Characterizing Quality Aspects in Airbnb

Geanderson E. dos Santos
UFMG
Belo Horizonte – Minas Gerais
geanderson@dcc.ufmg.br

Pedro H. F. Holanda
UFMG
Belo Horizonte – Minas Gerais
holanda@dcc.ufmg.br

Jussara M. Almeida
UFMG
Belo Horizonte – Minas Gerais
jussara@dcc.ufmg.br

Raquel O. Prates
UFMG
Belo Horizonte – Minas Gerais
rprates@dcc.ufmg.br

ABSTRACT

Sharing economy is a new kind of economy that allows users to share human or physical resources that they are able to supply with people who are interested in that resource. This new kind of economy has become very popular in the last few years with systems such as Airbnb, Uber, TaskRabbit among others. In this paper we present a quantitative analysis of quality aspects of different trust indicators rated by Airbnb users, one of the currently most notable sharing economy platforms. Based on public data collected from Airbnb, covering more than 220,602 hosts, we have analyzed six qualitative aspects related to trust in different regions of the world. Our results show that the quality aspects vary significantly from region to region. We have also assessed the relative importance of each quality aspect (e.g., value, accuracy, cleanliness, check-in, communication and location) for user satisfaction, finding that value is the most important quality aspect in most regions for user satisfaction.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

Author Keywords

Sharing Economy; Trust; Airbnb

INTRODUCTION

Sharing economy is a new kind of economy that is reaching an increasing number of people around the world. This concept was recently discussed by [4], and is based on four main characteristics: (1) significant supply of spare resources from some individuals, (2) a large amount of people wanting to share those resources, (3) trust among strangers, and (4) the recognition by participants of the benefits of sharing. Many different types of resources can be shared in this economy, for example, temporary housing, transportation, storage, and a variety of other services. One of the currently most notable sharing economy applications is Airbnb[1][1], which gives users the opportunity to share spare rooms in houses/apartments in exchange for money, which in most cases proves to be far cheaper than conventional renting services. As of April 2017, this platform has served more than 150 million guests, and is available in more than 65,000 cities in 191 countries [1].

Despite the large success of this type of platform, many concerns have arisen in communities that utilize these services, in particular following incidents involving sexual abuse, theft, verbal assault, and other social problems [6]. To avoid these problems, these platforms have implemented solutions that allow users to develop more trust in other participants [7]. In general, these trust generating mechanisms involve building a reputation based on user satisfaction [3], both with respect to those offering the service (providers) and those receiving the service (consumers).

In order to contribute to the current research on reputation building, our goal in this paper is to characterize the relationship between the quality aspects of trust indicators and user satisfaction. We have collected a set of Airbnb public data and analyzed it aiming to answer the following research question:

RQ: "What is the relationship between the quality criteria of evaluating rented rooms and user satisfaction?".

The remainder of this article is organized as follows. The next section describes related research, after which the experimental methodology employed in this analysis is detailed. The following section presents and discusses the results. Finally, we present the contributions of this study and next steps in our research.

RELATED WORK

Trust in sharing economy has been studied by researchers in computer science as well as other areas, such as business and marketing. These studies have highlighted primary elements in the construction of trust between participants, both in relation to the system being used and other users (i.e., consumers and

---

[1]https://www.airbnb.com.br/

providers). The research done by [3] is a prime example of this application, as the authors use questionnaires to evaluate the effectiveness of the flow theory model in the process of ranking accommodations online by participants. The authors conclude that aspects related to system interface and usability directly influence the property ranking decision for users.

In addition, some studies investigate the impact of human relations in the development of trust between strangers. Jung et al. [2016] show the difference between user information provided on Couchsurfing and Airbnb, and how the available information may impact users' trust [8].

Also examining information provided by users in these platforms, Ma et al. [2017] discusses the way in which the amount of detail provided by an Airbnb host in his/her profile may influence the trust of users interested in making a reservation on the property. The authors use a framework known as Profile as Promise to measure the effect of the impact of the profile details. They conclude that profiles with more details about the host are judged as more trustworthy from the point of view of those looking to rent.

In addition to platforms involving the reservation of accommodations, some investigations have been done on the process of building trust in applications pertaining to ridesharing. In the investigation of [12], the authors develop a rideshare application to analyze the impact of reputations on the establishment of trust between people in a city where the sharing economy is fairly widespread. In a broader project over trust development, <Omitted> [5] do a systematic literature review (SLR) in an attempt to define trust in sharing economy. The authors propose a framework that organizes indicators of confidence that have been identified in the literature since the conceptualization of sharing economy. They also identify the types of exchange and most relevant research methods in the context of trust building in a sharing economy.

Our investigation presented in this paper seeks to complement prior research in the sense of using the indicators identified by other authors [10, 6, 5], mainly those delineated by [5], to quantitatively characterize Airbnb with a specific focus on quality of rented rooms.

METHODOLOGY
Our methodology is divided into 3 subsections: (1) data collection, (2) data processing and (3) definition of quality aspects.

Data Collection
Airbnb served as the chosen platform for this case study because, as seen in [7, 6, 9], concerns regarding trust have arisen with a high frequency mainly due to the large number of users and the amount of money exchanged by participants. Furthermore, the process of data collection from Airbnb is ideal due to the availability of a web environment for user access, which facilitates data collection as opposed to applications limited to a mobile environment (e.g. Uber).

The data collection was performed during the month of March, 2017. The collection was performed using a webcrawler developed with Python's API Scrapy[2] as well as InsideAirbnb[3]. InsideAirbnb is a public platform that contains data from various Airbnb hosts; however, this platform excludes Brazil. As a result, the Python-based webcrawler was developed to collect the remaining data. This data is important because Rio de Janeiro is the fourth largest city in the world in terms of number of registered houses and apartments [2], and no reason is evident for the omission of these Brazilian data in the InsideAirbnb database. Airbnb has a search engine that limits the number of results that appear for a given search, such that only around 300 listings are returned for each city following the selected filters.

In the interest of a more comprehensive study, the analysis will be divided across five different regions of the world, i.e., Europe, the United States, Brazil, China, and Australia. The cities of Paris, London, and Berlin were selected as European representatives because these three cities have an extremely high number of listings and are included in the top ten cities in the world (by number of listings) [2]. New York City, Los Angeles, and Chicago were selected from the United States, given that New York City and Los Angeles are members of the top ten from the east and west coast respectively, and Chicago serves as a representative from the central region of the country. In Brazil, data from six of the most important cities were collected, including Rio de Janeiro, São Paulo, Belo Horizonte, Salvador, Fortaleza, and Porto Alegre. Hong Kong was the only city studied from China; however, this one city supplied a sufficient number of listings. Finally, data from Sydney, Australia was analyzed because the city also falls among the top ten globally in terms of listings [2].

Data Processing
At the end of the data collection, our database contained 220,602 host listings from Airbnb (Table 3.2). An initial screening and processing of the collected data was necessary. There are various hosts registered in Airbnb who lack their own unique user evaluation data. The data from these hosts were discarded prior to formal analysis noting that all correlations would be null. The filtering stage was responsible for removing slightly more than 27% of the hosts from the database. In other words, out of the 220,602 listings collected, 161,340 were maintained in the database for analysis.

Data Collection					
	EU	USA	Brazil	China	Australia
Data	117446	71454	1613	6474	23615
Remaining	85154	55439	1450	4617	14680

Table 1. Data gathered from Airbnb (#listings)

Quality of the Sharing Economy
As described in [5], quality is a key aspect evaluated by users following their stay with a host through Airbnb. Quality is comprised of six attributes related to the platform: accuracy, communication, cleanliness, value, check-in, and location. Accuracy corresponds to the degree to which the experience matched the description on the listing page. Communication

---

[2]https://scrapy.org/
[3]http://insideairbnb.com/

corresponds to the ease of communicating and interacting with the host to arrange the details of the reservation. Cleanliness evaluates the overall hygiene of the property. Value is an evaluation of the compatibility of the cost of rent with the market value and the overall experience. Check-in evaluates the arrival process and initial accommodation on the property, and location relates to the region where the property is located [1]. The guest may rate each attribute on a scale ranging from 0-10, in addition to leaving an evaluation of overall satisfaction with the service provided [7].

RESULTS

This section presents the results of the characterization of quality aspects in Airbnb. We start by presenting, in Figure 1, the cumulative distribution of the user satisfaction (in the range of 0% to 100%) for all reservations in our dataset. We observe that more than 75% of the hosts have a satisfaction rating greater than or equal to 90%, which translates to a high concentration of user satisfaction on this platform. However, this high rate of satisfaction can lead to hypotheses that are false regarding the quality of trust in this system. The investigation of [7] critiques the bias that Airbnb itself creates in the process of reciprocity of evaluations, which has led to incoherent and untrustworthy reviews for system users [7].
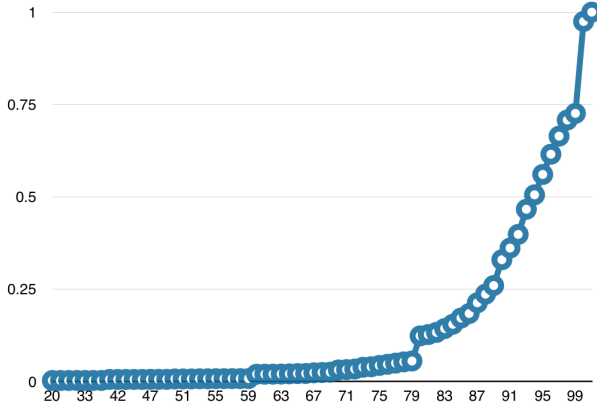

Figure 1. CDF User Satisfaction

We then evaluate the relationship between each quality aspect and user satisfaction by computing the correlation between each pair of variables. To do so, we first assessed whether each pair of variables are related according to a linear function. A plot of user satisfaction against each quality attribute indicates that the assumption of linear relationship is not linear. Thus, we chose to use the Spearman's rank correlation coefficient [11], which is a nonparametric measure of the relationship between two variables. It assesses how well the relationship between two variables can be described using a monotonic (not necessarily linear) function (i.e., how well the ranking of the two variables are related. The Spearman correlation gives a value between -1 and 1, where 1 signals total dependence between two variables, 0 suggests no existing correlation, and -1 signals an inverse relationship between the variables [11].

Figure 2 the Spearman correlation between each quality attribute and user satisfaction for different regions. The analysis
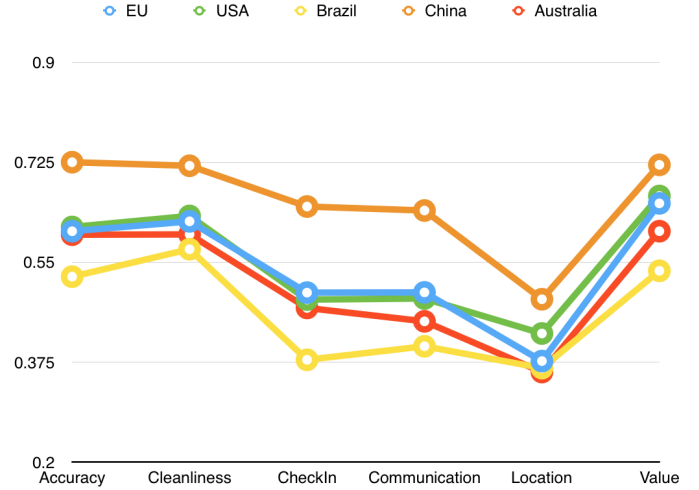

Figure 2. User Satisfaction x Quality Aspects

was divided by region. The figure shows that, in relation to user satisfaction, the six quality aspects are slightly different across different regions. For example, China, a representative of Eastern culture, notably presents stronger correlations for all quality aspects. This correlation indicates that in China the rankings given to hosts are more in line with the general satisfaction of guests. Furthermore, this correlation suggests that in China quality aspects may have a more significant impact on user satisfaction in comparison to the other four regions under study. In contrast, Brazil provides an interesting case in that it obtained a lower correlation for five out of six of the quality aspects (i.e., accuracy, cleanliness, check-in, communication, and value). Only with respect to the criterion of location did Brazil show a stronger correlation than Australia, making location the sole attribute in which Brazil did not exhibit the lowest correlation in the database. This result suggests that platform users in Brazil may be less concerned with these five quality criteria to evaluate their satisfaction with Airbnb in comparison with other regions of the world.

The figure shows that Brazil and China are the most extreme points on the graph (least and most significant correlations), while the other three regions (USA, Europe, and Australia) are more similar in terms of evaluations. Future analysis will be able to clarify the difference between the regional correlations, especially when considered jointly with other aspects of trust in sharing economy (e.g., compensation, content, and familiarity among others).

For an improved comprehension of the regional relationship between criteria, Table 4 presents a ranking of the manner in which each region evaluated the individual quality criteria. The table shows that value is the most important criterion for three of the five regions (i.e., Europe, USA, and Australia). While accuracy is the most important criterion for China, cleanliness is more highly valued in Brazil. Overall, the data indicates that location, check-in, and communication are the least important elements for the final user evaluation in all five regions under analysis. The data also indicates a clear order in which the criteria of value, cleanliness, and accuracy exercise a greater

Quality Aspects Ranking (Top to Bottom)				
EU	USA	Brazil	China	Australia
Value	Value	Cleanliness	Accuracy	Value
Cleanliness	Cleanliness	Value	Value	Cleanliness
Accuracy	Accuracy	Accuracy	Cleanliness	Accuracy
Communication	Communication	Communication	CheckIn	CheckIn
CheckIn	CheckIn	CheckIn	Communication	Communication
Location	Location	Location	Location	Location

Table 2. Quality Aspects by Region

influence on general Airbnb user satisfaction in all regions of the world.

CONTRIBUTIONS AND FUTURE WORK

This investigation in progress seeks to answer the following research question: "What is the relationship between the quality criteria of Airbnb and user satisfaction?". The quantitative analysis showed considerable variation in the order of the quality criteria, as much in terms of regional variation as in the order of the criteria themselves in relation to satisfaction. This type of research is important to characterize the criteria presented by [5], in the sense of consolidating one dimension of the initial trust model proposed by the authors, and also due to the quality of the service being one of the indicators of trust in the sharing economy.

Future research will include new quantitative analysis in the context of additional aspects of trust building in Airbnb. It will also compare the results of this article with analysis of data of other similar sharing economy platforms, including those that present other types of value exchange that are not necessarily monetary (such as Airbnb). An interesting platform for future analysis would be the Couchsurfing platform.This platform, despite allowing people to share their homes as in Airbnb, does not allow the direct exchange of money between participants through the platform, favoring instead the social interaction between individuals as the primary motivator for its use and circulation in cities around the world.

As a limitation of this work, we assumed that the pattern in a given region is an accurate representation of that region; however, due to internationality and ease of travel in the modern day, people tend to visit many countries around the world. As a result, the fact China showed a different pattern than Brazil does not mean that a generalization of either China or Brazil could be made from this dataset, because travelers in any of these regions could be from anywhere around the globe. This fact is especially relevant for generalizations about Europe and the USA, which represent some of the most visited places in the world.

REFERENCES

1. Airbnb. 2017a. About Airbnb Page. (April 2017). `https://www.airbnb.com.br/about/about-us`

2. Airbnb. 2017b. Top Ten Cities: Only Two in the US. (2017). `http://getpaidforyourpad.com/blog/top-ten-airbnb-cities/`

3. Anil Bilgihan, Khaldoon Nusair, Fevzi Okumus, and Cihan Cobanoglu. 2015. Applying flow theory to booking experiences: An integrated model in an online service context. *Information Management* 52 (2015).

4. R. Botsman and R. Rogers. 2010. *What's Mine is Yours: The Rise of Collaborative Consumption*. HarperBusiness, New York, NY, USA.

5. Geanderson E. dos Santos and Raquel O. Prates. 2017. Uma Análise de Confiabilidade em Pesquisas em Sistemas de Economia Colaborativa. *14º Simpósio Brasileiro de Sistemas Colaborativos* (2017).

6. Eyal Ert, Aliza Fleischer, and Nathan Magen. 2016. Trust and reputation in the sharing economy: The role of personal photos in Airbnb. *Tourism Management* 55 (2016).

7. Andrey Fradkin, Elena Grewal, Dave Holtz, and Matthew Pearson. 2015. Bias and Reciprocity in Online Reviews: Evidence From Field Experiments on Airbnb. In *Proceedings of the Sixteenth ACM Conference on Economics and Computation (EC '15)*. ACM, New York, NY, USA.

8. Jiwon Jung, Susik Yoon, SeungHyun Kim, SangKeun Park, Kun-Pyo Lee, and Uichin Lee. 2016. Social or Financial Goals?: Comparative Analysis of User Behaviors in Couchsurfing and Airbnb. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16)*. ACM, New York, NY, USA.

9. Xiao Ma, Jeffrey T. Hancock, Kenneth Lim Mingjie, and Mor Naaman. 2017. Self-Disclosure and Perceived Trustworthiness of Airbnb Host Profiles. In *Proceedings of the 20th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion (CSCW '17)*. ACM, New York, NY, USA.

10. Sunjoo Oh and Jae Yun Moon. 2016. Calling for a Shared Understanding of the "Sharing Economy". In *Proceedings of the 18th Annual International Conference on Electronic Commerce: E-Commerce in Smart Connected World (ICEC '16)*. ACM, New York, NY, USA.

11. C. Spearman. 1904. The Proof and Measurement of Association between Two Things. *The American Journal of Psychology* 15, 1 (1904), 72–101.

12. David Sánchez, Sergio Martínez, and Josep Domingo-Ferrer. 2016. Co-utile {P2P} ridesharing via decentralization and reputation management. *Transportation Research Part C: Emerging Technologies* 73 (2016), 147 – 166.