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NOVEL APPROACH IN DATA AGGREGATION AND ITS APPLICATION  
IN AIRLINE SERVICE EVALUATION

Master's Thesis

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## **Abstract**

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The use of questionnaire data has been a common method to gain more insights from service or product users, however interpreting this kind of data is never a straight-forward task and sometimes it can lead to ambiguous or misleading results. This thesis paper suggests a new approach for the evaluation and analysis of questionnaire data. It suggests a multiple criteria multi-expert evaluation framework where importance of specific answers from respondents will be reflected. Likert-scale inputs and aggregated evaluations are represented using histograms. The concept of histogram weights of criteria for the analysis of questionnaire data is introduced. The proposed method was empirically tested on the real-world data set, evaluation of Vietnamese airlines by their customers in 2017. The result shows that we can obtain a lossless representation of the evaluations of a given alternative by a group of evaluators overall, get the marketing implications of the lossless representation of questionnaires and reflect weights of answers specified by the user/buyer of the analysis.. The concept of a 2-dimensional histogram to represent the data with subjective importance of the partial evaluations as expressed by the experts and propose histogram weights is a useful tool for the analysis of respondents' preferences in marketing research.

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# 1. INTRODUCTION

## 1.1 Background and motivation

In a competitive market, customer satisfaction is important for the business's developing strategy, and it has been a key value for success or failure of a company on the market (Trends et al., 2017). Although playing a critical role in the economies of many countries, the services sector is in the state of tremendous competitive pressure. Hence, the improvement of service quality and customer satisfaction will help businesses maintain their existing customers, attract new customers, and improve their ability to compete. Given its ability to transport passengers to their desired locations all over the globe, aviation is a typical service industry which plays an important part in the global service sector. In spite of its fast growth, the aviation industry faces many challenges like oil prices, fuel expenses, high competition, safety and other operational challenges. Especially during this Coronavirus crisis where travelling has been restricted to a great extent, measuring customer satisfaction is even more important for the business to adapt and survive. Understanding customers, particularly how they feel about the service quality, is one of the core strategies for an airline to sustain their profitability and development (Neil Patel, 2017).

Airline in Vietnam is becoming a popular means of travelling for Vietnamese during recent times when the economic development of the country is booming. During the last few years, many budget airline companies have been founded and gone into operation. However, it is not easy for an aviation company to keep its stand in the market, and maintain its competitiveness as well as its share in the industry. Indeed, a couple of companies (like Air Vietnam, Indochina Airlines and Air Mekong) have stopped operating (Private airlines go bankrupt leaving big debts behind - News VietNamNet, 2018). In such a highly competitive world of low-cost airlines, providing sufficient quality services to satisfy customers is essentially important for airlines to achieve profitable and sustainable development. According to Lu and Ling (2008), service quality is one of the main keys for corporate success. It has been pointed out that the cost of attracting new customers is five times higher than the cost of keeping old ones, and 80% of profit is earned by 20% of old customers (Chow and Reed 1997; Heskett et al. 1994). Therefore, airline marketers need to create more

products and services in their marketing offerings and development strategies in order to sustain their profitability. There are various marketing strategies that boards of management can employ such as service design, pricing, communication, promotion. Knowing how customers evaluate airline services will help businesses in this industry understand the elements affecting customer satisfaction. Then, they can assess the effectiveness of their business operation and come up with suitable strategies.

Using surveys and questionnaires to measure customers' opinions about airline services is a challenging task because of the survey's versatile designs and also the expectation subsequent quantitative analysis of the data when numerical outputs are expected from the analysis. Furthermore, there are many intangible factors that can affect customers' choices. The qualitative methodological framework (where data is gathered through interviews, focus groups, observation etc.) can provide interesting and valuable data, but usually in a form that is difficult to process further using quantitative methods. This limits its use in hypothesis testing and similar contexts. To improve service quality, there were many researchers and marketers focusing their attention on customer evaluations of services (Fisk, Brown, & Bitner, 1993). However, majority of the studies used similar methods, for example Clemes et al.'s (2008) and Aydin and Yildirim (2012) who both employed the SERVQUAL methodology (Parasuraman et al., 1988) and statistics tests like One-way ANOVA in their papers. This pure method received quite many critiques, Francis Buttle (1996) in his article "SERVQUAL: review, critique, research agenda" pointed out that consumer final decisions are taken at a higher-level of abstraction. Brown, Churchill and Peter (1993) also showed their primary concern on the difference score (i.e. perception minus expectation) with psychometric concerns about conceptualization. From those examples, we can see that to fully present all the insights from a questionnaire data without losing information is not an easy task. This thesis will present a new approach to deal with the questionnaire data so that its distortion is minimal by its aggregation and other forms of further processing.

## **1.2 Objective and contribution of the study**

There have not been many researchers studying customer satisfaction in Vietnam aviation market. For example, a paper conducted by Ha Nam Khanh (2017) used multiple linear regression analysis, a traditional way to examine service evaluation that cannot aggregate all

the insights from the questionnaire data. The objective of my thesis paper is to examine customer perceptions of domestic airline services in Vietnam using a novel approach to present questionnaire data in a lossless way and also with minimal distortion. This approach will tackle with the problem of data translation from pure SERVQUAL method mentioned previously (section 1.1) , in other words, it will capture and translate survey data in the most complete way. The research will also explore the quality airline services from the customer's point of view, among all the suggested service quality dimensions (which will be mentioned in detail in the Theoretical framework section), which dimension will significantly influence the satisfaction of airlines passengers.

We will proceed with the assumption that discrete Likert-type scales are used in the questionnaire to obtain answers (evaluations) from several respondents (experts) concerning several aspects (criteria) of a given object (alternative). The respondents were asked to express the perceived importance of the given answer. A general methodology for the processing of such questionnaire data will be proposed. First, we introduce the problem in general terms and the necessary notation and also the notation for histograms. Then we suggest a lossless aggregation procedure for the expert evaluations w.r.t. the criteria and a visualisation technique of these evaluations. In the end we outline a full multi-expert multiple-criteria evaluation framework dealing with discrete Likert-scale data and reflecting expert-defined importances of evaluations as well as the importances of particular evaluations as perceived by the user of the analysis. In all the steps we try to minimize information loss and distortion. The resultant findings are expected to help direct the airlines to better strategies when providing their services. Moreover, some suggestions for further improvement will be proposed to help the airlines achieve the quality of a good airline company.

### **1.3 Theoretical framework and data collection summary**

The theoretical part of this research is based on a review of previous studies on customer satisfaction, traditional models on service evaluation and customer satisfaction, and some research models on satisfaction of airline clients. The empirical part of the study looks carefully into the evaluation of the airline services from customers' points of views by using a combination of the following methods: Likert scale, distance from ideal, histogram

aggregation and fuzzification. An elaboration of this summary can be found in part 2 and 3 of the paper.

The study data was collected through social network sites using Qualtrics and sent out to more than 200 people who already used two budget airlines, namely Jetstar Pacific and Vietjet Air. These two airlines were selected due to fast growing market and its existing problems when operating in this dynamic industry. The convenience sampling method was used since reaching whole population is not possible. 114 respondents completed the questionnaires, incomplete ones were discarded. After the completion, data were analyzed carefully as presented in the Empirical Analysis and Findings section. An in-depth discussion of this part will be addressed in part 5 of the thesis.

#### **1.4 Structure of the thesis**

The thesis is structured into seven chapters. The first chapter introduces general information about the background and motivation for the research topic, the thesis objectives and contributions. Theoretical framework and data collection is also briefly mentioned in this chapter. Chapter 2 provides a literature review of previous research focusing on the aggregation of questionnaire data, some limitations from these papers will also be discussed. Chapter 3 introduces an overview of theoretical framework about Likert scale, fuzzy logic, distance from ideal and histogram aggregation, as well as why a different method is proposed to solve the problem instead of other traditional ways. Chapter 4 contains background information of domestic airline market and airline services in Vietnam, and a closer look at two budget airlines chosen to be analyzed in this thesis. Chapter 5 delves into the questionnaire design and the discussion on data collection. In chapter 6, empirical analysis and key findings are presented. First we will look at the dimension measures without weight reflected, dimensions measures with weights and then the comparison between the two. General formulas and calculations will also be documented in this chapter. Chapter 7 will conclude the research with the theoretical and managerial implications, limitations and suggestions for future research.

## **2. LITERATURE REVIEW**

### **2.1 Customer satisfaction**

Customer satisfaction topic has attracted a lot of researchers in the recent past. This part of the paper will look at approaches and methodologies of some prominent researches and from there, we will gain a basic understanding and insights about methodologies used for measuring customer satisfaction.

#### **2.1.1 Customer satisfaction definition**

Customer satisfaction is defined as an "evaluation of the perceived discrepancy between prior expectations and the actual performance of the product" (Tse and Wilton, 1988, Oliver 1999). In Gustafsson, Johnson and Roos's paper (2005) customer satisfaction is defined as customers' evaluation about the performance of the firm. According to Hennig-Thurau and Klee (1997), if customers are pleased with the services and products that they received, the companies can be more successful and competitive in the market. Previous research has shown that the satisfaction of customers can help brands build strong and profitable relationships with their clients in the long run even though it is costly to do so (Anderson, Fornell and Mazvancheryl, 2004). Researchers from the University of Michigan (Keiningham & Vavra, 2001) showed that for 1% increase in customer satisfaction, there is an average increase of 2.37% of return on investment. However, poorer services have even larger effects on customer's perception. Gitomer's research (1998) shows that if the service is particularly poor, 91% of retail customers will not return to the store, and the cost of acquiring a new customer is five times greater than the cost of keeping a satisfied customer. In a research by Cook (2012), he points out that there are four levels of experience that customers have with service businesses. First, at the lowest level, when the services provided for customers are poor or below standards, they fail to meet the customer's expectations. When this happens, customers may choose to complain with the business, express discontent with other people or do nothing. It is possible that customers may choose to remain with the business due to the convenience of location or price, but they can also choose to leave. Above this level is when services are at satisfactory level to customers. In this case, customers can choose either sticking to the brand or looking for an alternative service. However, they are

more inclined to the idea of remaining with the business. Move to a higher level, when customers receive services beyond their expectations, they will feel more emotionally attached to the firm and be more loyal with that brand. The highest level of customer experience is the stage when customers persistently feel satisfied with the services. They will love to promote the brand to their friends, acquaintances, and others. This view on four levels of experience seems to be correct for most of service sectors. Those levels can be summarized in the Figure 1.



Figure 1: The customer-advocacy pyramid. Adapted from Complaint management excellence (Cook, 2012, pp. 6-7)

### **2.1.2 Objective of customer satisfaction**

Customer satisfaction helps businesses gain considerable competitive advantage. According to Jagdish (2001), customer satisfaction brings a lot of benefits for firms.

First, customer satisfaction results in repeating purchases, which reduce the cost of doing business. This can be explained by the economy of scales advantage. Due to coming-back customers, the marketing and management cost is minimized, and the productivity of marketing activities is improved more significantly thanks to the recommendation of this coming-back customers to their networks. From another way of looking, dissatisfied customers increase the cost of sales by delaying their payments, sending complaints to high-level management, or even using the legal department to fulfill their expectations. It cannot be denied that precaution is always better than correction.

Second, customer satisfaction creates price advantage. This is due to satisfied customers will bring a lot of benefits for company and for the companies to get more customers they should try to give better price offer. Once customers are satisfied with one brand, they are unlikely to switch to a different one. Therefore, if a competitor wants to attract those satisfied customers, they either have to lower the price with the same level of performance or increase performance level with the same price. This price advantage is considered as differentiation. Another price advantage of customers satisfaction is brand reputation. When customers can't judge or control quality consistency, brand reputation will become a price advantage.

Third, customer satisfaction is likely to reduce corporate crisis because satisfied customers want the company to survive and support the company financially and morally to ensure that survival. There are four major sources of crises that are relevant to customer satisfaction: (i) product tampering, (ii) operational breakdowns, (iii) unfair competition, and (iv) industry restructuring.

Fourth, having satisfied customers helps the company to have more new customers. If the customers like the products, through word of mouth, they spread the company's brands to the market with the lowest possible cost. There are several reasons for this action. For example, it is a way to show customers' appreciation for being treated well. Also, it helps drive out bad companies from the market.

Fifth, pleased customers tend to shop at one place rather than risk trying other places since they are familiar with the procedure for ordering, delivery and payments. This makes their buying easy, convenient and fast. It is quite economical for customers to place multiple orders from one firm rather than splitting across several vendors. Further more, they can also have more purchase discounts, better support. With these set loyal customers, company tends to have a fixed source of revenue and marketing cost can be reduced. In other words, this allows the company to expand its line of products and generate more growth.

Last but not least, customer satisfaction encourages successful product innovations which are directly linked to corporate growth opportunities. When customers are satisfied about the services, they tend to share their experiences and this will help R&D departments interface more with customers as they are developing new technologies. These input from customers are precious for innovation process.

### **2.1.3 Factors affecting customer satisfaction**

#### *a. Service quality*

Considering that most developed economies are now service-oriented, service quality has been put in a critical marketing and management role. The service sector made up 58 percent of worldwide gross national product (Bateson & Hoffman, 1999). Service quality is regarded as the customer's impression of the quality, and customers usually compare the company's services to those of its competitors (Bitner & Hubert, 1994). In this situation, service quality is one of the most essential elements in deciding brands to go with when there are many companies in the industry. It is characterized as a network of activities, including customer support systems, complaint processing, complaint processing speed, complaint reporting easiness and complaint reporting friendliness. Such programs are meant to meet consumer needs. For example, if the complaints of customers are not handled or addressed properly, they will look for other brands (Gustafsson, Johnson and Roos, 2005). In addition, Soderlund and Rosengren (2008 ) found out that a courteous nature and welcoming disposition of service employees left a positive impression on the customer, which resulted in greater customer satisfaction.

The first model to measure service quality was introduced by Gronroos (1984). He used a two- dimensional model to study the quality of service, which includes technical quality (i.e., outcome of the service performance) and functional quality (i.e., consumers' perceptions of their interactions with the service providers). This model contrasts service efficiency with customers expectations. Gronroos concludes that each customer has their own perceptions of the quality of the service.

#### *b. Price*

Price plays an significant part in pleasing our customers. Price is the amount of money spent for a good , service, or sum of the values consumers pay for the benefits of using that service (Kotler & Armstrong, 2010). According to Kukar-Kinney, Xia and Monroe (2007), there is a strong relationship between price fairness and customer satisfaction because customers who pay to use the service assess whether the price is justifiable or acceptable, and if it is, customer satisfaction and loyalty will be developed. Customers decide to buy the products only when the they meet minimal quality standards, and they rarely purchase the products with the highest quality. They see the price as an indicator of service quality.

The importance of price has been proved in previous literature. For example, Mahmud, Jusoff, and Muammil (2013) mentioned the importance of prices on the satisfaction and loyalty of customers in the aviation industry. Research has shown that service quality has a substantial effect on customer satisfaction with a positive relationship, while price plays an insignificant role with a negative relationship. This research also suggested the company should maintain a consistent quality of service and continue to set the price at fair price. In banking industry, a research paper by Činjurević, M., Tatić, K. and Avdić, A. (2010) investigates an integrated model of price, service quality, satisfaction and loyalty showed that banks should focus on delivering the right quality at the right price (price-quality ratio), and on treating the customers fairly if they want higher customer satisfaction and loyalty. However, in this thesis, price factor is dropped out because the two airlines under study use very similar price strategy on the same routes.

*c. Other factors*

Apart from service quality and price, customer satisfaction is also influenced by other factors such as customer's mood, emotions, and social interactions. Customer behavioralists and marketers have researched extensively the essence and role of customer satisfaction in a number of service settings; in a recent study about the mood on product evaluation by Sirakaya, Petrick, & Choi (2004) the result suggests that such emotional states indeed bias research outcomes and associated management responses. In another research done by Srivastava and Kaul in 2014 showed that social interactions with other customers could have a positive effect on customer experience and this is quite consistent with the research done by Lloyd and Luk (2011) with the same topic. Nevertheless, the goal of this study is to present a new approach to deal with the questionnaire data so that its distortion is minimal by its aggregation and other forms of further processing, these factors will not be considered in the scope of study.

## **2.2 Traditional models of service quality and customer satisfaction**

Parasuraman and his colleagues (1988) developed a scale for measuring service quality, which is popularly known as SERVQUAL. This scale measures the difference between expectations and perceptions on the five dimensions of service quality known as: tangibility, reliability, responsiveness, assurance and empathy. The elaboration of these five dimensions is presented in Table 1. Customer's perception of service quality is a result from the

comparison between their expectations before using service and their actual service experience. SERVQUAL-based data analysis can take many forms: item-by-item analysis (e.g. P1–E1, P2–E2); dimension-by-dimensional analysis (e.g.  $(P1 + P2 + P3 + P4)/4 - (E1 + E2 + E3 + E4)/4$ ) where P1 to P4 and E1 to E4 represent interpretation and expectation statements in a single dimension, respectively (Buttle, 1996). There have been many studies that use this scale in various contexts such as hospitals (Amin and Zahora Nasharuddin, 2013), banking (Nandi and Debarati Deb, 2011), electricity (Achchuthan, Sivathaasan and Jayasundara, 2014) . However, this popular scale is also the subject of criticism which suggests that customization to specific services should be done when applying the scale (Lapierre et al., 1996).

Table 1: Five Broad Dimensions of Service Quality

<b>Dimension</b>	<b>Definition</b>
<b>Tangibles</b>	Physical facilities location, supplies, staff and written materials
<b>Reliability</b>	Ability to conduct the service offered with reliability and accuracy
<b>Responsiveness</b>	Willingness to help customers and deliver timely service
<b>Assurance</b>	Awareness and courteousness of employees and their ability to encourage confidence and trust
<b>Empathy</b>	Caring, quick access, good communication, knowledge of customers and individualized customer service

This validity of (P-E) framework has been criticized because of the conceptualization and measurement problems of expectation component of the SERVQUAL scale (Jain and Gupta, 2004). This vagueness of expectation concept has asked for the need of a more precise scale, the SERVPERF model of Cronin and Taylor (1992). This model discarded the expectation component of SERVQUAL and only used the performance component instead.

The empirical research on SERVPERF model points out that customer's perception is the best reflection for the service quality. This approach includes gaining an awareness of the service needs perceived by the target clients. According to this model, service quality is equal to customer's perception. SERVPERF scale also used 5 factors and 22 perception items as in

the SERVQUAL model, but it ignores the expectation items. Nevertheless, results from a multi-industry study suggested that the SERVPERF scale may have problem with consistency and generalization factor structure (Taylor and Cronin, 1994). The equation for SERVPERF can be expressed as:

$$SQ_i = \sum_{j=1}^k P_{ij}$$

Where

$SQ_i$  = perceived service quality by individual 'i'

$k$  = Number of attributes/items

$P_{ij}$  = Perception of individual 'i' with respect to performance of a service firm on attribute 'j'

There were many arguments about the superiority of either SERVQUAL or SERVPERF in measuring service quality. A research of Carrillat and others (2007) shows that both models are equally valid in predicting overall service quality. Other researchers, however, point out that SERVQUAL are used to diagnose service issues and measure the variance of dependent constructs, while SERVPERF is known as a tool to predict outcome variables such as customer satisfaction and brand loyalty (Cronin, Brady, & Hult, 2000 ).

Skogland and Siguaw (2004) used Expectation-Disconfirmation, Equity Theory, and Comparison-Level Theory to explain customer satisfaction. Among these theories, Expectancy Disconfirmation is one of the most influential theories, and it gains increasing acceptance (Ekinci, Massey, & Dawes, 2008). According to this theory, there was a comparison between expectations and disconfirmation of those expectations. The disconfirmation is the result of difference between prior expectation and actual performance.

### **2.3 Models on customer satisfaction in airline industry**

Measuring customer satisfaction is perhaps the most common way of measuring a company's success and providing critical details for the improvement process. Although there have been considerable amount of research on service quality over years, studies on this topic in airline industry are limited compared to other industries. This part will look at few of them.

Aydina and Yildirim (2012) examined service quality using SERVQUAL model by Parasuraman's et al.'s (1988) for different domestic airline firms in Turkey. In this research, the authors used five service quality dimensions, namely Tangibility, Reliability, Responsiveness, Assurance and Empathy. Significant differences between expectations and perceptions were investigated. By using Pearson Chi-square tests, a significant relationship between preference toward airline firms and preference toward airline services among passengers was found. The Cronbach's Alpha values were used to test for passengers' expectations and perceptions. One-way ANOVA test was used to evaluate the significance of difference between expectations and perceptions. The authors also found out that the most important dimension in SERVQUAL scale was "Reliability". It was suggested that for the further research, the demographics of the sample should be varied. The use of SERVQUAL for this kind of service also showed the difference between Turkish Airlines THY (Türk Hava Yolları) and other domestic airline firms in Turkey.

In another scenario, Gilbert and Wong's research (2003) looked at the service dimensions that mattered the most to airline passengers. In this research, data was collected from passengers departing Hong Kong airport. The paper focused on the link between customer expectations and service quality. The study demonstrated how an airline can utilize a measure of passengers' expectations as a tool to manage its service quality. The findings showed major variations between passengers from different ethnic groups, nationalities and for various purposes of travel. With regards to the most important service dimension, assurance was ranked first, which meant that the passengers concerned about safety and securities.

Assessing passenger expectations was not an easy task because the passengers are sensitive to quality, and all service dimensions are not equally important to them. In this paper, the authors emphasized on two hypotheses. The first one was: "If passengers are of different ethnic groups/ nationalities then there will be significant difference in their expectations of desired airline service quality", and the second one was: "If passengers are the decision-makers in choosing the airline, then their expectations of desired airline service quality will be significantly different from those of non-decision-makers". The methodology employed in this research was a combination of the Key Purchase Criteria formulated by Mason (1995) and the use of SERVQUAL (Parasuraman et al., 1988). Instead of using five dimensions model, David and Robin (2003) chose seven categories to measure which includes reliability, assurance, facilities, employees, flight patterns, customization and responsiveness. Findings revealed that Reliability was not the most important dimension as indicated in the previous

studies, but Safety took that role. Consequently, more measures in security gave passengers more confidence. The authors also pointed out that Customization (loyalty and frequent flyer programs) and Facilities (in-flight entertainment; waiting lounges and in-flight internet) should be re-examined and targeted to the right audience.

The application of SERVQUAL in airline industry was also seen in another research of Chau & Kao (2009) conducted in an Eastern (Taiwan) and a Western (UK) country to examine the differences in expectations of service quality between the two areas. The Gap-5 values between perceived and expected service quality from respondents were also recorded. The Gap-5 depends on the size direction of the four disconfirmations relevant to the marketer's delivery of service quality. The study results showed that there was a statistically significant difference between the level of service quality perceived and expected, and these differences were affected by demographic factors such as education, occupation and income levels. However, the examination of Gap-5 values also indicated that there seemed to be no statistically significant difference for respondents in the two locations under study. To examine whether these Gap-5 values for each of the measure are statistically significant, paired sample t-tests were performed for each of the five pairs, the mean differences were shown as large enough to be statistically significant.

Suhartanto and Noor's study(2012) worked on the hypothesis of whether the service quality and price together substantially influenced customer satisfaction in full-service and low-cost airlines. There were seven variables examined in this research, including tangible, empathy, reliability, responsibility, assurance, price and customer satisfaction. The authors ran the regression test of service quality and price on customer satisfaction. Regression test indicated that changes in service quality and price explained 46.4% of changes in customer satisfaction. The findings also showed that respondents using full-service airlines received better service quality than low-cost airlines respondents on all service quality dimensions. The largest difference in service quality between full-service and low-cost airlines occurred in the Empathy dimension, and the smallest one was the Tangible dimension. In summary, the study shows that customers of full-service airlines were more satisfied than those who used low-cost airlines. It was suggested by the researchers that attitude of employees in delivering services and the price factor should also be taken into consideration to improve customer satisfaction for both types of airlines.

Clemes et al.'s (2008) analyzed customer satisfaction in international air travel by looking at seven dimensions, namely: timeliness, assurance, convenience, helpfulness, comfort, meals, and safety and security. The findings revealed that these dimensions were positively related to perceived service quality in international travel. Among these, safety and security were the most important dimension. This finding might be partly explained by the time of the research, which was after the incidents of global terrorism, SARS outbreak and the bird flu. The scope of research was broadened to customers who traveled all over the world, and not restricted within any single country. In terms of methods, this study used a range of statistical analyses. For example, exploratory factor analysis resulted in seven factors corresponding to the seven theoretical dimensions. Multiple regression analysis was used to test hypothesis. ANOVA and t-tests were carried out to determine whether passengers with different socio-demographic characteristics had different impressions of the quality of service.

As can be seen, not many researches have been done in the Vietnam airline market and the methodology used were quite similar. A new approach will be conducted in this paper to process such questionnaire data and show how this lossless aggregation can help in improve development strategies for Vietnam aviation industry.

### **3. THEORETICAL FRAMEWORK**

This chapter discusses research methods used in this thesis by explaining why certain methods were chosen over others, and describing how the empirical parts of this study were conducted. There are many empirical studies on customers' evaluation of service quality. Some methods used in previous studies include a combination of qualitative and quantitative methods in longitudinal research designs (Arnould & Price, 1993), case studies (Frow & Payne, 2007), and scale development (Klaus & Maklan, 2009). The methodological challenges of measuring customer evaluation of service quality are usually due to the complexity of the service quality concept.

#### **3.1 Likert scale**

Likert scale is one of the most popular instruments used to collect data on variables which normally cannot be directly observed, so-called latent traits (such as feelings, behaviors, expressions, and opinions). It was first introduced by Likert in 1932. Typically, each question has a five-response scale. For example, the response can go from 1 = strongly disagree to 5 = strongly agree. Depending on what is measured, the labels of responses on the scale can be worded differently. Many studies have been using this scale in various fields, such as patient advocacy in hospital (Seal, 2007), organizational behavior in learning organization (Kiedrowski, 2006), customer attitudes towards labeling in nutrition (Lindhorst, Corby, Roberts, & Zeiler, 2007) or student perspectives of engineering education (Li, McCoach, Swaminathan, & Tang, 2008).

However, the Likert scale has some disadvantages. The response categories have a rank order, but the intervals of values between the categories cannot be considered the same. Blaikie (2003) showed that researchers usually assume equal intervals between the responses in Likert scales. It is not logical to think that the intensity of feeling between the categories in the five-point scale is equal. Thinking in this way could lead to a wrong assumption about the significance of the research. A Likert scale is basically an ordinal scale measure, and the idea of whether arithmetic operations can be applied to this scale is still very controversial. Jamieson (2004) pointed out that assigning the labels such as “strongly agree”, “agree”,

“neutral”, “disagree” and “strongly disagree” to numerical values such as 1 to 5 violated the basic assumption of ordinal measures.

Furthermore, researchers often combine the scores from each item to measure the variables. Sukasem and Prasitratsin (2007) argue that this practice is not appropriate as the weight of each item may be not equal. Another downside of the Likert scale is rooted from its closed response format. As pointed out by Hodge and Gillespie (2003), answers from people who are forced to choose from a set of ready-made answers may be not the same as their true thinking, and somehow the responses collected may just reflect an acceptable preciseness.

For the above reasons, the data computed from the Likert scale with conventional methods could be unreliable and distorted. Some studies have attempted to improve the Likert scale. For example, Chang (1994) pointed out that adding more levels to the scale could obtain better details. Russell and Bobko (1992) also suggested that the information captured would be more accurate if there were more scale points. However, Chang (1994) realized that the more scale points increased the chance of errors occurring because respondents might be mistaken or confused by too many response categories. Moreover, too detailed responses which can result in long questionnaires may discourage respondents' participation.

The methodology in this thesis will look at alternative way to deal with the interval-level of Likert scale by using fuzzy logic to develop a more suitable case. This new approach permits partial agreement on the scale points and overcomes the problem of information lost arising from the ordinal nature of the traditional Likert method.

### **3.2 Fuzzy logic**

The fuzzy logic is proposed by Lotfi Zadeh, who dealt with approximate answers rather than precise ones in 1965. Zadeh points out two principal rationales for fuzzy logic (FL) generalization in his paper. First, FL-generalization helps to build models that take into account the reality. The second rationale relates to the exploitation of tolerance for imprecision. This property of fuzzy logic is widely utilized because it opens the door for simplifying design and lowering costs. As the critics of fuzzy theory argued, in most cases, classical mathematical theories or bivalent logic might have ability to build the same product or result without the aid of fuzzy theory. However, fuzzy has its strength to solve problem in a simplified and cost-effective way (Zadeh, 2015).

Our daily language often involves imprecise and fuzzy information, hence fuzzy logic is normally seen in social science research. For example, when we say: “The way to school is far”, it is hard to measure as the definition of the “far” concept cannot be easily defined. Different people will have different opinions or views about being “far”. In other words, fuzzy logic can handle relative importance of precision. This perspective is related to the question: “How important is it to be exactly correct when a rough answer will do?”. Look at the earlier example when applying a traditional sets theory with crisp numbers. The distance will either belong to a set (denoted as 1) or does not belong to the set (denoted as 0). For instance, the distance to school can be considered as “far” when it is more than 15km away from home (set 1), while the distances within 15km and below belong to the other set (set 0). However, this convention can be misleading as 14 or 15km can be thought as “far” for many people. When the logic of fuzzy set is adopted, it allows the membership of a variable to operate over the range from 0 to 1. Values between 0 and 1 represent a partial or fuzzy membership of the variable in a set.

Fuzzification is a process by which input variables are translated into fuzzy values identified by membership degrees and their associated membership functions. This method results in a set of combined fuzzy values and then we evaluate the fuzzy values using the theories of social science in combination with fuzzy set laws.

Development of fuzzy logic can potentially be incorporated into decision making in multiple areas. Various applications of fuzzy set theory have been created over time, expanding benefits of fuzzy logic in tackling management problems. Nowadays, artificial intelligence is widely discussed along with neural networks, which are adaptive and hence efficient in learning process. Intelligent systems are rapidly improving and getting faster by their ability of learning through experience. Applications of fuzzy vary greatly and can be found in various fields (Singh et al., 2013): financial area (e.g. stock market prediction, fraud detection, economic indicator forecasts), medical area (e.g. medical diagnosis, treatment cost estimation), sales and marketing (e.g. sales forecasting, usage forecasting), chemical industry (e.g. control of distillation processes) and other industries. This section mostly covers application examples in decision-making contexts such as disaster management, human resources management and finance (pricing of new products).

Stoklasa (2011) evaluated the performance of academic faculties to identify the staffs’ strengths and weaknesses, which could be used for bonus allocations and task assignments.

The evaluation process was defined linguistically using a linguistic fuzzy rule base for aggregating partial evaluations into two key areas of interest-Pedagogical Activities (PA) and R&D. The input data for this study's model included the information of all activities performed by current staff members on a yearly basis. In the model, partial evaluations were determined simply as multiples of standard scores for the current work position and areas of interest, but the aggregation of these partial evaluations was performed by a fuzzy-rule-based system. Staff were asked to fill out a questionnaire in which they earned scores for different tasks according to their value and time requirements. Three areas were taken into consideration for PA evaluation. They were: (i) lecturing, (ii) the supervision of students, and (iii) works associated with the development of fields of study. The RD evaluation was based on the methodology validated in the Czech Republic. This involved highly graded activities (papers in influential journals , books, patents, etc.) and other significant activities (project management awards, memberships in the editorial board, etc.). Both PA and RD areas were assigned standard scores. The author pointed out weaknesses in the use of traditional methods such as Weighted Average (WA), Ordered Weighted Average (OWA), on the normalized partial evaluations. Specifically, these methods did not appreciate excellent performance and penalize unsatisfactory performance. It was unfair to use fixed weights to evaluate staff members according to their own strengths because it made people concentrate on the areas with higher weights. In order to avoid the disadvantages of balanced results, it is better to use fuzzy linguistic modeling in which the relationships between inputs and outputs are linguistically represented. It is advisable that partial evaluations for PA and RD should be determined in terms of standard score multiples. While the PA evaluation is based mainly on the time spent on the activities (such as number of lectures, seminars, and examined students), the RD area is scored according to the importance of the final work (such as paper, book, invited lecture at a conference, etc.)

Cret and Laurence (1993) proposed a decision-making model based on fuzzy set theory for emergency shut-off of city gas networks in earthquake. The estimation of earthquake damage is used for various purposes such as planning repair work, calculating economic loss and so on. It can even be more critical for gas networks because wrong decision making in this case can lead to secondary disasters due to gas leakage. If heavily damaged area is detected, gas supply should be suspended. It implies that emergency shut-off decision is critical and earthquake damage estimation should be efficiently utilized for more credible shut-off decision-making. The system proposed by Cret and his colleague (1993) was based on fuzzy

set theory. It formulated knowledge obtained from experiences and experts, and then estimated earthquake damage from characteristics of ground motions and conditions. The results were a fuzzy damage index. Finally, fuzzy decision analysis was performed to transform the fuzzy index into clear bound decision on whether to shut-off the gas network in a given area or not (Cret and Laurence 1993). The model suggested by Cret and Laurence (1993) is basically a decision-making system based on fuzzy expert system. During the disaster incidents, responsiveness might be more weighted than precision due to the time and resources limitation. Therefore, fuzzy decision support model can be considered as more practical than rigorous mathematical models. Cret and Laurence's research (1993) can be considered as exploiting strengths of fuzzy logic-based models.

As can be seen, all the researches mentioned above showed that this logic of fuzziness will be useful when one wants to incorporate the weights of importance into our analysis as it helps translate the rate range into a more reasonable range, in other words, from a general Likert scale to concrete membership function. Further discussion of how this method can be applied can be found in section 6.2.2 of the paper.

### **3.3 Distance from ideal**

The Likert scale is often used to measure attitudes, beliefs and opinions, and it is one of the most popular measurements for survey design. It allows respondents to answer the questions based on degrees of their agreement or disagreement. The 5-point Likert scale is chosen for this thesis because it requires less ability from respondents to define their correct feeling or experience. If the 7-point scale is used in a survey, respondents may choose their answers at random, and thus the data collected will be random. The 5-point scale is also easier for researchers to analyze data, and for survey respondents to stay focused on the questionnaire. Furthermore, the 5-point scale is strongly recommended from previous studies (Fink, 1995). The scale with the odd number of points includes a clear mid-point which can be considered as indifferent point because it does not show any preference to either directions. In this scale, the linguistic labels are assigned with the numerical levels. The values obtained from this scale should be considered to originate from an ordinal scale. Then we can apply aggregation methods on the converted Likert scale values.

The introduction of distance from ideal can be defined as how far the measured sample is away from the ideal, with the ideal as the best or desired evaluation on the scale. In this situation, the degree of fulfillment of a given target can be calculated. It seems illogical to characterize the ideal as extreme answers in the sense of a potential central-tendency bias, since such an production might not be attainable. It is noted that defining unachievable ideal evaluations can seriously bias the absolute type of evaluation procedure. The degree to which the ultimate target is achieved can be defined as normalized similarity of the group evaluation to the ideal assessment.

### **3.4 Histogram aggregation**

In market research, getting full information from the perceived importance of criteria can provide lots of meaningful insight into the answers of the respondents. Visual representation of quantitative data helps to translate and explain those information in an effective way. Data is normally presented in various forms such as bar graph, histogram, pie chart and line graph. Whereas the bar charts are good to represent categorical data, histograms are good for representing a continuous variable on the horizontal axis. Histograms also help to give knowledge about the data distribution, whether it skews to the left or to the right, or clumps in the middle. This thesis uses histogram to aggregate answers collected after the survey. Moreover, it takes into account multiple criteria obtained by multiple experts into one overall evaluation. In other words, it proposes the concept of two-dimensional histogram to represent data with subjective importance of partial evaluations. With the above explanation, it is fair to say histogram aggregation is a lossless and novel approach to minimize information loss and distortion.

## **4. DOMESTIC AIRLINE MARKETS**

### **4.1 Overview of domestic airline markets and airline services in Vietnam**

*Airline service* is the combination of all the services provided for customers for the purpose of transportation and moving from places to places while *Budget airline service* is a business module in airline industry. Airline companies offering budget airline services provide cheaper airfares compared to traditional airline companies. However, there is reduction in service comforts such as absence of inflight meals or refreshments, fixed ticket prices, and non-refundable tickets in case of cancellation or no-show.

There are many low-cost carriers in South-East Asia market. Unlike the Europe and North America markets, the South-East Asia market lacks a steady supply of wealthy passengers, but overall it is competitive. Vietnam is a country which has the fastest economic growth and urbanization within the ASEAN region. Over the last 15 years, Vietnam's GDP per capita has grown at the rate of 5.3% annually, and this high rate is expected to continue until 2021. With a population of 91 million inhabitants, there is a big room for air travel services to grow in Vietnam. The domestic airline market in Vietnam is on an upward trend as more and more customers opt to choose airlines as their means of transportation. Due to the benefit of time saving and better deals, airlines in Vietnam are experiencing a big jump in the market compared to the past. Vietnam has experienced the fast growth in aviation market in Asia Pacific for years. According to the International Air Transport Association (IATA), Vietnam is one of the fastest growing aviation markets globally. The growth rate of compound annual gross rate (CAGR) from 2004 to 2014 in Vietnam reached 17.4%, higher than an average growth rate of 9.8% in Asia Pacific (Vietjet Annual Report, 2016). The total size of Vietnamese aviation market (including international traffic) increased more than double, from 25 million passengers in 2012 to 52 million passengers in 2016 (centreforaviation.com, 2018).

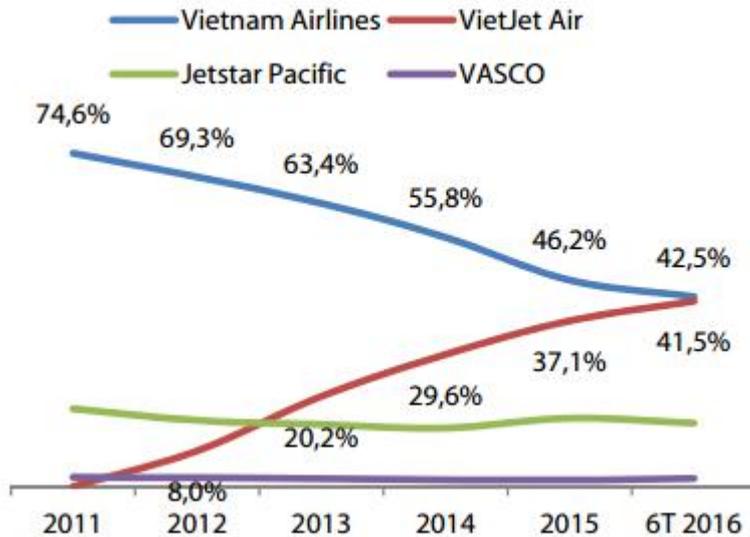
There are four domestic airlines: Vietnam Airlines, Jetstar Pacific, Vietjet Air and VASCO. Among these four players, Vietnam Airlines is the national airline and captures the largest market share, 74,6% in 2011 but it drops to 42% in the first six months of 2016. The airline

has routes all over the country as well as international routes. Vietnam Airlines also offers services with the highest price compared to the others. Due to its high price and the presence of other low-cost airlines, the percentage of passengers flying with Vietnam Airlines has gone down dramatically.

Jetstar Pacific and Vietjet Air are two budget airlines in Vietnam. These two airlines are chosen to investigate in this research. They offer frequent domestic flights with cheap prices, hence they are favored by majority of customers. Although VietJet is not the first low cost carrier (LCC) in Vietnam, it has played a critical role in Asian aviation markets. Jetstar Pacific became the first LCC in Vietnam in 2008, when the former Pacific Airlines rebranded and adopted the LCC model. However, Jetstar Pacific languished for several years, and did not pursue any expansion until 2013, when VietJet became the largest LCC in Vietnam. Due to high competitiveness in the market, these two budget airlines offer nearly same prices for the same routes. Thus, the price factor will be excluded from service evaluation in this research.

VASCO is not a popular airline in Vietnam. It is not a budget airline, with its prices in the middle range (i.e., below Vietnam Airlines but above Jetstar Pacific and Vietjet Air) and very few routes being offered.

Figure 4 presents market shares of these companies from 2011 to first half of 2016. In the first six months of 2016, Jetstar Pacific made up only around 14% of the domestic market, whereas Vietjet accounted for nearly three times higher share of domestic passengers. Vietnam Airlines also took a large share in the market but its growth is very slow compared to Vietjet. The horizontal axis present the market shares of these airlines over the year while the vertical axis is the 100% unit.



(Source: Vietnamese Dragon Research, 2018)

Figure 2: Market shares of domestic airline companies

## 4.2 Vietjet Air

Vietjet was first launched in December 2011 and considered as an international low-cost airline. Their vision is to become a global aviation company with a network of routes spanning the entire region and the world, delivering and expanding not only aviation services but also consumer goods on the e-commerce platforms and being a favorite and respected brand name. Vietjet operates 54 aircrafts plus 6 aircrafts on order. Vietjet has a route network covering 38 domestic routes and 44 international routes, and it plans to expand the network to 42 domestic routes and 60 international routes. It is operating a fleet of A320s and A321s with an average age of 3.3 years old (2017). During 5 years of taking off and serving customers, Vietjet has been honoured with 32 domestic awards and 9 significant international awards. VietJet captured a 42% share of the Vietnamese domestic market in 2016, and it has been reported to be consistently profitable since 2013.

## 4.3 Jetstar Pacific Airlines

Jetstar Pacific Airlines was founded as one of the first low budget airlines in Vietnam. Formerly known as Pacific Airlines, the airline was re-branded Jetstar Pacific after a corporate restructuring in 2007, when Australian-based Qantas took a minority

shareholding. Jetstar Pacific is now part of the Jetstar low-cost network which includes Jetstar Asia (Singapore) and Jetstar (Australia). Its base is in Tan Son Nhat International Airport, Ho Chi Minh city, Vietnam. Their operation target is to provide cheap tickets every day. They now fly to 16 domestic and international destinations with a fleet of 10 Airbus A320 aircraft. They plan to expand their size to 30 Airbus A320 aircraft. Table 2 presents a summary of these two low cost carriers.

Table 2: Summary table of main information for Vietjet and Jetstar

	<b>Vietjet</b>	<b>Jetstar Pacific</b>
<b>Date of commencement</b>	25 December 2011	May 2008 (Vietnam)
<b>Ownership</b>	Sovico Holdings, HDBank, other organizational investors and individual stakeholders	Pacific Airlines were under control of Government, in 2007 a portion of its shares were sold to Qantas (30%). In 2012, Vietnam Airlines bought 70% stake of the company.
<b>Destinations</b>	Fly to 38 domestic destinations and 44 scheduled international destinations from its hubs in Tan Son Nhat International Airport and Noi Bai International Airport	Fly to 16 domestic and international destinations from its hubs in Tan Son Nhat International Airport and Noi Bai International Airport
<b>Business strategies</b>	Expand domestic and international network, maintain credits and reputation to partners passengers, as well as nurture sustainable values for the company, develop new services based on e-commerce technologies, diversify capital portfolio, participate in many investment projects, enhance cost management and deploy high-tech appliances.	Accelerate the expansion of the fleet and networks, implement a clear dual brand strategy using Jetstar Pacific to compete with Vietjet.

## 5. DATA COLLECTION

### 5.1 Questionnaire design

As presented in the first part of this paper, the objective of this study is to suggest how to deal with questionnaire data so that its distortion is minimal by its aggregation and other forms of later processing. The questionnaire used in this study was a refinement of the original SERVQUAL instrument, but some modifications were made to suit the context of airline industry. Four dimensions were chosen to measure customer's perceptions of service quality for the two airline companies, Jetstar and Vietjet. In the first part, demographic information such as gender, age and income was asked to be filled by respondents. In part 2, service quality dimensions (SERVQUAL) were taken into consideration with some customizations to be suitable for the airline industry.

The four dimensions consisted of four main categories, which are tangibility, reliability, responsiveness and assurance. In each category, there were sub-categories. A Likert-style five-point scale, ranging from 1 (Bad), 2 (Below Average), 3 (Average), 4 (Good) to 5 (Awesome), accompanied each statement/item. These items are described as follows.

- **Tangibility**

Q1: Onboard catering

Q2: Comfort and cleanliness of seat

Q3: Onboard entertainment

Q4: Onboard reading materials

- **Reliability**

Q5: Cabin safety procedure

Q6: Accident rate

- **Responsiveness**

Q7: Courtesy of crew

Q8: Responsiveness of crew

- **Assurance**

Q9: Efficiency of crew

Q10: Language skill of crew

The survey also asked passengers to assess the level of importance for each sub-dimension on the five-point scale from 1 (Not important), 3 (Medium important) to 5 (Very important). When looking at each dimension to evaluate the service quality, it is important to consider the weight importance of each among all as that will translate better information. In the analysis, we will look at evaluation cases with weights and the ones without weights. The questions were written in both Vietnamese and English, the survey questions can be found in the appendix.

## **5.2 Data collection**

Data of this research was collected by using an online survey tool of Qualtrics. The data collection was conducted in Vietnam, between June and October 2017, via social media channels. The data provided insights into customers' perceptions of service quality of two airline companies, Vietjet and Jetstar.

This specific sample of respondents is a network of friends from school and work who usually chose these two airlines as their means of transportation, could be either domestic or international routes. Since this sample consists of people from different backgrounds, different gender and ages, they can be assumed to be a representative of the population. They were asked to fill in the degree of importance in assessing the service performance of airline companies. In total, 114 customers completed the questionnaires, incomplete ones were discarded. About three fourths of respondents are those who got the income around average or higher. Demographic descriptions of these customers will be described in section 6.1 of this paper.

In the first part of the questionnaire, respondents were instructed to indicate their level of satisfaction for each category of the services offered by the airlines. They were also asked to rate the importance of the categories. Last, they were asked to give an overall evaluation to evaluate each airline.

The collected data was analyzed by using Excel. They were transformed into figures, tables and histograms to understand the whole picture of the thesis topics and to further analyze and report the results.

## **6. EMPIRICAL ANALYSIS AND FINDINGS**

The analysis comprises of three main parts. The first part provides general customer profiles. The second and third part give more insights into customer satisfaction levels of four service quality categories of Vietjet and Jetstar, with weights and without weights. The last part summarizes and compares the findings.

### **6.1. Demographic Analysis**

Data was coded and tabulated in preparation for analysis. Descriptive statistics was used to determine the main features of the collected data in quantitative terms. Specifically, data was reported regarding mean, median, mode and standard deviation.

Acknowledged that 114 not a big sample size and there may exist some problems of small samples like: increase the chance of assuming as true or false premise, inflated effect of size estimation (Faber J, Fonseca LM, 2014) but due to time constraint and lack of resources we assume this sample make a decent representation of larger population. Table 3 provides detailed statistics of the demographic characteristics of the respondents.

The composition of the sample spreads out quite reasonably, slightly more female respondents (59.65%) than male respondents (40.35%). The gender of the participants in the study mirrors very closely the 50-50 percentages. The age of respondents, ranging from 18 to 61, from table 3 we can see that most of the respondents aged 18-29 years old (76.32%), so the airline passengers were quite young in this sample. The respondents were also equally divided into four income ranges: below 6 million VND (around 300 USD), from 6 to 12 million VND (from 300 to 600 USD), from 12 to 20 million VND (from 600 to 1000 USD) and above 20 million VND (above 1000 USD). Income distribution was quite equally even. Over all, the data distribution was quite reasonable in terms of gender, age and income to proceed with the analysis.

Table 3: Descriptive statistics of respondents

Variable	Category	% of responses
Gender	Female	59.65%
	Male	40.35%
Age	18-29	76.32%
	30-45	19.30%
	46-60	3.51%
	Other	0.88%
Income	Below 6 mil VND	24.56%
	From 6 to 12 mil VND	27.19%
	From 12 to 20 mil VND	27.19%
	Above 20 mil VND	21.05%

## 6.2. Dimensions Analysis

### 6.2.1 Dimension measures without weight reflected

The aggregation of data obtained from questionnaires frequently means loss or distortion of information. However, the lossless information can be achieved by using histograms and outline an overall evaluation methodology based on such lossless partial evaluations. Detail of formulas and calculation will be explained below.

Data was gathered and tabulated to see how many customers evaluated which point for the service in the five-point Likert scale. The sub-dimensions in each dimension were combined as can be found in four histograms below. In this part, information on the importance of criteria/dimensions was not integrated. These are simply the count based on the choices of respondents; the difference in sum is due to the number of sub-dimension of each. To come up with these graphs, each dimension will be looked at individually, for example in Tangibility, there are 4 questions asked, the Y axis is the sum of all the respondents of these 4

questions over each Likert point, the X axis is the five-point Likert scale. Same steps were done for Reliability (2 questions), Responsiveness (2 questions), Assurance (2 questions).

Charts below show the summary of the results.



Figure 3.1: Tangibility assessment \_Weights not reflected

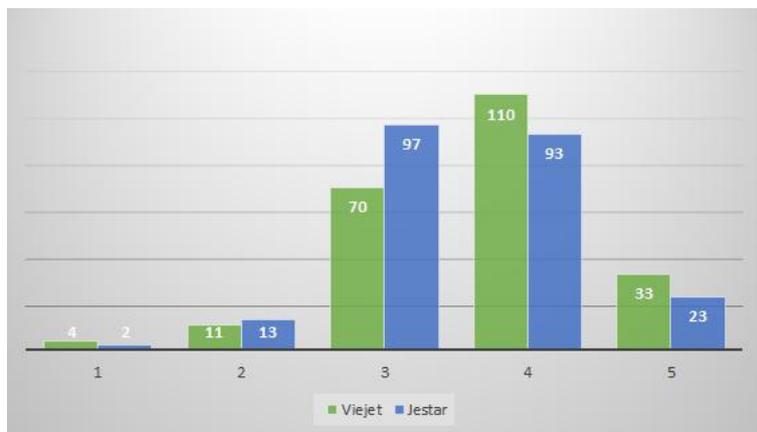


Figure 3.2: Reliability assessment \_Weights not reflected

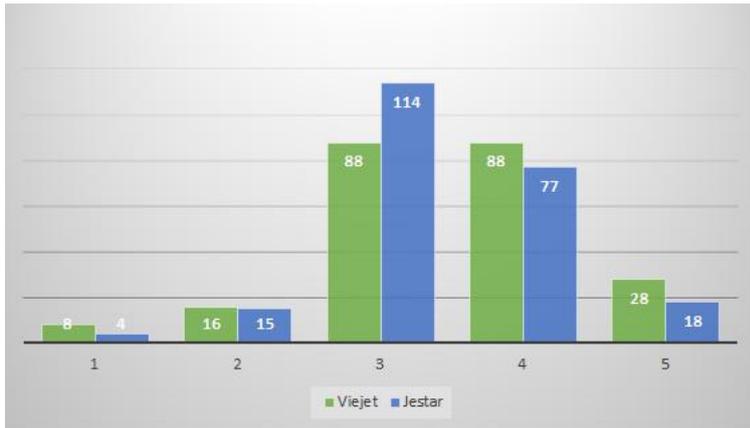


Figure 3.3: Responsiveness assessment \_Weights not reflected

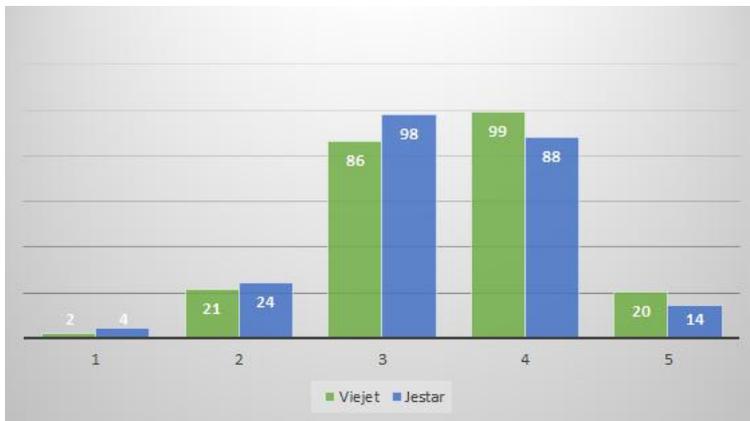


Figure 3.4: Responsiveness assessment \_Weights not reflected

Let's have a more detailed look in each category to see customers' view for each dimension. The Tangibility dimension included the questions focusing on onboard catering, comfort and cleanliness of seats, on board entertainment, and on board reading material. When combining the answers for these four subcategories together, it can be seen that 234 respondents rated at point 3 for Jetstar, but only 193 for Vietjet. At point 4, Vietjet was favoured with 109 respondents, while Jetstar only had 71 respondents. So it seems that even though Jetstar was ranked better at a middle point, Vietjet got the major votes when it comes to 'above average' rank.

The Reliability dimension shared a similar pattern with the Tangibility. The only noticeable difference was that most customers chose point 4 for the Reliability, but point 3 for the Tangibility. The remaining two dimensions were in the same context. At point 3, Jetstar was

close to 100-110 range, and Vietjet was around 80. However, at point 4, the role position was switched between Jetstar and Vietjet. With this statistics, we can see same story happens as Tangibility, for Jetstar they will come in mind when thinking about middle range quality while Vietjet performs a bit better when it comes to above middle quality.

It can be seen that the majority of respondents rated the satisfaction level around 3 and 4 on the 5-point scale from all criteria perspective. Since the questionnaire utilized the 5-point rating scale, it is easy to understand that the middle options were the most common response. At the score of 3, Jetstar had a higher number of respondents compared to Vietjet. However, at point 4, the number of clients who voted for Vietjet was higher, which indicated that clients ranked Vietjet's service quality better than Jetstar in general.

Applying the distance from ideal method that was mentioned in the theoretical framework, we can have better ideas of how far each airline was from ideal. If we consider the ideal airline is the one which was rated 5 for all the service dimensions by all respondents, we can calculate the distance of each company to that “ideal airline” (point 5). To illustrate the calculation in a simpler way, imagine those who stand at point 1 will be 4 steps away from the ideal, at point 2 will be 3 steps, point 3 will be 2 steps, and point 4 only 1 step. In this we assume equal distances between categories 1,2,3,4,5.

To put it in a general methodology (Hoang, Stoklasa and Talášek, 2018), let's now look at  $n$  evaluators who give their evaluation for an alternative  $A$  on  $m$  items of the questionnaire using discrete  $p$ -point Likert-type scales, we also collect the perceived importance of these criteria. The presentations of the notions above will be as followed :

- overall evaluation of the alternative  $A$ :  $e_A$
- overall evaluation of the alternative  $A$  with respect to the criterion  $C_k$ :  $e_A^{C_k}$ ,  $k=1, \dots, r$
- overall evaluation of the alternative  $A$  by the evaluator  $E_i$ :  $e_{A, E_i}$ ,  $i=1, \dots, n$
- evaluation of the alternative  $A$  by the evaluator  $E_i$  with respect to criterion  $C_k$ :  $e_{A, E_i}^{C_k}$ ,  $k=1, \dots, r$  and  $i=1, \dots, n$
- the importance of the criterion  $C_k$  as perceived by the evaluator  $E_i$ :  $w_{E_i}^{C_k}$ ,  $k=1, \dots, r$ ;  $i=1, \dots, n$

- the overall importance of the criterion  $C_k$ :  $w^{C_k}$ ,  $k=1, \dots, r$

In the paper on Fuzzified Likert scales in group multiple-criteria evaluation of Stoklasa, Talášek and Luukka (2018), a histogram of a set of evaluation  $EV = \{e_1, \dots, e_m\}$  all expressed on a p-point Likert-type scale, i.e.  $e_j \in \{1, \dots, p\}$  for all  $j = 1, \dots, m$  as a vector or an ordered p-tuple ( $H = [H_1(EV), \dots, H_p(EV)]$ ), where the values  $H_s(EV)$  can be defined for all  $s = 1, \dots, p$  in the following way:

$$H_s(EV) = \sum_{j=1}^m c_{js}, \text{ where } \begin{cases} 1 & \text{if } e_j = s \\ 0 & \text{otherwise.} \end{cases} \quad (1)$$

So with  $n$  evaluators,  $m$  items in the questionnaire and p-point discrete benefit-type Likert scales as  $EV_{IDEAL} = [0, 0, \dots, m, n]$  We can easily define distance to ideal using the earth-mover's distance (Rubner, Tomasi & Guibas, 1998):

$$d(e_A, e_{IDEAL}) = \sum_{s=1}^{p-1} (p-s)(H_s(EV) - H_s(EV_{IDEAL})) \quad (2)$$

Also note that, the distance from ideal presented in (2) is under the assumption that there is equidistance in the evaluation scales for each item.

The next step is to look at the way to compute ideal fulfillment. The general formula for this calculation will be:

$$\text{Ideal fulfillment} = 1 - (d(e_A, e_{IDEAL})/d_{max}) \quad (3)$$

In the above equation,  $d_{max}$  is the maximum possible distance between the worst alternative and the ideal alternative, dependent on the number of bins and the number of evaluations. In other words, the calculation will be:

$$d_{max} = (p-1)*n$$

From the data collected and the proposed calculation above, we come up with the results as the table 4 below. From the results we can see that there is slight superiority from customer satisfaction for Vietjet compared to Jetstar, however, the difference is not big. This was quite consistent with what had been analyzed before.

Table 4: Summary for distance of evaluation with regard to a given criteria from ideal criteria without weights (weights are considered uniform) for Vietjet and Jetstar

		<b>Distance from ideal</b>	<b>Ideal fulfillment</b>
Vietjet	Tangibility	919	50%
Jetstar		987	46%
Vietjet	Reliability	299	67%
Jetstar		334	63%
Vietjet	Responsiveness	334	62%
Jetstar		366	60%
Vietjet	Assurance	342	63%
Jetstar		372	59%

### 6.2.2 Dimensions measures with weights reflected

It might be useful to see how the customers perceive the importance of the criteria in market research. A research done by Hsu, Chuang and Chang (2000) pointed out that the users of the product consider different factors to be important in its evaluation. Full information on the perceived importance of the items or sets of items (criteria) can therefore provide interesting insights into the needs and expectations of the respondents of the survey. Again, histograms seem to be capable of conveying the necessary information. The design of the questionnaire incorporating the weights seems to be a realistic approach, it is quite certain that customers do not value all criteria with equal weights. And this is the case where the ideal of “only evaluations on items considered important by the evaluators should matter“ similar to the ideas of fuzzy ROC analysis suggested in Stoklasa and Talašová (2011). In other words, the perceived importance of the criteria will be considered here. Let us for now assume that we have  $m$  items,  $p$ -pointed scale,  $q$ -pointed importance scale on  $n$  evaluators, in other words all the evaluations  $e_{A,E_i}^j \in \{1, \dots, p\}$ . This can be understood as all the  $n$  evaluators provided their evaluations of a given alternative. We can define a 2-dimensional histogram  $H'(EV_{A, E_i}) = [H_1'(EV_{A, E_i}), \dots, H_p'(EV_{A, E_i})]$  as below:

$$H'_s (EV_A, E_i) = \left[ \sum_{j=1}^m i c_{js}^1, \dots, \sum_{j=1}^m i c_{js}^q \right]^T, \text{ where } i c_{js}^t = \begin{cases} 1 & \text{if } (e_{A,E_i}^j = s) \text{ and } (w_{E_i}^j = q) \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

where  $j = 1, \dots, m$  and  $s = 1, \dots, p$

And the overall evaluation histogram would be:

$$H'_s (EV_A) = \sum_{i=1}^n H'_s (EV_A, E_i) = \left[ \sum_{i=1}^n \sum_{j=1}^m i c_{js}^1, \dots, \sum_{i=1}^n \sum_{j=1}^m i c_{js}^q \right]^T \text{ where } s = 1, \dots, p$$

The reflection of perceived weights is usually done in the process of aggregation of evaluations into the overall evaluation using e.g. the weighted arithmetic mean or more complex aggregation operators. In our case the 2-dimensional histograms do not lose the information concerning the perceived importance of the given evaluation.

To approach to this step, all the ideas of fuzzy, distance from ideal and histogram were applied. First, we started by seeing for each rating of the criteria (from 1 to 5), the importance of that criterion will be rated at what score with individual respondent. The presentation of the table is illustrated in following two-dimensional histograms below.

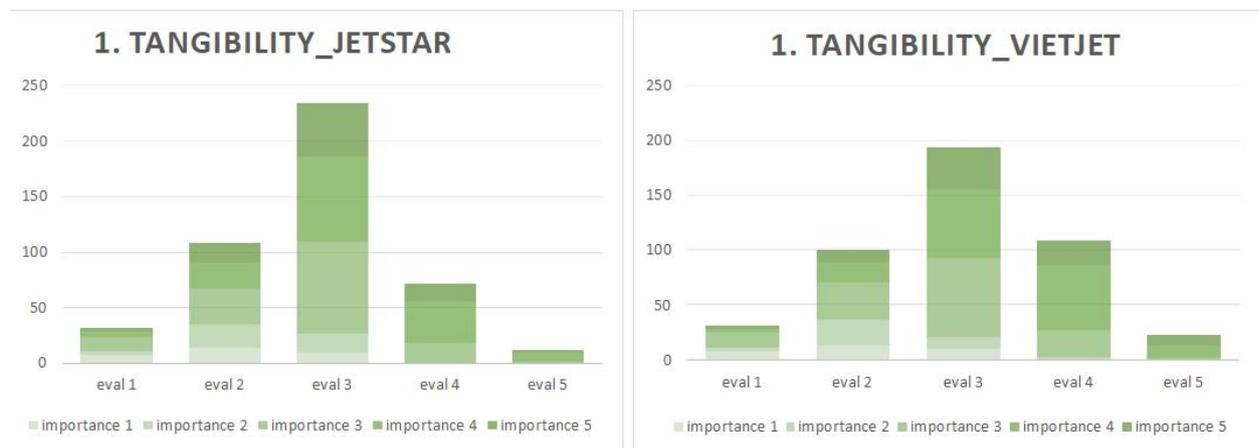


Figure 4.1: Tangibility assessment with weights reflected

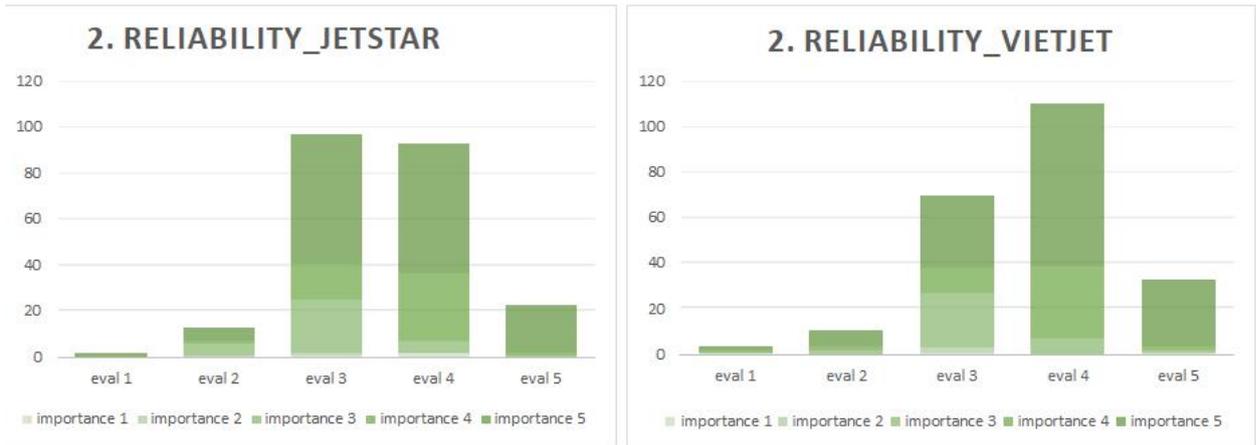


Figure 4.2: Reliability assessment with weights reflected

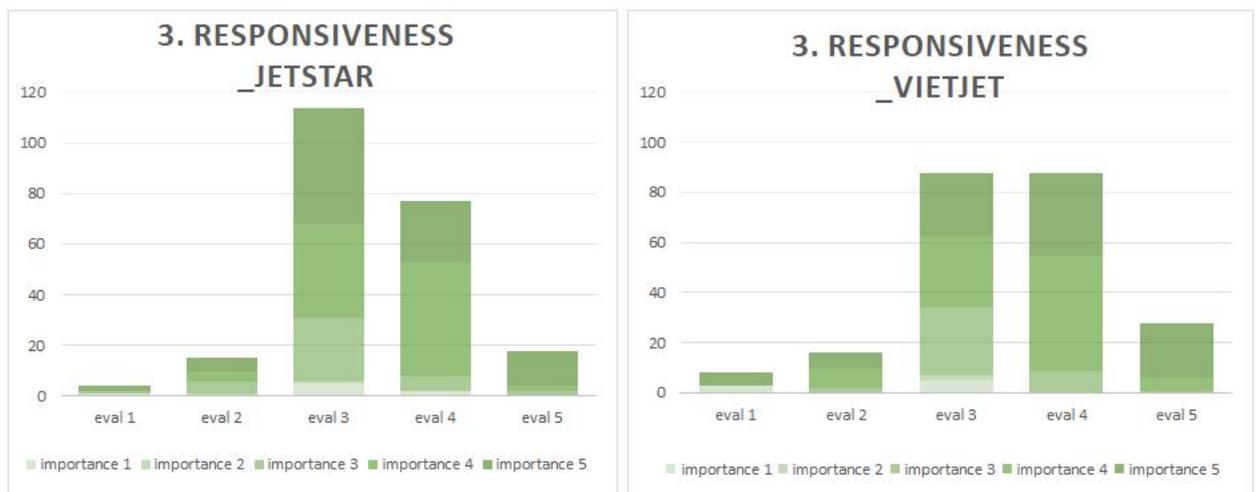


Figure 4.3: Responsiveness assessment with weights reflected

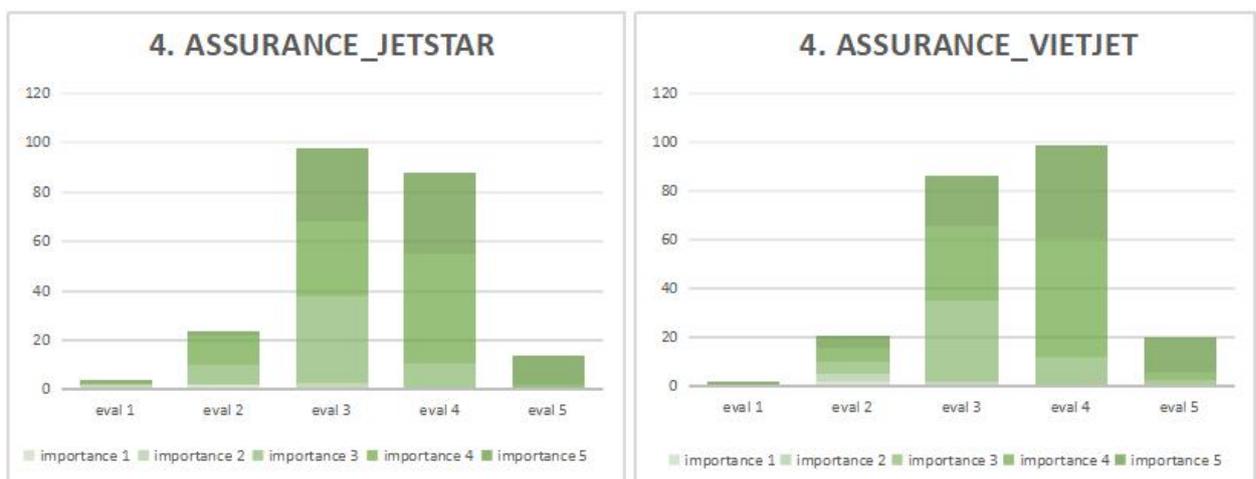


Figure 4.4: Assurance assessment with weights reflected

Since the questionnaire utilizes the 5-point rating scale, it is easy to understand that the middle option was the most chosen response.

The intensity of importance was colored from light to dark, the darker the color is, the more important the customers want to emphasize on that criteria. As visible from the chart 4.1, with Tangibility, customers do not consider them as important as the other three dimensions, their rate of 4 and 5 are quite low. At rating of 3, those who consider this as an essential criteria take up only 52% for both airlines, and this gets to 75% with rate 4. For Reliability, at satisfaction level of 3, Vietjet customers account for about 61% while Jetstar 74% for the importance rate, and these numbers got higher with satisfaction level of 4 and 5. Customers who appreciate the importance Responsiveness and Assurance are in the range from 60% to 100% (for rate from 3 to 5). Generally we can be confident to say that 4 dimensions chosen above are critical ones from customers' point of view. And to be more specific, Reliability, Responsiveness, Assurance are considered as somewhat more important than Tangibility. This information could be a good hint for marketing strategies in building development plan for the companies then they can serve customers better, improve their satisfaction and hence, its revenue. Using stacked histogram has been successful in translating lots of information in an easy way to understand.

Next step will be the application of distance from ideal and fuzziness. Since we want to incorporate the weights into final calculation for the airlines. We will define a fuzzy set of important answers on the set of evaluations by converting the importance rate range from [1; 5] into [0; 1] membership degrees. In this case of fuzzification, crisp Likert scales were considered. It should be emphasized that this reflection of the importance could be adjusted depending on the specific goal of the research. In this thesis, from my perspective as an analyst, I will go with the assumption that any rate below the middle point in the scale will have the same effect to respondents, so we assign them the point of 0.1, point 3 in the middle will have the degree of 0.5, the other above average (point 4 and 5) will have degree of 1.

The important answers as a fuzzy set is presented as  $\{\mu|_1, \mu|_2, \mu|_3, \mu|_4, \mu|_5\}$  or in our case

$\{0.1|_1, 0.1|_2, 0.5|_3, 1|_4, 1|_5\}$  and to put it in a general formula  $\{\mu|_1, \dots, \mu|_q\}$

Table 5: Importance reflection of needs of the analytic/ analysis buyer

Importance	1	2	3	4	5
Reflection of the needs of the analytic/ analysis buyer	0.1	0.1	0.5	1	1

Then this membership function will be multiplied with the number of choice in each range and the step (distance) to ideal will also be calculated in the similar way as the one without weights. The formula for this calculation will be formed as followed.

$$\begin{aligned} \Delta(H'(EV_A), H(EV_{IDEAL})) &= \sum_{s=1}^{p-1} (p-s) \left( \mu_1, \dots, \mu_q \right) \left[ \begin{array}{c} \sum_{i=1}^n \sum_{j=1}^m i c_{js}^1 \\ \dots \\ \sum_{i=1}^n \sum_{j=1}^m i c_{js}^q \end{array} \right] - H_s(EV_{IDEAL}) \\ &= \sum_{s=1}^{p-1} (p-s) \left[ (\mu_1, \dots, \mu_q) H'_s(EV_A) - H_s(EV_{IDEAL}) \right] \\ &= \sum_{s=1}^{p-1} (p-s) \left[ (\mu_1, \dots, \mu_q) H'_s(EV_A) \right] \end{aligned}$$

Where  $EV_{IDEAL}$  is defined as before,  $EV_{IDEAL} = [0, 0, \dots, m.n]$ .

With data as in table 6, distance from ideal and ideal fulfillment is computed following similar methodology as without weights case, this time we got weights reflected on the 5-bin scale.

For example, the one at satisfaction level of 1 will be the SUMPRODUCT of the membership function and the amount of choice at each membership function, together they will be times 4. So the distance from ideal will be the sum of results at satisfaction level in each point, calculation was done similar to the without weights. The table below is a sample of how this step will be done.

To apply the general formula in our case, the distance from ideal for Vietjet will be calculated as

$$\begin{aligned}
& 4*(8*0.1+3*0.1+14*0.5+3*1+3*1)+ \\
& 3*(13*0.1+24*0.1+34*0.5+17*1+12*1)+ \\
VJ_{\text{Distance from ideal}} = & 2*(10*0.1+11*0.1+72*0.5+62*1+38*1)+ \\
& 1*(0*0.1+3*0.1+24*0.5+59*1+23*1)+ \\
& = 576
\end{aligned}$$

$$VJ_{\text{Ideal fulfillment}} = 1 - ((31 + 100 + 193 + 109 + 23) / (4*576)) = 68.4\%$$

Table 6: Data for Tangibility with weights of criteria importance incorporated

Importance reflection	0.1	0.1	0.5	1	1	Sum of respondents
Criteria importance	1	2	3	4	5	
VJ1	8	3	14	3	3	31
JS1	7	4	12	5	3	31
VJ2	13	24	34	17	12	100
JS2	14	21	32	23	18	108
VJ3	10	11	72	62	38	193
JS3	10	16	83	77	48	234
VJ4	0	3	24	59	23	109
JS4	0	0	18	38	15	71
VJ5	0	0	2	11	10	23
JS5	0	0	1	9	2	12

The final results are presented in table from 7.1 to 7.4 as below.

Table 7.1: Distance from ideal and ideal fulfillment of Tangibility

<b>Tangibility</b>	Distance from ideal	Ideal fulfillment	Difference
Vietjet	576	68.4%	
Jetstar	642.1	64.8%	3.6%

Table 7.2: Distance from ideal and ideal fulfillment of Reliability

<b>Reliability</b>	Distance from ideal	Ideal fulfillment	Difference
Vietjet	259.5	71.5%	
Jetstar	292.9	67.9%	3.7%

Table 7.3: Distance from ideal and ideal fulfillment of Responsiveness

<b>Responsiveness</b>	Distance from ideal	Ideal fulfillment	Difference
Vietjet	286.1	68.6%	
Jetstar	309.6	66.1%	2.6%

Table 7.4: Distance from ideal and ideal fulfillment of Assurance

<b>Assurance</b>	Distance from ideal	Ideal fulfillment	Difference
Vietjet	274.8	69.9%	
Jetstar	301.1	67.0%	2.9%

As can be seen from the results, the difference between these two low cost carriers are not big, for all the dimensions, it fluctuates around 2-3%. However, it was quite consistent with the normal way when weights were not taken into consideration, Vietjet is slightly better than Jetstar. The similarity to the ideal airline is more than 50%.

Furthermore, in this section, we will look at weights histogram in more detail. Since the previous step already aggregated weights into calculation, this step will just look at weight dimensions separately to extract more useful information. In order to study about this, first we will sum all the subcategories into the big category and then normalized them. Below is the illustration that summarizes the calculated results. Tangibility was not as highly ranked as reliability, responsiveness and assurance. The figures shows that at rate 5, tangibility accounts for only around 19%, but reliability is around 60%, responsiveness is 40% and assurance 35%. Reliability seems to take the highest important among four. This relates to cabin safety procedure, accident rate and punctuality which is quite easy to make sense since recently news about airplane crashes, terrorists are all over the news. Furthermore, some airlines usually must deal with complaints of customers about flight delays. More safety measures and well-trained employees are advisable to give passengers greater confidence. In a nutshell, we can say that customers rank the importance of tangibility just around the middle range (3) while reliability, responsiveness and assurance were considered as more important, around 70% were in range for more than “medium important”. If we just look at the weights of criteria alone, the above assumptions seem to be correct. Tangibility was not considered to be very important compared to the other 3, among the rest, Reliability proves to take the most consideration from respondents.

Also another visible point from the graph is at rate 1 and 2, the percentage is really low, it is in the range from 0% to 5% which means that these dimensions chosen were all considered essential according to airline customers, except for tangibility whose weights are mostly at rate 3 and 4.

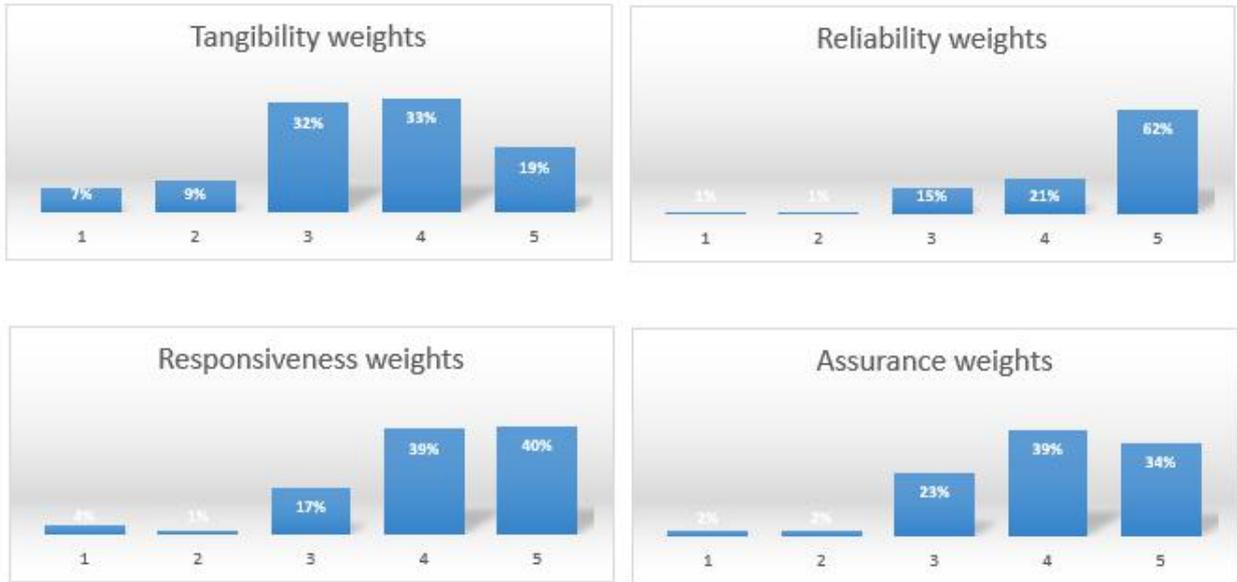


Figure 5: Histogram weights of four dimensions

### 6.2.3 Summary and comparison

In the questionnaire, there is one last question that asks for customer's opinions for general evaluation of the two airlines. Let's have a look at the results and compare with the methods above.

Table 8: Overall evaluation for the quality service of each airline

	Below average	Average	Above Average
Vietjet	6.14 %	45.61 %	48.25 %
Jetstar	7.02 %	69.30 %	23.68 %



Figure 6: Overall rates

Figure 6 is simply the sum of all the votes for each airline with three options: below average, average and above average. From the statistics above, we can see that at the average level, more votes go for Jetstar compared to Vietjet (69% vs 45%); however, for above average ranking, Vietjet with 48% is nearly double with Jetstar, which is only 24%. This result has proven that the proposed fuzzy Likert scale can provide a more accurate measurement result and also to get the accurate evaluation from customers. This overall check is quite consistent with the details results above. It should be noted that, customer ignorance or defection to the questionnaire is quite hazardous to the strategic management plan of marketers or leaders. The aggregation and visualization of data or questionnaire is extremely crucial in designing plans for airline firms.

## 7. DISCUSSION AND CONCLUSION

### 7.1 Conclusion and Recommendations

This paper helps to translate from raw data into small but actionable information. With a different way of aggregating information, we have obtained a lossless representation of evaluations by a group of respondents. Different views have been approached: measures dimensions with weights and without weights with the help of histogram weights and distance to ideal methodology. Furthermore, a final step (the last question of the questionnaire) to check the overall consistency of evaluators is also conducted. All of those have come to final concrete conclusion that even though on average, Jetstar seems to be a dominant one in terms of services performance, Vietjet on the other hand take a higher rank when consider above average services. And for companies to get to an “ideal airline service” there are still a lot of works to work on (these airlines have ideal fulfillment around 60% to 70%).

The novel approach of the method in this research has shown how important it is to find the right way to assess customer's evaluation on the quality of airline service and hence will add value to the brand name and spreading a positive word of mouth for the airline. Customers who are treated with good services will feel more emotional attachment with the company. Hence, it can be concluded that if the airline companies want to have long and rooted stand in the market, they need to keep on improving a more memorable customer services and keeping control over the service as close to the customer as possible.

The data collected and the findings can provide for the managers of these airline companies clearer ideas and insights in service designs from these detail customers' feedbacks. Board of directors need to invest effort in the core services that are rated importance by customers: reliability, responsiveness and assurance; tangibility should be put in the loop too. The analysis of the importance of those categories above did show that tangibility seems to ranked the lowest and reliability is considered to be the most important among the four. This is a useful find-out that board of management can take into consideration for their development plan. It also be noticed that responsiveness and assurance were considered as more important,

around 70% were in range for more than “medium important”. We will look in more detail of the ways to improve satisfactions level of customers when using airline services.

## § Tangibility

- Onboard catering: with this element, there are some changes that airline companies can consider such as putting more effort in meal preparation process, the price charged for meal should be in an affordable range, ordering device can be introduced. Sometimes, just the onboard dishes are not tasty or selected menu runs out of options, this can lead to bad impression to customers. Noticing on the details which can cause inconvenience for customers will help company to ensure customer satisfaction better level.
- Comfort and cleanness of seat: it is known that comfort and cleanness of seats were the important differentiators of airlines when it comes to airline services evaluation. This cannot be overlooked by business, they should make sure the carpet areas around seat legs which may attract a lot of debris which are normally overlooked while cleaning. Seat pockets could also be the places that contain rubbish from customers. The hygiene issue also needs to focus on the headrest cover, the place where next flight customers could find strands of hairs, stains, etc of the previous customers. Pillows and blankets should also be properly washed as well.
- Onboard entertainment: It seems that majority of airlines do not pay that much of attention on the design and ease of usability of onboard entertainment even it does leave a strong impression on customers if they experience these services. It is crucial that both Vietjet and Jetstar should diversify their in-flight entertainment programs with more updated films, relaxing music and games and also take good care of channels for kids. The navigation map is another thing that could be considered as it would create more interaction with flyers, in the design of the map, there could be some integration or similarity with the design of the airlines, from that improvement, the brand name will stay longer in customers' minds. Another option for innovating could be the use of internet while flying, it is getting more prevalent for some airlines in the world. Further than that, to get to a higher level in this technological era, it is potential for a consideration of using eye tracking technology to interact with the screens.

▫ Onboard reading material: this element in tangibility seemed to be ignored the most when it comes to on board service. However, there are still quite some options that airline companies can apply to improve the experience of airline users. They could install e-reader app into the screen in the back seat with many reading categories depending on the need of customers. It is a good way to get more knowledge. Also, airlines can promote the tourism for their country by putting travelling brochure, landscapes images of some hidden gems of the origin countries.

### § **Reliability**

▫ Cabin safety procedure and accident rate: this is one of the most important things in the aviation industry. showing strong focus around safety and operational procedure. Airlines should always be consistent with the global standards and regulation. Not only that, they should revise recommended practices and update best practice guidelines and these new practices will be updated and trained for cabin crew so they can address numerous policies and procedures in normal, abnormal and emergency situations. Risks level should be managed as low as possible, together with audit principles, hazard identification, risk mitigation should be well applied.

▫ Punctuality: being on time is one of the biggest problems of low cost airlines and that shouldn't be ignored when considering all strategies to improve for a better service. Policies should be in place to overcome flight delays. Customers' needs have to be resolved quickly or dealt with satisfactory when there is flight delay. Whenever flights cannot take off on time, customers need to be informed as soon as possible, flight schedules need to be updated regularly with specific and exact information to customers and resolve the requests and complaints of customers efficiently.

### § **Responsiveness**

▫ Courtesy and responsiveness of crew: having a courteous attitude should be a key goal of the service cultures for the employees. To do that, airlines should run employee training program so flight attendants will be more professional and friendly to customers. There are a lot of cases where airline staff can address problems and complaints on plane. Try to give the power to customers by using the best manners, listening to them carefully, smiling when they leave, making a memorable experience. To make it easier for management board on keeping

track of this, having a measurement of performance is necessary as well. Be more selective in the hiring process, hire employees with excellent skills in courtesy.

## § Assurance

- Efficiency of crew: to enhance the quality of this element, the management should have a very comprehensive dashboard for the crew planning quality, spot out productivity issues, discuss clear metrics with crew representatives, create a bonus system that rewards productivity, make sure of minimum rest after duty, regular medical check-up.
- Language skill of crew: this is one of the weakest points of flight attendants in these budget airlines and there are many ways to address this problem, the recruitment process should be stricter with this quality of candidate, or there should be ongoing training language program for personnel who have to deliver the service on board.

We suggest that making customers satisfied and establishing good relationships with them is a very crucial factor in maintaining efficient customer services which can lead to brand loyalty. Besides improving service quality, companies should care about price fairness as well since these two factors are the most essential in keeping a long term profitable relationship with customers. From the evaluation collected from customers, firms can choose the most suitable marketing strategy. To be more specific, this innovation of service quality is through a systematic, step by step process that encourages ability and willingness of employees to support quality service in all every area (Berry, Parasuraman and Zeithaml, 1988).

### a. Institutionalize and Symbolize quality

First, organizations need to define customer's expectation and come up with a benchmark against which performance can be evaluated. Those standards should be one of the most crucial to customers, and from the research above, these could be: reliability, responsiveness and assurance. And the personnel who perform these services need to understand wholeheartedly because they are the ones who provide the services directly hence take full responsibility for their work. However, this normally is a bigger concern to managerial personnel compared to low and intermediate level staff and to solve that issue, the organization can try to rotate quality-assurance-board which consists of both managerial and nonmanagerial staff. Once everyone is in charge, they will come up with more service

improvement ideas and it forces all to get involved continually about the service quality issues. And foremost, this helps symbolize the organization's commitment to quality service.

**b. Include Managers in Quality- Improvement Efforts**

This part will focus more on the how can operating-unit managers help in maintaining high-quality service over time. Most of the time, these high positions are filled with ones who possess great technical skills but not human-relations skills. Hence, to bring the service to the best quality, organizations can evaluate the commitment to service and interpersonal skills of these managers and filter those who cannot meet these requirements. Moreover, for service improvement program within in the business like whole training, performance measurement, incentives must have the presence of these managers.

**c. Consider knowledge and skills development as a process**

Employees' skill and willingness play an important role in the process of service enhancement and they should emphasize on upgrading knowledge and skills, as reliability and assurance are directly related to employees' competence. Furthermore, employees should consider this as a continual process during which they got a chance to always refresh, practice and learning more advanced skills. Also, this should be seen as a decentralized approach rather than centralized one which means employees can lead and participate in sessions to demonstrate these techniques and services or raise the existing issues, in this way, everyone is responsible for their own progress.

**d. Close the quality loop**

After the service standard has been set up, there should be an ongoing comparison with the standard ones and the excellent performance should be rewarded or substandard performance should be wiped out. From that completed loop, board of management can check the specific effects of policy and see if personnel changes are needed. This checking process can be extended beyond the organization itself, information from customer studies will provide a clear insight of what is happening. For example, the organization can ask employees some questions related to biggest problem while trying to deliver quality service or what would they recommend to change if they could to improve the quality service

**e. Invest in Problem Resolution**

The ability of the organization to find the solution when something wrong happens is also what customers care about. This skill in handling problems is a good way to build reputation as well as have strong impression on customers. However, to get this strategy work well, it requires a lot of effort and trying from organization. First is educating customers of what to do when problems occur and then training staff to be more talented and resilient. It is recommended that this should be considered as the core value for the business.

With all of the techniques mentioned above, managers should be able to ensure the growth for the company. They will attract new customers and keep good relationship with the old ones, motivate them to spend more and also recommend the products and services to other people. And these should be looked from the long term view point.

For the research specific case, aviation companies can also introduce loyalty schemes or the frequent flyer program towards customers who usually use their service. The effort to acquire new customers can be done through various marketing channels, for example travel exhibitions ITE HCMC, placing advertisement on popular magazines, social media, promotion for first time user, etc. Not only that, to expand the market share, Vietjet and Jetstar can execute some practical activities like reduce price during specific periods, offer some free domestic tickets for international long-haul flight. Even though price was excluded from research scope, strategies related to price should be considered as well. Price need to be consistent with the quality service, prices compared to competitors, price compared to expectations of customers. To develop such a reasonable and developed pricing policy, airlines companies should have differentiated prices suitable for different flight times, different times of the day. The diversified pricing policy should be suitable for each type of ticket, with each type of customers' goods, cost of luggage, cost of choice seats, cost of change dates, flight hours, change of departure place or passenger's names, refund policy, etc. Besides, these low cost carriers should try appropriate promotional policies, discounts, as well as better clients program to attract customers and meet the demands better than expected from customers.

## **7.2 Limitations**

Even though the data collected in this thesis is very original and helps lead to many interesting findings compared to public data, the research still encounters several limitations.

Due to the lack of time and human resources, the sample size was quite small to draw a general picture for this evaluation in the Vietnam market. The initial objective was to collect at least 100 samples from the questionnaires and the total collected in reality was just 114. Another thing that should be taken into consideration is the dimension covered in this thesis may not be able to cover all the service quality of an airline, other factors can be added like facilities, flight patterns. Each person will have their own definition of what is the main factor to make a good airline service. During the literature reviews it was easily seen that expectation for service should be identified and prioritized to incorporate them into improving service quality. But it should be acknowledged that the method used is brand new, not many researches or papers have done before and it works quite well.

### **7.3 Future research directions**

Future studies could make further research extension from current case in this paper. First, to enhance the generalizability of the research findings, future researchers can employ more diversified answers from responders from various background and genders to have a better evaluation. Nowadays, people define big data with 3Vs, volume, variety and velocity which is getting larger and more complex. The magnitude of data and the rapidity of its growing and spreading together with the diversity of available data is helping transform marketing decision making. Those are extracted from individual customer and it is leading to a new way of understanding customers' behaviors. In the era of big data nowadays, taking advantage of such extensive sources of data and translating them to potentially valuable information will help big corporates identify necessary actions to operate business in a better way (Erevelles, Fukawa and Swayne, 2016). There are many ways to extract these hidden information and the study of this paper is one example of that. Second, the measurement method developed in this study can be used to further investigate how customer perceived airline service quality affects purchasing behaviour, intention to buy back and loyalty. It is also suggested for further research that there could be more information to employ from respondents in the demographic presentations, we can infer more comprehensive information, such as: education level, purposes of traveling or how often do they use airline as means of transportation and from there, we can conclude or have better marketing strategies to suitable groups, what kinds of promotion to offer. And the research can be applied to more airlines, not only the ones in Vietnam but also the ones in Asia.

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# APPENDICES

## *Airline service evaluation*

### Giới tính (Gender)

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- Nam (Male)
- Nữ (Female)

### Độ tuổi (What is your age?)

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- 18-29
- 30-45
- 46-60
- Khác (Other)

### Thu nhập (What is income?)

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- Dưới 6 triệu VND (Below 6mil VND)
- Từ 6 đến 12 triệu VND (From 6 to 12 mil VND)
- Từ 12 đến 20 triệu VND (From 12 to 20 mil VND)
- Trên 20 triệu VND (Above 20 mil VND)

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Survey Powered By [Qualtrics](#)

Bạn hãy chỉ ra ý kiến của bạn vào những yếu tố sau đây để dẫn đến sự hài lòng và trung thành với 2 hãng hàng không giá rẻ ở Việt Nam.

Please state your opinions of the following elements to you which lead to your satisfaction and loyalty for these 2 budget airlines in Vietnam

Về việc xếp hạng cho Vietjet và Jestar, thang điểm từ 1 đến 5 được định nghĩa như sau:  
For the service ranking of Vietjet and Jestar, the scale from 1 to 5 is defined as below:

- Xấu\_Bad (1)
- Dưới trung bình\_Below Average (2)
- Trung bình\_Average (3)
- Tốt\_Good (4)
- Tuyệt vời\_Awesome (5)

Về việc xếp hạng cho tầm quan trọng của từng yếu tố, thang điểm từ 1 đến 5 được định nghĩa như sau:  
For the ranking of importance of that criteria, the scale from 1 to 5 is defined as below:

- Không quan trọng\_Not important (1)
  - Quan trọng\_Medium Important (3)
  - Rất quan trọng\_Very important (5)
-

Thức ăn đồ uống trên chuyến bay\_Tính hữu hình  
Onboard catering\_Tangibility

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Sự thoải mái và sạch sẽ của ghế ngồi\_Tính hữu hình  
Comfort and cleanness of seat\_Tangibility

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Phương tiện giải trí trên máy bay\_Tính hữu hình  
Onboard entertainment\_Tangibility

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Tài liệu đọc trên máy bay\_Tính hữu hình  
Onboard reading material\_Tangibility

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Thủ tục an toàn cabin\_Sự tin cậy  
Cabin safety procedure\_Reliability

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Tỉ lệ tai nạn\_Sự tin cậy  
Accident rate\_Reliability

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Lịch sự của phi hành đoàn\_Khả năng đáp ứng  
Courtesy of crew\_Responsiveness

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Khả năng đáp ứng của phi hành đoàn\_Khả năng đáp ứng  
Responsiveness of crew\_Responsiveness

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Hiệu quả của phi hành đoàn\_Sự đảm bảo  
Efficiency of crew\_Assurance

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Language skill of crew\_Assurance  
Khả năng ngôn ngữ của phi hành đoàn\_Sự đảm bảo

	1	2	3	4	5
Vietjet	<input type="radio"/>				
Jestar	<input type="radio"/>				
Bạn đánh giá tầm quan trọng của yếu tố này đến chất lượng của hãng bay như thế nào? How would you evaluate the importance of this criteria to airline service?	<input type="radio"/>				

Bạn đánh giá như thế nào về chất lượng tổng thể của từng hãng hàng không?  
How would you rank the overall quality of each of these airline services?

	Dưới trung bình (Below average)	Trung bình (Average)	Trên trung bình (Above average)
Vietjet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jestar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>