



UNIVERSITI PUTRA MALAYSIA

***AIRBNB CUSTOMERS' SERVICE QUALITY AND SATISFACTION WITH
BIG DATA APPROACH***

DING KAI

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By

DING KAI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

August 2021

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

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Chairman : Associate Professor Choo Wei Chong, PhD
Faculty : School of Business and Economics

A desire for sustainability, enjoyment of activities and financial gain, which has sparked a growing interest among researchers and businesses, drives the sharing economy phenomenon. The sharing economy enables people to sell services through reputable online platforms such as Uber or Airbnb. This research focuses on Airbnb, a peer-to-peer (P2P) internet platform provider that has become one of the most successful models in the sharing economy. Because of the unique lodging experience that Airbnb users pursue, understanding Airbnb users' perceptions of service quality and satisfaction by referring to the standards of traditional hotel customers can often be misleading. Therefore, more research is needed to explore Airbnb customers' experience. Online reviews serve as the data source for this research, which provides a representative sample of individual customers' personal and unique lodging experiences.

This research is divided into two parts, Study 1 and Study 2. The primary purpose of Study 1 is to explore the Airbnb service quality attributes that are essential to deliver an outstanding customer experience. A novel structural topic model (STM) is employed due to its advantage that enables us to incorporate covariates in the analysis. Study 1 employed STM to extract service quality attributes from 242,020 Airbnb reviews in Malaysia. This study complements the lack of Airbnb-related research in developing countries and improves our understanding of the Airbnb service quality attributes in Malaysia. A widely used modified SERVQUAL questionnaire (MSQ) is cross-validated in this study by mapping identified service quality attributes to five service quality dimensions of this questionnaire, which contributes to the further modification of this instrument to suit the Airbnb context. By employing the methodological advantage of STM, this study extends previous studies by examining the different preferences of Malaysian and international Airbnb users. The results reconfirm the impact of nationality on customer preferences. In this study, Airbnb users from Malaysia are found to pay more attention to the property attributes (e.g., appearance, decoration); international Airbnb users are found to care more about whether this property is suitable for group

accommodation, which could be associated with Airbnb users' preferences for group travel. In addition, this study further examines the changing patterns of identified service quality attributes during a five-year period. The findings reveal the different changing patterns of Airbnb users' perceptions of these attributes, notably, communication with the host and shopping are found to play an increasingly important role in Airbnb users' experiences. The extracted service quality attributes perceived by Airbnb users provide a detailed reference for Airbnb practitioners to develop marketing strategies, property recommendation systems, and customer service standards.

As for Study 2, it aims to investigate the drivers of satisfaction and dissatisfaction in the context of Airbnb accommodation, with a focus on Airbnb stay experiences.. The second study used LDA (Latent Dirichlet Allocation) and supervised LDA (sLDA) to achieve the study objectives, as these two topic models can effectively assist us in topic extraction and simultaneous analysis of quantitative data and topic distribution, respectively. A corpus that comprises 59,766 Airbnb reviews from 27,980 listings in 12 different cities is analyzed by using these two approaches. Unlike previous LDA based Airbnb studies, this study examines positive and negative Airbnb reviews separately. The results contribute to Airbnb literatures by revealing the heterogeneity of satisfaction and dissatisfaction attributes in Airbnb accommodation. In addition, the emergence of the topic "guest conflicts" in this study leads to a new direction in future sharing economy accommodation research, which is to study the interactions of different guests in a highly shared environment. The topic distribution analysis reveals the service attributes valued by users stay at different types of Airbnb properties, thus providing hosts operating different types of Airbnb properties with more targeted operational strategies to increase customer satisfaction. This study determines attributes that have the strongest predictive power to Airbnb users' satisfaction and dissatisfaction through the sLDA analysis, which provides valuable managerial insights into priority setting when developing strategies to increase Airbnb customer satisfaction.

Last, previous research highlighted the challenges of performing social media analysis, which is required to process an enormous amount of unstructured big data. Therefore, two studies in this thesis contribute to the development of the social media literature. Two user-generated content (UGC) analytical frameworks are developed for companies to use social media data in their service operation management. The detailed process of implementing these techniques is provided in this thesis and can serve as a useful reference for future research.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Falsafah Doktor

KEPUASAN DAN KUALITI SERVIS PERKHIDMATAN PELANGGAN AIRBNB MENGGUNAKAN KAEDAH 'BIGDATA'

Oleh

DING KAI

Ogos 2021

Pengerusi : Profesor Madya Choo Wei Chong, PhD
Fakulti : Sekolah Perniagaan dan Ekonomi

“Sharing economy” – ekonomi perkongsian adalah didorong letusan minat yang semakin meningkat dikalangan para penyelidik dan perniagaan yang tercetus dari keinginan untuk kemampunan, kepuasan sesuatu aktiviti dan pemerolehan kewangan. Ekonomi perkongsian membolehkan orang ramai menawarkan perkhidmatan melalui platform dalam talian yang mempunyai reputasi seperti Uber atau Airbnb. Penyelidikan ini bertumpu kepada Airbnb, pembekal platform internet rakan-ke-rakan (P2P) ataupun “Peer to peer” yang telah menjadi salah satu model yang paling berjaya dalam ekonomi perkongsian. Disebabkan kemahuan pengalaman unik Airbnb pengguna, memahami persepsi mereka (pengguna Airbnb) terhadap kualiti dan kepuasan perkhidmatan dengan merujuk kepada pelanggan hotel tradisional standard adalah sering mengelirukan.

Penyelidikan ini terbahagi kepada dua; Kajian 1 dan Kajian 2. Tujuan utama Kajian 1 adalah untuk menerokai ciri-ciri kualiti perkhidmatan Airbnb yang penting dalam memberikan pengalaman pelanggan yang cemerlang. Satu model yang baru “STM” – Model Topik Berstruktur digunakan berdasarkan kelebihanannya membolehkan gabungan kovarian dalam analisa yang dijalankan. Kajian 1 menggunakan STM untuk mengekstrak ciri-ciri kualiti perkhidmatan daripada 242,020 ulasan Airbnb di Malaysia. Penyelidikan ini melengkapkan kekurangan kajian berkaitan Airbnb di negara-negara membangun dan meningkatkan pemahaman kita tentang ciri-ciri kualiti perkhidmatan Airbnb di Malaysia. SERVQUAL (satu kaji selidik yang digunakan dengan meluas dan telah diubahsuai) telah diabsahkan menggunakan kaedah silang dalam kajian ini dengan memetakan ciri-ciri kualiti perkhidmatan yang dikenalpasti dalam kaji selidik ini kepada lima dimensi kualiti perkhidmatan, yang menyumbang kepada pengubahsuaian selanjutnya instrumen ini agar sesuai dengan konteks Airbnb. Dengan menggunakan kelebihan kaedah STM, penyelidikan ini memperluaskan lagi kajian terdahulu dengan mengkaji kepelbagaian kegemaran pilihan pengguna Airbnb Malaysia dan antarabangsa. Hasil kajian mengesahkan sekali lagi impak kerakyatan terhadap pilihan keutamaan pelanggan. Dalam kajian ini, pengguna Airbnb dari Malaysia didapati memberi

perhatian yang lebih kepada ciri-ciri sesebuah premis penginapan sebagai contoh; penampilan, hiasan. Pengguna Airbnb antarabangsa didapati mengambil berat sekiranya sesebuah tempat/premis penginapan itu sesuai untuk penginapan berkumpulan, yang boleh dihubungkan dengan pilihan pengguna Airbnb untuk perjalanan berkumpulan. Di samping itu, penyelidikan ini mendalami dengan lebih lanjut corak perubahan ciri-ciri kualiti perkhidmatan yang dikenal pasti dalam tempoh lima tahun. Dapatan kajian ini mendedahkan corak perubahan persepsi pengguna Airbnb yang berbeza terhadap ciri-ciri ini, terutamanya, komunikasi dengan hos/tuan rumah dan kemudahan membeli-belah didapati memainkan peranan yang semakin penting dalam pengalaman pengguna Airbnb. Juga didapati persepsi pengguna Airbnb memberi petunjuk bagi pengamal Airbnb untuk membangunkan strategi pemasaran, sistem pengesyoran premis penginapan, dan standard perkhidmatan pelanggan.

Manakala bagi Kajian 2, ia bertujuan untuk menyiasat faktor kepuasan dan sebaliknya dalam konteks penginapan Airbnb, dengan tumpuan terhadap pengalaman penginapan Airbnb. Kajian ini menggunakan LDA dan SLDA untuk mencapai objektif kajian, kerana kedua-dua model topik ini mampu membantu dengan efektif dalam pengekstrakan topik dan analisis serentak data kuantitatif dan pembahagian topik. Satu "corpus" – himpunan yang terdiri daripada 59,766 ulasan Airbnb daripada 27,980 penyenaian di 12 bandar yang berbeza dianalisa dengan menggunakan kedua-dua pendekatan ini. Tidak seperti kajian Airbnb sebelum ini yang berasaskan LDA, kajian ini mengkaji ulasan Airbnb positif dan negatif secara berasingan. Hasil kajian menyumbang terhadap ulasan sumber pustaka Airbnb dengan mendedahkan kepelbagaian kepuasan dan ketidakpuasan berkaitan penginapan Airbnb. Di samping itu, kemunculan topik "konflik tetamu" dalam kajian ini membawa kepada arah baru dalam penyelidikan penginapan perkongsian ekonomi masa depan, dalam mengkaji interaksi tetamu yang berbeza dalam persekitaran yang dikongsi. Analisis pembahagian topik mendedahkan ciri-ciri perkhidmatan yang dinilai oleh pengguna yang menduduki pelbagai jenis penginapan Airbnb; ini membolehkan hos/tuan rumah yang mengendalikan pelbagai jenis premis penginapan Airbnb mengenalpasti strategi operasi yang lebih bersasar bagi meningkatkan kepuasan pelanggan. Kajian ini menentukan ciri-ciri ramalan yang paling kuat sebagai petunjuk kepuasan dan ketidakpuasan pengguna Airbnb melalui analisis SLDA – seterusnya memberikan pandangan bernilai pengurusan dalam menetapkan keutamaan apabila membangunkan strategi untuk meningkatkan kepuasan pelanggan Airbnb.

Akhir sekali, penyelidikan sebelum ini mengetengahkan cabaran melakukan analisis media sosial, yang diperlukan untuk memproses sejumlah besar data besar yang tidak berstruktur. Oleh itu, dua kajian dalam tesis ini menyumbang kepada perkembangan sumber pustaka media sosial. Dua rangka kerja analisis kandungan-dijana-pengguna (UGC) dibangunkan bagi membolehkan syarikat perniagaan menggunakan data media sosial dalam pengurusan operasi perkhidmatan mereka.

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Choo Wei Chong, PhD

Associate Professor
School of Business and Economics
Universiti Putra Malaysia
(Chairman)

Serene Ng Siew Imm, PhD

Associate Professor
School of Business and Economics
Universiti Putra Malaysia
(Member)

Ng Keng Yap, PhD

Senior Lecturer
Faculty of Computer Science and Information Technology
Universiti Putra Malaysia
(Member)

ZALILAH MOHD SHARIFF, PhD

Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 09 December 2021

TABLE OF CONTENTS

| | Page |
|--|-------------|
| ABSTRACT | i |
| ABSTRAK | iii |
| ACKNOWLEDGEMENTS | v |
| APPROVAL | vi |
| DECLARATION | viii |
| LIST OF TABLES | xiii |
| LIST OF FIGURES | xiv |
| LIST OF ABBREVIATIONS | xvi |
| | |
| CHAPTER | |
| | |
| 1 INTRODUCTION | 1 |
| 1.1 Background of Study | 1 |
| 1.1.1 Big Data in Business Research | 1 |
| 1.1.2 Sharing Economy and Airbnb | 3 |
| 1.2 Problem Statement | 6 |
| 1.3 Research Questions | 10 |
| 1.3.1 Study 1 | 10 |
| 1.3.2 Study 2 | 11 |
| 1.4 Research Objectives | 11 |
| 1.4.1 Objectives of Study 1 | 11 |
| 1.4.2 Objectives of Study 2 | 11 |
| 1.5 Significance of Research | 12 |
| 1.5.1 Theoretical Significance | 12 |
| 1.5.2 Practical Significance | 13 |
| 1.6 Scope of the Study | 13 |
| 1.7 Definition of Terms | 14 |
| 1.8 Organization of Thesis | 14 |
| | |
| 2 LITERATURE REVIEW | 16 |
| 2.1 Introduction | 16 |
| 2.2 Introduction of Big Data | 16 |
| 2.2.1 Big Data and Strategic Decision-making | 17 |
| 2.2.2 Big Data Analytics | 19 |
| 2.2.3 Unstructured Big Data | 20 |
| 2.2.4 Text Mining | 21 |
| 2.2.5 Word Frequency Analysis | 22 |
| 2.2.6 Topic Modeling | 23 |
| 2.2.7 Latent Dirichlet Allocation | 23 |
| 2.2.8 Structural Topic Model | 25 |
| 2.2.9 Sentiment Analysis | 27 |
| 2.3 Quality Management | 31 |
| 2.3.1 Service Quality | 32 |
| 2.3.2 Service Quality Measurement | 33 |
| 2.3.3 SERVQUAL and its Application | 34 |

| | | | |
|----------|-------|---|------------|
| | 2.3.4 | User-generated Contents | 36 |
| | 2.3.5 | Review Helpfulness | 39 |
| | 2.3.6 | Customer Reviews and Service Quality | 40 |
| 2.4 | | Sharing Economy | 42 |
| | 2.4.1 | Review of Airbnb related Studies | 44 |
| | 2.4.2 | Airbnb Service Quality | 46 |
| 2.5 | | Nationality and Customer Preferences | 50 |
| 2.6 | | Capturing Customers' Changing Preferences | 52 |
| 2.7 | | Customer Satisfaction | 54 |
| | 2.7.1 | Airbnb Satisfaction Attributes | 56 |
| 2.8 | | Sentiment Analysis in Customer Satisfaction Research | 58 |
| 2.9 | | Topic Modeling in Consumer Research | 59 |
| 2.10 | | Research Gaps in the Literature | 61 |
| 2.11 | | Summary of Chapter 2 | 64 |
| 3 | | RESEARCH METHODOLOGY | 65 |
| | 3.1 | Introduction | 65 |
| | 3.2 | Research Design | 65 |
| | 3.3 | Overall Research Procedures | 66 |
| | 3.3.1 | Data Collection | 67 |
| | 3.3.2 | Data Preprocessing | 67 |
| | 3.3.3 | Data Analysis | 68 |
| | 3.4 | Summary of Chapter 3 | 69 |
| 4 | | EMPLOYING STRUCTURAL TOPIC MODELING TO EXPLORE PERCEIVED SERVICE QUALITY ATTRIBUTES IN AIRBNB ACCOMMODATION | 70 |
| | 4.1 | Introduction | 70 |
| | 4.2 | Research Methodology | 72 |
| | 4.2.1 | The Application of STM in Study 1 | 72 |
| | 4.2.2 | Data Collection | 73 |
| | 4.2.3 | Text Preprocessing | 75 |
| | 4.2.4 | Covariates Setup | 75 |
| | 4.2.5 | Topic Number Estimation | 76 |
| | 4.3 | Findings | 78 |
| | 4.3.1 | Topic Summary and Labeling | 78 |
| | 4.3.2 | Topic Mapping and Analysis | 82 |
| | 4.3.3 | Topic Correlation Analysis | 86 |
| | 4.3.4 | Topic Trend Analysis | 88 |
| | 4.3.5 | Customer Preference Analysis (Malaysia vs International) | 91 |
| | 4.3.6 | Critical Incident Analysis on Each Topic | 92 |
| | 4.4 | Summary of Chapter 4 | 122 |
| 5 | | EXPLORING SOURCES OF SATISFACTION AND DISSATISFACTION IN AIRBNB ACCOMMODATION USING UNSUPERVISED AND SUPERVISED TOPIC MODELING | 123 |
| | 5.1 | Introduction | 123 |
| | 5.2 | Research Methodology | 125 |
| | 5.2.1 | Research Design Framework | 125 |

| | | |
|----------|---|------------|
| 5.2.2 | LDA and sLDA Method | 126 |
| 5.2.3 | Data Collection | 128 |
| 5.2.4 | Data Preprocessing | 128 |
| 5.2.5 | Sentiment Analysis | 129 |
| 5.3 | Results | 129 |
| 5.3.1 | Topic Number Identification | 131 |
| 5.3.2 | Topic Extraction and Labeling | 132 |
| 5.3.3 | Comparative Topic Analysis | 138 |
| 5.3.4 | Topic Correlation Analysis | 141 |
| 5.3.5 | Topic Distribution Analysis | 143 |
| 5.3.6 | sLDA Analysis | 147 |
| 5.4 | Summary of Chapter 5 | 152 |
| 6 | DISCUSSION AND CONCLUSION | 153 |
| 6.1 | Introduction | 153 |
| 6.2 | Research Summary | 153 |
| 6.3 | Discussion of Findings | 154 |
| 6.3.1 | Discussion of Research Objective 1 (Study 1) | 154 |
| 6.3.2 | Discussion of Research Objective 2 (Study 1) | 155 |
| 6.3.3 | Discussion of Research Objective 3 (Study 1) | 156 |
| 6.3.4 | Discussion of Research Objective 4 (Study 1) | 156 |
| 6.3.5 | Discussion of Research Objective 1 (Study 2) | 157 |
| 6.3.6 | Discussion of Research Objective 2 (Study 2) | 158 |
| 6.3.7 | Discussion of Research Objective 3 (Study2) | 158 |
| 6.4 | Research Implications | 158 |
| 6.4.1 | Theoretical Implications (Study 1) | 158 |
| 6.4.2 | Practical Implications (Study 1) | 160 |
| 6.4.3 | Theoretical Implications (Study 2) | 162 |
| 6.4.4 | Practical Implications (Study 2) | 164 |
| 6.5 | Limitation and Recommendation for Future Research | 166 |
| 6.6 | Conclusion | 167 |
| | REFERENCES | 168 |
| | APPENDICES | 196 |
| | BIODATA OF STUDENT | 204 |
| | LIST OF PUBLICATIONS | 205 |

LIST OF TABLES

| Table | | Page |
|--------------|--|-------------|
| 2.1 | Summary of Common Attributes of Big Data | 17 |
| 2.2 | Types of BDA | 20 |
| 2.3 | Summarization Table of Text-mining Techniques | 31 |
| 2.4 | A Summary of Findings of Previous Airbnb-related Research | 48 |
| 2.5 | A Summary of Airbnb Satisfaction Attributes | 56 |
| 4.1 | Summary Statistics of Top Ten Country of Origin of Airbnb User Reviews in Malaysia | 74 |
| 4.2 | The Representative Review of Each Topic | 79 |
| 4.3 | Topic Summary and Labeling | 81 |
| 4.4 | Mapping of Identified Topics to MSQ | 83 |
| 5.1 | Descriptive Statistics of Review Samples | 130 |
| 5.2 | Top Topic Words (Positive Reviews) | 134 |
| 5.3 | Top Topic Words (Negative Reviews) | 135 |
| 5.4 | Topic Label | 136 |
| 5.5 | Topic Classification | 139 |
| 5.6 | ANOVA Test for Topic Distribution in Different types of Properties | 144 |
| 5.7 | sLDA Topic Summary | 149 |
| 5.8 | sLDA Statistical Summary | 151 |

LIST OF FIGURES

| Figure | | Page |
|--------|--|------|
| 2.1 | Latent Dirichlet Allocation Model, in Plate Notation (Blei, 2003) | 24 |
| 2.2 | Structural Topic Modeling, in Plate Notation (by Roberts et al., 2013) | 26 |
| 2.3 | Taxonomy of Sentiment Analysis (Liu, 2012) | 28 |
| 4.1 | Analytic Framework | 72 |
| 4.2 | Monthly Review Frequency | 74 |
| 4.3 | Semantic Coherence and Exclusivity of Selective Topic Model Solutions | 77 |
| 4.4 | Estimated Topics Correlation Map | 87 |
| 4.5 | Changing Estimated Topic Proportion Over Time (Topic 1-6) | 88 |
| 4.6 | Changing Estimated Topic Proportion Over Time (Topic 7-12) | 89 |
| 4.7 | Changing Estimated Topic Proportion Over Time (Topic 13-18) | 89 |
| 4.8 | Changing Estimated Topic Proportion Over Time (Topic 19-22) | 90 |
| 4.9 | Topic Proportion Comparison (Malaysian vs. International) | 91 |
| 4.10 | Text Network (Topic 1) | 94 |
| 4.11 | Text Network (Topic 2) | 96 |
| 4.12 | Text Network (Topic 3) | 97 |
| 4.13 | Text Network (Topic 4) | 98 |
| 4.14 | Text Network (Topic 5) | 100 |
| 4.15 | Text Network (Topic 6) | 101 |
| 4.16 | Text Network (Topic 7) | 102 |
| 4.17 | Text Network (Topic 8) | 103 |
| 4.18 | Text Network (Topic 9) | 105 |
| 4.19 | Text Network (Topic 10) | 106 |
| 4.20 | Text Network (Topic 11) | 107 |

| | | |
|------|---|-----|
| 4.21 | Text Network (Topic 12) | 108 |
| 4.22 | Text Network (Topic 13) | 109 |
| 4.23 | Text Network (Topic 14) | 111 |
| 4.24 | Text Network (Topic 15) | 112 |
| 4.25 | Text Network (Topic 16) | 113 |
| 4.26 | Text Network (Topic 17) | 115 |
| 4.27 | Text Network (Topic 18) | 116 |
| 4.28 | Text Network (Topic 19) | 117 |
| 4.29 | Text Network (Topic 20) | 119 |
| 4.30 | Text Network (Topic 21) | 120 |
| 4.31 | Text Network (Topic 22) | 122 |
| 5.1 | Research Framework | 126 |
| 5.2 | Graphical Model Representation of LDA (Blei et al., 2003) | 127 |
| 5.3 | Graphical Model Representation of sLDA (Blei and McAuliffe, 2007) | 127 |
| 5.4 | Comparison of Frequent Terms in Positive and Negative Reviews | 131 |
| 5.5 | Topic Solution Metrics (Positive Reviews) | 132 |
| 5.6 | Topic Solution Metrics (Negative Reviews) | 133 |
| 5.7 | Topic-specific Word Probabilities (Positive Reviews) | 137 |
| 5.8 | Topic-specific Word Probabilities (Negative Reviews) | 137 |
| 5.9 | LDavis Visualization (Positive Reviews) | 142 |
| 5.10 | LDavis Visualization (Negative Reviews) | 142 |
| 5.11 | Topic Distributions in Different Airbnb Properties (Positive Reviews) | 146 |
| 5.12 | Topic Distributions in Different Airbnb Properties (Negative Reviews) | 147 |
| 5.13 | Perplexity Scores of Different Topic Solutions | 148 |
| 5.14 | sLDA Visualization | 152 |

LIST OF ABBREVIATIONS

| | |
|------|--|
| BDA | Big Data Analytics |
| B2B | Business-to-Business |
| CX | Customer Experience |
| CXM | Customer Experience Management |
| C2C | Customer-to-Customer |
| DTM | Dynamic Topic Modeling |
| eWOM | Electronic Word of Mouth |
| LDA | Latent Dirichlet Allocation |
| sLDA | Supervised Latent Dirichlet Allocation |
| MSQ | Modified SERVQUAL Questionnaire |
| NLP | Natural Language Processing |
| P2P | Peer-to-Peer |
| STM | Structural Topic Model |
| TQM | Total Quality Management |
| UGC | User-generated Contents |

CHAPTER 1

INTRODUCTION

1.1 Background of Study

1.1.1 Big Data in Business Research

With the development of information technology, big data has been playing an increasingly important role in the business world. The primary goal of using big data for companies is to translate data into business advantages, which can be achieved by uncovering the trends and patterns of collected data with various types of big data analytics (BDA) (Choi et al., 2020; George et al., 2014). Big data also can be integrated into the strategic decision-making process, which contributes to a better understanding of customers, products, and services (Bertei et al., 2015; Chittiprolu et al., 2021; Kim et al., 2020b). Both scholars and practitioners regard big data as an opportunity for companies to create meaningful insights for better strategic decision-making, thus gaining competitive advantages (Demirkan and Delen, 2013; Lee, 2017; Morabito, 2015). One statistic shows that companies that use data-driven decision making in the top third of their industry are, on average, 5% more productive and 6% more profitable than their competitors (McAfee, 2012).

Three distinctive attributes of big data include volume, velocity, and variety (McAfee and Brynjolfsson, 2012). Volume is regarded as the major attribute of big data, and the large volume of data results in the challenge of using traditional methods to analyze big data, leading to the need for more advanced analytics. However, from the perspective of generating valuable insights, the volume of big data can provide more robust and valid results. Velocity refers to that we can acquire relevant information in real time or process the data rapidly, which can help companies speed up the decision-making process (Davenport et al., 2012). Variety refers to the various types of big data, which contributes to the increase in data volume. Broadly, big data can be classified as structured and unstructured data. Structured data are regarded as data with a fixed coding meaning and format (e.g., numbers), usually stored in database fields. In contrast, unstructured data has no fixed format, mainly created from human interaction (Kopenhagen et al., 2011; Sivarajah et al., 2017). In addition, structured data can be directly processed by computers. However, the processing of unstructured data requires extra prior transformations, such as data filtering, data pre-processing, data normalization. Examples of structured data include purchase order data, customer ratings, customer ID and spending amount. Examples of unstructured data include customer reviews, social networks, phone calls, and transcripts (Intezari and Gressel, 2017).

As for BDA, the major goal of BDA is to generate novel insights to supplement and complement conventional research data source such as surveys, statistics, and archival data (Davenport et al., 2012). The increasing application of BDA to business intelligence

contributes to obtaining a better understanding of market characteristics, consumer behavior, products, etc. (Wixom et al., 2014; Cohen, 2018; Xu et al., 2017). In addition, many strategies are based on business intelligence and marketing intelligence, which make it possible to extract useful knowledge and insights from the vast amounts of data generated by customers in a digital environment (McAfee and Brynjolfsson, 2012; Saura, 2020). Especially for customer experience management (CXM), BDA can help companies to enhance CXM by assisting those companies in gaining a better and faster understanding of the customer consumption experience (Brochado et al., 2017; Joseph and Varghese, 2019; Wedel and Kannan, 2016). CXM is defined as a high-level cultural mind-set resource for customer experience (CX). The design of CX's strategic direction, and the continuous improvement of CX's organizational capabilities with the goal of achieving and maintaining long-term customer loyalty (Homburg et al., 2017). For CX, although there is no uniform definition of CX, in this thesis, CX is defined as the customer's response to interact with the organization before, during, and after purchase or consumption, across multiple channels and across time (Morgan and Teerling, 2018). More specifically, in the lodging industry, CX comes primarily from food, beverages, accommodations, and entertainment, but also from numerous support functions and processes such as online and offline interactions, website user-friendliness, in-room entertainment, facility design, and interactions with service providers and other guests (Kaanapali et al., 2018). Customers tend to buy relevant products with companies that deliver a quality CX (Bolton et al., 2018; Lemon and Verhoef, 2016; Ngo et al., 2020). CX has become a key strategic objective for many organizations (Berezina et al., 2016; Brodie et al., 2011; Chen et al., 2018; Johnston and Kong, 2011). In recent years, technologies have evolved, such as social media (Kietzmann et al., 2011), has been enhancing organizations' ability to understand and translate CX (Bolton et al., 2018; Breidbach et al., 2018; Van Doorn et al., 2017; Xu et al., 2020). Traditionally, a customer's experience with a brand, product or service has been largely confined to a closed sphere, that is, shared only with the company; however, with the rise of social media and online review sites, these experiences have been pushed to the forefront. This is reflected in the fact that customers can access and share their consumption experience online at any time and from any location, while remaining anonymous. This publicly available information can be valuable to prospective customers who want to learn about the experiences of others. But it can pose a certain risk to providers of service offerings, as dissatisfied customers may exaggerate or misrepresent their experience with an organization, thereby damaging the reputation of the focused company (Xu, 2020a). Therefore, it is recommended that organizations monitor and keep track of how customers describe their experience, such as online customer reviews.

As for different types of CX data, online customer reviews are regarded to be a good proxy for communicating CX by word-of-mouth (Sutherland and Kiatkawsin, 2020; Wang et al., 2018; Xiang et al., 2015; Zhu and Zhang, 2010). Online reviews reflect how customers interpret and share their experiences in various forms, which is a valuable way to discover what customers expect while helping to develop relevant strategies to meet their needs. Online customer reviews have been widely used in academic research as an important source of data for CX. For many service-based industries, service is an integral part of CX, and therefore many studies have been conducted to assess customers' perceptions of service quality (Johnson et al., 2009; Shah et al., 2020; Tiwari et al., 2019; Zheng et al., 2015). In addition, customer review data is an important learning tool that can help service providers understand their problems and identify areas for improvement

(Li et al., 2013; Melián-González et al., 2013), and analyzing online reviews is an effective way to understand customer needs and identify key attributes of customer satisfaction. This concept is also practiced in studies analyzing CX data, where researchers look at online reviews that can describe customers' past consumption experiences in order to identify the main factors that may trigger customer satisfaction and dissatisfaction. Hence, the incorporation of BDA is conducive to the implementation of customer-centered management, thus enhancing customers' consumption experience (Lemon and Verhoef, 2016).

To analyze large volumes of unstructured customer review data that represent the customer's past consumption experience, text mining as part of BDA has been developed. Text mining refers to the knowledge discovery from textual databases or text data mining. It is implemented by extracting significant and meaningful knowledge or patterns from unstructured text data (Hung and Zhang, 2012). According to Aggarwal and Zhai (2012), text mining is defined as the analysis of data in the form of natural-language texts. In addition, text mining is also considered as an extension of data mining (Chau et al., 2007). In this thesis, text mining serves as the major technique used to extract meaningful information from unstructured big data.

1.1.2 Sharing Economy and Airbnb

In recent years, people's attitudes towards consumption have changed and aroused growing concern over economic, societal, and developmental impact (Hedberg, 2013). One of the alternatives has become increasingly appealing among consumers, which is the so-called sharing economy. The sharing economy has recently emerged as a major global phenomenon in practice and is consequently an important research topic (Daniel Schlagwein, 2019). The sharing economy is defined as a new economic model based on the participation of third parties and the temporary transfer of the right to use goods for the purpose of receiving a certain amount of remuneration (Frenken and Schor, 2019). The essence is to integrate and share offline goods, labor, education and medical resources, which can be unused or newly created. "Sharing" is the act of an individual sharing something with others for use, possession, or enjoyment. In other words, a sharing economy is one in which people enjoy social resources equitably, each paying and benefiting in different ways, and exploiting synergies to reap economic dividends together. This kind of sharing is more often realized through the Internet as a medium. The term sharing economy was first introduced by Felson (1978), a professor of sociology at Texas State University and Joan Spence. Its main feature is the inclusion of an information technology-based marketplace created by a third party. This third party can be a commercial institution, an organization, or a government. Individuals use these platforms to exchange various goods, to share their knowledge and experience, or to raise funds for an enterprise or an innovative project. The sharing economy involves the demand side of goods or services, the supply side, and the sharing economy platform. As a link between the supply and demand sides, the sharing economy platform enables the supply and demand sides to trade through the sharing economy platform by establishing a series of mechanisms such as dynamic algorithm, pricing, and a mutual evaluation system.

The newly emerged P2P business model has sparked off an intensive debate over its ability to either promote or pose a threat to the conventional economies. For example, Uber as the flagship sharing economy platform has resulted in significant changes in the demand for transportation, where the traditional taxi industry has encountered a major competitive challenge, the diffusion of Uber has also cut down the earnings potential of incumbent drivers in the traditional taxi services in the United States (Berger et al., 2018). However, on the positive side, Uber has created more job opportunities than it has destroyed (Forbes, 2019), illustrated by the dramatic expansion of self-employment accompanying its introduction. Besides modern transportation industry, the sharing economy also thrives in other industries.

In the accommodation sector, the sharing economy has been developing at a significant rate. Currently, Airbnb is the leading sharing economy platform in the short-term rental market. Liu and Matilla (2017) mention that Airbnb is the most successful P2P model for the hospitality industry. Airbnb was founded in 2008, which has experienced a significant growth since 2014. Airbnb provides access to over 5 million unique places to stay in across 81,000 cities and 191 countries (Airbnb, 2017). One of the Airbnb's key success factors is that it offers a cost-effective solution to solve a problem which is frequently faced by many young travelers: finding suitable, affordable accommodation to visitors in a city. Furthermore, Airbnb tends to satisfy sharing economy travelers' needs of pursuing the feeling of "living like a local" for a short period during their travels (Guttentag, 2016). According to Gallagher (2017), Airbnb is estimated to make a profit of \$3.5 billion per year on \$8.5 billion in revenues by 2020, predicting 3400% profit growth. Forbes (2019) also shows that Airbnb as a rarely profitable unicorn to be worth at least \$38 billion. Li and Kim (2018) state that Airbnb is one of the most popular examples of a thriving sharing economy, and much existing research has been conducted to uncover its impact on the hospitality industry, housing affordability, and the stability of society.

There are various types of sharing economy based platforms in the market. For this thesis, the focus is on Airbnb. Airbnb is the representative of the online rental P2P lodging service within the sharing economy concept, and it is a well-known online platform which allows individuals to rent their personal accommodations to others on a short-terms basis (Ert et al., 2016). Many hosts can rent their private accommodations via Airbnb at a comparatively cheaper price than conventional hotels (Permalink, 2013). Hence, to a certain degree, Airbnb provides a win-win situation for both Airbnb hosts and users. The main reason why Airbnb can attract large number of users in such a short period is by providing them with authentic experience, which is based on three factors, namely the accommodation, the economic benefits and the idealistic motives (Oskam and Boswijk, 2016). However, as one of most successful sharing economy business models, Airbnb still faces some challenges from the government, due to its disruptive impact on many aspects of the society. Moreover, Airbnb may have other negative consequences in a community, such as reducing housing stock and hurting the community fabric (Guttentag, 2015). Edelman and Geradin (2015) found that Airbnb represents a danger to the affordability and safety of the local residence, and it was also responsible for the issue of housing shortage and replacing long-term tenants. On the positive side, Tussyadiah and Pesonen (2016) found that Airbnb can contribute to the

economic development of a local community by attracting more tourists and generating rental income. Airbnb as an unprecedented business model, which has significantly changed tourists' travel behavior. The major differences can be found between travelers who choose Airbnb accommodations, and traditional hotels are the length of stay and local spending. Fang and Law (2015) evaluated the effect of the sharing economy on the tourism industry and claimed that the former generated new jobs as more tourists arrived due to lower accommodation costs. It is important to acknowledge that a P2P business model in the hospitality industry has brought diverse benefits to travelers such as authentic experiences and social interactions with the locals (Guttentag et al., 2018).

Airbnb is similar in function to global budget hotel chains because it is a platform for short-stay places at affordable prices, but Airbnb has the disadvantage that hosts are not licensed to operate hotels, so travelers perceive a higher overall risk than budget hotels. However, Airbnb's competitive advantages are also clear. Travelers choosing Airbnb can be summarized as follows:

- 1) Most Airbnb listings are inexpensive, and since most are private residences, they are significantly cheaper than the average budget hotel (Xie and Kwok, 2017).
- 2) Airbnb offers a different kind of accommodation experience, as travelers can rent a local residence, a castle, or even a palace (Airbnb, 2017).
- 3) With nearly 34,000 cities in 190 countries, Airbnb users have a wide range of properties to choose from, so travelers can find a suitable and inexpensive place to stay in a popular tourist city during a popular travel season, even if they are not able to plan ahead (Airbnb, 2017).

Regarding accommodation options, Airbnb has different accommodation options. The first type of accommodation is called an "entire room". By stay at this type of room, guests do not have to share living space, common areas, or bathrooms with other guests. Guests who book this type of accommodation pay more attention to privacy, although these customers can still have a shared outdoor space. The other type of room is "private property", which means that the guest can live in the same house as others, but with his or her own bedroom. The third type is "shared property". This type of property is aimed at financially constrained travelers who have the option of sharing a room. This means that some clients can sleep in a room with two or three beds for other travelers. The last type of Airbnb property is "hotel room" which refers to those listings inside hotels.

As for Airbnb in Malaysia, it experienced rapid growth since 2008. In 2008, the number of Airbnb guest arrivals in Malaysia increased dramatically from 1.5 million in 2017 to over 2 million (NST Business, 2018). In addition, Airbnb is strongly supported by the Malaysian government for its positive impact on tourism growth and development of local real estate market (Tan, 2018). Moreover, Airbnb established partnership with Malaysia Digital Economy Corporation and the Malaysia Productivity Corporation in 2018 to promote Malaysian tourism's inclusive, sustainable development (Tan, 2018). Even though Airbnb is embracing great opportunities for its expansion in the Malaysian short-term lodging market, during the Ph.D. candidature of the author, limited research

has been conducted to investigate Airbnb, especially regarding the service quality attributes perceived by users in Malaysia. As maintaining a high level of service quality is essential to the sustainable development of a business (Min et al., 2002), hence, this research intends to fill this gap by examining the service quality of Airbnb in Malaysia, which can contribute to the future development of P2P accommodation business in Malaysia. As for Airbnb research in Malaysia, Razli (2017) conducted the first study related to Airbnb in Malaysia. This study provides an overview of the Airbnb business in Malaysia from different perspectives. First, this study highlights the late start but fast growth of Airbnb business in Malaysia, especially in 2013, Airbnb has grown 500% this year. This study also reflects the Malaysian government's support for Airbnb's business. This is mainly reflected in the fact that the Malaysian government has encouraged visitors to Malaysia to book Airbnb accommodation at major events, such as Visit Malaysia Year 2014. Razli (2017) highlighted the current lack of Airbnb research in Malaysia, while suggesting that more Airbnb-related research be conducted in Malaysia in the future from different perspectives, such as host-guest relationships, Malaysians' motivations for using Airbnb, and guest experiences. Lee et al. (2019) conducted an analysis on Airbnb listing page of top 20 host listings in Kuala Lumpur and Georgetown in Pulau Penang. This study found that elements of both authenticity and commoditization are present in host listings, thus blurring the distinction between P2P lodging experiences and the traditional hospitality industry. Woon and Ban (2019) conducted a study on Malaysian Airbnb from the perspective of purchase intention of Malaysian Airbnb users. This study examined four important variables, including price, electronic word-of-mouth, brand image, and unique and local authenticity, to uncover the important factors that influence customers' purchase intention. By analyzing the 205 questionnaires collected from Malaysian Airbnb users, the statistical results show that all four variables have a significant effect on the purchase intention of Malaysian Airbnb users. Nathan et al. (2020) investigated the factors predicting tourists' behavioral intention to use the Airbnb app when they travel in the historical city of Melaka, Malaysia using the extended Unified Theory of Acceptance and Use of Technology model and the exhaustiveness of critical appraisal theory to measure tourists' use of a mobile app. The results showed that effort expectation, performance expectation, social influence and price value had significant positive effects on tourists' behavioral intention to use the Airbnb app while traveling in Melaka. Among them, there are two main predictors of tourists' willingness to use the Airbnb app to make accommodation reservations in historical cities: price value and social influence.

1.2 Problem Statement

Even though the incorporation of BDA into operational decision-making has been put in practice in the industry, it still remains as a new issue for strategic decision-making (Meel and Vishwakarma, 2019). One of reasons is that with the emergence of big data and the internal and external data of the organization, the diversity of knowledge sources and forms have increased the complexity of the strategic decision-making process (Intezari and Gressel, 2017). Unlike operational decision-making, where insights can be drawn directly from BDA to support the formulation of action plans, the results of big data analysis used to support strategic decision-making need to integrate more diverse types of data to make strategic plans that are consistent with the long-term development of the company (Araz et al., 2020). Especially, the rise of unstructured data has posed

new challenges for companies to integrate different types of data (Lodha et al., 2014). With the development of Internet technology, a large amount of unstructured data is created. This phenomenon is especially prominent in social media, which has become the major source of unstructured data, and the information collected from various social media platforms is usually known as user-generated contents (UGC). Various studies have been conducted on UGC in gaining an understanding of customer behavior, and this is especially popular in the hospitality industry. For instance, Xiang et al. (2015) used a text analytical approach to explore the relationship between hotel guest experience and satisfaction, Zhao et al. (2019) analyzed hotel customer reviews collected from TripAdvisor.com to predict overall customer satisfaction, Gavilan et al. (2018) examined the impact of customer reviews on hotel booking. Based on the findings of previous research, UGC provides rich information about consumers' perception of service, and analyzing UGC allows companies to act more quickly, adapt business processes and improve CX (Watson and Marjanovic, 2013). Despite the importance of UGC and many text mining techniques have been developed, conducting big data analysis is still challenging due to lack of universal approaches for effectively analyzing and employing data on social media, which led to that the value of social media data is under-explored to support companies' decision-making (Xu et al., 2017; Miah et al., 2017). Therefore, finding innovative and effective ways to leverage existing data is a big challenge for enterprises to leverage big data. In the service industry, this is the most important task because historical data can help service providers understand the behavior and preferences of their customers, thus improving the quality of service, and increasing profits and customer satisfaction (Cohen, 2017). Therefore, it is needed to explore how to analyze unstructured UGC from social media to determine the perception of customers, which can provide an alternative solution to support companies' business level of strategic decision-making by gaining insights from UGC. This research aims to fill this gap by proposing a machine learning-based technique to analyze unstructured UGC to support strategic decision-making at the functional level, as the results of this study are mainly relevant to the development of marketing strategies and the operational management of Airbnb.

Service quality has been regarded as an essential variable to access the quality of service providers and it is also regarded as a major factor for the success of organization due to that service quality is strongly associated with customer satisfaction particularly in the service-based industry (Gilber and Veloutson, 2006). In the service industry, service quality is one of the key factors for service providers to maintain competitive advantage and win customer confidence in the marketplace with stiff competition (Min et al., 2002; AI-Ababneh, 2017). Despite the importance of service quality, there is no consensus on the definition of service quality. In academic research, service quality is generally defined as the extent to which the provided service satisfies the needs and expectations of customers (Lewis and Mitchell, 1990), hence, service quality can also be considered as the variance between customers' expected service and actual perceived service. Customers generally have a higher satisfactory level when the actual perceived service exceeds their expectations (Parasuraman et al., 1985; Lewis and Mitchell, 1990).

Due to the inherent intangibility of provided service to customers, measuring service quality has been regarded as a daunting task (Armstrong et al., 1997). In order to objectively measure service quality, many studies have been conducted to identify the attributes of service quality, which help to specify measures to control and improve perceived service quality (Johnston, 1995). Especially, with the emergence of different service quality models (e.g., SERVQUAL, SERVPERF), most service quality studies in the hospitality industry have heavily relied on the traditional survey method, which is mainly based on using pre-defined service quality attributes. Due to the multidimensionality of the service quality, using survey approaches has limited investigation scope to measure the service quality may give rise to the loss of significant information (Duan et al., 2015; Korfiatis et al., 2019). However, a large amount of UGC from different online platforms are generated can be used as an alternative data source to explore service quality. Consumer reviews as a part of UGC have been widely analyzed from the perspective of big data (Cheng, 2016), and UGC is regarded as a rich source of data for extracting factors which are associated with customer satisfaction in the service industry. In addition, the creation of UGC over time, which can be utilized as a practical way to supplement conventional research methods to identify salient issues (Gopalkrishnan et al., 2012). For companies, customer reviews are regarded as a type of valuable information for better understanding consumer demands, especially for hotels and restaurants. Analyzing customer textual reviews can reveal the consumption of CX, and highlight the product and service attributes customers will consider in their decision-making processes, which provides the perceptions of customers in a comprehensive manner through open-structure form (Yang et al., 2004). In addition, using online reviews can help researchers to better measure hotel service quality and performance (Duan et al., 2015). Therefore, the first and essential step in diagnosing service quality is to obtain and analyze customers' written feedback on the service in order to understand the customer's desires and their perception of the service they experience, which can contribute to obtaining useful information to improve the existing service system for a better CX (Song et al., 2016).

Even though UGC can serve as a useful data source for researchers to examine CX for different purposes, limited studies have been conducted in the sharing economy based business, in particular in the accommodation sector (Cheng and Jin, 2019; Sutherland and Kiatkawsin, 2020). Laurell and Sandstrom (2017) also highlighted that studies on P2P accommodation are in the infancy stage, hence, in order to fill this gap, Study 1 in this thesis focused on exploring the service quality attributes of a leading peer-to-peer (P2P) accommodation platform (Airbnb), which is the most successful sharing economy business model in the lodging industry (Ert et al., 2015). In terms of functionality, both Airbnb and traditional hotels are fundamentally providing the same lodging services to customers. However, customers' perceptions of service quality are found to be distinct in these two types of accommodation, as customers pursue different living experiences (Tussyadiah, 2016; Cheng and Jin, 2019). Airbnb users are more likely to pursue authentic experience of living like a local (Guttentag, 2013), such as the opportunity for travelers to interact with hosts and local community (Tussyadiah and Pesonen, 2016). Comparing those who stay at traditional hotels, guest who stay at Airbnb properties are more often motivated by the tangible benefits of the service, such as low cost, convenient location, and home amenities (Guttentag, 2013). In addition, these guests, inspired by Airbnb's sharing economy concept, are more focused on interactive experiences, such

as with hosts, guests sharing the same space, and the local community, and are more likely to be backpackers, often staying at shared rooms (Tussyadiah, 2016).

Due to the distinct preferences of Airbnb users, many indicators of service quality identified in the conventional hospitality industry are not well suited to accommodation offers in the sharing economy. Hence, it is needed to conduct further research to identify the unique service quality attributes of Airbnb. In addition, these instruments developed for measuring service quality in traditional hotels can be used as a basis for developing Airbnb service quality measures, since both P2P accommodations and traditional hotels fundamentally provide the same accommodation services. Therefore, this study intends to cross-validate Akbaba's (2006) tool using identified service quality attributes that can also serve as additional information to adapt Akbaba's (2006) tool to the Airbnb environment and provide service quality measurement tool support for later Airbnb studies.

Researchers have shown increasing interest in investigating the phenomenon of Airbnb from various perspective, for example, Airbnb user experience (Cheng and Jin, 2019; Luo and Tang, 2019; Zhang, 2019), the impact of Airbnb on traditional hotels (Zervas et al., 2017; Blal et al., 2018), the price determinants of Airbnb (Wang and Nicolau, 2017; Lawani et al., 2019), and Airbnb service quality (Priporas et al., 2017a; Ju et al., 2019). Even though the phenomena of Airbnb has caught many researchers' attention, the majority of these studies were conducted in some developed countries, such as the U.S., Australia, and some European countries. Limited studies have examined the Airbnb phenomenon in developing countries. Hence, this study focuses on Airbnb in a developing country, in particular Malaysia, which responds to the call of Cheng and Jin (2019) and Zhang (2019) on examining Airbnb user experience in different regions. The findings of this study can contribute to generating cross-regional insights into lodging experiences of Airbnb users and serve as the foundation for future comparative studies. The reason for choosing Malaysia is that it is the fastest growing Airbnb market in Southeast Asia, with a 73% year-on-year growth from 2018 to 2019, and there are over 53,000 listings in Malaysia (Inn, 2019). In addition, little Airbnb related study has been conducted in the context of Malaysia (Razli et al., 2017).

Although Airbnb has experienced rapid growth in many countries and regions around the world, Airbnb is not perfect in providing its services, especially as more and more hosts with no experience in the service are coming into the Airbnb business, resulting in many Airbnb experiences not being maintained at a standard level and therefore many guests would have unsatisfactory lodging experience (Sutherland and Kiatkawsin, 2020; Ju et al., 2019). According to a user report from Fergusson (2017), many Airbnb users have expressed their dissatisfaction with the unsafe conditions during their stay. Some risks that arise directly with Airbnb hosts include some dangers including kidnapping, sexual assault and the possibility of pedophiles or convicted felons renting out rooms. Although Airbnb has reported a permanent ban on harmful individuals, some Airbnb users have reported that it is easy for hosts who abuse Airbnb to sign up for new accounts under different names. Some other dissatisfaction factors included different categories. According to survey data and statistics released by Deen (2018) for 2016 and 2017, 3-

7% of all Airbnb stays turned out to be serious problems. But these statistics only include some of the meticulous dissatisfaction factors, such as 20.5% of Airbnb users reported that Airbnb hosts canceled their stay within 24 hours of booking or never showed up; 15.4% of Airbnb users reported that Airbnb hosts faked home damage, e-mails, or websites; 13.4% of Airbnb users reported that during the stay undesirable conditions such as pests, hidden cameras, unfriendly hosts, or unsafe amenities during their stay. These statistics provide a preliminary understanding of Airbnb users' dissatisfied accommodation experiences, and therefore give inspiration to explore more unknown factors affecting Airbnb users' dissatisfaction, to support future improvements of Airbnb services. In addition, due to the rapidly changing nature of Airbnb's services and customer preferences, these outdated findings may not accurately reflect current conditions. As for academic research, even though some studies were conducted to determine attributes that affect Airbnb user satisfaction (e.g., Lee and Kim, 2018; Möhlmann, 2015; Sthapit, 2019; Tussyadiah and Zach, 2017), these studies failed to distinguish satisfaction attributes from dissatisfaction attributions. Those studies that analyze Airbnb reviews to extract user satisfaction attributes tend to analyze those reviews indiscriminately, without differentiating positive and negative reviews, resulting in many Airbnb users' dissatisfaction attributes not being uncovered. This is because that dissatisfaction attributes are often extracted from negatively polarized reviews, and the total number of negatively polarized reviews in Airbnb reviews accounts for a very low percentage of the total reviews (Cheng and Jin, 2019; Ju et al., 2019; Zhang, 2019), hence dissatisfaction attributes have often been overlooked in past studies. Hu et al. (2019) also suggest that to deepen our understanding of the customer satisfaction attributes, we should identify topics that appear only in negative reviews, or those that appear more frequently in negative reviews than in positive reviews and are statistically significant. Therefore, the second study in this research aims to fill this gap by identifying the main sources of Airbnb's satisfaction and dissatisfaction attributes.

1.3 Research Questions

This thesis aims to answer the question of what service quality attributes Airbnb users consider important and what factors contribute to Airbnb users' satisfaction and dissatisfaction. The specific research questions for Study 1 and Study 2 are presented below.

1.3.1 Study 1

- (1) What are the service quality attributes perceived by Airbnb users in Malaysia?
- (2) How well a modified SERVQUAL questionnaire developed by Akbaba (2006) in generalizing Airbnb's service quality attributes in Malaysia?
- (3) What are the changing patterns of Airbnb service quality attributes perceived by users in Malaysia?
- (4) What are the emphases of service quality attributes perceived by Malaysian and International Airbnb users in Malaysia?

1.3.2 Study 2

- (1) What are the attributes that affect Airbnb user satisfaction and dissatisfaction?
- (2) How do Airbnb users' review emphasis on satisfaction attributes and dissatisfaction attributes differ when they stay at different types of Airbnb properties?
- (3) How does the relative importance of attributes extracted from customer reviews to Airbnb users' satisfaction and dissatisfaction differ?

1.4 Research Objectives

The main objective of this thesis is to use online customer review data to identify the key service quality attributes perceived by Airbnb users, as well as the satisfaction and dissatisfaction attributes associated with the Airbnb user's lodging experience. The specific research objectives for Study 1 and Study 2 are presented below.

1.4.1 Objectives of Study 1

- (1) To identify key service quality attributes of Airbnb perceived by users in Malaysia.
- (2) To cross-validate the effectiveness of a modified SERVQUAL questionnaire developed by Akbaba (2006) in capturing Airbnb's service quality attributes.
- (3) To identify changing patterns of service quality attributes perceived by Airbnb users in Malaysia.
- (4) To identify the hierarchy of importance of Airbnb service quality attributes as perceived by Malaysian and International Airbnb users in Malaysia.

1.4.2 Objectives of Study 2

- (1) To identify attributes associated with Airbnb users' satisfaction and dissatisfaction.
- (2) To identify the different emphasis of Airbnb users when they stay at different types of Airbnb properties.
- (3) To identify the relative importance of satisfaction attributes and dissatisfaction attributes in Airbnb accommodation.

1.5 Significance of Research

1.5.1 Theoretical Significance

This thesis demonstrates that social big data can be utilized to gain valuable insights regarding service quality and customer satisfaction. The results reveal the significant advantage of using the big data approach to draw customer insights from their past consumption experience, thus suggesting more studies to embrace the big data approach in the future to fully exploit the value of social big data. More specifically, this thesis adds to the literature on customer reviews by proposing a supplement approach for topic and feature extraction in customer reviews, with a focus on the analysis of service quality and customer satisfaction attributes from the opinion texts. This thesis proposed novel approaches to support UGC analysis and facilitating the analysis and visualization of customer review insights into P2P accommodation service quality and customer satisfaction. This thesis demonstrated the detailed process of using different topic modeling techniques to extract valuable insights into Airbnb service quality and user satisfaction. In particular, Structural Topic Modeling (STM) and supervised Latent Dirichlet Allocation (sLDA), which are applied for the first time in a P2P accommodation environment, extend the usability of these techniques in new environments. In the thesis, the advantages of these two techniques are fully utilized to achieve different purposes. The detailed data analysis framework developed in this thesis can serve as a useful reference for applying these techniques to other contexts to achieve various research goals.

This thesis contributes to the existing body of knowledge in the P2P accommodation literature by filling a research gap in developing countries with limited attention to the quality of P2P accommodation services. The results of the analysis of Airbnb user reviews in Malaysia help to generate cross-regional insights into the accommodation experiences of Airbnb users and serve as a basis for future comparative studies. In addition, this thesis contributes to the literature by providing a more comprehensive understanding of Airbnb customer satisfaction. Unlike previous Airbnb studies that focused on a single dimension of customer satisfaction, the findings of this thesis reveal not only the service attributes associated with Airbnb user satisfaction but also the same service attributes associated with dissatisfaction are also uncovered. This thesis also investigates the relative importance of extracted service attributes on Airbnb customer satisfaction, which provides a useful reference for future Airbnb customer satisfaction research.

This thesis contributes to the theory by using an unconventional data source to validate the widely applied theoretical models. A SERVQUAL based service quality developed by Akbaba (2006) is cross-validated using extracted service quality attributes, and the results of the cross-validation analysis can serve as a useful reference for future studies to develop instruments to measure Airbnb's service quality. This thesis also provides empirical evidence generated from big data analysis to support the applicability of Herzberg's two-factor theory and Kano model in the P2P accommodation setting. By considering the service attributes that affect Airbnb customers' satisfaction and

dissatisfaction, this thesis will provide a broader application of these two theories for understanding customer satisfaction in the context of online customer review platforms.

1.5.2 Practical Significance

This thesis proposes a new approach to extract, compare and identify meaningful information from unstructured UGC to improve the customer accommodation experience of P2P accommodation companies. For instance, this thesis provides the Airbnb management deeper insights into how customers perceive Airbnb service quality, which can serve as a foundation to develop relevant strategies to enhance the service quality. This is especially important in a highly competitive society, as a continuous development in providing outstanding services could be the core completeness of a company in the service industry. In addition, the trend analysis of Airbnb service quality attributes in this study can help to examine the dynamics of Airbnb users' preference, which can help Airbnb management to develop a system to monitor the changing perception and emphasis of Airbnb user by using the up-to-date customer reviews. As for determining satisfiers and dissatisfiers in Airbnb users' lodging experience, it can help Airbnb hosts avoiding put too many efforts on areas that do not generate satisfaction, however they still must maintain these areas acceptable to minimize customer satisfaction. The research results provide Airbnb practitioners with recommendations for service improvements to enhance the satisfaction of guests staying at different types of Airbnb properties. In addition, the findings inform Airbnb practitioners' priority setting when making customer satisfaction improvement decisions. As for practical implications for CXM, customer insights on service quality and customer satisfaction can contribute to Airbnb CXM, especially CX design, as an important component within CXM, aimed at achieving customer loyalty (Homburg et al., 2017). The results of research on service quality attributes identified in Airbnb users' stay experiences, factors affecting guest satisfaction and dissatisfaction, can provide insights that Airbnb practitioners can implement to design CX at different touchpoints of the guest journey, such as check-in, during stay and check-out. This study employed an advanced textual data processing approach that is based on several techniques, such as topical modeling, sentiment analysis, and text network analysis. These techniques were tested by using large amount qualitative data from Airbnb, which can be applied by practitioners from different industries to big data collected from the online customer reviews.

1.6 Scope of the Study

Two studies in this thesis focus on the use of BDA to extract valuable information from customer reviews, which represents past consumption experience of customers, with a particular focus on service improvement. Study 1 in this thesis focuses on identifying the service quality attributes perceived by Airbnb users in Malaysia by using a novel technique. The identified service quality attributes can help Airbnb hosts and practitioners to access the provided service and gain insights about service related improvement, which can help them enhance the customer satisfaction which is considered as a key factor to achieve successful business in the accommodation industry (Rahimi and Gunlu, 2016). As for Study 2 in this thesis, it is focused on determining

factors affecting Airbnb users' satisfaction and dissatisfaction through the analysis of textual big data. In contrast to the first study, the second study collected data from 12 different countries in order to increase the generalizability of the results. Similarly, the second study focuses on how to use textual big data to extract valuable user information to inform company decisions from different perspectives (e.g., an operational perspective and a human resource management perspective).

1.7 Definition of Terms

Big Data: Big data refers to very large data sets that can be computationally analyzed to reveal patterns, trends, and associations, especially those related to human behavior and interactions (Watson and Marjanovic, 2013).

Text Mining: The process of obtaining quality information from the text.

Topic Modeling: An unsupervised machine learning technique that scans a set of documents, detects word and phrase patterns in them, and automatically clusters groups of words and similar expressions that best describe a set of documents.

Customer Experience: The customer's response to interacting with the organization through multiple channels and at different times before, during, or after a purchase or consumption (Voorhees et al., 2017).

Service Quality: The extent to which the service meets customer needs or expectations (Parasuraman et al., 1988).

Customer Satisfaction: A measurement that determines how products or services provided by a company meet customer expectations (Oliver, 1984).

1.8 Organization of Thesis

This thesis is structured in six chapters, and the outline of the following six chapters is provided below.

Chapter 1 (Introduction): This chapter aims to provide the background of the study and to convey the importance of the study for big data analytics, especially for applications among the business sectors. It also explains the importance of this research to the service industry, especially the sharing economy based short-term accommodation sector. This chapter discusses the problem statement, research objectives, and research questions,

and concludes with a summary of the theoretical and practical contributions of this research.

Chapter 2 (Literature Review): This chapter presents a literature review on the big data and the application of big data in business research. First, big data and BDA are defined to establish the scope with reference to relevant big data methodologies. Then, the chapter reviews literature relates to service quality and customer satisfaction to demonstrate the appropriateness of using unstructured UGC to gain insights into these two aspects. At the same time, this chapter also compares the textual big data analysis approaches proposed in this thesis with traditional research methods, in order to highlight the advantages of this big data analysis method and its complement to traditional analysis methods.

Chapter 3 (Research Methodology): This chapter describes the research design and methodology adopted in this thesis. The chapter starts by giving a general description of the chosen research design. Then, the overall research process is explained, along with steps and analysis techniques.

Chapter 4 (Employing Structural Topic Modeling to Explore Perceived Service Quality Attributes in Airbnb accommodation): This chapter starts with the introduction of the Study 1. In the next section, the detailed research process and framework of this study is explained. The detailed use of STM is described. The latter section presents the major findings of the Study 1, including the extraction of topics related to service quality from customer reviews and the effect of different covariates on the distribution of topics across the document.

Chapter 5 (Exploring Sources of Satisfaction and Dissatisfaction in Airbnb Accommodation Using Unsupervised and Supervised Topic Modeling): The first section of this chapter gives some background information on Study 2 by introducing some relevant studies and theories about customer satisfaction. Detailed analysis techniques and steps are explained in the next section, with a focus on LDA and sLDA. Findings are given in the following sections, and the last section concludes the Study 2.

Chapter 6 (Discussion and Conclusion): This chapter is separated into four subsections: summary of major findings, detailed research finding discussions, research contributions, limitations, and suggestions for further research.

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