

Research on the Express Service Failure Attribution Based on microblogging users from the perspective of big data-- Taking A express Company as an example

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Abstract: based on the consumer sentiment of express company service in Wei Bo, First of all, we use text classification method to identify service failure attribution types and consumption emotion. Then, through the association rules, we look for links between service failure type and consumption type of emotion, and analyze consumer coping behaviors in attribution to illustrate the dangers caused by service failure. Finally, through clustering analysis to find the object of service failure recovery work that is the valuable user. Our research shows that: in express negative sentiment, anger is the most; "anxiety" and "delivery delays" has a strong correlation, which can help enterprises take some emergency measures to remedy a consumer service, reduce customer churn, and maintenance enterprise reputation and image.

Keywords: consumer emotions; the express service failure; association rules; Cluster analysis.

1. INTRODUCTION

With the rapid development of China's economy, the express delivery industry has also ushered in rapid development. According to the relevant data published by the State Post Office of the People's Republic of China, In 2007, The business volume of national express service companies has completed 40.06 billion pieces 28% year-on-year increase[1].However, with the rapid growth of express delivery business, a large number of consumers complain and complain about corporate express services. In December 2017, the State Post Office and the postal administrations of the provinces (regions, municipalities) accepted 288,855 consumer complaints related to express delivery business through the "12305" postal consumer complaint phone and website of the postal industry, accounting for 95.5% of the total complaint. The more concentrated complaints were delaying, delivery services, and shortages, accounting for 37.5%, 39%, and 18.4%[2].The paper draws on relevant blog posts about express delivery services published by Wei Bo users, and analyzes consumer's emotional responses to delivery service failures and the types of corresponding attributions to help courier companies quickly discover the service focus that users care about and the

existence of their own services Shortcomings and then improve service levels to create a high competitive advantage.

2. RELATED STUDIES

With the market segmentation and industrial specialization, the relationship between the various components of modern express delivery services becomes more complex and the combination is closer. But at the same time, due to the increase in links, factors affecting service quality also increase, making it impossible for companies to completely avoid service errors. Li[3] analyzed the customer's attribution to service failure through literature research, which will affect their satisfaction. Richens[4] believes that "attribution of service failure refers to the process by which customers infer the cause of failure based on the scenario and consequences of service failure". Tomlinson[5] found that consumers' awareness of responsibility, controllability and stability in attribution will significantly affect their subsequent coping behaviors. Concepcion's Varela-Naira[6] studied the situation where customers have negative emotions when service errors occur. Menlo[7] established a difference model of attribution results before and after service remediation, analyzed the attribution, stability and controllability of customer attribution results before and after service remediation, and proposed corresponding solutions.

In recent years, with the rise of online shopping, some scholars have begun to combine the study of courier service errors with attribution theory. Fan Jun and Lin[8] proposed that express companies should take targeted actions from the perspective of attribution. Zhang and Tao[9] also applied the psychological account theory and attribution theory to evaluate the impact of service failures of express delivery companies on customer satisfaction and loyalty of online stores; He Liu[10] used the structural equation model to explore the consumer 's response to the B2B2C environment. Satisfaction of brands in the express service industry; Zhai[11] improved the logistics service remediation system and proposed a customer-oriented third-party logistics company service remediation model. Lei[12] made the types of service errors and the factors affecting remediation satisfaction Descriptive statistics, and demonstrated that the satisfaction of remediation has a positive impact on customers' willingness to reuse; Zhang [13] proved empirically that the failure of third-party express delivery will have a negative impact on customer satisfaction and analyzed the negative relationship of remediation measures.

To sum up, the research on express delivery services and the attribution of errors has made some research results, but most of the studies use theoretical analysis, questionnaires, scenario simulations and other methods. From the perspective of big data, this thesis analyzes express delivery service failure issues from consumer sentiment, service failure types, and consumer response behavior by mining express post data, helping companies find the target of service failure remediation work, thereby helping Enterprises reduce losses.

3. STUDY DESIGN

From the perspective of big data, the paper uses text classification methods to identify the attribution types of service failures and consumer sentiment. It also uses association rules to find the connection

between service failure types and consumer sentiment types. Finally, it finds companies to perform services through cluster analysis. The object of error recovery work to help companies reduce losses.

3.1 Courier Service Consumer Sentiment Types

At present, the evolution of research on sentiment classification at home and abroad has become more and more detailed, Izard[14] established a theory of differential emotions including ten basic emotions, among which positive emotions include happiness, joy, etc., neutral emotions include surprise, etc., negative emotions include disgust, fear, contempt, sin, anger, shame, and sadness; Thelwall[15] Described their emotions from multiple dimensions through investigations, including anger, dissatisfaction, optimism, anxiety, joy, fear, affection, shame, envy, loneliness, sadness, romance, quietness, satisfaction, excitement, and surprise. Wait for sixteen types of emotions, and designed the Consumer Emotion Set (CES) emotion scale. Based on the related research on sentiment classification and the related features of express blog posts, this paper summarizes eight sentiment types, as shown in Table 1.

Table 1 Consumer sentiment classification of express services

Emotion classification	Mood	Description
Negative	Angry	Very angry and Excited
	Disappointed	Expressing chills, sadness
	Anxiety	More anxious and irritable
	Disdain	Slightly negative speech, low evaluation
	Surprised	Emotions are mild and slightly negative
Neutral	Neutral	No obvious emotional orientation
Positive	Favorite	Positive emotions
	Happy	

3.2 Attribution Types of Delivery Errors

The State Post Office divides consumer complaints about express delivery business into 7 types of issues, including mail delays, delivery services, reduced mail loss, mail damage, receiving and sending services, illegal charges, and collection of payment[2]. Based on the actual situation of the users' blog posts published on Wei Bo platform, the paper summarizes the types of courier service errors into six situations, as shown in Table 2.

Table 2 Types of Failures in Express Delivery Services

Main classification	Fine classification	Description
Business operations management capabilities	express delay	Delays in dispatch and delivery of shipments;
	Lost or damaged express	Loss of express items or loans, items were damaged on delivery;
	Illegal operation	Illegal charges, operations, and leakage of customer information;
Service interaction	Poor service	Express staff attitude is bad, impolite, lack of

capabilities		professionalism;
	Dispatching interaction error	Notify the receipt of courier interaction information error.
	Complaints and feedback	No channels were found for help, complaints were unsuccessful.

3.3 Text Categorization

3.3.1 Data Collection

Use web crawler tools to collect blog information about express services posted by consumers on Wei Bo platforms and store them in local databases.

3.3.2 Data Cleaning

Use regular expressions to filter and clean collected blog posts, mainly to remove invalid information such as pictures, videos, and URL addresses; remove "@ + user nickname" and "#topic name #", which do not include consumer sentiment information and services. The content of the specific analysis of the error.

3.3.3 Text Segmentation

The process of splitting a sentence into individual words is called word segmentation. The part-of-speech tagging is performed after the word segmentation, which is convenient for part-of-speech analysis and deletion of certain words that have no practical significance for text classification. The thesis uses the ICTCLAS Chinese word segmentation system of the Chinese Academy of Sciences to process word segmentation and part-of-speech tagging for blog posts.

3.3.4 Text Categorization

The paper intends to use a space vector model to represent the text, and at the same time use the TF-IDF function to calculate the feature weights. The document frequency and information gain are used to select the features to achieve the purpose of dimensionality reduction. Finally, the support vector machine classification algorithm is used to train the classifier.

The article first uses a trained classifier to classify the post data of unknown classifications, extract blog posts containing five negative emotions in negative emotions, and then use the courier error type classifier to classify courier service error types, and classify each post Converted to {consumer sentiment, delivery error type} binary form.

3.4 Assonition Mining Design

After converting the blog post into the {consumer sentiment, express delivery error type} two-tuple, the association rules are used to mine the relationship between emotions and error types, and to understand the recent problems in express delivery services and consumers' emotional feedback.

After giving a certain minimum support and minimum confidence, you can get the relevant rules, which is the combination of emotion and error type, as shown in Figure 1.

X is the former term, and represents a type of emotion (or type of error). Y is the latter term, which represents a type of error type (or emotion). The probability of the combination of a certain type of emotion and a certain type of error type is the support of this rule. A larger value indicates that the combination frequently appears in the overall sample, and consumers publish more such blog posts.

When X occurs, the probability of Y appearing is the confidence of the rule. This can be used to analyze what kind of courier service errors are mainly attributed to users when consumers have X emotions; or what kind of emotions are mainly caused when consumers attribute service errors to X error types.

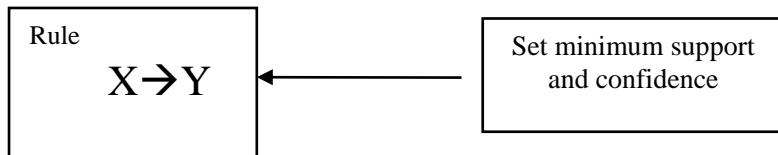


Figure 1 Association Rule Process

3.5 Consumer Response Behavior Analysis Program

In the context of service failure, consumer response behaviors are mainly divided into two types of behaviors: "seeking retaliation" and "seeking settlement" (or "seeking compensation") [16]. In the field of courier services, when service errors occur, consumers "revenge seeking" response behaviors are specifically expressed as "negative word of mouth" and "conversion purchases"; consumers' "seeking settlement / compensation" response behaviors are specifically expressed as "business complaints" and "tripartite complaints", as shown in Figure 2.

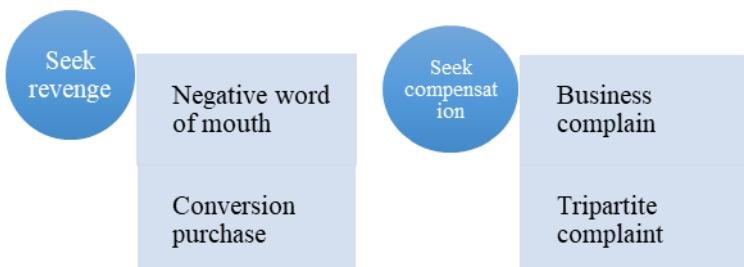


Figure 2 Consumer response

Consumer retaliation is a behavior where consumers take losses in order to express their dissatisfaction in the context of corporate service failure. Among them, negative word of mouth is that consumers share service failure experiences to their social circles to spread negative emotions and warn others not to choose the services of the company; conversion purchase means that consumers reject the company and choose services of other companies.

When consumers are harmed, they will complain to the company and complain to third parties (such as regulatory authorities, media.) in order to solve the problem or get some compensation. "Corporate complaints" and "tripartite complaints" are manifested as direct communication between consumers and companies or with third parties. Therefore, these two behaviors are rarely mentioned in the blog post, so the paper does not analyze and discuss the two situations.

The thesis will analyze the text features of blog posts with two types of consumer coping behaviors such as "negative word of mouth" and "conversion purchase", so as to extract certain rules to identify the remaining unknown blog posts. Through analysis, it is found that the characteristics of blog posts expressing these two types of consumer response behavior are relatively simple, so the paper intends to use text fuzzy matching query method to quickly identify and find the target blog posts.

3.6 User Clustering

When service errors occur, in order to effectively restore consumers and prevent negative word of mouth, they need marketing remediation. However, due to the limited resources of the enterprise, user cluster analysis can be used to find those value users who have great influence and play a significant role in communication, and carry out service recovery work for these value users, which will make the company's marketing recovery work more targeted And effectiveness.

The thesis will reflect the characteristics of value users from the aspects of personal attributes and communication effects[17]. Combined with the actual research of the thesis, the personal attributes will select the user's "follows", "fans", "ratio of followers and followers" and "number of Wei Bo posts", where the ratio reflects the popularity of the user, The number of micro-blogs posted reflects the user's activity; according to the number of comments and reweets of this express blog post, the influence of communication is expressed. The details are shown in Table 3.

Table 3 Value user characteristic performance

Feature	Specific performance
Personal attributes	The number of followers
	The Number of fans
	number of followers/ Number of fans
	Number of Wei Bo posts
Dissemination impact	Comments on this express blog post
	Reposts for this express blog post

According to the relevant data collected in the paper, combined with the characteristics of Table 3, cluster analysis can be used to find valuable users to the enterprise, in order to facilitate accurate remedial marketing and other tasks.

4. EMPIRICAL ANALYSIS

Collect crawler technology related data on Wei Bo through crawler technology. The collected post information mainly includes the user name of the blog post, the publication time of the blog post, and the content of the blog post. A total of 6 sites were crawled from July 2012 to June 2017. During the year, there were 18012 relevant Wei Bo posts related to A Express, and finally 16,000 valid blog posts were selected as sample data.

4.1 Express Blog Features

After word-processing the express blog posts related to Company A, you can see the relevant semantic focus or focus expressed by Wei Bo users over a period of time through the word frequency. Among them, the paper treats invalid information such as the name of company A with high frequency. Words that appear more frequently include "complaint", "delivery", "parcel", "service", "call", "attitude", "contact", "signature" and "junk". Seeing information related to company A, such as complaints may be more serious, and service-related work is often mentioned.

4.2 Consumer Sentiment, Types Of Courier Service Failures

The association rule algorithm is used to analyze the distribution of consumer-attributed service types when consumers have some emotions. Set the emotion to the previous item and the service failure type to the latter item. When the minimum rule support degree is set to 5% and the minimum confidence degree is 15%, the association rule results of the emotion and error types corresponding to Company A are obtained, as shown in Table 4.

Table 4 Common types of service failures for specific emotions

Number	Front item	Later item	Supporting of Front item(%)	Supporting of rule(%)	Confidence of rule(%)
1	Anxiety	Express delay	18.65	14.89	79.84
2	Anger	Poor service	30.57	9.21	30.13
3	Disappointed	Express delay	19.84	6.47	32.61
4	Anger	Express delay	30.57	6.41	20.97
5	Disdain	Express delay	19.19	5.98	31.16

In the results that satisfy the minimum rule support and confidence, there are only four emotions in the former term, and only two types of service failures in the latter term. It can be seen from the support of the previous item in the table that the proportion of anger is the largest among all emotions, which is 30.57%; from the support of rules, it can be seen that in the attribution of consumer emotions and service types, "anxiety ("Impatience" and "Express delivery delay" occur at the same time with the highest probability of 14.89%; it can be seen from the rule's confidence that when the emotion shown by consumers is impatient, there is an 80% chance that the delivery is delayed. In addition, Table 4 also shows that when consumers show anger, it is most likely caused by "poor service quality (mostly caused by courier)", followed by courier delays. In addition, express delivery delays are also likely to cause consumers to be "anxious (impatient)", "disappointed" and "continued (despised)". This also reminds relevant companies to ensure and improve their service quality while ensuring their logistics and distribution capabilities.

Similarly, when the type of service failure is determined, the type of emotions most likely to occur can be analyzed. The details are shown in Table 5, where the rule support is arranged from large to small, and the minimum rule support is still 5%, and the minimum rule confidence is 15%.

Table 5 Common emotions for specific types of service failure

Number	Front item	Later item	Supporting of Front item(%)	Supporting of rule(%)	Confidence of rule(%)
1	Express delay	Anxiety	32.14	14.89	46.33
2	Poor service	Anger	16.31	9.21	56.47
3	Express delay	Disappointed	32.14	6.47	20.13
4	Express delay	Anger	32.14	6.41	19.94
5	Express delay	Disdain	32.14	5.98	18.61

From Table 5, it can be seen that "delays in express delivery" are the largest of all errors, accounting for 32.14% of all errors, and when consumers encounter delays in their own delivery, they are most likely Will show "irritability (anxiety)" emotion, the probability is 46.33%, in addition, when the

delivery delay occurs, the probability of consumers showing "disappointment", "anger" or "contempt (despise)" emotions Both are around 20%. This shows that the delay of express delivery can easily cause negative emotions of consumers, and enterprises should pay great attention to it. At the same time, among all the combinations that meet the prescribed association rules, the poorest service quality (mostly caused by the courier) and the anger are the strongest, that is, when the courier company has a poor service quality (mostly caused by the courier), there is 56.47 Percentage of possibilities cause consumer "anger". It is concluded from Table 4 that anger is the most negative emotion that consumers can easily express. Therefore, improving the quality of courier services is an effective way to effectively increase the recognition of courier companies.

4.3 REMEDY SELECTION

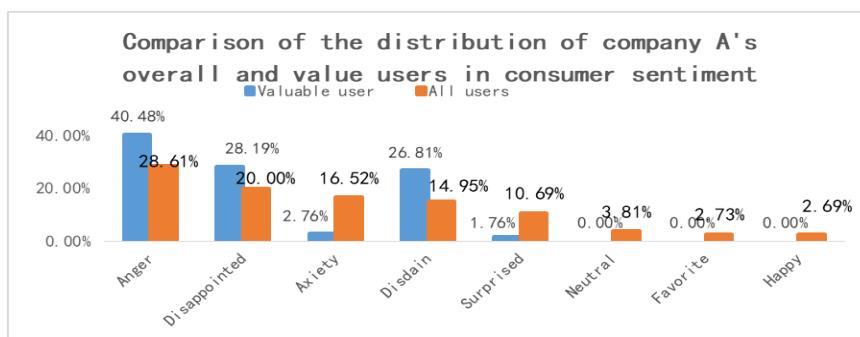
In order to help company A accurately locate the remedial object and better carry out service remediation, the paper uses cluster analysis to obtain value users who have a greater influence on company A's courier service. The paper uses the collected user-related attribute data related to company A, such as the number of fans, followers, Wei Bo, and post comments reposted as clustering indicators. The results shown in Table 6 are obtained through a two-step clustering method. .

Table 6 User clustering results

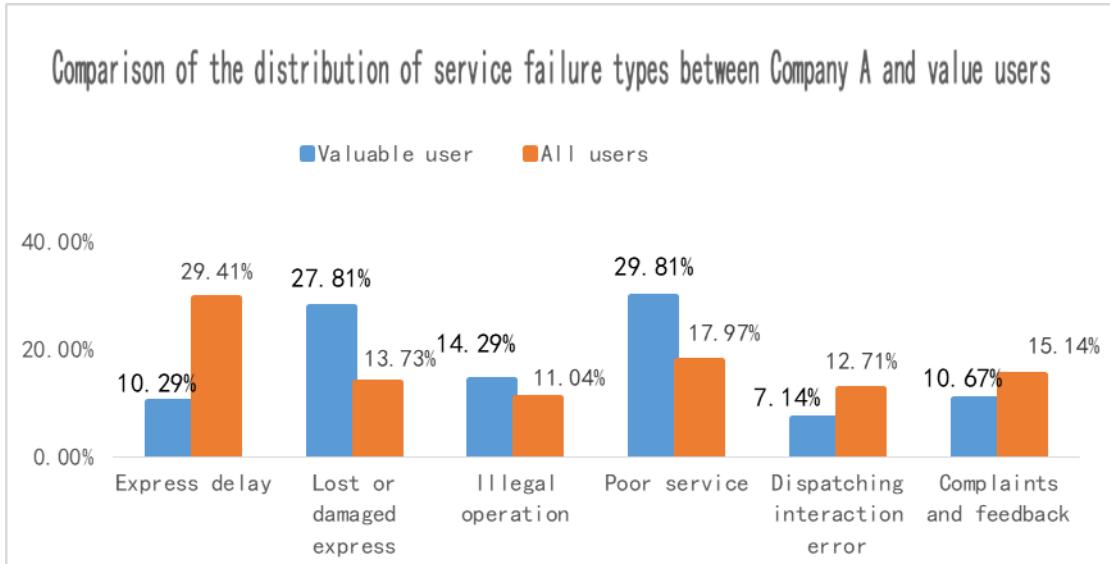
Clustering	Number of users	Proportion (%)
First category	17526	97.30
Second category	486	2.70
Total	18012	-

As can be seen from Table 6, users are divided into two categories, of which the first category accounts for 97.30%, and the second category accounts for only 2.7% of the overall. By analyzing the number of fans, followers, Wei Bo, and post comments on the first and second types of users, it is found that the overall attribute value of the second type of users is significantly higher than the first type, that is, the second type Of users have better activity, which has a greater influence on Wei Bo. Therefore, the second type, the value users of the paper, is the group that Company A needs to focus on, and it is also the first choice for Company A to carry out remediation work.

Because value users are the objects that Company A should focus on, it is necessary to analyze the distribution of consumer sentiment and service failure types with the overall users, as shown in Figures 4 and 5.



Figures 4 Comparison of the distribution of company A's overall and value users in consumer sentiment



Figures 5 Comparison of the distribution of service failure types between Company A and value users

It can be seen from Figure 4 that the value of the anger of Company A's value users, that is, the second type of users, is very high, reaching 40.48%. Company A should immediately collect effective remedial measures for users who exhibit value of anger. The distribution of disappointment and disdain for the second type of users is also significantly higher than the overall distribution, reaching 28.19% and 26.81%, respectively. Company A should also take a quick response to this and provide service remediation. The other emotional distributions are relatively low, but it can be seen from the whole that the negative emotional intensity of the value users of Company A is significantly more intense.

From the distribution of the types of service failures represented by the value users of Company A in Figure 5, the types of service delivery failures, damaged service failure types, and poor service quality accounted for 27.81% and 29.81%, respectively, and the other four service failure types. The proportion is relatively low, so Company A should pay attention to the problems of these value users first, and solve the mentioned problems of lost and damaged express delivery and poor service quality in a timely manner to avoid the widespread spread of this incident.

In general, when company A takes remedial actions, it can first find the second type of value users, and use its influence and communication power to expand the impact of this remedial behavior and achieve better results.

5. CONCLUSION

The dissertation selects Wei Bo platform to analyze consumer sentiment and its attribution type to the fault of express delivery service. The analysis found that "anger" accounts for a large proportion of consumer emotions. The most common type of attribution of service errors is "courier delay", followed by "poor service quality (mostly caused by courier)". It can be seen that courier delays often occur, and consumers are increasingly concerned about courier service work. Using the association rule algorithm, it was found that when the express blog post reflects the user's "anxiety (impatient)" mood, 71% of the probability is recognized by the consumer as the express delay; at the same time, when the express service error is attributed to the express service failure As a result, more than half of

consumers show anger. At this time, enterprises should take certain emergency measures to remedy consumers, reduce customer churn, and maintain corporate reputation and image.

Due to the limitations of text classification technology, the classification of the paper is to classify a blog post as a single emotion and the blog post corresponding to negative emotions as a single service failure attribution type, but there are a large number of compound emotions in actual situations. (A blog post contains two or more emotions) or a composite service failure attribution type (a blog post mentions two or more service failure types). Future research can explore complex types of problems.

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