

# Evaluating the Corporate Reputation of Public Hospitals with Emotion Analysis through Patient Comments: The Case of Antalya Atatürk State Hospital

Fatma Yiğit Açıkgöz<sup>1</sup>  

<sup>1</sup> Social Sciences Vocational School, Akdeniz University, Antalya, Türkiye

## Abstract

Reputation management, which is one of the application areas of public relations and constitutes an important part of strategic communication management, comes into play at the point where organisations implement differentiation strategies and achieve their goals. In this direction, strategic approaches supported by accurate data are critical to strengthening the overall reputation of organisations. In this study, it is aimed at analysing the corporate reputation of public hospitals through patient comments using sentiment analysis techniques. Antalya Atatürk State Hospital was selected as the sample for the study. Patient comments were obtained from feedback shared on public platforms about the hospital. Sentiment analysis is an effective method used to evaluate the perception of a brand, person, or institution among the public. In this context, a detailed analysis of the hospital's service quality, doctor-patient relations, hospital environment, and other important factors was made using sentiment analysis. As a result of the analysis, the main factors affecting patient satisfaction and the strengths and weaknesses of the hospital were revealed. It is thought that the findings of the study will provide important clues for the development of corporate reputation management strategies in public hospitals.

**Keywords** Corporate reputation, Hospital, Text mining, Public relations, Sentiment analysis

**Jel Codes** I10, G34, H46

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## ✉ Correspondence

F. Yiğit Açıkgöz fatmayigit@akdeniz.edu.tr




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## 1. Introduction

Corporate reputation refers to how an organisation is generally perceived by its stakeholders. This perception is shaped by the behaviour, performance and values of the organisation in the long term. For stakeholders, corporate reputation reflects the reliability, honesty and responsibility of the organisation. [Fombrun & Riel \(2004\)](#) define corporate reputation as a concept that gives confidence to the stakeholders of an organisation, satisfies them and helps the organisation to gain competitive advantage. This concept is built on an organisation's performance, values and relationships with its stakeholders ([Fombrun & Riel, 2004](#)). As Walker states, reputation reflects the intangible characteristics of a company such as reliability and prestige and therefore plays a critical role in the success of the organisation ([Walker, 2010](#)).

When the related literature is examined, it is seen that reputation, which has many advantages for the organisation, provides sustainable competitive advantage ([Fombrun & Shanley, 1990](#); [Fombrun, 1996](#); [Hall, 1993](#); [Roberts & Dowling, 2002](#)). On the other hand, the close link between reputation and corporate performance is frequently emphasised in the literature ([Deephouse, 2000](#); [Fombrun & Shanley, 1990](#)). [Gibson et al. \(2006\)](#) characterise corporate reputation as the most valuable corporate asset. [Hall \(1993\)](#) also analysed how CEOs and senior managers view the critical role of corporate reputation on business performance. According to Hall's findings, CEOs consider corporate reputation as the most important intangible resource that a business has. However, a positive reputation can lead to lower organisational costs ([Deephouse, 2000](#); [Fombrun, 1996](#)) and enable organisations to charge higher prices ([Deephouse, 2000](#); [Fombrun, 1996](#); [Rindova et al., 2005](#)). It also provides advantages in attracting skilled employees ([Fombrun, 1996](#); [Turban & Greening, 1997](#)), investors ([Srivastava et al., 1997](#)) and customers ([Fombrun, 1996](#)). In addition to increasing the profitability of the organisation ([Roberts & Dowling, 2002](#)), a positive reputation is also known to make significant contributions to competition ([Deephouse, 2000](#); [Fombrun, 1996](#)).

Although corporate reputation is important for all sectors, it has a more critical importance in some sectors. Health sector is one of these sectors. Corporate reputation in the health sector plays a critical role in terms of patient trust and loyalty and is directly related to patient satisfaction. Patients want to believe that the organisation they receive healthcare services from is reliable, committed to ethical values and provides quality service. A strong reputation increases patients' trust in the treatment process and increases the likelihood that they will prefer the same institution again. This trust and loyalty is further strengthened when patients share their positive experiences with their environment, which reinforces the reputation of the hospital ([Lee et al., 2008](#)). Patients' satisfaction with hospital services is reflected positively on positive feedback about the hospital, which in turn reflects positively on the hospital's reputation. Patient comments and feedback play a critical role in determining the strengths and weaknesses of the hospital ([Lee et al., 2008](#)). This feedback allows hospital administrations to evaluate service quality and make improvements.

In recent years, text mining techniques have been widely used in analysing patient comments. These techniques provide an effective way to extract meaningful information from large datasets and objectively assess the quality of hospital services ([Liu, 2012](#)). Text mining helps to identify the factors affecting the hospital's reputation by classifying patient reviews as positive, negative and neutral ([Pang & Lee, 2008](#)).

Analysing patient comments with text mining can help hospitals to develop reputation management strategies and increase patient satisfaction. In this context, the comments of Antalya Atatürk State Hospital were analysed by text mining method in this study in order to guide the careful management of corporate reputation and to improve hospital performance and patient experience.

However, sentiment analysis is a method that has become popular in recent years, especially in social media and customer feedback analyses. The use of this method in analysing patient comments is seen as an innovative approach. On the other hand, the fact that the study was carried out on a specific case study can be considered as factors that increase the originality of the study.

## 2. Material and Method

In the study, data obtained from Google Maps were used as a data set. The corporate reputation of the hospital was analysed and evaluated by using text mining and sentiment analysis on these data. The model proposed in the study consists of three stages. In the first stage, the data set is created and text preprocessing is performed on the data. In the second stage, feature extraction from user evaluations and determination of the prominent features of the hospital. Finally, the comments of the people receiving services from the hospital are classified by sentiment analysis. The outputs of the proposed system consist of positive, negative and neutral moods.

### 2.1. Dataset

Reputation management in public hospitals is of great importance for both the quality of health services and the general health of the society. For this reason, in this study, the corporate reputation of Antalya Atatürk State Hospital operating in Antalya province is analysed and interpreted through patient comments. The main reasons for the selection of Antalya province in the study is that it is a city of great importance for Turkey with its population, socio-economic status and health tourism. There are 19 hospitals in Antalya city centre, 16 private and 4 public hospitals.

Since public hospitals generally provide basic health services by reaching wider masses, the study was limited to public hospitals. The data set was obtained by using patient comments on Google Maps. The main reason for choosing Google Maps is that people who receive service from the hospital can share their thoughts about the hospital freely and without censorship.

**Table 1.** Google Maps public hospital information

Hospital Name	Year of Establishment	Score	Number of comments
Ataturk State Hospital	1974	3.0	605
Antalya Training and Research Hospital	2007	3.1	1.584
Antalya Kepez State Hospital	2017	2.9	722
Antalya City Hospital	2024	3.6	271

Since Antalya City Hospital was opened on 2 March 2024, it was excluded from the scope of the study due to the lack of sufficient time for evaluation and insufficient comments. Although the establishment of Antalya Training and Research Hospital, one of the hospitals examined in the study, is very old, it moved to its current building in 2007 and took this name. The hospital provides services in 95 branches. Antalya Kepez State Hospital was opened in 2017 and provides services in 41 specialities.

Atatürk State Hospital was opened on 12 November 1974 and serves in 22 branches. Considering the patient comments and general scores of the 4 state hospitals in Antalya, Antalya Atatürk State Hospital was selected as the sample. Antalya Atatürk State Hospital was selected as the sample because of its moderate reputation score, enough patient comments, comparison opportunities, service diversity, socioeconomic diversity and development potential due to its location in the city centre. Table 2, Antalya Atatürk State Hospital is given as an example of the comments made.

**Table 2.** Example of data set

Patient comment	Sentiment state
Appointment is difficult, parking is another problem in itself. Despite this, we have seen many doctors and nurses doing a good job as much as they can in such a place.	Neutral
Employees do not come to ask very rude questions, unfortunately, it returns as a harsh reaction, yes, their work may be stressful, but after all, they can be a little more kind to patients.	Negative
Endless thanks to the nurses of the orthopaedics department, we have had many hospital experiences so far, but I have never met such a relevant, warm and sincere people.	Positive
My wife underwent surgery for the second time at Antalya Atatürk State Hospital. I would like to thank the hospital management for its cleanliness, communication, extraordinarily delicious food, friendly staff, experienced doctors and all this staff at the same quality.	Positive
The hospital's patient and companion meals are terrible, we could not eat any of them, we were hungry for a week.	Negative

## 2.2. Text Mining

Text mining is a branch of artificial intelligence that analyses large amounts of text data and extracts meaningful information from this data. Text mining, as a branch of data mining, is a field of study that recognises only text as a data source. This field of study is based on mathematical and statistical methods. In essence, text mining is a process that involves the production of structured texts containing information from unstructured texts. Since texts need to be processed to obtain meaningful information, steps such as data preprocessing and feature extraction need to be performed. After these steps, unstructured data can be converted into a structured form that can be processed by computers and used in text mining. In this way, valuable information among large amounts of data can be discovered.

The aim of text mining is to extract and analyse the data in the text, to transform it into information and to transform the information produced into a usable form in different decision-making processes. Text mining is widely used in many areas today and this use is increasing rapidly. Text mining is used in areas such as banking systems, education, health, insurance, consultancy services, government infrastructures and of course communication and media sectors.

Text mining is performed using information retrieval, syllable analysis, word frequency distribution, pattern recognition, tagging, information extraction, data mining and visualisation methods. Text mining consists of four basic stages. In text mining, the process starts with the analysis of unstructured texts. At this stage, the texts are converted into appropriate quantitative data to form a dataset, and then the process continues by applying one or more of the different machine learning or

statistical analysis methods. According to the results of the analyses, the information is interpreted, and the derived information is presented for use (Doğanlı, 2023).

### 2.3. Sentiment Analysis

Emotion defines a state that activates as an attitude, thought or judgement. Sentiment analysis is a method that visualises the main emotional features evident in the text and is a measure of confidence in predictions (Beşkirli et al., 2021).

Today, social media platforms such as Facebook, Instagram, Twitter are used to share information, emotional expressions and ideas by sharing information in text, pictures and other formats as well as obtaining and sharing information. Therefore, social media platforms are a rich source of data for text mining and opinion mining. Social media contents contain not only information about events, but also the emotional states of the users who create these contents. User opinions about a particular event are extracted through text analysis and it is possible to predict emotional states through this analysis (Başkaya & Aydın, 2017).

Text and sentence level analyses examine whether a text contains personal thoughts or emotions and the possible emotional intensity of the situation. This analysis helps to understand the contextual and emotional characteristics of texts. It is used to analyse whether the hidden emotions in the texts are positive, neutral or negative.

The sentiment analysis process starts with data collection and cleaning steps (Figure 1). The use of cleaned data makes it possible to perform sentiment analysis by increasing the analysis performance. In the second step, which is another performance enhancing step, feature selection is performed. In the third stage, the analysis method is determined and a model suitable for the purpose is selected and classification is performed. Finally, the polarity of the emotion classes is determined (Tokcaer, 2021).



**Figure 1.** Sentiment Analysis Process

Technological advances and diversification in communication channels have made access to information extremely fast and easy, which has been effective in increasing the awareness levels of individuals. With this increased level of awareness, the expectations of individuals from organisations have changed. Today, stakeholders expect organisations not only to provide quality products and services, but also to create social benefits, to meet the expectations of employees, and to be reliable and transparent. In line with these changing expectations, organisations try to fulfil their social responsibilities by engaging in activities to solve social problems, while at the same time aiming to reflect their corporate reputation positively by meeting the emotional expectations of stakeholders.

In this environment where corporate reputation is of critical importance, manufacturing organisations can create a positive perception in their target audiences through their tangible products,

while service organisations create a similar positive perception in their stakeholders through their intangible services. Therefore, corporate reputation is even more critical for service organisations. Public hospitals currently fulfil an important task for the health of individuals and society. Considering that corporate reputation plays a major role in these service organisations, public hospitals are one of the leading organisations.

As stated by [Öncel & Sevim \(2014\)](#), corporate reputation refers to the position of an organisation in the eyes of all its stakeholders and stakeholders' perspectives are at the centre of this concept ([Öncel & Sevim, 2014](#)). Therefore, it is important to evaluate stakeholder views in the measurement of corporate reputation ([Oktar & Çarıkçı, 2012](#)), which plays an important role in explaining the general activities and achievements of the organisation. Sentiment analysis is an application that comes to the fore in a more comprehensive evaluation of corporate reputation by analysing the opinions and emotional reactions of individuals about the institution.

Emotion analysis, which plays an important role in corporate reputation measurement, plays a critical role in understanding the emotional reactions of stakeholders, managing and improving the reputation of organisations. By using the data obtained from sentiment analysis, organisations can develop more informed and effective strategies and thus strengthen their reputation in a sustainable manner.

### 3. Results and Discussion

Research has been carried out by obtaining the messages through Google Maps and performing sentiment analysis for them with the TextBlob library of the Python programme, as well as examining the word frequencies with the N-gram method.

In the first stage of the text, the text was prepared for analyses by using methods such as deleting non-letter characters from the texts examined, removing stop words, determining the maximum and minimum length limits of the words, stemming the words and converting all letters to lower case ([Kayakuş & Yiğit Açıkgöz, 2023](#); [Tekin & Tunalı, 2019](#)).

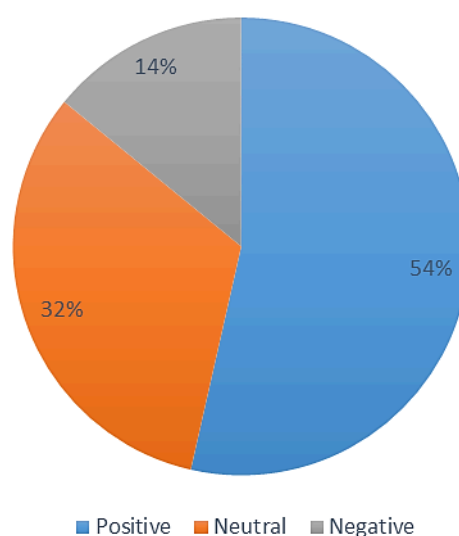
Python programme was used to determine the corporate reputation of hospitals by performing sentiment analysis with customer comments. Python has become very popular thanks to its wide library support and has found widespread use in various fields. In this study, the TextBlob library of the Python programme was used for sentiment analysis. TextBlob is a library specifically designed for natural language processing tasks. Certain NLP tasks, such as sentiment analysis, tend to give more effective results on English texts. This is because TextBlob uses English language resources during sentiment analysis and these resources are more compatible with English texts.

According to TextBlob, the polarity of a text is in the range [-1.0, 1.0], while the subjectivity value is between [0.0, 1.0]. If the subjectivity value of a text is approximately 0, the text can be evaluated objectively. If the subjectivity value is close to 1, it means that the text is more subjective ([Loria, 2018](#)). High subjectivity values mean that it contains more subjective judgements. Likewise, high polarity values express positive emotions. If the polarity value of the text is positive, it reflects positive emotions, while if the polarity score is negative, the text expresses negative emotions; if the polarity score is 0, the text indicates neutral emotions. TextBlob determines polarity and subjectivity values using a vocabulary of adjectives. For sentiment analysis, TextBlob performs preprocessing

steps on the reviews, removing stop words and punctuation. It then evaluates the polarity and subjectivity scores of the words in each review and calculates the overall polarity and subjectivity scores (Durkaya, 2020; Sel, 2022).

**Table 3.** Sentiment analysis of the hospital

Sentiment State	Number of Comments	Percentage Value (%)
Positive	227	53.5
Neutral	60	32.3
Negative	137	14.1



**Figure 2.** Atatürk State Hospital Sentiment Analysis

Patient comments provide important feedback for health institutions to improve service quality and ensure patient satisfaction. In Figure 2, the ratios of positive, neutral and negative effects of patient comments on Atatürk State Hospital are given to evaluate the positive, neutral and negative effects. Positive comments about the healthcare organisation strengthen its reputation, increase patient loyalty and increase the potential to attract new patients (Gretzel & Yoo, 2008). Neutral reviews, on the other hand, generally refer to situations where services meet expectations but are not perfect or defective. These reviews provide objective information to healthcare organisations about the areas where services can be improved (Hennig-Thurau et al., 2004). Negative patient comments, on the other hand, provide information about deficiencies in service quality or patient dissatisfaction and provide critical clues for healthcare organisations to improve their services, but may also have a negative impact on the reputation of the organisation (Anderson, 1998). When the general number of comments of the institution, which provides service as the oldest state hospital in Antalya, is evaluated, an average rate emerges. However, it is seen that positive comments constitute approximately 53.5% of all comments, which indicates that the hospital has a positive reputation in general. On the other hand, negative comments constitute approximately 32.3% of all comments, which is a point to be considered in terms of corporate reputation. The relatively high number of negative comments indicates that service quality needs to be improved in certain areas. Neutral comments account for approximately 14.1 per cent of all comments, indicating that the services generally meet



expectations but do not cause any satisfaction or dissatisfaction. This suggests that services have been standardised in some areas but could be further customised or improved.

One of the most widely used methods for representing text documents is the n-gram text representation method. An n-gram is a contiguous sequence of n elements of any text document. For example, the unigram (1-gram) attribute representation models whether a particular word exists in the text document. Another method, bigram (2-gram) attribute representation, is used to model consecutive words. Similarly, trigram (3-gram) attribute representation is used to model three consecutive words in a text fragment (Kayakuş & Yiğit Açıkgöz, 2023). In this study, two different attribute methods were applied using Unigram (1-gram) at the root and word level of each word in the text.

Word frequencies were created for Antalya Atatürk State Hospital comments. Word frequencies show how often words are used in a data set. These frequencies are expressed using a collection of matrix terms to show the frequencies from the most to the least used words in the dataset. The position of the words in the document is ignored.

**Table 4.** Word Frequency List

Positive	Negative	Neutral
Location	Staff	Room
Hospital	Former	Doctors
Service	Hygiene	Friendly
Health	Waiting	Hygiene
Location	Crowded	Health
Doctors	Building	Meals
Maintenance	Busy	Calm
Transport	Disgustingly	Neglected
Ideal	Terrible	Beginner
Helpful	Disgraceful	Contact

When word frequency analysis is applied for Atatürk State Hospital comments, the 10 most frequently used words in positive, neutral and negative categories are given in Table 4. Based on these words, when the comments about the hospital are evaluated, it is seen that positive comments are generally centred around the location of the hospital and the quality of doctors. The fact that these words are frequently used shows that patients reflect their satisfaction and hospital experiences in a positive way. Factors such as the location of the hospital, service quality, the competence of doctors and the helpfulness of the staff stand out as important positive factors for patients. This paints a positive picture in terms of the overall reputation of the hospital and makes it attractive for other potential patients.

When the words used in negative comments are analysed, it is seen that patients complain about the staff, the old building, hygiene and crowding. These words point to the negative experiences and dissatisfaction of the patients in the hospital. Factors such as the attitude of the staff, hygiene deficiencies, long waiting times, crowded environments and old or poorly maintained facilities are thought to trigger negative comments from patients. This may negatively affect the overall reputation of the hospital. It is recommended that the hospital management should take the necessary steps to improve service quality by taking this feedback into consideration.







indicates that the hospital performs well in general, while negative comments point to opportunities for improvement in certain areas. The location of the hospital, service quality, the competence of the doctors and the helpfulness of the staff stand out as important positive factors for patients. This paints a positive picture in terms of the overall reputation of the hospital.

When the negative comments of the patients are analyzed, it is seen that they express their dissatisfaction on issues such as rooms, doctors, emergency service, staff, general service quality and waiting times. When neutral comments are analyzed, it is seen that issues such as rooms, doctors, nurses, emergency services and general quality of care stand out. It is critical for the hospital management to take into account especially the negative feedback. It is thought that making improvements in frequently complained areas such as waiting times, emergency services and staff attitude will positively affect the overall reputation of the hospital. In this context, it is recommended to analyze the sources of negative comments and develop strategies to improve service quality and increase patient satisfaction. As a result, hospital management should take steps to improve service quality by taking into account both positive and negative feedback. This process will further strengthen the overall reputation of the hospital and increase patient satisfaction.

Indeed, when similar studies in the literature are examined, (Rahim et al., 2021) state that patient coverage and service can be evaluated comprehensively by analyzing social media comments. Similarly, this study examined user comments in detail using text mining and sentiment analysis techniques. However, Greaves et al. (2013) emphasized that effective storage of feedback can increase patient coverage and service coverage. As a result, this study is in line with previous explanations in the literature.

In this context, it is important for the hospital management to strengthen its strong performance by taking strength from positive comments and to use negative developments as an opportunity to improve service quality. In particular, improvements in frequently visited areas such as waiting times, emergency services and staff communication will both strengthen corporate reputation and increase the number of patients. This study is in parallel with similar studies in the literature and contributes to the literature with different methods.

## Declarations

**Conflict of interest** The authors have no competing interests to declare that are relevant to the content of this article.

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