate model indicates that there is no significance model.

**Keyword:** Financial Distress, Altman Z-Score Model, Springate Model and Zmijewski Model.

## ABSTRAK

Objektif kajian ini adalah untuk mengenal pasti masalah kewangan syarikat penerbangan di Asia menggunakan tiga kaedah berbeza iaitu model Altman Z-Score, model Springate dan Model Zmijewski. Kajian ini dilakukan dengan menggunakan kaedah penyelidikan kuantitatif berdasarkan data sekunder dan diperoleh dari Bloomberg Terminal pada tahun 2016 hingga 2020 setiap suku tahun. Kaedah analisis deskriptif dan perbandingan telah digunakan untuk kajian ini dan model-model ini dikembangkan untuk membandingkan pemboleh ubah bebas. Analisis deskriptif dalam kajian ini menunjukkan bahawa model Altman Z-Score adalah model yang paling signifikan untuk meramalkan masalah kewangan syarikat. Analisis perbandingan menunjukkan terdapat perbezaan yang signifikan antara model Altman Z-Score dan model Zmijewski juga antara model Springate dan model Zmijewski. Namun, model Altman Z-Score dan model Springate menunjukkan bahawa tidak ada model kepentingan.

**Kata Kunci:** Masalah Kewangan, model Altman Z-Score, model Springate dan Model Zmijewski

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## LIST OF ABBREVIATIONS

FY	Financial Year
GDP	Gross Domestic Product
IATA	International Air Transport Association
MAVCOM	Malaysian Aviation Commission
SARS	Severe Acute Respiratory Syndrome
WHO	World Health Organization
YoY	Year of Year



## **CHAPTER 1: INTRODUCTION**

### **1.1 Introduction to the Study**

This study seeks to predict the early sign of financial distress using financial ratios models; Altman Z-Score model, Springate S-Score model and Zmijewski X-Score model in order to evaluate its ability to determine the selected airlines industry financial health in Asia as well as to compare the financial distress models. This chapter provides background information for the study as well as specifics about how the analysis will be conducted. It also explores on the problem statement, research objectives, research questions, significance and scope of research and conceptual definition of key variables of the research.

### **1.2 Background of Study**

Predicting financial trouble in the airline industry can have a big impact on the economy because it is a good early warning sign. This industry is highly volatile and notorious for its proclivity for financial distress. The financial health of a company has a direct effect on its ability to operate successfully. Weak financial stability puts a company's survival in jeopardy and leads to bankruptcy. Terms can be found in the literature are insolvency, bankruptcy default and failure to depict the condition of confronting the financial distress.

There will be a potential to be within the financial difficulties increase when firms have high fixed costs, revenue or illiquid assets is sensitive to the economic downturn. Due to fluctuations in airline fortunes, early monitoring and warning systems of impending distress would benefit management as well as airline stakeholders such as investors and creditors.

The announcement of Coronavirus Disease or COVID-19 outbreak as a global pandemic made by the WHO, economic activities have disrupted all over the world to adhere the physical distance and a lockdown. According to the World Economic Outlook, global economic growth will fall to -3 percent in 2020. It indicates that the strict lockdown is the worst economic downturn since of the great depression, also worse than the global financial crises. Many companies are trembling due to country-wide lockdown and travel restrictions as a result of the virus's containment measures. As the result, a lot of companies are facing bankruptcy especially retail, travel, and tourism businesses such as AirAsia Japan and Virgin Australia. Therefore, companies need to wisely manage their funds to avoid in getting unhealthy financial state.

Undoubtedly, the Covid-19 giving a negative impact in many ways which is on the global economy at the beginning of 2020. Other than that, it also has diminished prospects of economic recovery that has already slowed down prior to the Covid-19 crisis. The fear of contagion of the virus will affects to trigger people to postpone vacations and have a direct effect on the tourism and hospitality industries. The stock market in the United States starts to sell off since the early year of 2020 on February 20 and it has been hits on the airline stock prices together with the bearish condition, this similarly to the SARS pandemic and terrorist attacks since September 11th, but lower than after the global financial crisis in 2008.

Asia is a vast continent and exigently makes it one of the most populous areas on the planet. Asia is a developing country, there is enormous variation among them. It is well known for its uniqueness, cultures, population and economies. Asian economic interdependence grew significantly during the late 20th century as a product of trade,

investment and better access to information. Asia has become biggest contribution within the growing aviation industry and major markets of airlines in the world. The continent is slowly but surely becoming the number one region in carried passengers.

According to aviation business news (2017), Asia is expected to account for approximately 40% of future airliner production. Achievement of Asian airlines continue to rank as the best in the world year by year. SKYTRAX (2020), proudly announce the best airlines in the world for the last 5 years are dominated by Asia. Qatar Airways awarded as the best airlines in the world 2019, followed by Singapore Airlines, ANA All Nippon Airways, Cathay Pacific, Emirates, EVA Air, Hainan Airlines, Qantas Airways, Lufthansa and Thai Airways, respectively.

The airline industry is most lucrative for investors, and it is taken into consideration as a big deal because it is expected to expand rapidly over the next 20 years (IATA, 2016). Despite the promising growth, in comparison to other industries, airlines industry remains the most unstable. According to Aviation Outlook (2018), the raising on labor and fuel costs are affecting the company's operating margin. The key reason for this industry's high volatility is the fluctuating jet fuel and oil rates, variable costs, and high fixed, market prices.

Asia is one of the world's major airline markets, especially China and India contributing significantly to the aviation industry's growth. The ascend of the aviation industry in Asia-Pacific is being fueled by regional economic growth, trade liberalization and new business models (Asia Pacific Business Review, 2014). Researcher emphasis that world economic conditions, Avgas price, technology, jet fuels and standard policy are some of the factors

that influence the aviation industry (Mordor Intelligence, 2018).

On top of that, the unexpected crisis in Malaysia, something worse could happen the Malaysia Airlines over the years. In 2014, Malaysian Airlines and fellow Malaysians suffered a major tragedy when one of their planes, MH370 aircraft was lost and a few months later MH17 was shot down. Within a short period of time, they had to deal with two tragedies. The tragedies causing a tremendous hassle to the public. The losses were resulted with the public's negative perception towards the brand name related with questionable safety pertaining to the tragedy. According to Topham (2015), the airline's CEO, Christoph Mueller even said the airline was "technically bankrupt".

Many of Arab economies are reliant on oil prices adds a new dimension to the challenges faced by Arab carriers. Abdul Wahab Teffaha (2019) stated that the volatility of those prices has resulted in Arab GDP growth falling in line with mature markets – for example, to 2.6 percent in 2018 – rather than rising to the level expected by emerging economies. According to Tony Douglas (2019), Etihad Airways remains a work in progress with restructuring while announcing another massive loss. Etihad reported a huge loss on financial 2018. However, the \$1.28 billion loss was an increase over the \$1.52 billion loss seen the previous year.

Financial economists are interested in forecasting airline distress because it can provide a signal about a company's financial health. The financial distress prediction analysis which is done accurately and on timely manner is very important to stakeholders including the government, managers, suppliers, employees and customers to take the necessary actions to aver or avoid a potential bankruptcy (Byrne & Barron, 1993).

Numerous studies on bankruptcy have concluded that financial ratios are critical in determining whether a company is healthy or unhealthy. Therefore, this study focuses on three different financial distress models to predict firms' financial health on airlines in Asia for the quarterly period from 2016 to 2020.

### **1.3 Problem Statement**

Airline industry is increasingly exposed to competition like many other industries. There are two effects on companies: it puts downward pressure on output prices and provides incentives for companies to improve their efficiency and productivity. Many airlines are being forced to restructure in order to fulfill these challenges. Various factors have financially impacted the airline industry: the economic crisis, rising labor costs, maintenance and interest costs, increasing prices of jet fuel, rising insurance costs and increased competition (Carla Kroeze, 2005). The transition from a regulated to a deregulated setting increased the volatility of the operating income of the carriers.

Evidently, labor and aircraft services, which make up the majority of airlines' input costs. Poor equipment management (composition, acquisition and utilization of fleets) and low labor productivity are assumed to be linked to poor airline performance. In general, it is more effective on newer aircraft compared to older aircraft. There are higher maintenance costs and fuel usage for older aircraft. The average age of the fleet should also be a characteristic of poorer performing airlines. Airlines known as a highly leveraged, as consequences, airlines must lease or purchase new engines and aircraft on a regular basis and also make fleet decisions, bearing in mind the goal to fulfill market demand while operating a fleet that remains economical for the industry. They must manage the related

costs efficiently in order to sustain the services offered by an airline. Some examples of the price of operating an airline are labor, IT facilities and networks, fuel, spare parts, engines, aviation insurance, handling services, training, distribution of sales, catering, and equipment.

Almost all of an airline's profit from ticket purchases is used to keep the company afloat. Airlines are also held responsible for implementing government regulations that apply to aircraft. For instance, if a passenger boards an international flight without appropriate documentation, the airline must return the passenger to the initial country. Next factor is when political processes supersede airline operational interests in a market with significant government control (government airline or monopoly market). Another significant resource is employees. Pilots are normally the most expensive resource for labor. Therefore, the higher number of flight hours per pilot is believed to be attributed to the better performance of carriers.

MAVCOM Outlook (2018) stated that the price of crude oil and jet fuel increased by 44.8% YoY and 52.7% YoY, respectively, in 2017. Despite this in 2017, Malaysian carriers' average fares dropped by 7.7% YoY to RM371 (2016: RM402). The average prices of crude oil and jet fuel rose by 18.4% YoY and 25.3% YoY, respectively, for the first four months of 2018, while the United States Energy Information Administration and IATA predicted oil prices to rise between 10.7% YoY and 30.5% YoY in 2018. When fares are currently poor, this can exert downward pressure on the profitability of the airlines.

AirAsia Group Bhd, Asia's largest low-cost carrier, lost money in the financial year ended December 31, 2019 (FY19), plunged into the red due to the absence of a RM1.1 billion profit in 2018. In FY19, it posted a net loss of RM303.72 million, compared to a net profit of RM1.97 billion the previous year. The carrier was also affected by the recognition of one-off expenses, which included consultant costs of RM25 million for leaseback and sales transactions, tax provision and payment of RM49 million for a subsidiary, discounting of RM40 million for long-term receivables, and RM280 million for losses in AirAsia India, including recognition of losses in the previous year.

Consistent with the above discussion, CAPA - Centre for Aviation (2018) emphasis that the Southeast Asia's airline industry continues to underperform in 2017. There is no assurance that the airlines will be financially secure, no matter how many awards they have won. Despite the optimistic profit outlook since 2017, the oil price phenomenon remains remarkable in 2014 due to the struggle to carry positive margins. The downturn in recent years has been witnessed by most Southeast Asian airlines. Garuda also announced losses of around \$222 million from January to September 2017.

As reported by Garuda from the previous year the loss increased to approximately 404.53% and was primarily driven by the increased cost of fuel, maintenance costs, fines and the high cost of tax amnesty to be met. The reasons why all rate rises are influenced by the sensitivity of the world's gas and oil prices (Daeng, 2017). The significant issue of their internal problem, which impacted the stock price by up to 58% was also influenced by their decision to go public (Hidayat, A, 2018).

In addition, other Asian airlines have announced losses as well. Singapore Airlines declared a loss in March 2018, amounting to SGD 138 million (CNA, 2019). In addition, despite as the Best Airlines in Economy Class, Thai Airways suffered their lost 3.69 billion THB in the third quarter (Live and Let's Fly, 2018). Malaysia Airlines is going to have another loss in 2017 because of a loss of USD 195.2 million (Blueswandaily.com, 2018). Most airlines in Asia, both best and not, face the same problems which are high fuel prices, leading to financial losses, they are Emirates, Luthfansa, Hainan Airlines and Cathay Pacific Airways (Lee, D, 2018; IATA Economics, 2019; Balcaen, Sofie & Ooghe, Hubert, 2006).

Moreover, the Coronavirus spreading actively since March 2020 and all the flights were suspended gradually due to the government restrictions. In May 2020, many airlines have slowly started to recover but still the load factor is low and it is also including by the increasing of operating costs. It is necessary for airlines to find ancillary revenues as an alternative to increase their revenues as much as possible. Airlines in the Western Asia continue to be battered as Emirates announced its first half-year loss from the start of April, posting negative \$3.8 billion, against a \$320 million profit in the same period of 2019. Meanwhile, in Saudi Arabia, over 35 million fewer passengers have resulted in a revenue loss of \$7.2 billion, putting 287,500 jobs at risk and contributing \$17.9 billion to the Saudi economy. Muhammad Al Bakri (2020) said passenger traffic has practically ceased, and revenue sources have disappeared. There is no option to save airlines from a liquidity crisis by cutting costs. The collapse of air transportation would have catastrophic consequences for economies and employment in many countries. Direct financial assistance is essential to keep employment and airlines viable businesses.

Altman Z-score model is a common method used to identify the company's financial distress. Pakdaman, H (2018), stated that Altman was the first multivariate bankruptcy model. As independent variables, Altman used the multiple differentiation analysis tool (MDA) in conjunction with financial ratios. Furthermore, the Altman model is regarded as a success in the aviation industry, where the prediction of carrier failures correctly predicted the bankruptcy filings of Braniff and Continental in the early 1980s (M. Abdullah, 2015). Another common model used to predict financial distress is Springate model. Gorgon L.V. Springate developed this model in 1978. The Springate model is a ratio model that employs multiple discriminate analysis (MDA) to select 4 out of 19 financial ratios that are commonly used in literature to distinguish between distress and non-distress sound businesses. While the third common model used to predict financial distress is Zmijewski model. Zmijewski came up with his own model due to his critics towards the previous model or sampling model used by his predecessors. Zmijewski uses leverage, liquidity and performance ratios to present a suitable model (Zmijewski, 1984).

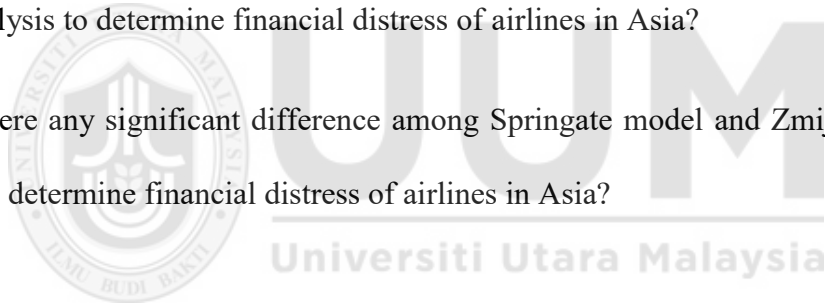
However, based on the comparative research conducted previously, there are various result in these three model differences. Based on research conducted by Tanjung (2020), the results between Altman Z-Score model and Springate model also between Springate model and Zmijewski model indicate a probability below 0.05, indicating that there are substantial discrepancies between the two sample groups when it comes to forecasting financial distress on a pharmaceutical company listed. According to Tanjung (2020), based on comparative analysis test for both Altman and Zmijewski model, the result showed there was a significant difference in the analysis results of financial distress between these two models. Therefore, this research aims to compare if there is a

significant difference between Altman Z-Score model, Springate S-Score model and Zmijewski X-Score model.

#### **1.4 Research Questions**

The following questions need further discussion upon the issues that have been addressed in the research problem. The research questions are as follows:

- 1) Is there any significant difference among Altman Z-score model and Springate model analysis to determine financial distress of airlines in Asia?
- 2) Is there any significant difference among Altman Z-score model and Zmijewski model analysis to determine financial distress of airlines in Asia?
- 3) Is there any significant difference among Springate model and Zmijewski model analysis to determine financial distress of airlines in Asia?



## 1.5 Research Objectives

The aim of this research is to analyze the comparison between three financial ratio models in determining financial distress of Airlines Industry in Asia. To simplify this, the following objectives have been addressed in providing answers to the research questions:

- 1) To compare Altman Z-Score Model and Springate Model in determining financial distress of airlines in Asia.
- 2) To compare Altman Z-Score Model and Zmijewski Model in determining financial distress of airlines in Asia.
- 3) To compare Springate Model and Zmijewski Model in determining financial distress of airlines in Asia.

## 1.6 Significance of Study

The intent of this financial distress analysis is to raise awareness to the non-manufacturers such as airlines to be alert that there are numerous things to concentrate on and monitor. The state of a country's economy has a significant impact on its bankruptcy rate. Essentially, if a country's economic situation continues to deteriorate, it will only signal an increase in the rate of bankruptcy in that country (Buehler, Kaiser & Jaeger, 2012)

It is expected that the study would benefit the scholar or researcher to form a foundation for future analysis and scholars will find the information valuable in their contribution to the knowledge pool. It would also contribute to the theory by verifying whether the three models are applicable to assessing the financial health context of the airline industry as

well as other emerging economies.

The analysis would be beneficial for investors to make rational decisions by evaluating a company's financial ratios before determining the securities to acquire and which ones to dispose of, as it will also secure their return. Investors would be able to predict the financial soundness of companies prior to investing by using the financial ratio models. In order to prevent more losses and avert the situation, managers will find the analysis useful in rendering prompt responses to financial distress.

Interestingly, stockholders, financial analysts, bondholders, government regulatory bodies, other creditors and the traveling public need the ability to assess the level of financial distress that prevails in the industry (Davalos, Gritta, and Chow, 1999). This research will be beneficial for the policy makers and the government agencies. The regulators can apply the verdict in implementing and designing appropriate policies to ensure an efficient market system. The government may use the outcomes in designing strategies to avoid tax losses that are triggered by financial distress.

## **1.7 Definition of Key Terms**

### **1.7.1 Financial Distress**

The liabilities outweigh the company's assets which are generally due to undercapitalisation, ineffective utilisation of money, insufficient cash investment, inefficient management of all projects, an adverse market condition and a decrease of revenues (Ashok Panigrahi, 2019).

### **1.7.2 Altman Z-Score Model**

The Altman Z-score is the output of a credit-strength test that gauges a publicly-traded manufacturing company's likelihood of bankruptcy. The Altman Z-score is based on five financial ratios that can calculate from data found on a company's annual 10-K report (Kenton W & James M, 2020).

### **1.7.3 Springate Model**

Springate model is a financial distress prediction model that is based on the study done by G. I. V. Springate in 1978 that is known as Springate model or Canadian model (Peter & Yoseph, 2011)

### **1.7.4 Zmijewski Model**

Zmijewski (1984) used financial ratios that measured firm performance, leverage, and liquidity to develop his model. Where X-Score is more than 0.5, the firm is classified as non-bankrupt (Anandarajan & Simmers, 2004).

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Introduction

This chapter reviewed the previous research and selected literatures that are relevant to the related variables in this research which is the three financial ratio models used to determine airlines' financial distress as well as the related theory to this study.

### 2.2 Financial Distress

Financial distress is where a condition of a company's liabilities exceeds assets and generally happens because of under capitalization, resources not being utilized properly, not maintaining sufficient cash, inefficient management in all operations, decline in revenue and adverse market condition (Ashok Panigrahi, 2019). In particular, when the sensitivity of the company's fixed costs and revenue increases towards economic recessions or illiquid assets, the company's chances of going into financial distress increase.

Financial distress is difficult to detect in a short period of time. However, the period used as a tolerance limit for reduced performance to detect potential company bankruptcy is normally two to five years (Bimawiratma 2016; Triharyanti, 2018). The cost of issuing more debt induced by the cost of the agency, conflicts between shareholders and debtors, is financial distress (Jensen and Meckling, 1976). Therefore, the use of excessive debt by the corporation would allow them to be unable to fulfil the payment of interest and principal payments that will induce the risk of financial distress.

Airlines are exposed to a high financial risk. Financial risk is described as the increased variability in earnings for stockholders as a result of the firm's capital assets being financed with long-term debt (Gritta, Freed, & Chow, 1998). It is caused by the principal payments and interest on debt service. Rather than the business environment, this risk is the verdict of management decisions. Since interest represents as a fixed charge, it reduces reported profit. Besides, the probability of financial distress increases as a firm reliant more debt in its capital structure. The airline industry is extremely capital-intensive. The acquisition of assets, especially aircraft, requires a significant amount of capital. Airlines usually issuing debt to funded the acquisition of aircraft, which is needed in capital intensive businesses (Carla Kroeze, 2005).

### **2.3 Financial Distress of Airlines in Asia**

Asaduddin, Azam and Suhendi (2020) emphasis that financial distress analysis of National airlines companies in Asia after Covid-19 pandemic possibly to be distress for two national airlines company. Garuda Indonesia and Thai Airways are in distress state compared to other airlines. Those financial distress companies should carefully allocate remaining assets, liquidate the unproductive entities, and perform a company. A research by U.S Mahtani and C.P Garg (2020) analyze the factors of affecting financial distress of airlines companies in India were resulted that a logistic regression model designed with performance, operating and financial factors have a higher accuracy in determining financial distress where the aviation fuel price has biggest influence on the financial performance of the airline.

Elda F., Asep D. and S. M. Damayanti (2019) stated that airline industry known for its volatility due to the high operating cost such as unstable fuel price and labor. Those issues effect on predicting the bankruptcy possibilities of PT. Garuda Indonesia compared to five listed airlines company in Asia, which included as the best airlines in the world. Altman Z'-Score indicates that GIAA, THAI, and EVA predicted to bankrupt, while SING and ANA are predicted to be in the grey zone for the next 2 – 3 years.

#### **2.4 Altman Z-Score Model**

Using conventional financial ratios and statistical analysis, financial distress can be forecast a few years ahead of time (Altman, 1993). Edward Altman, a finance professor at NYU Stern, developed the Altman Z-score formula in 1967 and published it in 1968. He revised the Altman Z-score Plus in 2012, which can be used to compare public and private firms, manufacturing and non-manufacturing companies, and US and non-US companies. Altman Z score Plus can be used to assess corporate credit risk. Safitra (2013) in her study discovered two companies that were in a healthy state. Companies identified as vulnerable must raise sales, earnings, and operating expenses as much as possible while still paying attention to the equity market valuation.

A research by Kurniawanti (2013) emphasis that three companies of food and beverage were in good financial health, one was in the grey zone, and one was bankrupt. According to Jefri (2016), there was one food and beverage company in financial distress in 2012, one company in a healthy state that transformed into a grey area in 2013, another six companies that were still in a healthy state from 2012 to 2014. Other researchers investigated the precision of the Altman Z-Score system in forecasting the financial

distress of manufacturing company in the consumer goods sector, finding that in common companies in this sector are in good shape due to increased sales which leads to increased revenue (Kakauhe and Pontoh, 2017). Aside from that, total assets increased including fixed and current assets. For companies in the grey state or on the verge of bankruptcy, as well as companies in bankruptcy due to a drop in revenue, retained earnings, a drop in corporate assets, earnings before tax, and negative interest, as well as a loss suffered by the company.

The Altman Z-Score model is a popular method not only for predicting financial distress in advance of the case, but also for calculating a company's overall financial condition. In order to represent the elements of failure estimation, the Altman Z-Score model uses four financial ratios. These elements are liquidity, leverage, profitability and activity. Liquidity ratios are crucial in any bankruptcy. Carla Kroeze (2015) emphasis that analysis of the airline industry, especially as they relate to debt service obligations. For instance, in 2003, American Airlines was spending over 10 percent of its revenue on debt service obligations alone; thus, it was very close to filing bankruptcy.

## **2.5 Springate Model**

Study conducted by Ben et al. (2015), property and real estate companies, finding that eight were non-distress potential. However, nine were potential to be distress, another five were transitioning from distress to non-distress potential and five were transitioning from non-distress potential to distress potential. Since various ratios are used to assess the severity of the financial distress, Meiliawati (2016) found that the Springate model and Altman Z-Score model have a substantial difference in forecasting the potential of

financial distress in listed cosmetic companies. Other verdict of financial distress prediction in the cosmetic sector listed on the Indonesia Stock Exchange shows that the Springate model, with an accuracy level of 91.66% is the most accurate model, while the accuracy level of Altman Z-Score model is 60.41% due to the Springate model calculated the Earnings Before Taxes/ Current Liabilities (EBT/CL) ratio which is thought to be more dominant in representing of listed companies' cosmetic on the Indonesian stock exchange. Abadi (2017), emphasis that the calculation result of financial ratio calculated using Springate S-Score between research period 2013-2014, the result showed that there were 19 property companies indicated bankrupt potential. Therefore, it can be concluded that there are property sector companies with a potential of bankruptcy with Springate s-score analysis model.

## **2.6 Zmijewski Model**

Hadi and Anggraeni (2008) stated that the Zmijewski model's verdict with the significance of the X-Score is inaccurate. As a result, it could not conduct to forecast delisting. The coefficient of determination is just 1.4 percent, which is extremely low. This number shows the model's ability to explain Zmijewski's delisting, the remaining 88.6% were clarified by variables that aren't part of the equation. According to Abadi (2017), no of the samples analysed was bankrupt potential based on the results of financial ratio calculations using the Zmijewski x-score between 2013 and 2014. To conclude with the Zmijewski x-score model of study that no businesses in the property sector are at risk of going bankrupt. According to Husein (2014), the Altman Z-Score model, Springate model, Zmijewski model and Grover model suitable to use on forecasting financial distress. Nevertheless, it is the most recommended model on forecasting financial distress

due to the highest significance level among the models for cases stressing leverage ratio as a financial distress measure, the Zmijewski model is a component. A researcher summarize that the strongest financial failure model is the Zmijewski Model (Pambekti et al, 2014).

## **2.7 Underpinning Theory**

### **2.7.1 Trade-off Theory**

According to Myres (1984), this theory reveals the organizations can get the optimal leverage by three determinants including charges of financial distress, taxes and agency costs. According to the trade-off theory, a company's performance influences its target debt ratio, which is expressed in the securities issued by the company and its observed debt ratios (Hovakimian and colleagues, 2004). According to the static trade-off principle, more profitable companies have a higher target debt ratio. Higher profitability means lower debt-related taxes, a lower risk of bankruptcy and more over-investment, both of which necessitate a higher target debt ratio. Higher profitability lowers the expected costs of distress and allows companies to raise their tax benefits by increasing leverage; as a result, companies should prefer debt funding due to the tax benefit. According to this theory, businesses will borrow up to the point that the tax benefit of each additional dollar of debt is exactly equal to the cost of increased risk of financial distress (Rosset al., 2008).

Additionally, the companies may borrow up until the tax reductions precisely equal to the costs that come from the increase chance of financial insolvency or distressed. In which prescribed the companies to set their target to debt-to-equity ratio as well as moving to achieving towards it. If the optimal capital structure proceeds, the company, as the result,

the company value will increase. Baxter (1967) argued that the possibility of financial distress increases when the companies increase debts or leverage. In which, the companies should not utilize debt surpassing to the point where the debt is higher than tax benefits. In spite of Kraus and Litzenberger (1973) claimed that if the profit of the companies is much lower than the associated debts, it indicates that the market value of the companies is significantly resonance with its obligations or debts. The trade-off theory also states that the increase amount of debt could potentially increase the company insolvency, somewhat offsetting the decrease in the WACC. Therefore, the theory suggests a mix of debts and equities as capital structure is very important to mitigate the risk of default.



## CHAPTER 3: METHODOLOGY

### 3.1 Introduction

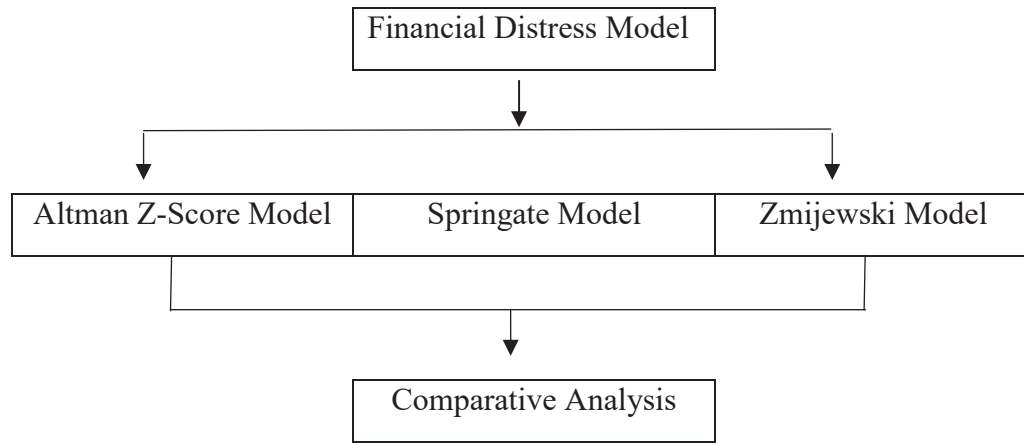
This chapter outlines methods used to conduct this research and will highlight on the research framework, hypothesis, research design, instrumentation, measurement of variables, sampling techniques and data collection procedures. Data collection in this study was obtained from the financial statements of the airlines in Asia for the study period. Data collection in this research is accessed from the airlines' financial reports, previous thesis, journals, articles, and newspapers have been conducted by other scholars. All these journals were collected from the Internet as well as from the Bloomberg terminal account. Quantitative research methodology is used with empirical study in this paper.

### 3.2 Research Framework

Based on the literature review, the research framework has been identified which demonstrate the comparison on the three financial distress models in determining financial distress of airlines industry in Asia. Therefore figure 3.1 shows the research framework which was created based on the variables.

**Figure 3.1**

*Research Framework*



### **3.3 Hypothesis**

These following generated hypotheses are hereby proposed in order to test the comparison on the three financial distress models in determining financial distress of airlines industry in Asia.

#### **Hypothesis 1:**

Research by Dimas (2017) stated that there are differences between the Altman Z-Score and Springate models as well also in line with Fitriani (2016), which says that there are differences between the Altman Z-Score and Springate model. According to the research conducted by Tanjung (2020), the results between Altman Z-Score model and Springate model indicate a probability below 0.05, indicating that there are substantial discrepancies between the two sample groups when it comes to forecasting financial distress on a pharmaceutical company listed. Hence, hypothesized that;

**H1:** There is a significant difference between Altman Z-score Model and Springate Model analysis to determine financial distress of airlines in Asia.

**Hypothesis 2:**

These results on a previous research by Dimas (2017), which states that there are differences between the Altman Z-Score and Zmijewski models. Moreover, this study is also in line with Wulandari (2014), that there are differences between the Altman Z-Score and Zmijewski models on food and beverages companies listed in Indonesia stock exchange. Tanjung (2020) also proved that there are differences in the results of the analysis of financial distress potential between the Altman Z-Score model with Zmijewski. Hence, hypothesized that;

**H2:** There is a significant difference between Altman Z-score Model and Zmijewski Model analysis to determine financial distress of airlines in Asia.

**Hypothesis 3:**

Based on pharmacy industry research by Gustina (2015) stated that there are differences between the Springate and Zmijewski models. The results of this study are also in line with Tanjung (2020) and Randy (2017) which says that there are differences between the Springate and Zmijewski models. Hence, hypothesized that;

**H3:** There is a significant difference between Springate Model and Zmijewski Model analysis to determine financial distress of airlines in Asia.

### **3.4 Research Design**

This research aims to determine the financial distress of airlines in Asia using three different financial ratio models where descriptive studies have been used. Research design is one of the significant master plans related to the measurement, collection and analysis of data which depends on the research questions developed for the study (Sekaran & Bougie, 2013). Besides, this process is crucial in ensuring that the data will be using is capable in providing the valid and reliable answer for the researchers.

#### **3.4.1 Quantitative Method**

The nature of this study is quantitative research which to examines the comparison on the three financial distress models in determining financial distress of airlines industry in Asia. The three models are Altman Z-Score model, Springate model and Zmijewski model. According to Sekaran, Robert and Brain (2001), as for social sciences and business-related field, quantitative is a suitable and common use for the empirical evidences, besides, being able to determine and validate the connection between the variables (Leedy & Ormond, 2005).

Munjis (2004) emphasis that quantitative research describes phenomena by gathering numerical data evaluated using mathematically based methods, especially statistical approaches. Therefore, it is determined that the study of quantitative research methodology and statistical measures used in the study to reach inferences that can be measured. Organizing information and identifying overall patterns is important for a study also needs to know the importance and strengthening of the relationship between the variables to examine the quantitative data.

### **3.5 Research Instrumentation**

As for this study, all data acquired from the financial reports for 5 years on a quarterly basis of airlines in Asia which contains secondary data. Therefore, this study did not conduct any questionnaires. The study will be performed using several different statistical methods to make better and more precise outcomes. Thus, SPSS software will conduct the data for this study.

### **3.6 Measurement of Variables**

The measurement of variables has derived from the previous studies, as such this research conduct financial ratios of Altman Z-Score model, Springate model and Zmijewski model. The independent variables in this research are:

#### **3.6.1 Altman Z-Score Model**

This model is a financial ratio analysis on determining the financial performance linked to the possibility of financial distress of the company (Auchterlonie D,1997). Another researcher by Sudiyatno, B. and Puspitasari, E. (2010) point that the Altman's first model is a five-factor model for predicting the failure of a manufacturing company. These factors are chosen according to their cumulative performance in predicting company financial distress. The modified Altman Z-Score model was developed to forecast the financial distress of nonmanufacturing companies including airline services. Auchterlonie (1997) point that one variable, X5, or total revenue, was simply removed from the method. It aims to mitigate the impact of the capital turnover ratio. In summarize of the developed model is as follow:

**Table 3.1**

*Altman Z Score model*

Variables	Method of Computation
Altman Z-Score Model	$Z\text{-score} = 6.56Z1 + 3.26Z2 + 6.72Z3 + 1.05Z4$ $Z1 = \text{Working Capital} / \text{Total Assets}$ $Z2 = \text{Retained earnings} / \text{Total Assets}$ $Z3 = \text{Earnings before Interest and Tax} / \text{Total Assets}$ $Z4 = \text{Market Value of Equity} / \text{Total Liabilities}$
Liquidity Ratio	$(WC/TA) = \frac{\text{Working Capital}}{\text{Total Assets}}$
Leverage Ratio	$(RE/TA) = \frac{\text{Retained earnings}}{\text{Total Assets}}$
Profitability Ratio	$(EBIT/TA) = \frac{\text{Earnings before Interest and Tax}}{\text{Total Assets}}$
Activity Ratio	$(MVE/TL) = \frac{\text{Market Value of Equity}}{\text{Total Liabilities}}$

From the equation above, the criteria which is used to predict financial distress is with the following assessment criteria:

- Z-Score > 2.67 is categorized as a very safe company so no financial distress.
- $1.1 < Z\text{-Score} < 2.67$  is in a grey zone and categorized as a company in financial distress, but the chances of being rescued or going bankrupt are the same, depending on the company's management policy as a decision maker.
- Z-Score < 1.1 is categorized as distress which a company that is experiencing a very high financial distress and is at risk of going bankrupt.

### 3.6.2 Springate Model

It was created in 1978 by Gorgon L.V. This ratio model that uses multiple discriminate analysis (MDA) to choose 4 out of 19 financial ratios that are commonly used in literatures to distinguish between distress and non-distress sound companies. If the cut off value S below 0.862, it is in a distress state. If  $0.862 < S < 1.062$  it indicates of the potential of financial distress and if S above 1.062, it is non-distress. Springate model is as follows:

**Table 3.2**

*Springate model*

Variables	Method of Computation
Springate Model	$S = 1.03S1 + 3.07S2 + 0.66S3 + 0.4S4$ S1 = Working Capital /Total Assets S2 = Earnings before Interest and Tax /Total Assets S3 = Earnings before Tax /Current Liabilities S4 = Sales /Total Assets
S1	$(WC/TA) = \frac{\text{Working Capital}}{\text{Total Assets}}$
S2	$(EBIT/TA) = \frac{\text{Earnings before Interest and Tax}}{\text{Total Assets}}$
S3	$(EBT/CL) = \frac{\text{Earnings before Tax}}{\text{Current Liabilities}}$
S4	$(S/TA) = \frac{\text{Sale}}{\text{Total Assets}}$

### 3.6.3 Zmijewski Model

Zmijewski (1983) extended the financial distress prediction analysis by using financial ratio validity as a corporate financial distress identification method. Companies are considered distressed, according to Zmijewski (1984), if the likelihood is greater than 0. To put it another way, the value of X is zero. As a result, the model's cut-off value is 0. Company with value of X is greater than 0 are likely to experience on future financial difficulties. Company with an X value less than zero, on the other hand, are unlikely to experience distress. This model successfully developed as follows:

**Table 3.3**

*Zmijewski model*

Variables	Method of Computation
Zmijewski Model	$X = -4.3 - 4.5X_1 + 5.7X_2 - 0.004X_3$ $X_1 = \text{Earnings after Tax / Total Assets}$ $X_2 = \text{Total Debt / Total Assets}$ $X_3 = \text{Current Assets / Current Liabilities}$
Return on Assets (ROA)	$(RE/TA) = \frac{\text{Earnings after Tax}}{\text{Total Assets}}$
Debt Ratio	$(TL/TA) = \frac{\text{Total Liabilities}}{\text{Total Assets}}$
Current Ratio	$(CA/CL) = \frac{\text{Current Assets}}{\text{Current Liabilities}}$

### **3.7 Data Collection Procedures**

#### **3.7.1 Data Sources**

This study uses the secondary data in the form of annual report generated from website of selected airlines in Asia for five years on a quarterly basis from 2016 to 2020. The data only covers airlines industry in Asia. Any airlines with missing data will be excluded from the study. Since this study focuses on financial condition of the company, hence all the information will be collected from the financial report of each company. Bloomberg Terminal was exploited to get the mathematical data or accounting information data. The study conducted 22 airlines only due to the limitations to get several listed airlines for these regional airlines. It is because of fully funded by the government and no disclosure financial reported by the airlines. All data is collected from financial reports such as income statements, balance sheet statements, and notes to the accounts, then financial ratios calculated to carry out the data in the next section, which is a significant part of the research.

Steppingstones (2004) stated that secondary data is the data used to conclude the study. Besides, secondary data is categorized into internal and external data, where internal data refers to the data obtained in the company while the study is conducted. Whereas external secondary data refers to the data that get from outside sources namely financial reports, journals, articles, thesis from previous years. Secondary data is cheaper and faster to collect than primary data as it has been collected or issued by former scholars.

Besides, articles were collected for the use of literature review, which has been attained from the UUM Online Library Database, many URL subscribed by UUM for the

convenience of students to refer to relevant papers were provided.

### 3.8 Sampling Techniques

In this research, the data are collected quarterly from 2016 to 2020. The sample size has an entire of 22 airlines in Asia as in figure 3.5. Choosing a regional airline in Asia is a developing country and has their own unique ways. Overall, the financial statements are broadly used for quarterly 5 years for each selected airline, so there is a total of 22 samples for this research.

**Table 3.4**

*List of Sampling on Airlines in Asia*

No.	Airlines	Country
1.	AirAsia Berhad	Malaysia
2.	Singapore Airlines	Singapore
3.	Garuda Indonesia	Indonesia
4.	Thai Airways	Thailand
5.	Bangkok Airways	Thailand
6.	Japan Airlines	Japan
7.	Cebu Pacific	Philippines
8.	EVA Air	Taiwan (China)
9.	China Airlines	Taiwan (China)
10.	Hainan Airlines	China
11.	China Southern Airlines	China
12.	China Eastern Airlines	China
13.	Shandong Airlines	China
14.	Air China	China
15.	Pakistan International Airlines	Pakistan
16.	Korean Air	South Korea
17.	Asiana Airlines	South Korea
18.	El Al Israel Airlines Ltd	Israel
19.	Royal Jordanian Airlines	Jordan
20.	Turkish Airline	Turkey
21.	AirArabia	UAE
22.	Jazeera Airways	Kuwait

### 3.9 Data Analysis Technique

The data analysis technique used in this research will be applied in order to reach the conclusion besides determining the connection among the related variables (Neuman, 2000). For this study, statistical analysis will be conducted by using the Statistical Package for the Social Sciences (SPSS). The analysis techniques involved are as follows:

#### 3.9.1 Descriptive Analysis

The descriptive analysis helps define the nature of an individual, event, or situation; in addition to enabling researchers to gain a deeper understanding of the variables and features involved in the study (Sekaran & Bougie, 2013). This descriptive analysis describes a statistical summary of the data collection for the three financial distress models in determining financial distress of airlines industry in Asia. These are used to define mean, minimum and maximum levels and standard deviations. Figure 3.6 explains the mean level based on the score obtained from the descriptive analysis that will be done where the score of 1.00 to 2.33 will be considered low, 2.34 to 3.67 medium and the score of 3.68 to 5.00 will be categorized as the highest level.

**Table 3.5**

*Frequency Mean Analysis*

<b>Range of Mean Score</b>	<b>Level</b>
1.00 – 2.33	Low
2.34 – 3.67	Moderate
3.68 – 5.00	High

### 3.9.2 Comparative Analysis

For this study, an analysis involved a normality test as it is a statistical process used to determine if a sample or any group of data fits a standard normal distribution. Further to the results, comparative analysis is a method where two or more datasets are analyzed to compare the consistency between one and another.



## **CHAPTER 4: RESULTS AND DISCUSSIONS**

### **4.1 Introduction**

This chapter discusses the finding of conducted study. It also comprises descriptive statistics analysis and result analysis of Altman Z-Score model, Springate model and Zmijewski model to obtain the Score Value. Besides, this study describes the comparison between independent variable models using Comparative Analysis. This chapter consists of tests and measurements performed for data gathered from 22 airlines in Asia.

### **4.2 Descriptive Statistics Analysis**

The descriptive analysis involves of minimum, maximum, mean and standard deviation for specific individual factors in data sampling. The finding is reported in figure 4.1 which comprises a total sample 22 for the quarterly 5-year period from 2016 – 2020. This group of descriptive analysis determines various statistical summaries for financial distress prediction for airlines in Asia's independent variables such as Altman Z-Score model, Springate model and Zmijewski model.

**Table 4.1**

*The output of Descriptive Statistics*

<b>Descriptive Statistics</b>					
	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
<b>Altman Z-Score</b>	418	-214.26	12.77	-0.1750	11.11469
<b>Springate</b>	418	-41.97	49.57	-0.0023	3.26934
<b>Zmijewski</b>	418	-4.37	60.53	4.6297	6.78329
<b>Valid N (listwise)</b>	418				

Above figure 4.1 displays the descriptive statistics of the variables that have been tested and summarize accumulate descriptive statistics such as mean, standard deviation, minimum, and a maximum of selected airlines.

The independent variables show various variations from the total 22 airlines for quarterly 5 year shows that Altman Z-Score is the highest standard deviation amounts to 11.1147, followed by Zmijewski model is 6.7833 and Springate model is 3.2693. These results indicate the volatility of respective ratios affected due to unstable industry and economic condition. The higher value of standard deviation the higher probability to get risk.

Minimum value of Zmijewski model is -4.37, while the maximum value is 60.53. Meanwhile, the value of Springate model is between -41.97 and 49.57 which lower than Zmijewski model. The mean for Springate model and Zmijewski model is -0.0023 and 4.6297 respectively. Results shows the mean value for Altman Z-Score is -0.1750, diversify between -214.26 and 12.77.

### 4.3 Comparison Analysis of three Financial Failure Models for 6 Quarter

#### 4.3.1 Altman Z-Score Model

*Table 4.2*

The output of Z-Score

Model	Altman Z-Score Model						
	Year	2019			2020		
		Quarter	Q2	Q3	Q4	Q1	Q2
Korean Air		-0.07	0.02	-0.32	-0.45	-0.31	0.01
Pakistan International Airlines		-22.55	-6.27	-214.26	-11.14	-24.54	-25.52
Cebu Pacific		1.45	1.36	1.29	0.69	0.15	-0.05
Air Asia		1.49	0.60	0.65	-0.15	-0.76	-0.88
Singapore Airlines		2.14	1.87	2.02	1.59	1.24	1.38
Garuda Indonesia		-2.20	-1.65	-2.96	-1.66	-2.30	-2.70
Thai Airways		-0.42	-0.56	-0.41	-0.91	-5.32	-6.32
Bangkok Airways		1.55	1.43	1.41	0.80	0.21	0.13
Japan Airlines		4.34	4.17	4.02	2.70	2.72	2.62
Eva Air		1.06	1.03	0.97	0.80	1.07	1.12
China Airlines		0.47	0.52	0.36	0.25	0.73	0.86
Asiana Airlines		-0.60	-0.84	-0.85	-1.23	-1.01	-1.20
Hainan Airlines		-0.91	-0.92	-1.09	-1.73	-1.86	-1.94
China Southern Airlines		-0.04	0.08	-0.16	-0.37	-0.01	0.10
China Eastern Airlines		-1.14	-0.79	-1.08	-1.32	-1.70	-1.64
Shandong Airlines		-0.12	0.57	-0.23	-0.64	-0.68	0.23
Air China		0.93	1.01	0.90	0.49	0.25	0.30
El Al Israel Airlines		-0.88	-0.62	-0.63	-3.39	-3.56	-3.61
Royal Jordanian Airlines		-0.06	0.21	-0.21	-0.45	-1.02	-1.44
Turkish Airlines		0.78	1.06	1.07	0.48	0.53	0.52
Jazeera Airways		2.90	4.02	3.24	1.47	1.64	1.60
Air Arabia		1.66	1.92	1.98	1.08	1.29	1.23

### 4.3.2 Springgate Model

**Table 4.3**

*The output of S-Score*

Model	Springgate Model						
	Year	2019			2020		
		Quarter	Q2	Q3	Q4	Q1	Q2
Korean Air		-0.16	-0.11	-0.13	-0.24	-0.19	-0.12
Pakistan International Airlines		-1.99	1.23	-41.96	-0.99	-2.11	-1.97
Cebu Pacific		0.13	-0.02	0.05	-0.15	-0.43	-0.45
Air Asia		0.06	-0.06	-0.03	-0.11	-0.29	-0.44
Singapore Airlines		0.03	0.01	0.04	-0.03	-0.08	-0.02
Garuda Indonesia		-0.27	-0.10	-0.49	-0.38	-0.64	-0.60
Thai Airways		-0.20	-0.18	-0.08	-0.34	-0.96	-1.17
Bangkok Airways		-0.02	0.09	0.20	-0.02	-0.42	-0.29
Japan Airlines		0.46	0.37	0.30	0.18	0.27	0.16
Eva Air		0.07	0.08	0.06	-0.01	0.02	0.00
China Airlines		-0.02	0.00	-0.04	-0.11	0.01	0.00
Asiana Airlines		-0.11	-0.13	-0.20	-0.32	-0.17	-0.22
Hainan Airlines		-0.31	-0.27	-0.36	-0.54	-0.56	-0.50
China Southern Airlines		-0.20	-0.09	-0.24	-0.32	-0.24	-0.15
China Eastern Airlines		-0.17	-0.06	-0.20	-0.29	-0.35	-0.27
Shandong Airlines		-0.19	0.19	-0.30	-0.45	-0.46	-0.14
Air China		-0.10	-0.01	-0.13	-0.26	-0.29	-0.21
El Al Israel Airlines		-0.12	-0.05	-0.16	-0.66	-0.65	-0.71
Royal Jordanian Airlines		0.04	0.13	-0.07	-0.13	-0.30	-0.31
Turkish Airlines		-0.01	0.17	0.09	-0.14	-0.13	-0.10
Jazeera Airways		0.22	0.55	0.09	-0.10	-0.10	-0.16
Air Arabia		0.21	0.33	0.19	0.08	-0.05	0.03

### 4.3.3 Zmijewski Model

**Table 4.4**

*The output of X-Score*

Model	Zmijewski Model						
	Year	2019			2020		
		Quarter	Q2	Q3	Q4	Q1	Q2
Korean Air		5.18	5.29	5.22	5.62	5.55	5.32
Pakistan International Airlines		49.58	25.82	26.10	26.93	58.67	60.53
Cebu Pacific		2.30	2.25	2.01	2.13	2.61	2.97
Air Asia		2.96	4.35	4.48	5.16	5.74	6.33
Singapore Airlines		-0.48	-0.46	-0.11	0.46	0.59	0.64
Garuda Indonesia		5.78	5.45	6.10	6.21	6.98	7.57
Thai Airways		5.79	6.05	6.10	7.04	7.40	8.53
Bangkok Airways		2.97	3.01	2.96	3.60	3.98	4.54
Japan Airlines		-0.18	-0.14	-0.15	0.35	0.16	0.17
Eva Air		4.23	4.26	4.15	4.21	4.17	4.22
China Airlines		4.58	4.55	4.57	4.77	4.57	4.59
Asiana Airlines		5.23	5.53	5.89	6.62	6.43	6.43
Hainan Airlines		3.05	3.05	3.30	3.71	4.01	4.27
China Southern Airlines		3.54	3.42	3.53	3.76	3.74	3.68
China Eastern Airlines		3.95	3.64	3.71	3.94	4.22	4.24
Shandong Airlines		2.17	1.66	1.92	2.46	3.20	3.93
Air China		2.24	2.08	2.16	2.40	2.69	2.71
El Al Israel Airlines		6.04	5.96	6.05	6.84	7.29	7.70
Royal Jordanian Airlines		5.84	5.47	5.73	6.18	6.99	7.90
Turkish Airlines		3.54	3.16	3.12	3.46	3.69	3.86
Jazeera Airways		3.37	2.39	3.29	4.14	4.38	4.80
Air Arabia		3.26	3.03	2.99	3.83	3.98	4.02

The analysis of financial distress prediction of airlines in Asia is reported from 22 airlines on a quarter-on-quarter (q-o-q) basis for five years period from 2016 until 2020. The calculation is performed using the formula of independent variables models which is Altman Z-Score model, Springate model and Zmijewski model and then the results are

summed up. The results score on the tables 4.2, 4.3 and 4.4 interpreted by comparing on the interpreted by comparing on the last three quarter of 2019 (2Q2019,3Q2019,4Q2019) and the first three quarter of 2020 (1Q2020, 2Q2020, 3Q2020). The financial ratios on each model being measure from the financial data that extract from Bloomberg data and Airlines Annual Reports.

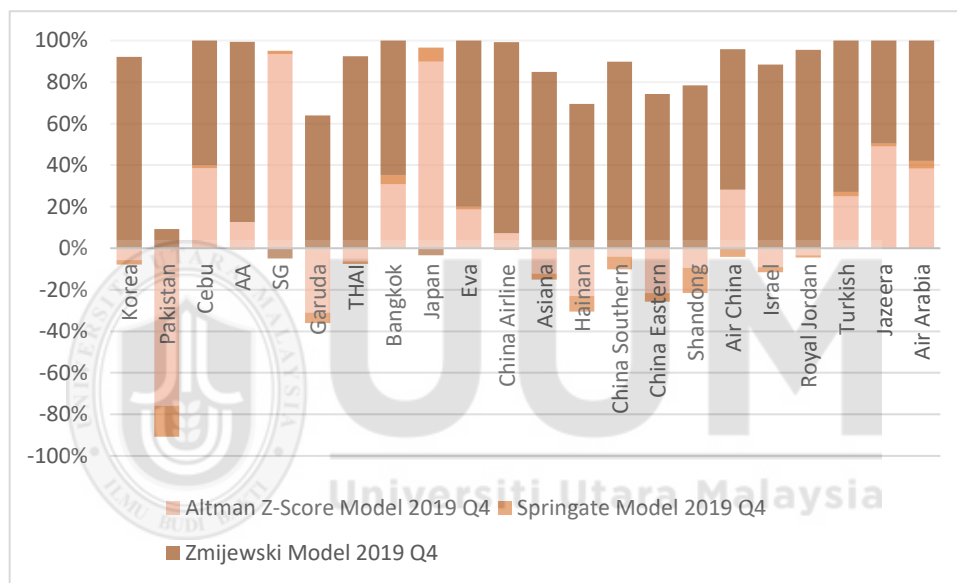
According to the tables of three financial failure models above, findings show most of the airline industry worst hit by the global pandemic even prior to the Covid-19 outbreak. The limitations of movement due to the government policy and restrictions were leads to massive drop and reduction economy activity. Out of the 22 airlines only Japan Airlines is survived in a healthy state from 2Q2019 until 2Q2020 but on 3Q2019 is in grey area while others airlines are suffered on the analysis results of Altman Z-Score model. Japan Airlines is in good shape because of the high volume of net working capital and profits before interest and taxes. This shows the company's ability to handle and meet its obligations. On a q-o-q basis, about 5 Airlines which Cebu Pacific, Singapore Airlines, Bangkok Airways and Air Arabia are in a grey state on several quarter within this comparison analysis period. Grey state is because of the obvious low amount on the net working capital generated from a rise in short-term debt, it exposed to a high risk of in satisfying its short-term obligation; however, company's net profits will be impacted if the retained earnings is low of undefined by the consumer.

Comparing to Springate model, Pakistan International Airlines is performed in a healthy state on the 3Q2019 while others airlines is categories under financial distress because the score is below 0.862. On the analysis of Zmijewski model, Japan Airlines is in healthy throughout this comparison period while Singapore Airlines is in a healthy state only the

quarter of 2019. Other 20 Airlines resulted notable in financial distress state as it is above zero '0' score. Table above shows the summary of the comparison between three models conducted during the period mentioned. Following below charts are the verdicts of prior to Covid-19 on Q4, FY2019 to compare with during the pandemic on Q3, FY2020.

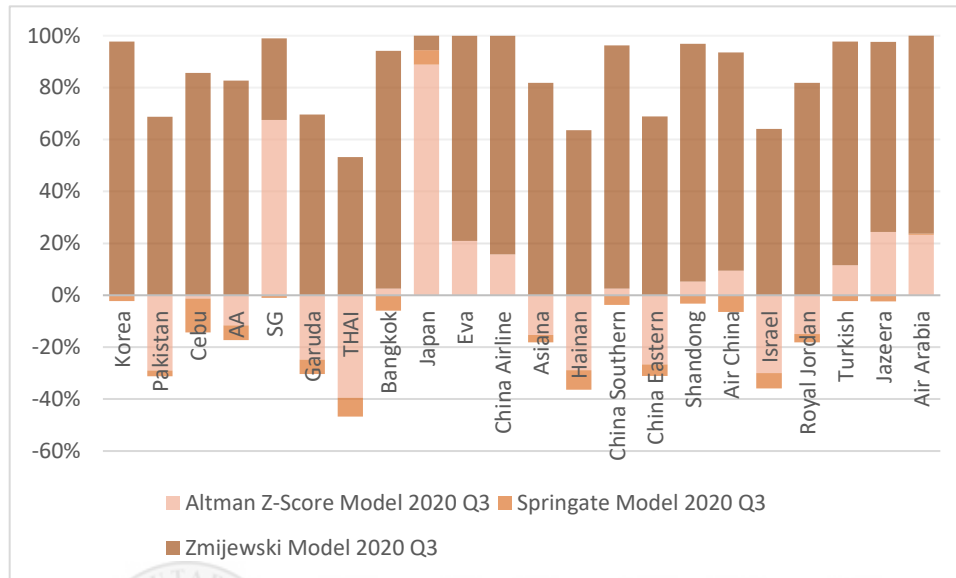
**Figure 4.1**

*Quarter 4 on Financial Year of 2019*



**Figure 4.2**

*Quarter 3 on Financial Year of 2020*



The results show the airlines have already been in financial distress prior to Covid-19 but the impact of during the pandemic worsens the financial condition on those airlines. Further it will also have broader implications on the airline industry. The shutdown of economic activities would be having a disastrous impact on tourism-based air traffic, representing the majority of the tourist tour package are postponed until COVID-19 could be controlled in destination countries. Likewise, the slowdown in air-transport caused by the spread of the COVID-19 epidemic is leading many international companies to reduce their flight programs and put in place savings measures and substitute with online meetings.

#### 4.4 Comparative Analysis

The comparative analysis in this study is using independent t-test since this study aims to compare the means a normally distributed interval dependent variable for two independent group. The independent t-test is used to test the hypothesis of this research. Therefore, the comparative analysis results as shown in the table below. In this analysis, normality test is important to determine whether the variables are a normal distributed or not prior to conduct analysis using parametric or non-parametric. The verdict of this test shown in table 4.5 is conducted by Statistical Package for Social Science (SPSS) Software.

**Table 4.5**

*The output of Comparative Analysis*

Bankruptcy Model	Mean Difference	Std-Error Difference	Sig. (2-tailed)	95% Confidence Interval	
				Lower	Upper
Altman – Springate	-0.1726	0.567	0.761	-1.285	0.940
Altman – Zmijewski	-4.805	0.637	<0.001	-6.055	-3.556
Springate – Zmijewski	-4.632	0.368	<0.001	-5.355	-3.909

This study intends to compare to sig. (2-tailed) value to test the hypothesis:

- If the Sig. (2-tailed)  $< 0.05$ , it means there is significant difference between the two-bankruptcy model. Therefore, H1 is accepted.
- If the Sig. (2-tailed)  $> 0.05$ , it means there is no significant difference between the two-bankruptcy model. Therefore, H0 is accepted, and H1 is rejected.

#### **4.4.1 Hypothesis 1 (H<sub>1</sub>: Altman and Springate)**

H<sub>1</sub>: There is significant difference between difference between Altman Z-score model and Springate model analysis in determining financial distress of airlines in Asia.

Based on the result in the figure 4.5, the Sig. (2-tailed) value is  $0.761 > 0.05$ . It means there is no significant difference between Altman Z-score model and Springate model analysis in determining determine financial distress of airlines in Asia. Therefore, H<sub>1</sub> is rejected.

#### **4.3.2 Hypothesis 2 (H<sub>2</sub>: Altman and Zmijewski)**

H<sub>2</sub>: There is significant difference between of Altman Z-score model and Zmijewski model in analysis in determining financial distress of airlines in Asia.

Based on the result, the Sig. (2-tailed) value is  $0.001 < 0.05$ . It means there is significant difference between Altman Z-score model and Zmijewski model analysis in determining financial distress of Airlines in Asia. Therefore, H<sub>2</sub> is accepted.

### 4.3.3 Hypothesis Three (H<sub>3</sub>: Springate and Zmijewski)

**H<sub>3</sub>:** There is significant difference between Springate model and Zmijewski model in analysis in determining financial distress of airlines in Asia.

Based on the result, the Sig. (2-tailed) value is  $0.001 < 0.05$ . It means there is significant difference between Springate model and Zmijewski model analysis in determining financial distress of airlines in Asia. Therefore, H<sub>3</sub> is accepted.



## CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

### 5.1 Introduction

The purpose of this chapter is to discuss the conclusion of the analysis conducted on the previous chapter and recommendations propose to for the future research.

### 5.2 Conclusion

The objective of this research is to examine the comparison between three financial distress models of Altman Z-Score model, Springate model and Zmijewski model on determining financial distress of airlines in Asia. Based on the results on this study, it is proven by the result of analysis done for airlines in Asia that all the three models have predicted that these companies are in financial distress. Altman Z-Score model is the most significant model to forecast financial distress. This study shows there is significant difference in these three models' analysis although the models are using different ratios in calculations.

The similarity of Altman Z-Score model and Springate model are liquidity ratio (working Capital /Total Assets) and profitability ratio (earnings before Interest and Tax /Total Assets) are used to predict financial distress while Altman Z-Score model and Zmijewski model uses leverage ratio (retained earnings /total Assets). The comparative analysis shows there is no significant difference between Altman Z-Score model and Springate model. Another independent T test verdict shows there is significant difference between Altman Z-Score model and Zmijewski model as well as Springate model and Zmijewski model.

This financial distress verdict demonstrates from the aviation outlook and recent issues that most of all affecting airline efficiency on their performance are only partially accurate. There is a deterioration in financial results of airlines company despite the rapid revenue growth. However, several airlines are predicted to be distress prior to Covid-19 which these airlines did not declared bankrupt until now.

### **5.3 Limitations**

There are several limitations in conducting this study which is the limited sample of financial report of airlines. There are many airlines in Asia but only it is not subject to under listed airlines, meanwhile several listed airlines did not disclose their financial report due to fully funded by the government. The time frame to conduct this research is quite tight with limitations guidance to meet personally with supervisor due to Covid-19 of restriction to cross state. The communication only conducted through Webex meeting.

### **5.4 Contribution of the Study**

This financial distress prediction analysis can be beneficial for investors, corporations and governance to improve the company's performance as an awareness and warning signal. Meanwhile, scholar will find the information valuable of this study to fill the knowledge gap. Furthermore, study shows the bigger picture of the airlines industry based on how to analyse the financial distress. As the verdict shows that COVID-19 is not the leading cause of its bad financial performance.

## 5.5 Recommendations

The analysis findings are important to the study of the pandemic's financial distress. Since no other research-related to Asia carriers have analysed the impact on Covid-19 pandemic while this research is being written, hence this analysis would be beneficial as a future reference and guide for the financial distress of company when the pandemic struck. Therefore, a wider research sample, compare more financial distress models and conduct other regional airlines such as Europe and North America. Longer period of research study can be used for a better and more accurate. Further research on other financial distress prediction can conduct analysis using methods such as CA Score, Shirata, Ohlson, Fulmer and also to run a data based on other regional Airlines.



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## APPENDIX I

### Comparative Analysis Test (Independent T Test)

- Altman Z-Score and Springate

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Score									Lower	Upper
	Equal variances assumed	14.937	<.001	-.305	834	.761	-.17263	.56668	-1.28491	.93965
	Equal variances not assumed			-.305	488.635	.761	-.17263	.56668	-1.28605	.94079

- Altman Z-Score and Zmijewski

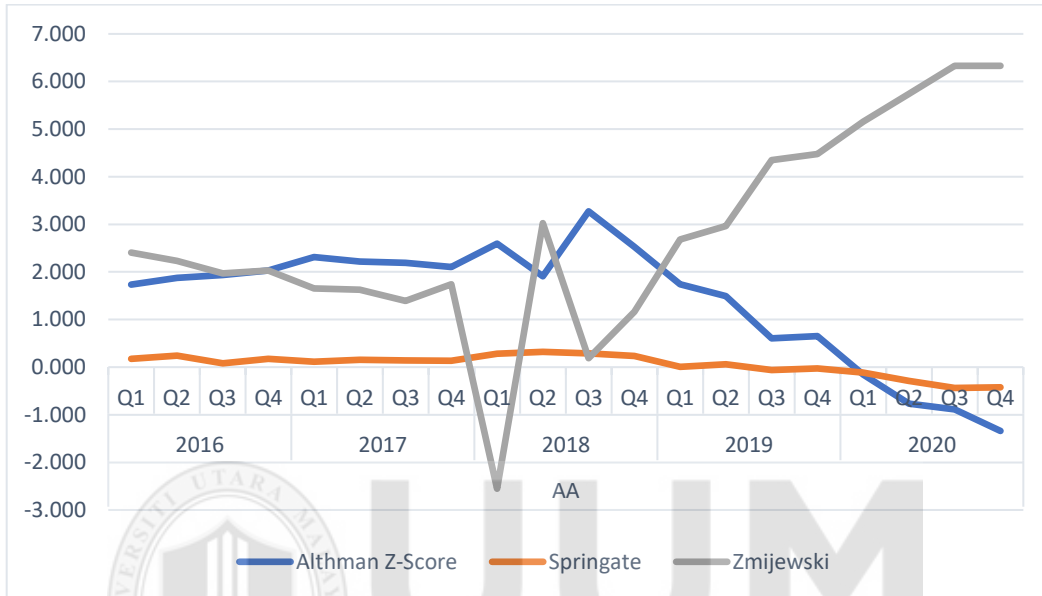
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Score									Lower	Upper
	Equal variances assumed	.565	.452	-7.544	834	<.001	-4.80488	.63689	-6.05498	-3.55479
	Equal variances not assumed			-7.544	689.794	<.001	-4.80488	.63689	-6.05536	-3.55441

- Springate and Zmijewski

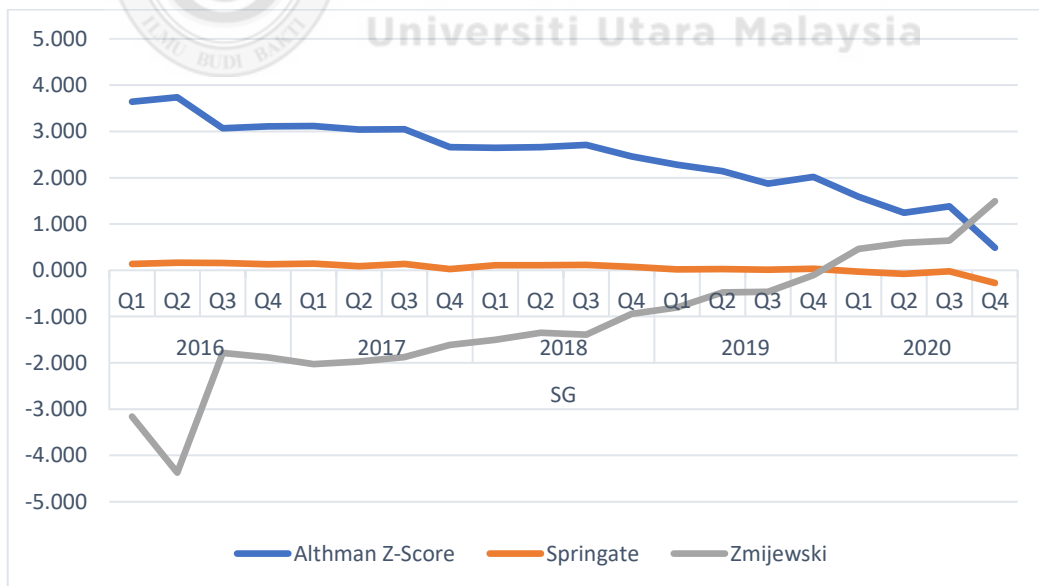
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Score									Lower	Upper
	Equal variances assumed	59.413	<.001	-12.577	834	<.001	-4.63225	.36832	-5.35519	-3.90931
	Equal variances not assumed			-12.577	600.841	<.001	-4.63225	.36832	-5.35560	-3.90890

**APPENDIX II**

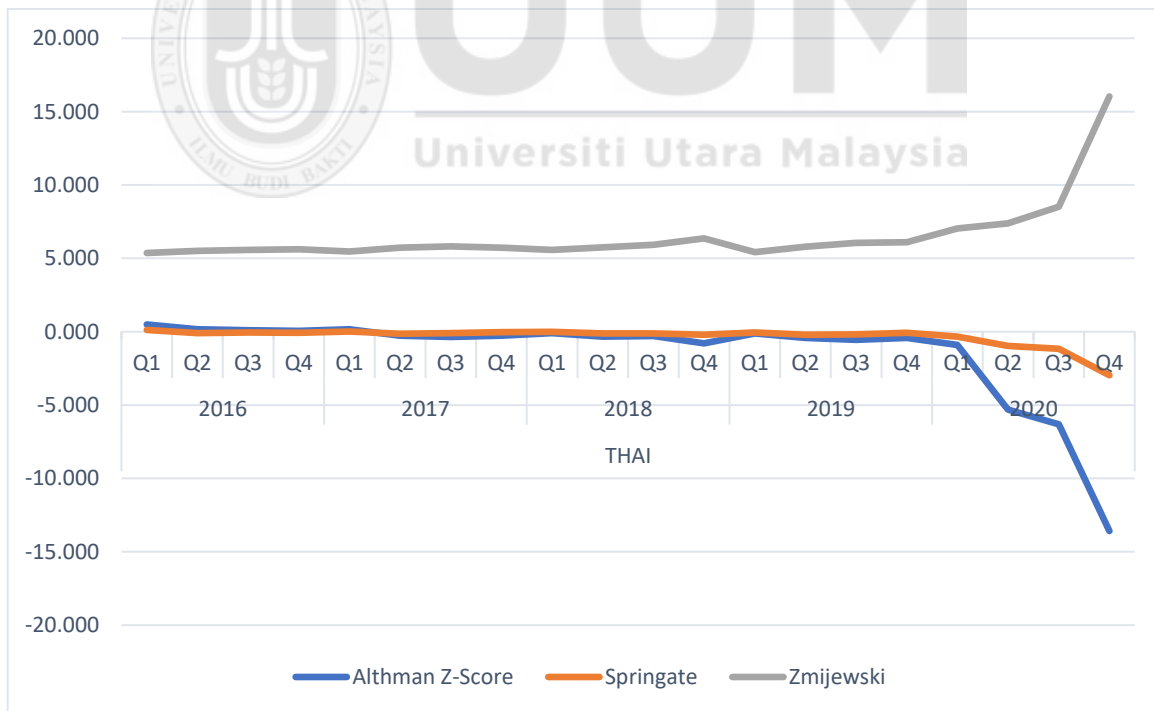
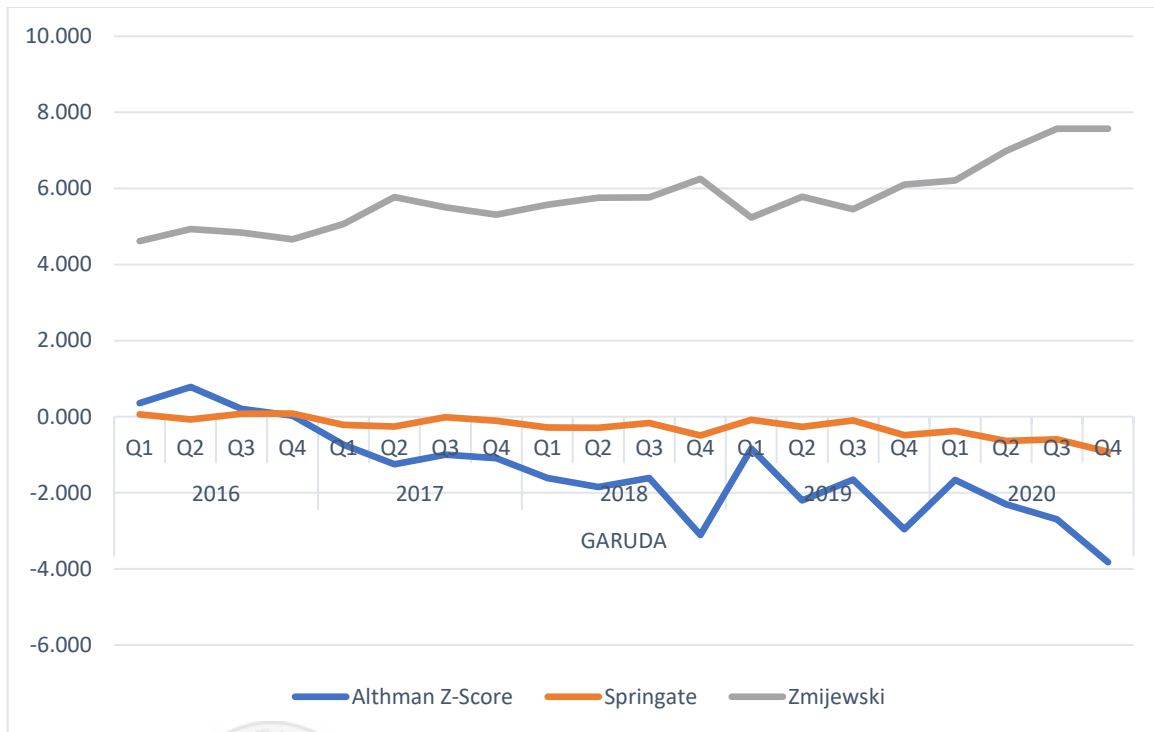
**Summary Results of Financial Distress Prediction of  
Airlines in Asia**

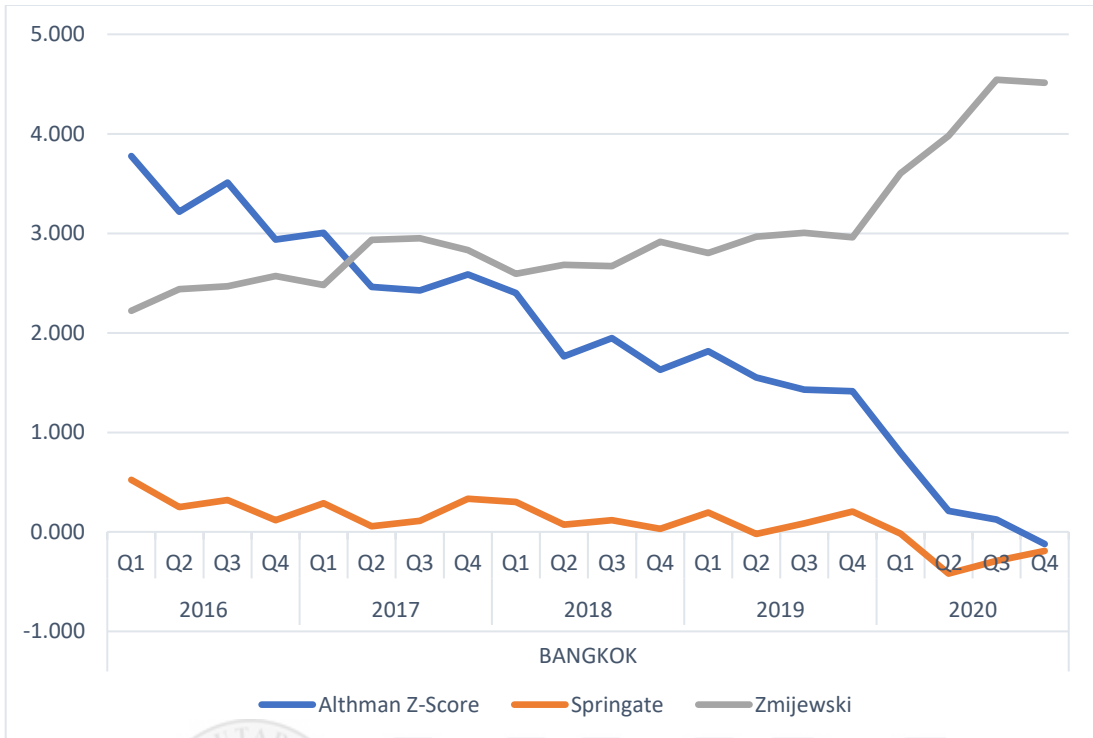


**AirAsia Berhad**

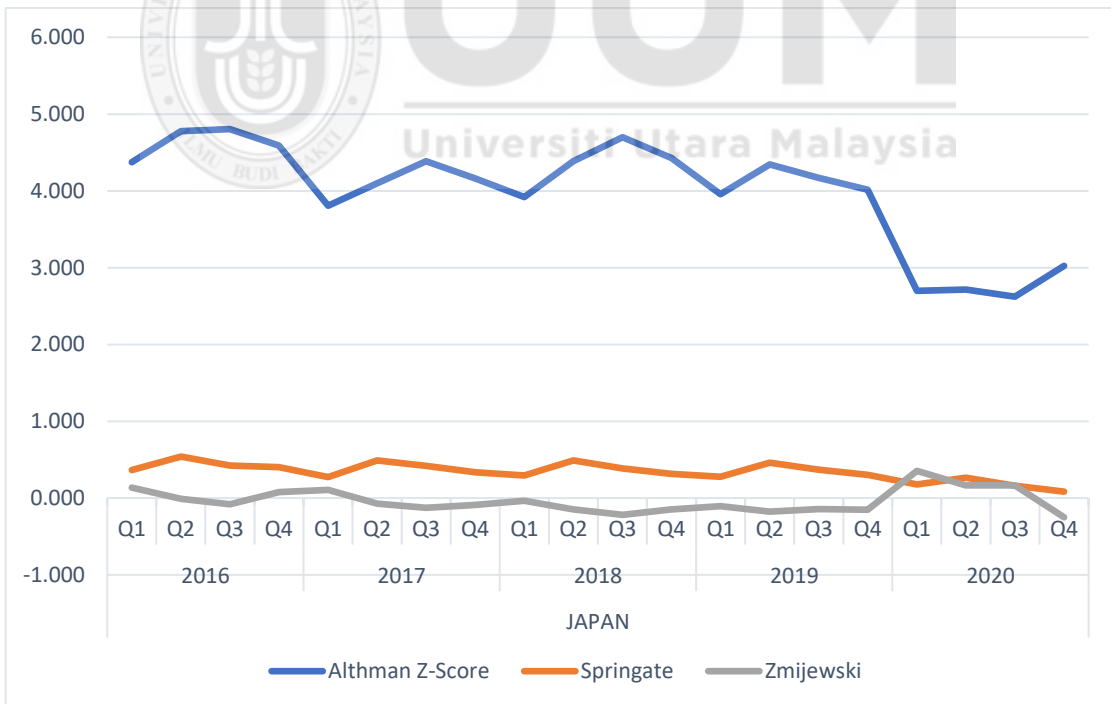


**Singapore Airlines**

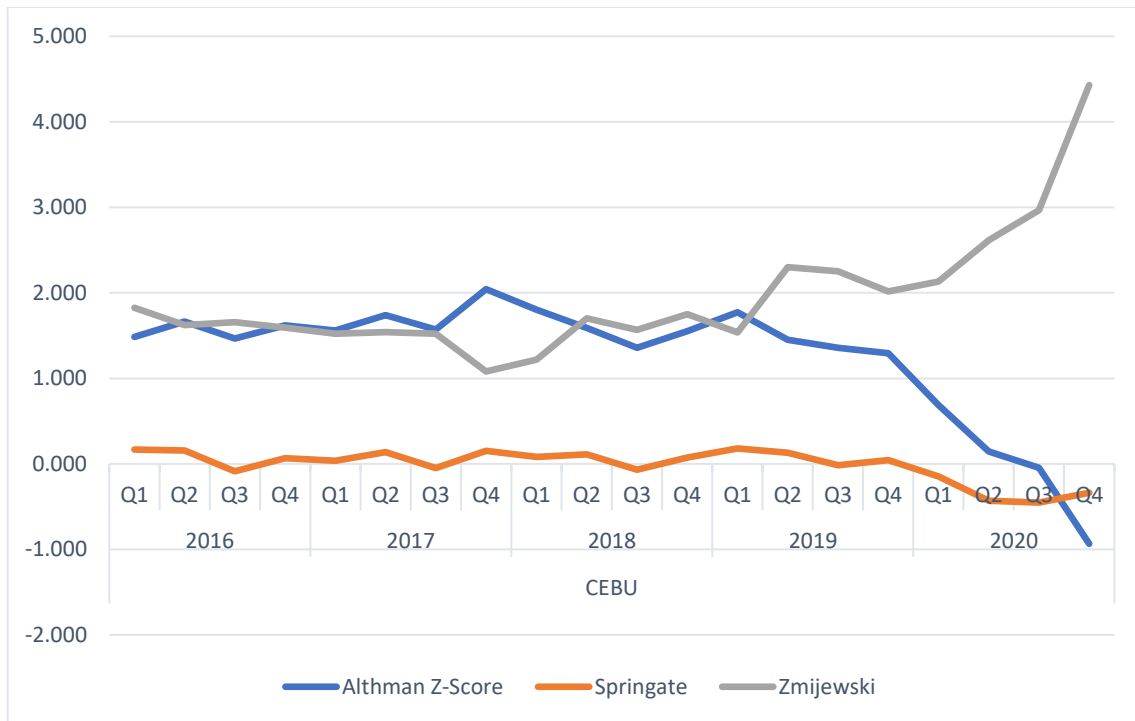




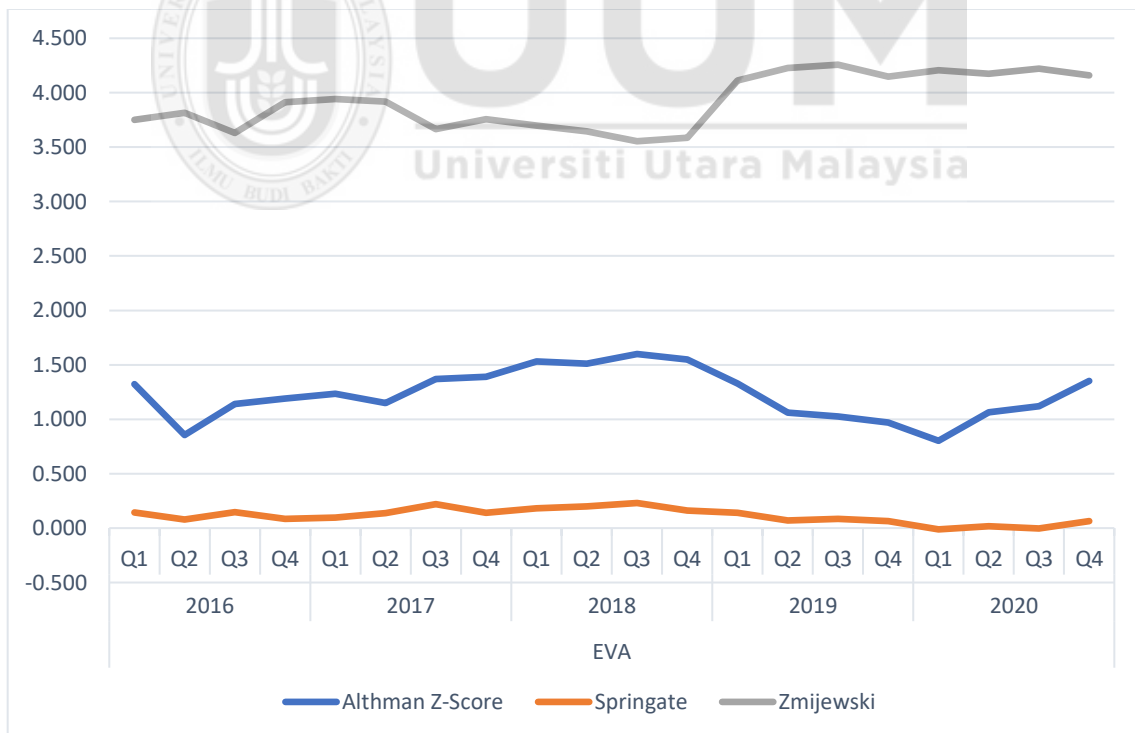
**Bangkok Airways**



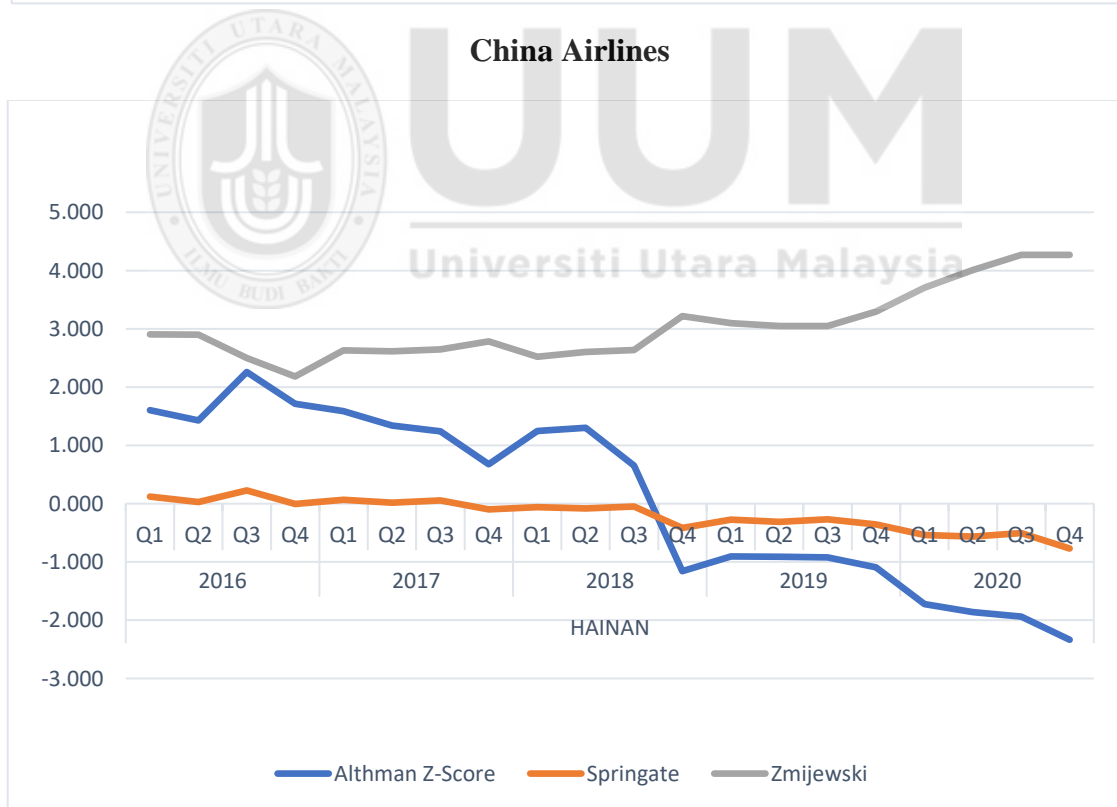
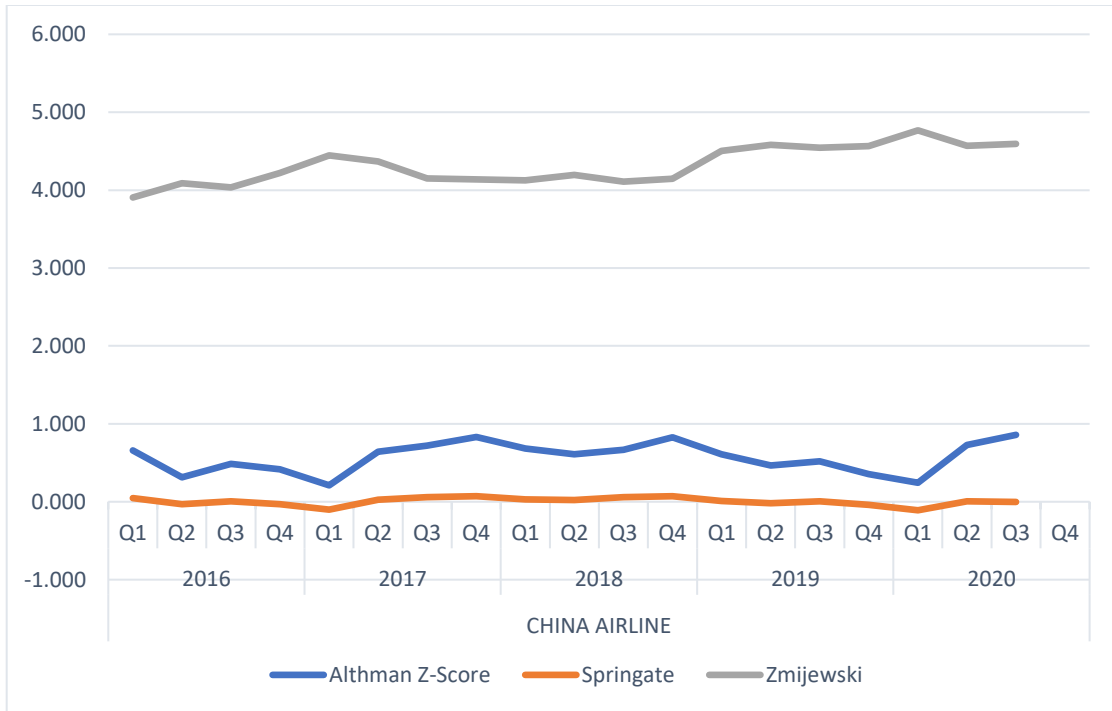
**Japan Airlines**



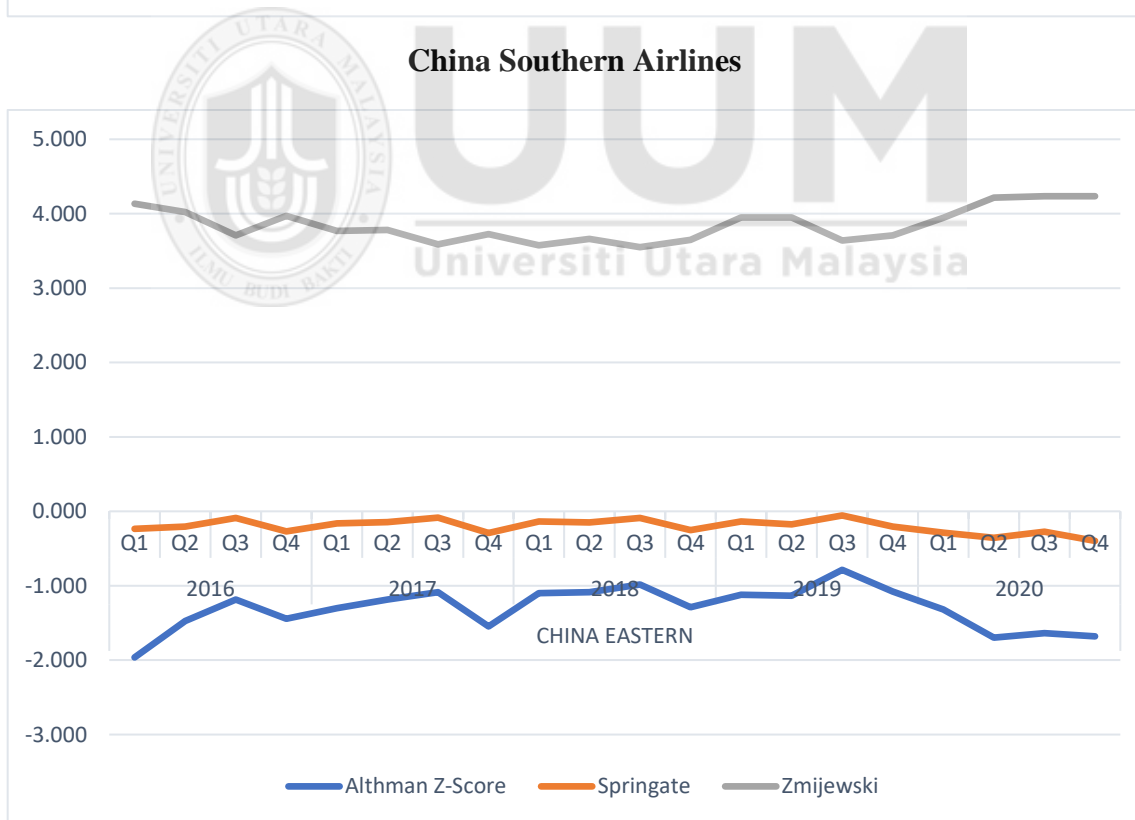
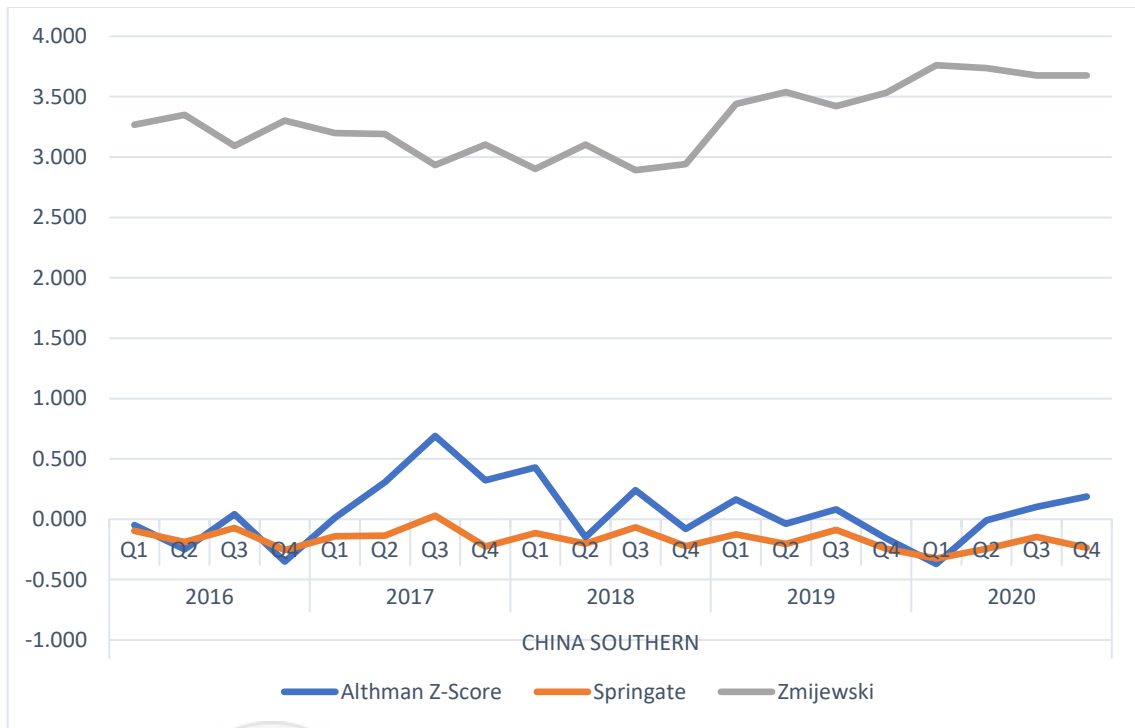
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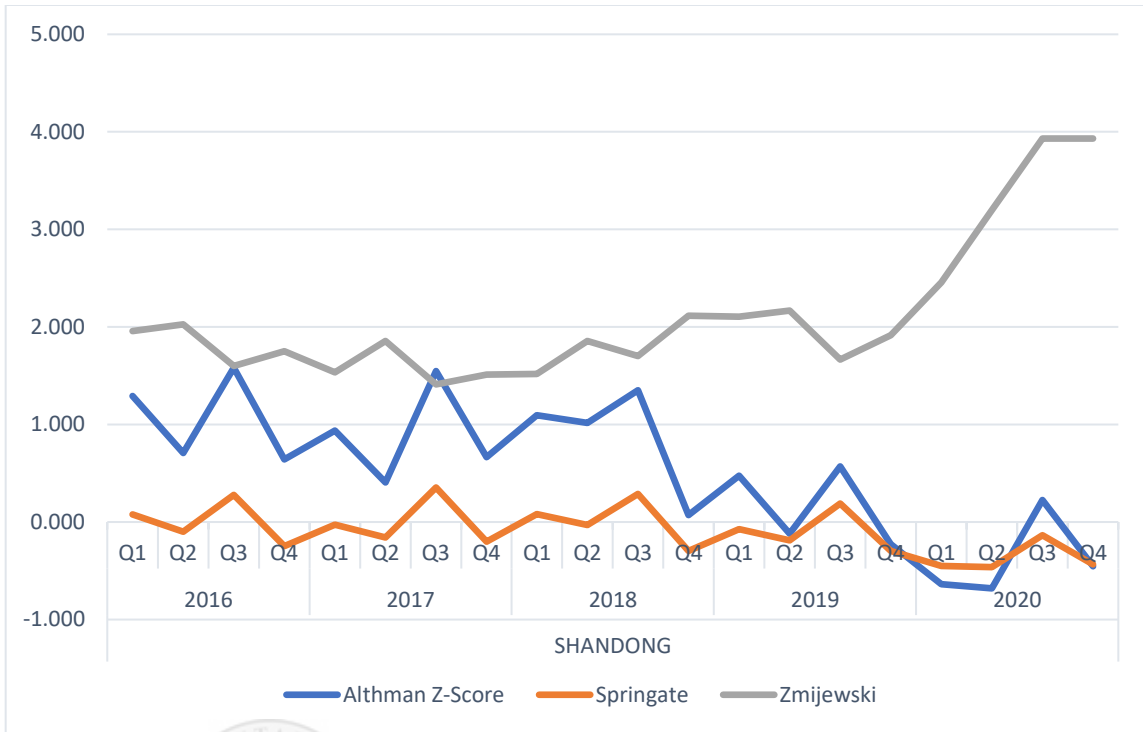
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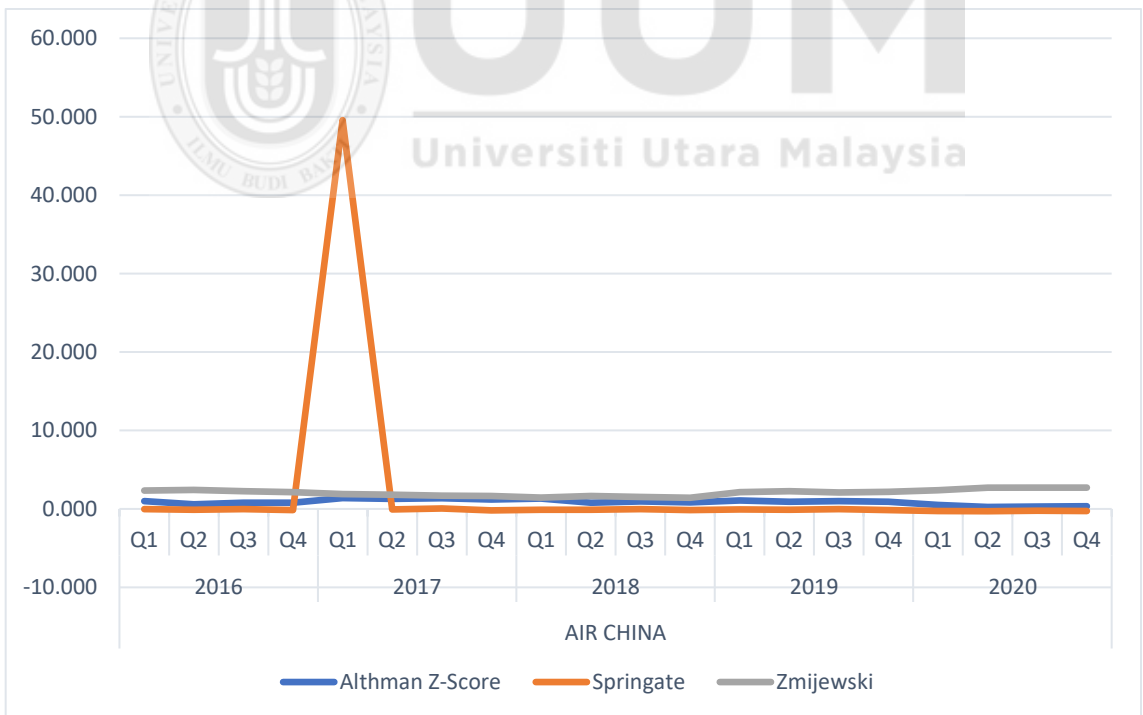
**Hainan Airlines**



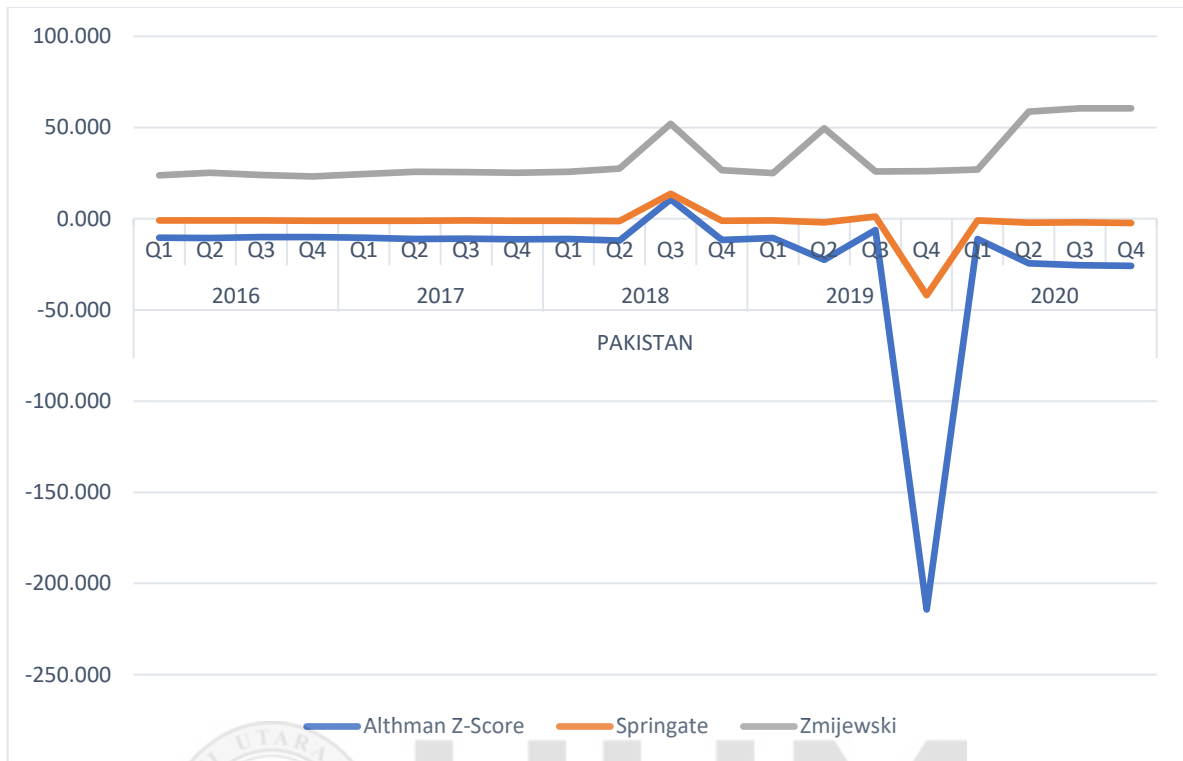
**China Eastern Airlines**



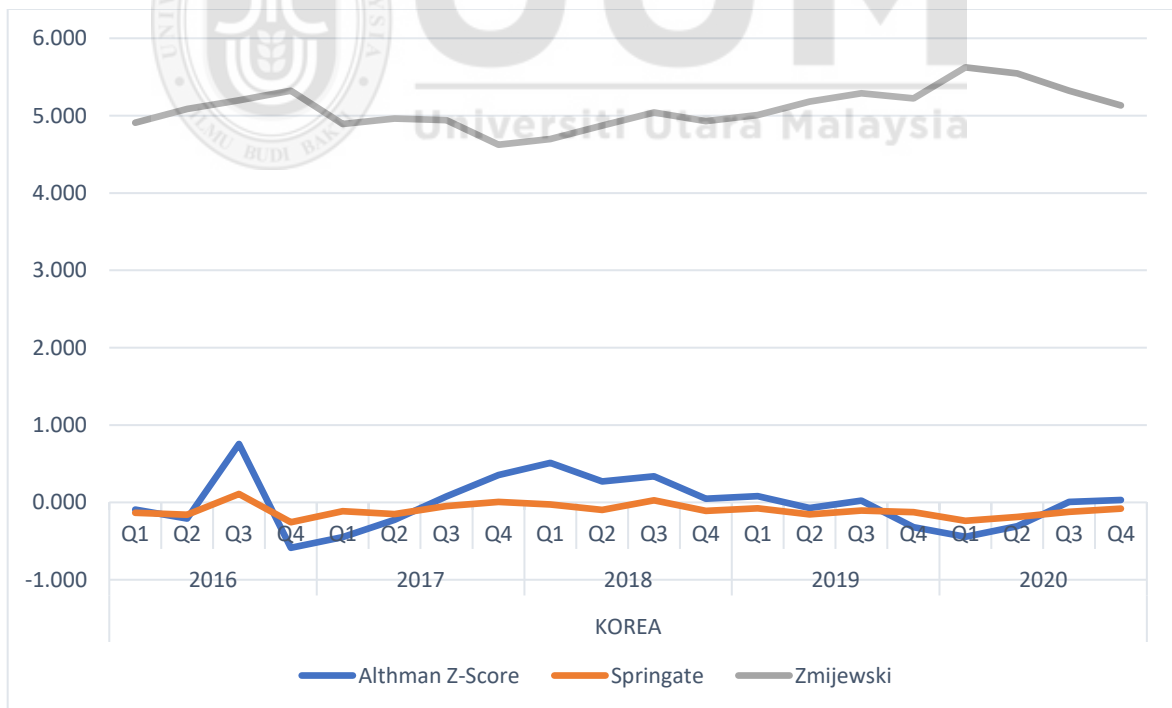
**Shandong Airlines**



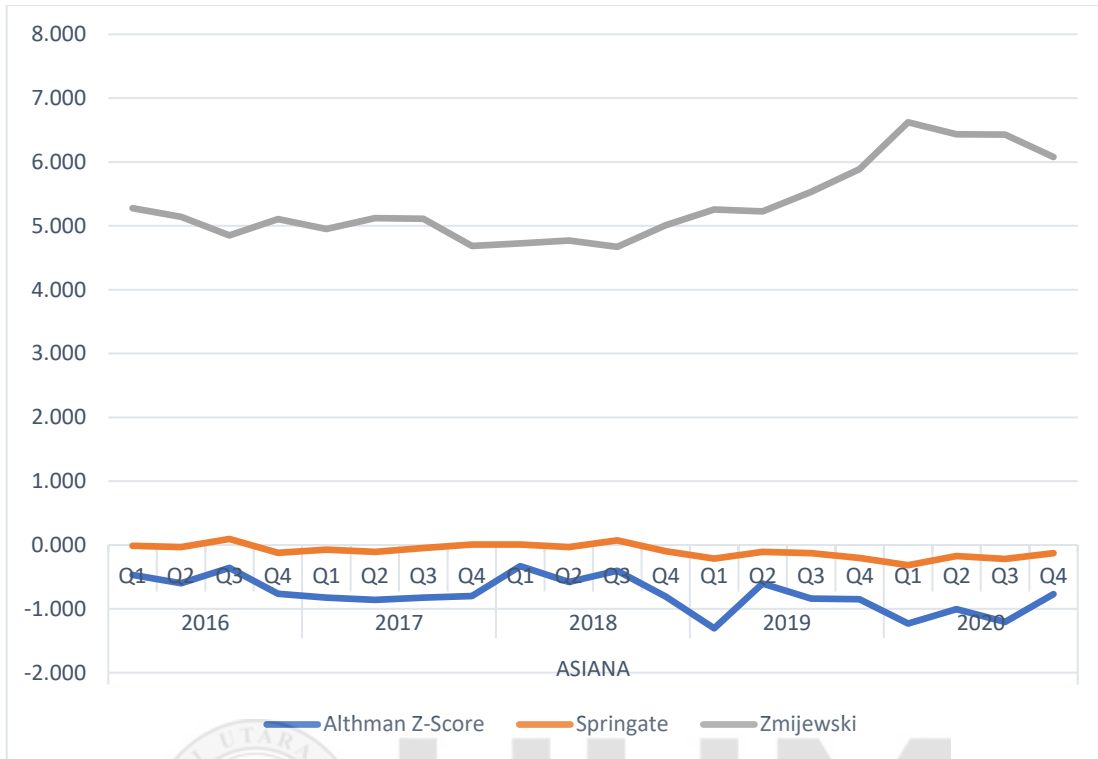
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**Pakistan International Airlines**

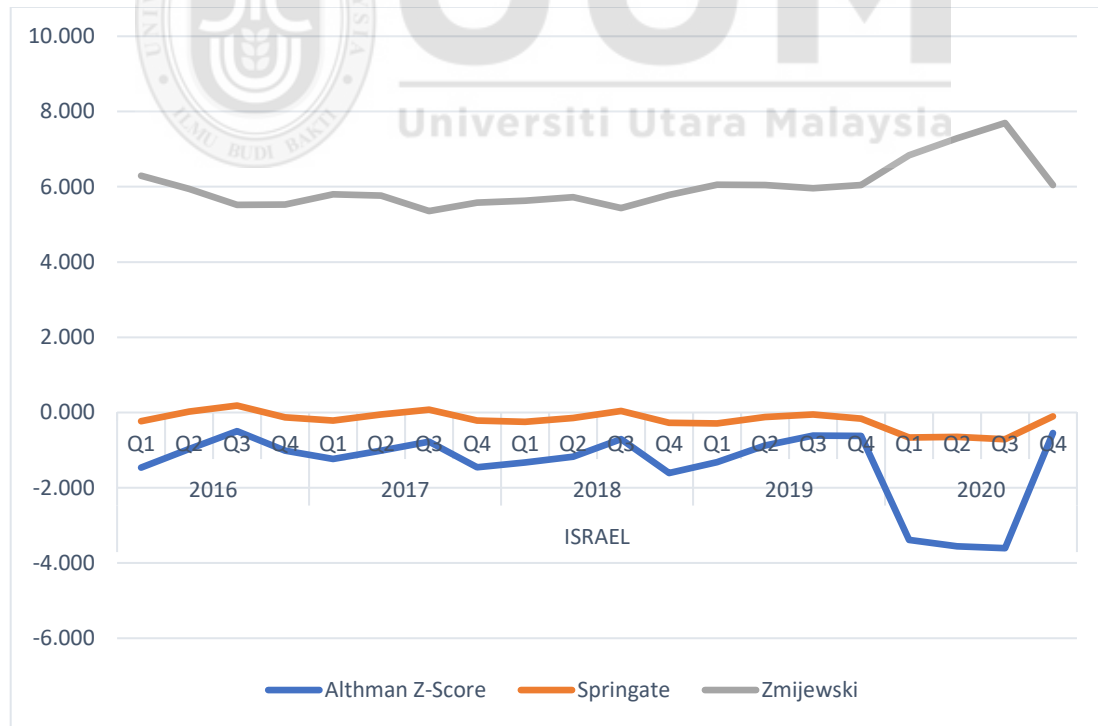


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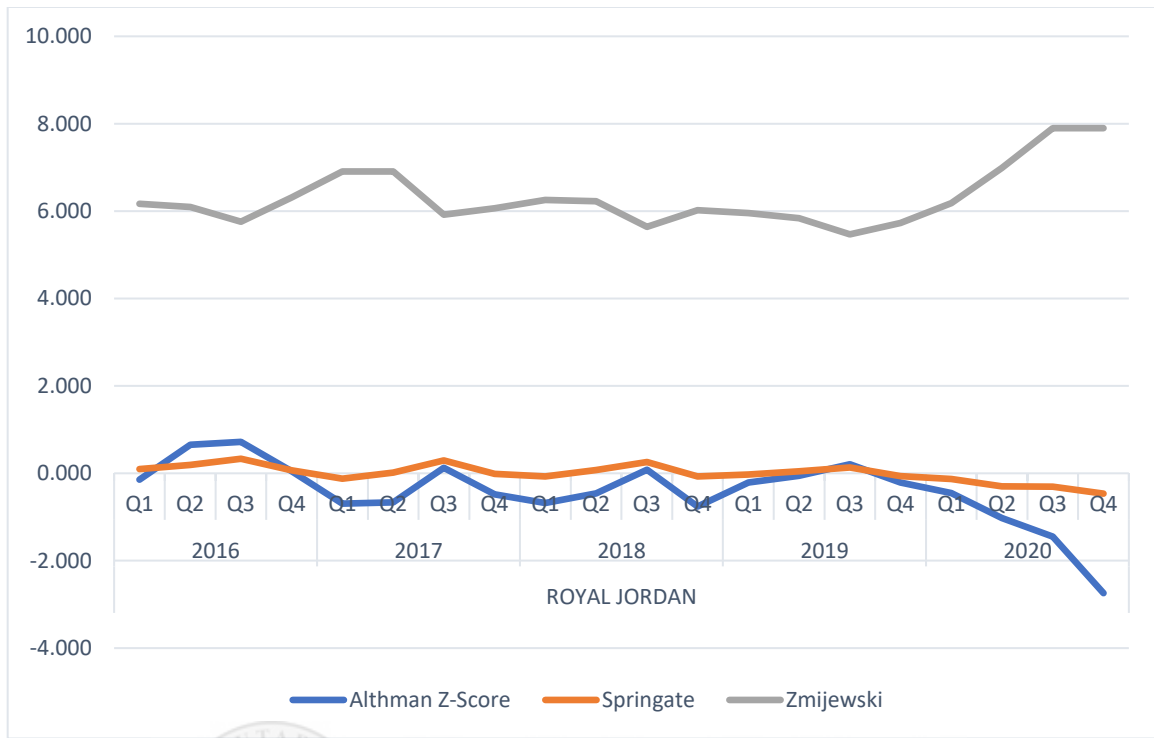


**UUM**  
Universiti Utara Malaysia

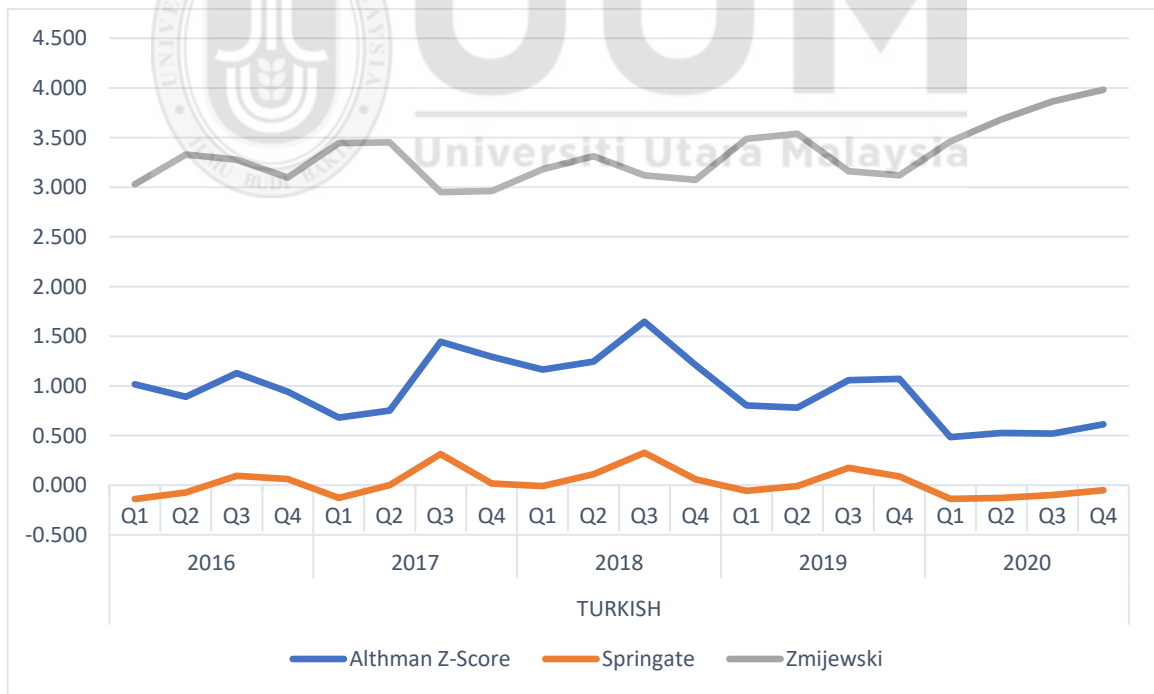
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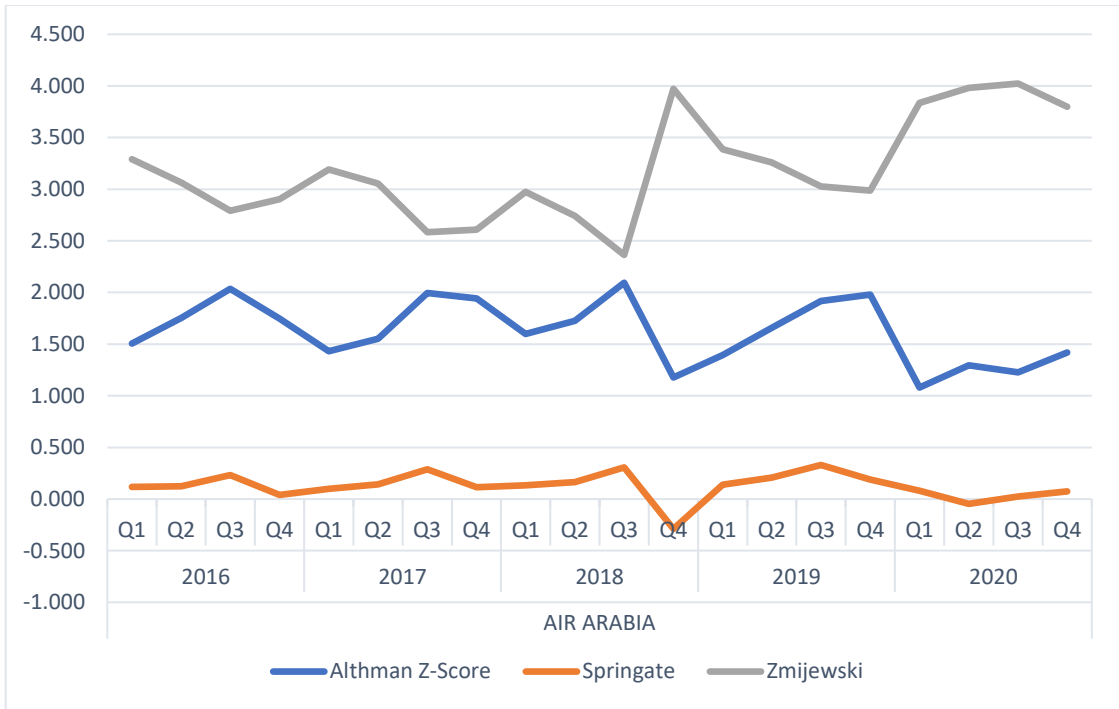
**El Al Israel Airlines Ltd**



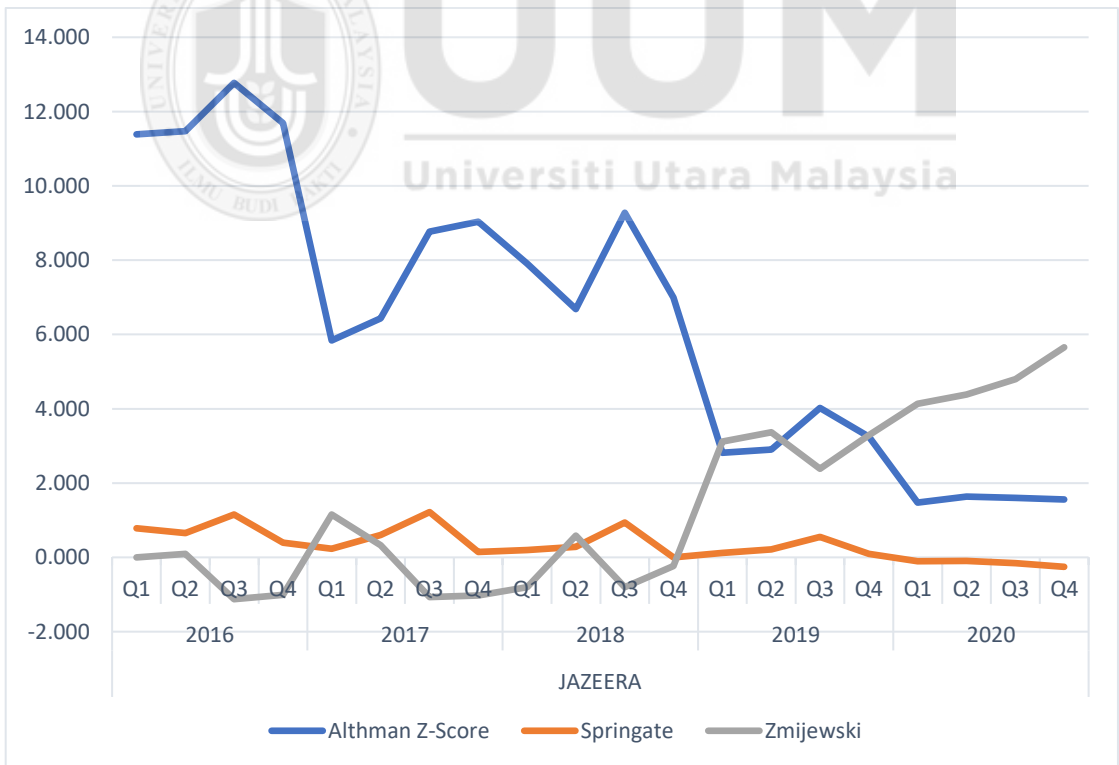
**Royal Jordanian Airlines**



**Turkish Airline**



**AirArabia**



**Jazeera Airways**