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Implementation Importance-Performance Analysis Method to Increase Customer Satisfaction of Honda Motorcycle Dealer using Text Mining

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ABSTRACT: Transportation is an essential aspect of people's lives that plays an essential role in supporting economic, social, and cultural activities. Private transportation has become a basic need for Indonesian people, increasing yearly, especially for motorcycles. One of the biggest motorcycle brands in Indonesia is Honda, and West Java is one of the most significant contributors to motorcycle usage. However, their market share is decreasing through the years. It is essential to review customer satisfaction in purchasing Honda products both in terms of product and service through their customer journey in purchasing Honda products. Therefore, this research will discover the aspects customers need from online reviews, especially Google reviews. This research conducted case studies on Dealer Daya Adicipta Motora Bandung, Dealer Bintang Niaga Jaya Bogor, and Dealer Murni Motor II Bogor.

Using Importance Performance Analysis (IPA) will recommend aspects that must be prioritized to improve. The first step is to identify the customer's needs from Google reviews using non-negative matrix factorization (NMF) that produces matrix H and matrix W as the keywords for every aspect. Then, this research also calculates the sentiment for each review using a dependency tree and lexicon SenticNet5. With the output from NMF and sentiment, we will calculate the performance and importance levels. Ultimately, the Performance Level and Importance Level will be plotted into the graph and divided into four quadrants, with Quandrant A as the top priority for improvement. Eight aspects identified in Dealer Daya Adicipta Motora Bandung, the waiting room facility become the priority of improvement. Dealer Bintang Niaga Jaya Bogor has 7 aspects identified, and the services and buying experience become the top priority of improvement; meanwhile, there are 4 aspects identified in Dealer Murni Motor II Bogor, with the waiting time and waiting room facility become the top priority for improvement.

KEYWORDS: Dependency tree, Importance Performance Analysis, Motorcycles Honda, Text mining, Sentiment analysis.

1. INTRODUCTION

Private transportation has become a basic need for Indonesian people, increasing yearly[1], especially for motorcycles[2], with the most significant motorcycle brand in Indonesia is Honda. West Java is one of the most significant contributors to motorcycle usage. However, according to internal data, Honda's Market Share in West Java decreased from January 2023 until October 2023 from 82,70% to 80,14%. Honda should maintain its value and increase its strategy, especially in customer satisfaction, this research will find the aspects that impact customer satisfaction based on Google Reviews related to the customer journey when purchasing Honda products and after-sales services. The customer journey is the process that represents the formation of customer experience and understanding of how customer goals, expectations, and behaviours evolve[3]. *Google Review* is a free service that enables Google to collect valuable feedback from customers who have purchased the product. Customer reviews in Google reviews will collected and processed using text mining with topic modelling method and sentiment analysis to result in Importance Performance Analysis (IPA) to find the priority aspect that must be improved to increase customer satisfaction. The Importance Performance Analysis (IPA) method usually uses data from surveys and interviews. However, online reviews are more efficient and informative [4]

2. LITERATURE REVIEW

2.1 Customer Satisfaction & Customer Reviews

Kotler (1999) defines *customer satisfaction* as a person feeling pleasure or disappointment from comparing what they received from the product or services against their expectations [5]. Satisfaction and dissatisfaction are derived from various interactions that customers have, from websites and online communities, when they enter the store, the employees, and others [6]. Nowadays, Customers utilize technology to help them recall their journey before and after purchase through online reviews such as Google

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Reviews, Trip Advisor, and other social media. A review is an activity carried out by someone to provide their shared experience in purchasing or using the product on a particular platform. The online review platforms have various formats for customers to fill in, such as providing an attribute or rating (1 to 5) and textual comment.

2.2 Topic Modelling

Topic Modelling is a statistical model for discovering the abstract "topics" that occur in a collection of documents. In this research, the topic modelling method used is Non-negative Matrix Factorization. Non-negative Matrix Factorization (NMF) is a decompositional, non-probabilistic algorithm using matrix factorization. It belongs to the group of linear-algebraic algorithms [7] that result in several groups or clusters that are different from each other, where each group contains a collection of words that can form a topic.

2.3 Sentiment Analysis

Sentiment Analysis is a computation technique to extract subjective information, such as opinions and sentiment, from textual data [8]. The sentiment analysis will be processed using the lexicon approach, in which the words in the data will be matched with words in the dictionary in SenticNet5, resulting in a polarity score that describes the sentiment level of the sentence or document. SenticNet's polarity score ranges from -1 to 1; negative polarity has negative sentiment, also otherwise.

2.4 Importance-Performance Matrix

Importance-Performance Analysis [9] was first introduced by Martilla and James (1977)
to measure client satisfaction with a product or service by approaching the function of two components: the importance of the product or service and the performance of the business in providing that service/product. The importance and the Performance score will be calculated and will result in four quadrants.

1. **A. Concentrate here** - high importance, low performance: requires immediate attention for improvement and are major weaknesses;
2. **B. Keep up with the excellent work** - high importance, high performance: indicate opportunities for achieving or maintaining competitive advantage and are major strengths;
3. **C. Low priority** - low importance, low performance: are minor weaknesses and do not require additional effort;
4. **D. Possible overkill** - low importance, high performance: the business resources committed to these attributes should be deployed elsewhere

3. METHODOLOGY

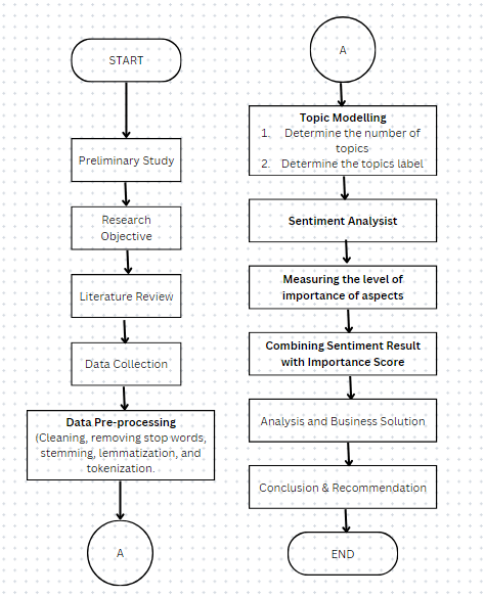

Figure 1. Flow Research Design

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1. Data Collection : The data was Collected from all the google review data using web scrapping “Export Comment”.
2. Data pre-processing : Normalization data using data pre-processing which go through several cleaning process such as : \ tokenization, remove stop words, stemming, and lemmatization [10] to remove unrelated words. Next, from the normalized data will identify bigrams, Bigrams are words with syllables as many as two pieces, if the word is separated will have different meaning. Then the words will be filtered again to remove words that appear too few times in the review and words that appear too much on reviews
3. Topic Modelling : Determine the best number of topics with coherence value then processed using Non-negative Matrix Factorization (NMF) method. Group of words that have been formed will labelled and become aspect of the restaurant.
4. Sentiment Analysis : Begins with preprocessing data such as case folding and tokenization document per sentence, then the data will process into part of speech tagging to labelling each word with correct part-of speech. After that, the dependency method is used to provide direct parent, direct child, and sibling relathionship in every word in a sentence. Last step is to determine weighted sentiment on each aspect that has been indentified using SenticNet lexicon 5
5. Measuring the level of Importance of Aspects : The level of Importance will me measure using Term Frequency-Inverse Document Frequency (TF-IDF) by counting how often the an aspect is appeared in the review
6. Combining Sentiment Score Result with Importance Score : The result from sentiment score and importance score will be combined and analyzed based on Importance Performance Analysis (IPA) matrix. Aspect that have low of performance but the level of importance is high will be the main priority for business solution.
7. Analysis and Business Solution : After designing and running the model, in this step would analyze the results of the research and provide recommendations on the problems that occur

4. FINDINGS AND ARGUMENT

4.1 Data Collection

Honda dealers in West Java are spread over many areas; there are 221 Honda dealers. The data used in this research is a representative Dealer from each category (Big Wing, Wing, and Reguler Dealers) that has the most reviews on Google Review. There are Dealer Daya Adicipta Motora Bandung with 1,582 reviews, Dealer Bintang Niaga Jaya Bogor with 1,128 reviews, and Dealer Murni Motor II Bogor with 504 reviews. The review that obtains is the review with a rating and textual comment.

4.2 Data Processing Topic Modelling

The data will be processed separately: topic modelling and sentiment analysis. Every raw data will processed into data pre-processing first. Topic modelling will processed using Non-Negative Matrix Factorization (NMF). Firstly, it must determine the number of topics by calculating the highest coherence score from the c_v score calculation, which has proven to have the best result for human interpretation compared to other methods [11]. Dealer Daya Adicipta Motora's highest coherence score is eight topics, Dealer Bintang Niaga Jaya Motor has seven topics, and Dealer Murni Motor II Bogor has four topics.

The NMF method will result in Matrix H and Matrix W, where Matrix H describes an approximation value of the contribution or importance of topics to each document. Meanwhile, Matrix W describes an approximation value of each word for each topic. Matrix W will produce keywords by ranking the word's approximation value for each topic and choosing the top 10 words (Table 1), then every top 10 words will labelled as a aspect. Therefore, some of the exact keywords are used in the different topics. The topics can be seen in Table 2 below. The topics are related to experience in visiting Dealer, therefore there are not any topics related to the product/experience while using the product.

Table 1 : Example of Identification Aspect Dealer Murni Motor II Bogor

Topik	1	2	3	4
Label	SERVICE EXPERIENCE	ONLINE ORDER VIA APPLICATION	SERVICES	WAITING TIME OR WAITING ROOM FACILITY
KEYWORDS	service	auto_power	friendly	good
	fast	helping	motorbike	motorbike

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	satisfying	via	mechanic	fast
	great	application	fast	help
	waiting	using	comfortable	mechanic
	workshop	list	place	workshop
	motorbike	helping	pure	comfortable
	room	use	honda	place
	comfortable	honda	cileungsi	honda
	using	great	waiting	room

Table 2 : Identification Aspect

Dealer	Aspects/Topics
Dealer Daya Adicipta Motora Bandung	motorcycle service experience, dealer area, buying experience, services, waiting room facility, product availability, brand & location, and waiting time.
Dealer Bintang Niaga Jaya Bogor	motorcycle service experience, waiting room area, services, buying experience, waiting time, dealer area, and service result
Dealer Murni Motor II Bogor	service experience, online order via application, services, waiting time, or waiting room facility

4.3 Data Processing Sentiment Analysis

The second data processing is through sentiment analysis. The result from sentiment analysis is the list of pairs of words containing adjectives and nouns; every adjective will represent the noun word to determine the intensity of the polarity, from -1 until 1. Below is an example of the sentiment result.

Table 3 : Example Resulf of Sentiment

Pair Word	Noun	Adjective	Polarity Intensity
Dealer Daya Adicipta Motora Bandung			
1	parking	narrow	-0,617
2	room	large	0,806
3	service	complete	0,989
Dealer Bintang Niaga Jaya Bogor			
1	motorbike	disappointed	-0,659
2	cbr150	useless	-0,329
3	service	satisfactory	0,329
Dealer Murni Motor II Bogor			
1	service	good	0,659
2	mechanic	friendly	0,659
3	seat	such	*

4.3 Importance Level Score and Performance Level Score

The result from topic modelling, Matrix H, will calculate the average approximation value for every document in every topic to determine the importance level (Table 4). Also, the result from Matrix W and sentiment analysis will be combined and the average of every topic will be calculated to determine the performance level (Table 5).

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Table 4 : Example of Importance Level

Pair of Words	Noun	Adj	1	2	3	4
1	service	good	0,659	0,000457	0	0
2	mechanic	friendly	0	0	0,659	0,099683
3	repair	official	0	0	0	0
4	dealer	busy	-0,0615	-0,02719	-0,836	-0,16479
5	seat	such	0	0	0	0
….						
194	shop	steady	0	0	0	0
195	service	good	0,659	0,000457	0	0
AVERAGE			**0,216622**	**0,000283**	**0,085738**	**0,022154**

Table 5 : Example of Performance Level

DOCUMENT/ ASPECTS	1	2	3	4
1	0,3050	0	0	0
2	0,0082	0	0,0155	0,0059
3	0,0033	0	0,0596	0,0057
4	0,0112	0,0035	0,0190	0
5	0,0016	0,0130	0,0763	0,0101
….				
503	0	0	0	0
504	0,0909	0	0,0149	0,1164
AVG	**0,070**	**0,051**	**0,053**	**0,038**

4.3 Importance-Performance Matrix Result

The performance and importance level results will be plotted into a quadrant matrix with an x-axis describing the importance level and a y-axis describing the performance level. The vertical and horizontal lines that divide the matrix into four parts are obtained by averaging the performance and importance level. Figure 2a is the result from Dealer Daya Adicipta Motora. The priority of improvement is the waiting room facility. Next, the result from Dealer Bintang Niaga Jaya Bogor can be seen in Figure 2b, the priority of improvement is buying experience and services. Last the result from Dealer Murni Motor II Bogor can be seen in Figure 2c, the priority of improvement is waiting room facility & waiting time. Based on the results from Figure 1, Figure 2, and Figure 3, the top priority for improvement is obtain from Quadrant A (high importance, low performance), also several aspects are included in Matrix C, where the meaning of Matrix C is the aspect that is not important but has low performance. Hence, it is not a priority for improvement. Although the aspect is included in low importance, it can still be improved. That might be from consumer experience; consumers only write about this aspect a little when reviewing. There are several factors; for example, the customers may feel these aspects are standard things that business owners should do, so the customers do not feel anything special if this is to be done. Consumers only write reviews on this aspect if the results are unsatisfied. For example, in the motorbike servicing process, if the motorcycles service carried out by the mechanic is good, this should be done. Therefore, it is possible that consumers will not praise or write about this matter. The customers will only write complaints if it turns out that the problem is with the motorcycles.

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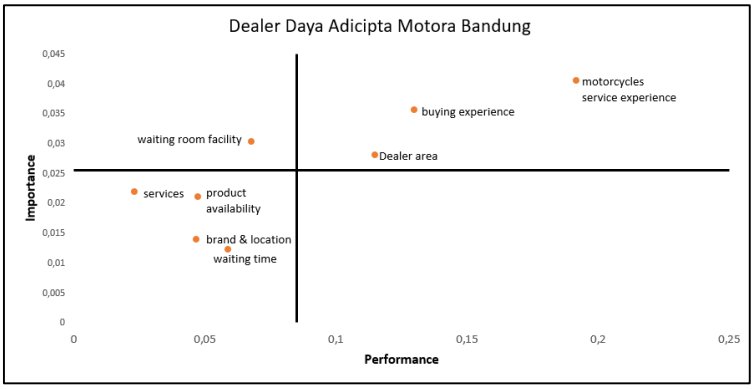
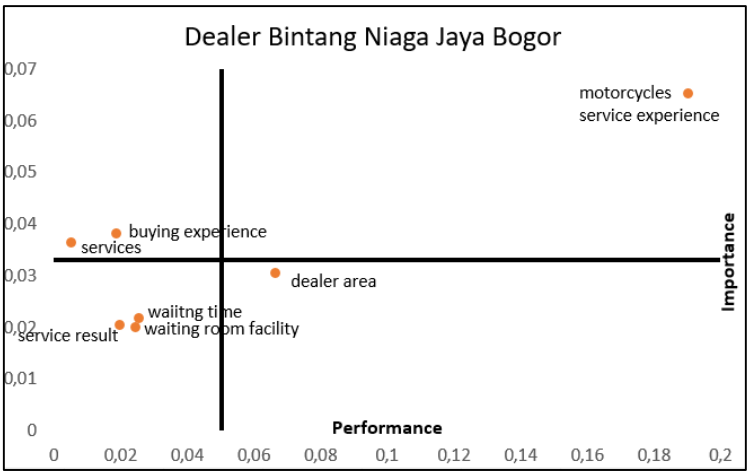
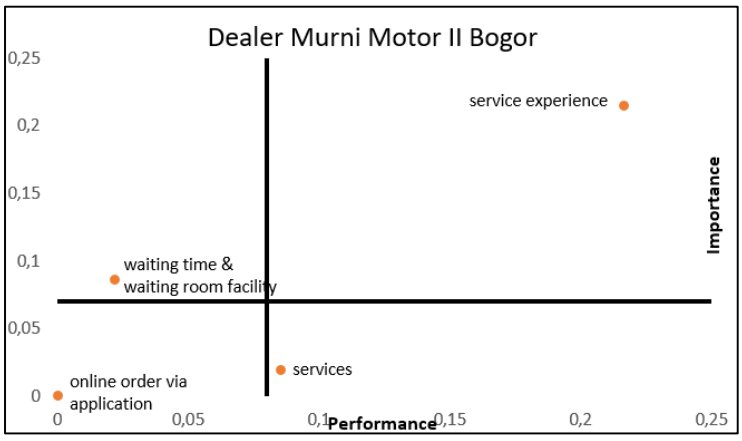


(a)



(b)



(c)

Figure 2 : Quadrant Dealer Daya Adicipta Motora Bandung (a), Quadrant Dealer Bintang Niaga Jaya Bogor (b) Quadrant Dealer Murni Motor II Bogor (c)

CONCLUSIONS

From the analysis of the review in Google Review, the top priority improvement for Dealer Daya Adicipta Motora Bandung is the waiting room facility. The top priority improvement for Dealer Bintang Niaga Jaya Bogor is buying experience and services. The top priority improvement for Dealer Murni Motor II Bogor is the waiting room facility & waiting time

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There are several shortcomings in the research conducted therefore there are several suggestions that can make future research run better :

1. The future research can compare several methods in topic modelling and also sentiment analysis to obtain better analysis result
2. The data collection can obtain for several platform such as Instagram or twitter to get more various and informative data.
3. Analyszing the customer experience while using the product

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