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THE INVESTIGATION OF ONLINE CUSTOMER COMPLAINTS IN THE BANKING SECTOR BY TEXT MINING[1]

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ABSTRACT

The goal of this study is to obtain new gains that would provide benefits to businesses from customer complaints that customers offer voluntarily and free of charge. In line with this purpose, in this study, 25,390 online customer complaints concerning banks operating in the retail banking sector in Turkey were analysed by data mining method. By using the clustering method in data mining analysis, complaints were grouped, familiar words, similar or the words used together of the complaints were identified.

As a result of the analysis done, the most frequently mentioned banks among customer complaints and the subjects that customers complained about most were determined. It was revealed that the subjects that the bank customers complain about most within the relevant periods were "branch, credit card fee, cancellation, customer service, subscription fee". Also, the result emerged that bank customers used the words "unfair" and "victimisation" when expressing their dissatisfaction.

Keywords:

Customer Complaints, Text Mining, Clustering Analysis

JEL Codes:

M3, C8, C38

BANKACILIK SEKTÖRÜNDEKİ ONLİNE MÜŞTERİ ŞİKAYETLERİNİN METİN MADENCİLİĞİ İLE İNCELENMESİ

ÖZ

Bu çalışmanın amacı, müşterilerinin kendi isteğiyle ve ücretsiz olarak sunduğu müşteri şikayetlerinden işletmelere fayda sağlayacak yeni kazanımlar elde etmektir. Bu amaca yönelik olarak çalışmada, Türkiye'de bireysel bankacılık sektöründe faaliyet gösteren bankalara ait 25,390 online müşteri şikayeti veri madenciliği yöntemi ile analiz edilmiştir. Veri madenciliği analizde kümeleme yöntemi kullanılarak; şikayetler gruplandırılmış, şikayetlerin ortak kelimeleri, benzer veya birlikte kullanılan kelimeler belirlenmiştir.

Yapılan analizler sonucunda; müşteri şikayetleri içerisinde en fazla adı geçen bankalar ve müşterilerin en çok şikayetçi oldukları konular belirlenmiştir. Banka müşterilerinin ilgili dönemler dahilinde en fazla şikayet konularının "şube, kredi kartı aidatı, iptal, müşteri hizmetleri, üyelik aidatı" olduğu ortaya çıkmıştır. Ayrıca, banka müşterilerinin memnuniyetsizliklerini ifade ederken "haksız" ve "mağduriyet" kelimelerini kullandığı sonucu elde edilmiştir.

Anahtar Kelimeler:

Müşteri Şikayetleri, Metin Madenciliği, Kümeleme Analizi

JEL Kodları:

M3, C8, C38

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1. INTRODUCTION

In today's world where communication has evolved into social media, where commerce has evolved into e-commerce and finance has evolved into cryptocurrencies, together with the threats such as nuclear dangers, drought and pandemics, data as new danger and power factor, makes states and societies to confront each other. The fact that the ban and embargo attempt between China and the USA, the world's two largest economies in recent years, have been made over applications (Campbell, 2020) and software (Doffman, 2020) shows how important data is for the world.

Data is also an element of value for businesses. The business that holds this value can transform data into information as a production factor and the most critical function of business assets. Sütçü and Aytekin (2018: 13) highlight the importance of data for the business world with examples of Uber, the world's largest taxi company, although it does not own any cars, and Airbnb, the world's largest hotel reservation company even though it has no hotels. Therefore, the party that has the most data and uses the data best (state, business or individual) holds power.

For businesses, having data expresses the collection, the storing and analysing everything related to their customers, employees, competitors and near/far circles. Using data well is about the transformation of the quality of the data into meaningful information. Thus, businesses might consciously direct their strategic decisions with the meaningful information that they obtain from data. However, reaching qualified information from data is not a good goal for businesses. The aims of businesses to access information require both continuity and speed. It might be said that being fast and stable in the process of accessing information determines the place of enterprises in a competitive environment.

According to Porter, while basic competition strategies for businesses consist of elements that are important based on sales and cost (Ülgen and Mirze, 2013: 256), information, which is processed data at the point reached today, has also been included in the mentioned competition elements (Varadarajan, 2020: 89-97). The data constituting this information, which is an element of competition, are various personal information, experience, comments obtained from the customers within or outside the

businesses and are customer complaints which are one of the critical concepts that provide feedback to businesses about their customers.

A customer complaint can be defined as informing the business, relevant decision-making units or third parties in the written or verbal form in cases where the products and services offered by the businesses do not satisfy the customers or do not meet the customer expectations. In other words, customer complaint is an expression of the dissatisfaction expected for an explicit or implicit solution as a result of the evaluation of the companies' products and services or themselves (ISO 10002). While Butelli (2007) defines customer complaints as a behaviour that is positively correlated with customer satisfaction and dissatisfaction, Balaji et al. (2015) emphasise the relationship between customer complaints and customer loyalty and satisfaction.

Customer complaints are warnings that should not be ignored by businesses, as the customer informs the business of their genuine feelings and impressions without the direction of anyone. Therefore, these explicit and actual statements warn businesses about either the mistakes of their corporation or the aspects that they need to improve and offer them new opportunities specific to different perspectives (Kalb, 2011). Park (2005) points out that negative feedback from customers reveals the weaknesses of businesses. Thanks to complaints, businesses can evaluate different ideas and opinions retrieved from customers. The main reason why businesses attach great importance to customer complaints is to retain existing customers and protect the number of potential customers. Also, complaints play an essential role in the prevention of customers from leaving the enterprise and the improvement of the service supply. Customer complaints are an explanatory function in the perception of products and services and the evaluation of consumer behaviours and reveal irregularities and inconsistencies that are prevented from being come to light in the business environment (Galitsky, 2006).

The phenomenon of the management and amelioration of customer complaints play a vital role in the improvement of customer relationships for businesses. The resolution of customer complaints contributes positively to business investments financially. Otherwise, businesses experience customer losses (Coussement and Poel, 2007).

The history of customer complaints, which play a vital role for businesses, dates back to 1750 BC. The first evidence of customer complaints is a clay tablet that a Babylonian buyer wrote his/her complaint to the merchant about copper ingots, that had been bought from him/her, that were not of the quality he/she wanted (www.openculture.com). In the Ottoman period, the Ahi-order institution, which supervises tradespeople and artisans, is known as a very successful institution in terms of customer complaints and their solutions. When the heads of the Ahi-order institution, Ahibaba and Yiğitbaşı, get a complaint concerning a tradesman, they check the situation, and if they see any fault, they punish the relevant tradesmen by throwing their shoes to the roof. This penalty, given as a result of customer complaints, has revealed the phrase "throwing one's shoes to the roof", which is used to mean the disgrace of the tradesman (TESK, 2005). This idiom in Turkish derived from this historical narrative might be translated into English as "putting somebody's nose out of joint".

For customer complaints, which have a long-standing history and in which clay tablets are also used in their transmission, today's businesses offer many alternative channels to their customers to report their complaints. Paid or toll-free phone lines, complaint boxes, customer services or complaint services, e-mail accounts, "contact us" sections on the business websites are the channels provided by businesses. Freephone lines are known as 800 services all over the world and are called free consumer lines. Paid phone lines are 444 coded and 850 coded phone lines. Paid lines are generally used by businesses that set up call centers. 800 service is preferred more than other telephone channels since they do not cost the customer. Complaint boxes are the cheapest and oldest channel. E-mail accounts and "contact us" sections on the business websites are considered as modern complaint boxes (Alabay, 2012: 147).

The channels other than these complaint channels, which are explained above, created by businesses, are face-to-face communication, social communities on the web such as Twitter, user-driven media blogs and online complaint sites. Social media platforms, in particular, have shifted customers' complaint channel preference to the online platform. Complaints submitted through these channels provide direct, secure, fast and effective communication (Tripp and Grégoire, 2011).

In this research, customer complaints of banks, one of the most effective intermediaries of financial systems, are examined. Banks are one of the most important actors that enable the functioning of an economy and are the necessary institutions for ensuring the flow of funds in an efficient economy (Yıldırım Güngör, 2012: 1-5). Banks in Turkey due to their asset size have placed the finance sector, as having the highest growth rate sector of the country's economy (Ministry of Development, 2014: 3). When the last five years of the banking sector reports published by the BRSA every quarter are evaluated, in all five years the fact that the ratio of the asset size of the Turkish Banking sector to GDP is more than hundred per cent emphasises the importance the banks in Turkish economy (BRSA, 2020).

Banks are businesses with a comprehensive customer portfolio as well as asset size (TBA, 2019). The retail banking area mainly is structured based on customer satisfaction (Beerli et al., 2004: 253). Therefore, any feedback regarding customers is a value for the development of the sector and the business. One of these feedbacks is customer complaints (ISO 10002). Today, customer complaints in the banking sector have been transferred to online environments as in many other sectors. Consumers prefer these online environments because they are open to the public and easy to use (Au et al., 2010).

The fact that banks have a broad customer portfolio leads them to face a large number of online customer complaints. It is imperative to analyse this large amount of online customer complaints data and to evaluate the obtained results by the banking sector. Online customer complaints, which are usually transmitted in text, are large volume, scattered and have complex data structure. To structure this data and discover information from data is a complicated and time-consuming process. Data mining techniques accelerate this process and reveal hidden information within the data set at the same time. Therefore, in this study, customer complaints published by the customers of banks, which have an important place in the economy, on online complaint platforms were analysed by data mining method. In the research, the database created from the original complaint texts expressed by the customers in their own words was grouped using text mining algorithms, and by identifying similar or the words used together, the scope inference of complaints is made.

2. ONLINE CUSTOMER COMPLAINTS

The customer complaint is described as written or verbal reporting to a company, relevant decision units or third parties in cases that products or services supplied by the company do not satisfy customers or do not meet a customer's expectations. In other words, the customer complaint, as a result of the evaluation of products and services of businesses or their self-assessments, is the expression of dissatisfaction waiting for an open or veiled solution (ISO 10002).

Customer complaints are formed depending on the relationship between expectation and actual performance. The criteria that constitute customer expectations are advertisement promises and recommendations by acquaintances concerning products and services. The actual performance is connected to the tolerance of an individual receiving product and service. The existence of a complaint provides the opportunity to overcome deficiencies that businesses cannot foresee. Table 1 is made up of statements of many business managers, who try to find a solution to online complaints, about their views on customer complaints in the research published in Marketing Turkey magazine. The businesses appear in the table are selected from among the ones who get the best grades in the evaluation of complaint index in their sectors. When Table 1 is examined, the common point of the company managers is that they perceive customer complaints as an important value in providing customer satisfaction and loyalty and see customer complaints as a benefactor.

In the body of literature, views about customer complaints are also in the same direction as private sector managers. While Mattila and Mount (2003) define customer complaint behaviour as a healing process, Barlow and Moller (1996) emphasise that customer complaint is beneficial for customer loyalty. Complaints are regarded as an opportunity for businesses to realise irregularities and inconsistencies in the workplace environment (Estorilio and Posso, 2010). Besides, the complaining customer is the customer who has not left the company yet. Therefore, the complaining customer is the person who has the chance of reclaiming by the proper complaint management and who allows a company (Alabay, 2012). Goodman (1999) underscores that complaints are customers' gifts to businesses whereas Özgül (2007) asserts that when

a relationship between a customer and a business enters a dangerous situation, a complaint brings about a chance to amend the situation.

Table 1. Business World's Leading Business Executives' Opinions Regarding Customer Complaints

Company	Authorised Person	Title	The Evaluation of a Customer Complaint
CarrefourSA	Nilhan Alkaya	Marketing Director	Our goal is to increase customer loyalty
Halkbank	İsmail Hakkı İmamoğlu	General Manager Assistant of Retail Banking	Customer complaints are a communication line
ING Bank	Seçil Refik	HR, General Manager Assistant of Brand Management and Communication	Complaints provide an opportunity for sustainable success
Markafoni	Tolga Tatari	Co-Founder	We manage complaints 24/7
Profilo Durable Household Goods	Bahriye Bayraklı Tavukçuoğlu	Marketing Manager	The most crucial advertisement channel is the consumer
Renault Mais	Ibrahim Ayhan	General Manager	The complaint offers us a golden opportunity/ We are not afraid of complaints
Surat Cargo	Adnan Konyalıoğlu	General Manager Assistant	We care about customer demands
Turkcell	Meltem Şahin	Customer Experience Management Director	We head for all areas that we can hear our customers
Vaillant Turkey	Levent Taşkın	General Manager	Every complaint is a gift
Vestel	Dr. A. Tarkan Tezcan	General Manager	Our purpose is to create the difference, and we are the first in solving complaints in the White Goods sector
Ziraat Bank	Osman Tanacan	Payment Systems Group President	Complaint index is an important criterion.

Source: It is prepared by compiling magazine interviews from 2014 July issue of Marketing Turkey

Eser et al. (2016: 41), in their research on online customer complaints in the banking sector, state that effective and systematic management of customer

complaints is one of the most critical factors that ensure customer retention. Shams et al. (2020:25, 30-31), in their study investigating the effects of banks' complaint management on customer satisfaction, they conclude that the process of handling customer complaints affects general customer satisfaction and banks' brand reliability. Besides, this study indicates that effective complaint management style is critical in-service businesses and the bad experience lived by customers often causes them to change the service providing bank.

It is now the more preferred method to report complaints by online platforms nowadays as customers have difficulties in contacting an enterprise through old-style techniques, for example, the inability to reach a call center or the misunderstanding between a customer and the person in charge. Many reasons, such as customers considering social platforms as the easiest and fastest way to report their complaints, have revealed the concept of online customer complaint.

An online customer complaint is an expression that customers inform business for what reasons products and services cannot meet their expectations and that they employ internet tools for this notification (Goetzinger et al., 2006). In other words, online customer complaints are entitled as the transfer of problems related to products and services on the internet to others through publicly available platforms (Hong and Lee, 2005) and also referred to as e-complaint in the body of literature (Tyrell and Woods, 2004: 183-184).

Online complaints can be defined as the transfer of message boards of the past to the digital platform. People who often have complaints about products and services use these websites to discharge their anger. The purpose of this system is not to find a solution to the complaint, but to be the voice of the customer. The rapid development of complaint sites has enabled this to turn into a sector. The online complaint industry formed in the cyber world has the characteristic of displaying a structure that finds solutions to complaints and informs visitors about the outcome of their complaints (Winch, 2011: 44-52). Thanks to online complaint sites on the internet, consumers are more comfortable in expressing themselves and sharing information than traditional complaint management process (Argan, 2014: 51-53). It is seen as an easier way for consumers to apply to online complaint sites, which are defined as third party

businesses, instead of going to the product or service provider (Tyrell and Woods, 2004: 189).

Özkaynar (2010) points out that the reasons behind the reporting of complaints online by customers are to inform others about product defects and to enjoy reporting those products. This situation is labelled as electronic word-of-mouth (e-WOM) in the literature. It is underlined that customers usually tend to explain their complaints to others rather than to businesses. The factors that direct customers to this behaviour are listed as egoism, the sense of unity, altruism and ethical principles. Customers' expression of positive/negative opinions on social platforms concerning businesses shows an increase with the diversification of Internet communication tools. At present, instead of businesses, customers rely on each other. The reason for this is the belief that they cannot receive reliable information from businesses and advertisements. Therefore, good advertising is considered as positive statements of a customer rather than high-budget advertising (Özaslan and Meydan Uygur, 2014).

The experiences and complaints that customers share in a virtual environment are mainly guiding in the preferences regarding service businesses. On the subject of travel expenses usage rates of online platforms are very high. Consumers when making travel plans through the information offered by cyber setting, they considerably count on the information provided by other individuals who have experienced that before. In the light of this information consumer making travel plans decide on their purchase of the hotel, decision on a restaurant and transportation services (Sezgin et al., 2012).

In comparison to complaints made via other channels, the negative word-of-mouth marketing effect of online customer complaints is very significant. Particularly the presence of those complaints on Internet environment, that is to say, the possibility of reading a complaint by millions of people at the very moment it is written, intensifies this negative effect even more (Memarzadeh and Chang, 2015).

Aytekin and Mayda (2013) define social media as a listening tool that provides data flow to businesses. Customers freely express their opinions about businesses, make recommendations and complaints. This information is a guide for the decisions

that businesses will take in a competitive environment. Customer complaints also play a decisive role in increasing the efficiency of businesses and in their strategic decisions.

In recent years, there has been an explosion in the number of complaints in all communication tools, especially in online social networks. While customers shared their complaints with an average of 10 people in the 1970s, this number reached 280 in 2014. The online channels with the highest number of complaints are Twitter and Youtube (Grainer et al., 2014).

Online complaints allow anyone who uses the internet to become a writer. Today a great majority considers even to share what they eat as significant in a free world where the whole world can be a spectator. The literal meaning of Twitter is a short burst comprised of birds' chirp and useless information. The application was regarded as "useless birds chirp" during the first period of its emergence, its use became increasingly widespread and especially when it was started to be used by famous persons, it has become indispensable for businesses. Twitter is a bird chirp for today's businesses that may be meaningful. However, this meaningful bird chirp might be a complaint that might alienate customers from the brand. Consequently, companies should be active on social media and should not lose the chance to convert complaints into an advantage (Rogers, 2014: 9-12; Sarno 2009a).

3. DATA

Within the scope of this research, online customer complaints about banks running in the finance sector and offering retail banking services in Turkey are examined. Two critical aspects have been taken into consideration in the selection of sector. The first of those is the high number of customers in the banking sector. The second important aspect is that every year banks are ranked within the best 100 businesses that are selected by various companies and published in economic magazines.

From publicly available sites on the internet, online complaints of all banks operating in Turkey were collected without any discrimination. The data used in the research are public and secondary. Therefore, an ethics committee approval document is not required. Given the probability of change in subjects of complaints depending on time, two separate data sets were used in the study. The first data set between

February 1, 2020 and February 29, 2020 and the second data set between March 1, 2020 and March 31, 2020 were composed of a total of 25,390 customer complaints. In the research, RapidMiner Studio 9.6 (Educational License) program was used.

4. METHODOLOGY

The collection of data of texts from the internet and the recording of .xls format into RapidMiner format is the first significant phase of text mining. In the obtaining of data, an ID for each complaint was defined in order to protect the personal rights of users. Complaints were recorded in separate columns as title text and complaint description text.

The dataset in Excel format was added to the RapidMiner program, and then data were saved in the database. During the recording phase of the data, each column of the table was selected as an attribute, and the format of each attribute was appropriately designated for the analysis.

A data pre-processing operation has been applied to transform unstructured text data into structured data. Many operators that should be used in the RapidMiner program take part in this process. The process formed by the help of these operators provides the creation of the document-word table by calculating each word as an attribute in the text along with the frequency of words in the document.

In the pre-processing data stage, the most commonly referenced first procedure is marking. Marking embraces the operations that are made to convert data without a specific structure into an appropriate attribute for the analysis. It is often used to define the characters between the spaces in the text as words, to arbitrarily determine character limit for words and the operations to convert uppercase to lowercase and create a meaningful document-word table.

In terms of data pre-processing the other operation that needs to be applied is parsing. Parsing is the operation to transform words with suffixes from the same root into the standard format, and it is used to standardise words with the same meaning. For instance, “card” and “of cards” have the same meaning. The parsing operation ensures that the number of words in texts is calculated according to the roots and that all of these words are recognised as the same word. The following operation related to

the word count is pruning. Pruning, in line with a researcher's opinion, is the process of extracting the words in texts in case they have a frequency below a specific ratio.

Apart from the counting of the words, another method that works according to the perceived importance of words is TF and TF-IDF methods which calculate the weights or scores of the words. TF is a measure of high term frequency of words in the database, and IDF is a measure of rarely used words. If a word is frequently employed, it can be said that it is "not determinant" for a researcher. If a word does not appear frequently, the powerful feature is mentioned. The TF-IDF is generally used to find the similarity ratio between the query vector and the training document vector.

TF-IDF (III) is the multiplication of two statistical indicated as term frequency (I) and inverse document frequency (II), as follows:

$$tf(t, d) = \frac{f(t,d)}{max\{f(w,d):w \in d\}} \quad (I)$$

$$idf(t, D) = \log \frac{N}{|\{d \in D: t \in d\}|} \quad (II)$$

$$tf - idf(t, d, D) = tf(t, d) \cdot idf(t, D) \quad (III)$$

There are several ways to determine the exact values of both statistics. When it comes to the frequency tf (t,d) term, the number of occurrences of the term t in document d is divided by the number of occurrences of the most frequently mentioned word (w) in the same document (Equation I). IDF is the measurement of the frequency of a word in all the documents. The logarithmically scaled part of documents that contain a word is obtained by dividing the total number of documents by the number of documents containing the term and by taking the logarithm of this section (Equation II). N is the total number of documents; $|\{d \in D: t \in d\}|$ is the number of documents in which the term T appears. Finally, TF-IDF is calculated (Equation III) (Kapucugil İkiz and Özdağoğlu 2015: 32).

In the pre-processing data stage of the research, the n-gram calculation was used. N-gram is a method used by the information systems to understand in which language texts are written. It is a process of information systems to deduce information by defining the patterns formed by the letters side by side that constitute the words. 2-grams, 3-grams or more can make these operations. However, another n-

gram operation is a pattern identification method in which the words that form the sentence are side by side by the terms. For instance, it offers the opportunity for the evaluation of the word's "credit" and "card" as a single word "credit card". In this research, the term n-gram method was used. The number of terms was experimentally determined according to the effect and computational complexity of the results.

5. RESULT AND FINDINGS

The screenshot of the course of data pre-processing, the process created in RapidMiner program and the operators used are shown in Figure 1. This process ensures that unstructured data in two separate sets of data, consisting of 25,390 customer complaints, is transformed into a structured data structure suitable for data mining analysis.

In the data pre-processing process in Figure 1, since Turkish dictionary is not included in the program, the parsing process was provided by snowball option which analyses this language best. In the process of applying the n-gram method, in front of each word, that word, along with the most used words, was defined as a separate attribute. Besides, the number of occurrences of these attributes in the whole database and their number of occurrences within the document was given. Even if the attribute is used more than once in the document, it is counted as single-use for that document, whereas in the total number each use of the attribute is counted as its actual value. The frequency of passing the attribute in the document was taken as the basis while interpreting the findings.

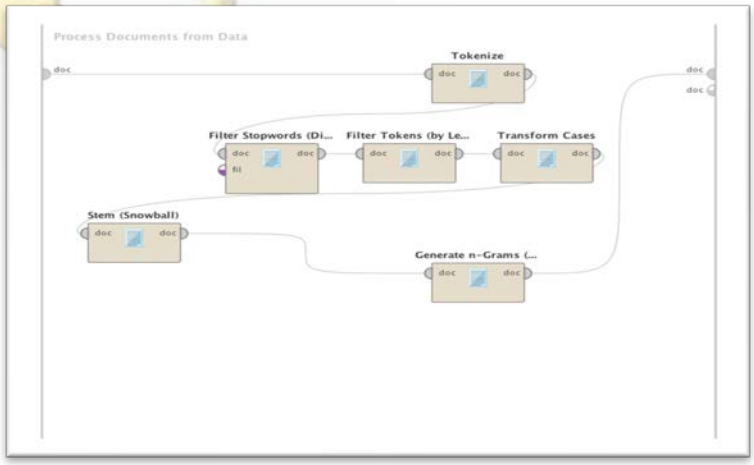

Figure 1. Data Pre-processing Process

When the word list in Table 2 is examined, it is seen that A1 Bank is the most mentioned bank among customer complaints with 860 documents. If 10,000 documents are considered to be customer complaints, the rate of 8.6% is quite high. Ranking; A2 Bank 8.1%, A3 Bank 6.7%, A4 Bank 6.4%, A5 Bank 6.2%, A6 Bank 5.5%, A7 Bank 4.7%, A8 Bank 4.7%, A9 Bank 3.0%, A10 Bank 2.9%, A11 Bank 2.1%, A12 1.2%, A13 Bank 0.1% and A14 Bank with the lowest percentage. The bank, which is the subject of the most complaints here, can be considered as A1 Bank, two important issues to be underscored also draw attention. The first of these is that the intensity of the number of banks' customers is a condition that can highlight a bank in the process of receiving complaints. Therefore, the banks with the largest customer portfolio are in the front row in the order. The other issue is that in the banking sector, the customers of the bank, which uses technology most, also show a tendency to use online platforms extensively (Şiker, 2012). Although A1 Bank is a company that is taken as a reference for the use of technology in the sector, A9 Bank, as a state bank, has been using technology more intensely in recent years (Pala and Kartal, 2010).

Table 2. An Example of Word List (February 1-February 29, 2020)

Word/Attribute	Total Appearance Frequency	Document Appearance Frequency
A1 Bank	1,301	860
A2 Bank	1,134	816
A3 Bank	1,344	679
A4 Bank	813	643
A5 Bank	882	627
A6 Bank	802	550
A7 Bank	663	476
A8 Bank	1,149	472
A9 Bank	468	316
A10 Bank	963	293
A11 Bank	460	212
A12 Bank	339	121
A13 Bank	76	19
A14 Bank	30	9

* Bank names are anonymised.

When the complaints in the March 1-March 31, 2020 data set (Table 3) are examined following the frequency of the appearance of bank names, in general, results close to the first data set were revealed. The outcomes of this data set also point out that the customer portfolio of the banks affects the number of complaints received. Online complaint sites remove the complaint after a certain period if the businesses report to them that the complaint has been resolved. Therefore, in the event of any bank forming a customer complaint management system by the system above, complaints against them cannot be observed by third parties. However, banks might also prefer to install online platforms within their organisations. In this case, reaching complaints that are outside of its platform may exist as a more troublesome and time-consuming problem.

The presence of numerous complaints regarding A5 Bank, A3 Bank, A4 Bank, A1 Bank and A2 Bank can be explained by the fact that these businesses do not benefit from online complaint sites and they use their complaint channels in complaint management. Accordingly, the occurrence of countless complaints concerning mentioned businesses does not reflect the failure of those businesses in complaint management.

Table 3. An Example of Word List (March 1-March 31, 2020)

Word/Attribute	Total Appearance Frequency	Document Appearance Frequency
A1 Bank	1,307	892
A2 Bank	936	747
A3 Bank	1,391	521
A4 Bank	1,700	614
A5 Bank	1,564	1,092
A6 Bank	967	688
A7 Bank	1,080	749
A8 Bank	1,336	588
A9 Bank	696	495
A10 Bank	1,178	396
A11 Bank	485	163
A12 Bank	915	292
A13 Bank	77	27
A14 Bank	42	11

* Bank names are anonymised.

In Table 4 the most intensively used words and phrases related to customer complaints are as follows: "branch, blocked, cancellation, cancel the card, consumer arbitration committee, consumer protection, contract, credit card, credit card fee, customer service, customer representative, extract, interest, internet, law, limit, mobile, money, otherwise, promotion, refund request, salary, salary account, shopping, subscription fee, to be called by customer service, unfair condition and victim".

Table 4. An Example of Word List (February 1-February 29, 2020)

Word/Attribute	Total Appearance Frequency	Document Appearance Frequency
Branch	3,104	1,907
Blocked	874	501
Cancellation	2,881	1,966
Cancel Card	459	417
Consumer Arbitration Committee	362	356
Consumer Protection	595	585
Contract	1,448	772
Credit Card	4,787	3,496
Credit Card Fee	3,487	1,857
Customer Service	1,857	1,563
Customer Representative	445	394
Extract	792	673
Interest	773	536
Internet	443	389
Law	416	395
Limit	919	500
Mobile	537	441
Money	2,610	1,676
Otherwise	446	443
Promotion	141	80
Refund Request	837	819
Salary	1,714	1,099
Salary Account	450	399
Shopping	820	516
Subscription Fee	1,304	944
To be called by customer service	333	326
Unfair condition	680	588
Victim	672	621

The appearance of the word "credit card" in 3,496 documents suggests that the most common complaints are due to "credit card". Although the banking sector has many products other than credit cards, such as deposit or draw accounts, various loans and individual pensions, it can be said that the most extensively used product and the most significant cause of complaints are credit cards. Along with credit cards, it is shown that the phrases "credit card subscription fee, cancel the card, membership fee, consumer arbitration committee" also has a total rate of 29.0 % among the complaints. The BRSA (Banking Regulation and Supervision Agency) 's regulations on card fees in 2006, (see; www.bddk.org.tr) and the fact that the fees did not disappear altogether despite the regulation, might suggest it as an influential factor in the intensity of these complaints.

The density of the word "Branch" in the documents was calculated as 19.0%. The second biggest problem after credit cards is related to branches. The previously mentioned might be a sign that branch banking is still being used extensively, even though many products of banks are put into use online. The total density of phrases related to telephone banking such as "customer service, customer service call and customer representative" in the data set only corresponds to 19.0%.

Another noteworthy aspect of customer complaint is the presence of the words "otherwise, cancellation and victim or victimisation". The word "cancellation" appeared in 1,966 documents and took a share of 19.6 % among all uses. It can be stated that customers who employ the expression "cancellation" can show a tendency to leave the bank that they use. It is also possible to mention that the occurrence of the word "otherwise" in 443 documents poses a threat to cited banks on the subject of losing customers. The expressions "victim and victimisation" were used 621 times in total. It gives the impression that customers identify themselves as victims against the bank that they get service.

Customers have expressed their expectations from banks by using the statements "consumer protection" and "contract unfair terms". This expectation embodies 11.0% of the complaints. Customers' request of "refund" at most from the banks that they get service can be explained by the appearance of this word in 1,276 documents at the rate of 12.7%. In March 2020 data as the second dataset, the most

frequent words related to customer complaints are quite similar to the first dataset except numerical difference. These are; "branch, blocked, cancellation, cancel the card, consumer arbitration committee, consumer protection, contract, credit card, credit card fee, customer service, customer representative, extract, interest, internet, law, limit, mobile, money, otherwise, promotion, refund request, salary, salary account, shopping, subscription fee, to be called by customer service, unfair condition, the victim". The different results of the second data set are related to the words' credit card and promotion'. In the first data, the word "credit card" is found 3,496 times. In comparison, in the second data it appears 2,982 times. There is a 5% reduction in credit card complaints between the two data sets. The word "promotion" takes place in 80 complaints in the first data set whereas appears in 401 complaints in the second data set. It is considered that this increase is related to annual promotional payment periods of banks.

Besides, the corona pandemic in the world has become one of the subjects of the complaints since March 1. The pandemic which was seen extensively in China and the Far East before March, appeared only three times in the complaints regarding the banks in Turkey and these complaints are related to the cancellation of flight tickets taken by credit card for the trips to the Far East. The epidemic, declared pandemic as of March 11, has tragically affected the whole world. A total of 15,391 complaints data in Turkey during the March were examined, and it was identified that the complaints originating from the compulsory measures are included among the complaints made to the banks. In the second data set covering March, the term "corona" passes through in 301 complaints. In these complaints both branch and customer service complaints and the complaints regarding the aboard expenses, which are required to be cancelled. After March 21, 252 out of 5,391 complaints, in general, encapsulate the requests for the postponement of upcoming credit and credit card payments. However, these complaints are specific to that moment and should not be generalised. After all, this pandemic is an extraordinary situation.

As can be seen, the text mining analysis of the research mostly takes place in the data pre-processing process. In the next process, the cluster analysis method has been applied.

The K-means algorithm works as follows (Sarıman, 2011):

- First, k number of objects is randomly selected to represent the center point or mean of each cluster.
- Other objects are included in the most similar clusters by taking into account their distances to the mean values of the clusters. The most widely used distance calculation formula is the Euclidean distance formula.
- By calculating the mean value of each cluster, new cluster centers are identified, and object-center distances are examined again. Until any changes occur, the algorithm continues to iterate.

The number of k clusters was determined randomly using the K-Means algorithm. For this reason, the cluster analysis has been made by increasing ten points starting from 10 until 100 clusters, and the cluster structure with high performance has been accepted. To determine whether the randomly selected cluster number is acceptable, the silhouette width value was used as the performance criterion. The Euclidean distance formula was used as the distance calculation criterion. The pruning value between 5% and 90% and the iteration were assigned as 10.

The silhouette width value, which is formulated as $SW_i = \frac{(bi-ai)}{max(ai,bi)}$, is employed to express how the clusters are different from each other. The silhouette width value, which is between +1 and -1, indicates that the closer it is to +1, the better the number of clusters. The equation calculates this value between the mean distance of the clusters themselves and the mean distance of between the clusters (Boros, 2011).

The screenshot of the course of clustering, the process created in RapidMiner program and the operators used are shown in Figure 2. As a result of cluster analysis, the average silhouette width values of the two data sets were found to be 0,062 and 0.557, respectively. The silhouette width value, which is greater than .5, indicates that an acceptable cluster structure was created (Hotho et al., 2005: 16-17). According to these values, the first data set does not have a significant set structure, but the second data set is divided into ten significant sets.

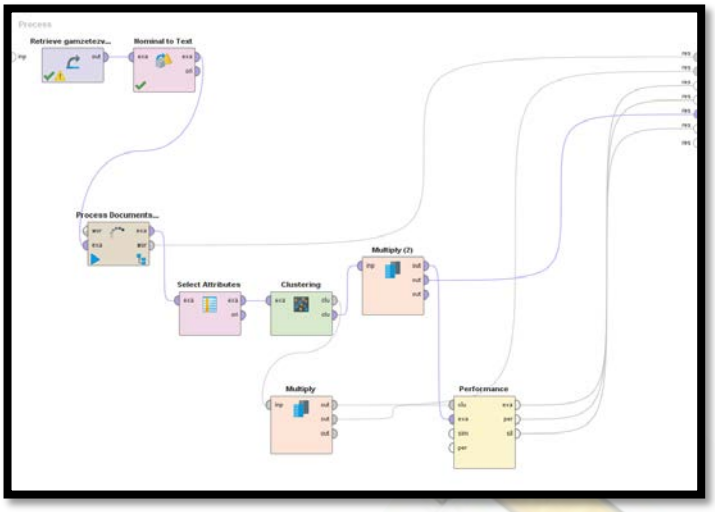

Figure 2. Clustering Analysis Process

The findings are as follows for the second data set whose cluster structure is significant;

When the average silhouette widths inside of the clusters are examined, it is seen that cluster 7 provides the best cluster structure with 0.617, followed by cluster 8 and cluster 9 with 0,610 and 0,585.

As a result of the analysis used in the research, the word list that provides the document similarities of the clusters was created. In Cluster 7, the document similarity is provided by the words "account, bank, branch, credit card, money and salary account" with the highest silhouette index. It can be concluded that the complaints in this set include salary accounts and credit cards in the relevant banks as well as the complaints concerning branches. Therefore, by determining the leading cause of the customer complaints in this cluster, the relevant bank might direct them to the relevant departments for the solution.

When the document similarities in Cluster 8 are inspected, the famous words are "credit card fee, cancellation and credit card". It can be considered that the centre of this cluster is customer complaints that complain about the credit card fee and that have cancellation requests. Cluster 9 focuses on the words "account, bank and credit card". The cluster generally consists of credit card and bank account complaints.

Another way to evaluate clusters is to examine clusters on a word basis. By choosing the words that may be important for research, in which clusters this word is found, and its frequency can be determined. Also, the density of words in clusters can

be easily explained with the help of graphics. In Figure 2, examples of circular charts of clusters on word basis are given.

According to the silhouette width expressing the performance value, acquired ten numbers of clusters is meaningful in terms of analysis but can be evaluated as useless about the application. In this case, in order to reduce the number of clusters, the closest neighbours of the clusters which are again calculated according to silhouette width can be identified.

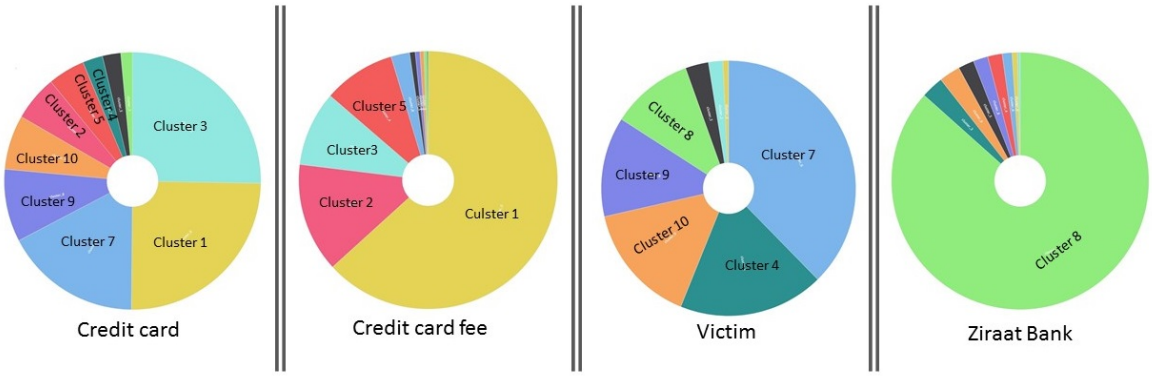

Figure 3. The density of the Attribute in the Cluster

Cluster neighbours for the second sets of data are determined and shown in Table 5. According to cluster and cluster neighbours table, Cluster 1 and Cluster 6 and Cluster 7; Cluster 2 to Cluster 4 and Cluster 10 are assigned as neighbours. Hence Cluster 1, Cluster 6, and Cluster 7 can gather together in new Cluster A; Cluster 2, Cluster 4, and Cluster 10 can aggregate in new Cluster B. The formation of a new cluster by each cluster with its close neighbour or neighbours leads to the merging of clusters and the reduction of the number of clusters.

Table 5. Cluster and Cluster Neighbours Table

Cluster and Cluster Neighbours (March 1-March 31, 2020)
Cluster 1: Cluster 6 & 7
Cluster 2: Cluster 4 & 10
Cluster 3: Cluster 5 & 8
Cluster 4: Cluster 2 & 6
Cluster 5: Cluster 3 & 9
Cluster 6: Cluster 1 & 4
Cluster 7: Cluster 1
Cluster 8: Cluster 3
Cluster 9: Cluster 5 & 10
Cluster 10: Cluster 2 & 9

The primary purpose of the cluster analysis is to group the units according to their characteristic features. By this method, customer complaints can be interpreted more efficiently, and the complaint texts can be summarised. Reducing the number of clusters will facilitate the identification of complaint categories in practice.

The classification of customer complaints about representative words provides convenience in pinpointing the words that constitute the main issues of the complaints. The detection of cluster and cluster neighbours can be decisive in splitting customer complaints into categories by narrowing the grouping. For instance, customer complaint management might divide the complaints into headings in line with representative words distinguished in the cluster analysis. Thus, the complaints that should be resolved by authorised staff in complaint resolution unit can be distributed to the relevant personnel according to these headings. The issue that each authority is responsible for can also be viewed on the screen of the user information system program and the time that is lost by reading out off-topic complaints can be saved. Cluster analysis is thought to contribute to businesses in finding solutions faster by dividing thousands of customer complaints into groups.

6. CONCLUSION

The banking sector is regarded as the central pillar of the global economic system due to its apparent impact on countries' development and steady growth

(Mohamed, 2016: 99). The critical factor affecting the success of businesses in this sector is customer satisfaction (Nazari et al., 2016). While a satisfied customer enables the income generation of businesses and the continuation of their existence, an unsatisfied customer leads a business to lose revenue and put its existence at risk. However, another significant point for businesses is that they know whether their customers are satisfied or unsatisfied. For this reason, businesses construct customer complaint channels where customers can report their dissatisfaction. With the development of internet technologies, online channels have also been included in these channels (Sparks et al., 2016). An online customer complaint is a concept that can provide an opportunity for businesses to reclaim unsatisfied customer.

The customer complaints on online platforms regarding the banks with extensive customer portfolio are high in number, complex in structure and composed of scattered data. According to the report of the Banks Association of Turkey (2019), 46 million bank customers in Turkey use the internet and mobile banking tools (www.tbb.org.tr). Internet communication technology, social media and online platforms are valuable and useful data sources for businesses (Bickart and Schindler, 2001). It was intended that data and text mining analysis that enable to transform dispersed and complex data in these sources into meaningful information will suggest a new perspective for businesses.

In this goal-oriented study, online customer complaints against the banks operating in the retail banking sector in Turkey were explored. By taking into account the time factor, two separate data sets were created from the online complaint texts written in daily language by the customers. By using the clustering method of data mining analysis along with text mining algorithms, familiar words, similar or coexistent words of the complaints were identified.

As a result of the analyses made, it was observed that A1 Bank is the most mentioned bank among customer complaints in both data sets. This is followed by A5 Bank, A4 Bank and A2 Bank. The excessive numbers of customers of banks and banks' support for the use of technology by their customers increase the intensity of these banks' receiving complaints online (Şiker, 2012). As a consequence of the analysis, it is seen that the banks receiving the complaints most are among the banks with the

highest portfolio in the banks report according to TBA (2019) asset-size (www.tbb.org.tr). It can be stated that A1 Bank is the leader and pioneer in technology use in Turkey, and A5 Bank and A4 Bank continuously increase their activities on this subject (www.capital.com.tr). Moreover, in complaint management businesses' non-use of online complaint sites and use of their complaint channels explain the appearance of too many complaints on online platforms concerning relevant businesses. Thus, the mentioning of the name of a relevant bank in too many complaints does not signify its failure in complaint management.

The complaint channels that banks operating in Turkey usually offer to their customers are contact/complaint forms through their websites, telephone banking, mobile banking, social networks (e.g. Facebook, Twitter), BRSA, TBA and third-party online complaint sites. Particularly social networks and third-party online complaint channels are channels of complaints that are not under the control of banks. To manage complaints coming from these channels might be more difficult and troublesome than managing complaints from other channels. Hence the creation of online complaint channels under banks' control and their encouragement of customers to use these channels might be suggested. Bank customers' reporting claims via online channels of their banks will make it easier for them to reach the solution process directly.

Another critical finding regarding the study is related to the identification of the most mentioned words and phrases regarding customer complaints. Although the banking sector has many products such as deposit or draw accounts, various loans and individual pensions, it came to light that the product causing the full complaints is the credit card. In 2006, as a result of the BRSA's new regulation on card fees, the word groups "credit card subscription fee, membership fee, consumer arbitration committee" constitute the most used word groups (www.bddk.org.tr). It is highly likely that the bank, which attempts to offer solutions to these word groups that constitute the subject of complaints most, will increase customer satisfaction. For example, banks offering alternative solutions such as a guarantee for not receiving fees within an individual expenditure commitment related to credit card fees can be a motive to prefer for the customers. Therefore, the solutions provided by the banks by detecting the most uttered subjects of the complaint can be used as an important

strategy to expand their customer portfolios of the banks.

Among the complaints, the most frequently used word is "victim and victimisation" when the customers express their situation. In the second data set, the use of the word "victimisation" has increased, and the word "unfair" was used extensively. It can be said that the customers in the banking sector convey their dissatisfaction with the words "unfair" and "victimisation". Han and others (2016) state the dissatisfaction of hotel customers in social networks with the word "value".

The data covering the months of February and March of 2020 also provide data on how the world, which has experienced an extraordinary situation, is economically affected by the Corona pandemic. The fact that the COVID-19 virus, which was seen as a local epidemic in February, has spread to the world and has turned into a pandemic as of March, although it has led the individuals to take health-related measures first; in the second phase it has put economic factors on the agenda. The most important proof of this is the fact that the highest expectation of customers from banks towards the end of March is related to the postponement of credit and credit cards with due dates.

As a result of the cluster analysis, the second data set was divided into 10 clusters, and according to the calculated silhouette index value, it is detected that they have a meaningful cluster structure. The obtained 10 number of clusters is significant in terms of analysis but can be assessed but can be evaluated as useless in terms of application. In this case, the closest neighbours of the clusters were ascertained to reduce the number of clusters. For all clusters, word tables representing clusters based on the document similarities were created from the words that best represent the clusters. It is thought that the grouping of customer complaints by the representative words will facilitate the determination of the words that constitute the main problems of the complaints and will contribute to businesses in finding solutions faster by grouping thousands of customer complaints. Kopuçugil İkiz and Özdağoğlu (2015) argue that the analysis of online customer comments by data mining methods will help to businesses in the process of determining the actual customer needs and being the customer's voice.

7. THE LIMITATIONS OF THE RESEARCH AND SUGGESTIONS FOR FUTURE RESEARCH

The research data were collected from two online complaint sites in two separate periods. The lengthiness of periods can cause data to become obsolete. In a setting where particularly the very rapid functioning in social media (Spence et al., 2016) and the gradual decline of customer loyalty (Wang et al., 2016) come into question, the period of data of analysis should be kept as short as possible. In future studies, designing a system that can use real-time data will positively affect the decisions managers will make.

The program used in the study is not one-to-one compatible with the Turkish dictionary structure. For businesses that will make data and text mining analysis, working with a program that is suitable for their information systems structure and where Turkish dictionary can be added is recommended. By this means more accurate words and phrases can be determined.

In the research, data of customer complaints of different businesses were collected and analysed and general results according to the sector were tried to be reached. Businesses' setting up a system where they can analyse their data of complaint will lead to more decisive results to emerge. Businesses should evaluate customer relationship management with the technological infrastructure that they can benefit from today's technology opportunities, database, software and the information systems that make up these as a whole (Özdağoğlu et al., 2008).

The interpretation that can be made according to the words that represent the clusters is an essential constraint because it depends on the researcher's knowledge and experience. For this reason, it is proposed to investigate the analysis and results of data mining by expert units and to develop them by the researcher-expert cooperation.

As a result of the analyses carried out in this study, it can be said that customer complaints are essential data that make businesses to understand their customers. By the data mining methods used in the study, it is conceivable to transform these critical data into meaningful information for the businesses. The contribution of advancing internet and information technologies is excellent in the collection of data and conversion them into information.

The information obtained as the result of the study is evaluated and interpreted according to the generated database and a specific date range. It should be taken into account that different results can be achieved if the number of data is increased, the database is changed, and different data mining methods are applied.

As a result, in today's world of continually improving information technologies, online customer complaints are an alternative channel that allows businesses to hear the voice of their customers and understand their problems. Data mining analysis, which transforms millions of data into meaningful information in this channel, is an essential tool in the process of complaint management. Although it is not possible to satisfy all customers or solve all complaints, it is possible to manage all customer complaints with the information provided by data mining.

REFERENCES

Alabay, MN (2012). Musteri Sikayetleri Yonetimi (Customer Complaint Management), *Int. Journal of Management Economics and Business*, Vol. 8, No. 16, p. 137-158.

Argan, Mehpare T. (2014). E-Şikayetle İlgili Tanımlayıcı Bir Çalışma (Descriptive Study of E-complaining: Social Network Analysis on a Website as Complaint Forum), *Journal of Internet Applications and Management*, Vol. 5, No. 1, pp. 49-66.

Au N., Law R., Buhalis D. (2010). The Impact of Culture on e-Complaints: Evidence from Chinese Consumers in Hospitality Organisations. *In: Gretzel U., Law R., Fuchs M. (eds) Information and Communication Technologies in Tourism 2010. Springer, Vienna.* doi: 10.1007/978-3-211-99407-8_24

Aytekin, C. and Mayda, I. (2013), Sosyal medyada rekabet analizi icin karsilastirma gorevine yonelik fikir madenciligi modeli (Competitive analysis on social media comparison task oriented: Opinion Mining Model). *Journal Academic Marketing Mysticisn Online*, Vol. 7, No. 27, pp. 414-425.

Balaji, M.S., Jha, Subhash and Royne, Marla B. (2015). Customer E-Complaining Behaviours Using Social Media, *The Service Industries Journal,* Vol. 35, pp. 633-654.

Barlow, J. and Moller, C. (1996). *A Complaint is a Gift Using Customer Feedback as a Strategic Tool*. Berrett-San Francisco, CA: Koehler Publishers.

Beerli, A., Martin, J.D. and Quintana, A. (2004). A Model of Customer Loyalty in the Retail Banking Market, *European Journal of Marketing*, Vol. 38, No. ½, pp. 253-275.

Bickart, B. and Schindler, R.M. (2001). Internet Forums as Influential Sources of Consumer Information, *Journal of Interactive Marketing*, Vol. 15, No. 3, pp. 31-40.

Boros, M. (2011). Cluster Analysis Methodology and Statistics, *University of Groningen*, Accessed address: http://www.let.rug.nl/nerbonne/teach/rema-stats-meth-seminar/presentations/Boros-Clustering-2011-May-24.pdf.

BRSA 2006 Reports, (2006). *Bank Credit Cards Law*, (Publication No. 9703). Accessed address: https://www.bddk.org.tr/WebSitesi/turkce/Mevzuat/Banka_Kartlari_Kredi_Kartlari_Kanunu/Banka_Kartlari_Kredi_Kartlari_Kanunu.aspx, (accessed December 22, 2019).

BRSA 2020 Reports, Key Indicators Reports, Accessed address: https://www.bddk.org.tr/Veriler/TBS-Temel-Gostergeler-Raporu/14. (accessed, November 5, 2020).

Butelli, S. (2007). Consumer Complaint Behavior: A Literature Review, Northumbria University.

Capital Banking News (2016). *E-Bank Leaders.* Accessed address: http://www.capital.com.tr/images/Haberler/djt1.jpg and http://www.capital.com.tr/sektorler/teknoloji/e-banka-liderleri-haberdetay-10129, (accessed December 28, 2019).

Campbell, C. (2020). How TikTok Found Itself in the Middle of a US - China Tech War -, *Time*, Accessed address: https://time.com/5876610/tiktok-china-tech-war/, (accessed July 12, 2020).

Complaint İndex Report 2013-2014, Marketing Türkiye, July 2014, Accessed: https://www.sikayetvar.com/images/basin/1391601138.jpg, (accessed July 12, 2016).

Doffman, Z. (2020). Confirmed- Huawei Smartphone Users Have Serious New Update Problem, *Forbes*, Accessed address: https://www.forbes.com/sites/zakdoffman/2020/08/15/confirmedhuawei-smartphone-users-have-a-serious-new-problem/?sh=67396e112881, (accessed July 12, 2020).

Coussement, K. and Poel, D.V.D. (2007). Improving Customer Complaint Management by Automatic E-mail Classification Using Linguistic Style Features as Predcitors, *Decision Support Systems*, Vol. 44, No. 4, Mart 2008, pp. 870-882.

Eser, Z., Pınar, M. and Girard, T. (2016). Importance of Customer Complaints: A study of Banking Industry Utilising the Services Marketing and Branding Triangle Framework, *Journal of Theory and Practice in Marketing*. Vol. 2, No. 2, pp. 23-49.

Estorilio, C. and Posso, RK (2010). The Reduction of Irregularities in the Use of Process FMEA, *International Journal of Quality & Reliability Management*. Vol. 27, pp. 721-733.

First Customer Complaint, http://www.openculture.com/2015/03/the-first-recorded-customer-service-complaint-from-1750-b-c.html, (accessed: August 28, 2020).

Galitsky, B. (2006). Reasoning About Attitudes of Complaining Customers, *Knowledge-Based Systems*, Vol. 19, pp. 592-615.

Goetzinger, L., Park, J.K. and Widdows, R. (2006). E-Customers' Third Party Complaining and Complimenting Behaviour, *International Journal of Service Industry Management*, Vol. 17, No. 2, pp. 193–206.

Goodman, J. (1999). Basic Facts on Costumer Complaint Behaviour and The Impact of Service on The Bottom Line, *Competitive Advantage*, pp. 1-5.

Grainer, M., Noble, C.H., Bitner, M.J. and Broetzmann, S.M. (2014). What Unhappy Customers Want, *MIT Sloan Management Review*, Vol. 55, No. 3, pp. 31-35.

Han, H.J., Mankad, S., Gavirneni, N. and Verma, R. (2016). What Guests Really Think of Your Hotel: Text Analytics of Online Customer Reviews, *Cornell Hospitality Report*, Vol. 16, No. 2, p. 3-17.

Hong, J. and Lee, W. (2005). Consumer Complaint Behaviour in the Online Environment, *Web Systems Design and Online Consumer Behaviour, New Jersey 2005*, pp. 90-105.

Hotho, A., Nurnberger, A., Paaß, G. (2005). A Brief Survey of Text Mining, *GLDV Journal for Computational Linguistics and Language Technology*, pp. 16-17.

ISO 10002: Quality Management-Customer Satisfaction Certification, accessed address: http://cisam.cu.edu.tr/Tr/Belgeler/10-ISO%2010002.pdf, (accessed February 18, 2016).

Kalb, 2011, http://www.cbsnews.com/news/how-customer-complaints-can-improve-business/, (accessed December 20, 2019).

Kapucugil İkiz, A., Özdağoğlu, G. (2015). Text Mining as a Supporting Process for Voc Clarification, *Alphanumeric Journal*, Vol. 3, No. 1, pp. 25-40.

Mattila, A.S. and Mount, D.J. (2003). The Impact of Selected Customer Characteristics and Response Time on E-Complaint Satisfaction and Return Intent, *International Journal of Hospitality Management*, Vol. 22, No. 2, pp. 135-145.

Memarzadeh, F. and Chang, H.J. (2015). Online Consumer Complaints about Southeast Asian Luxury Hotels, *Journal of Hospitality Marketing & Management*, Vol. 24, pp. 76-98.

Ministry of Development, (2014), 10. Development Plan: Financial Services Report. Accessed address: https://www.sbb.gov.tr/wp-content/uploads/2018/10/10_FinansalHizmetler.pdf (accessed: December 6, 2020).

Mohamed, W.M.H. (2016). Corporate Governance Practices of The Middle East Banking Sector: A Comparative Analysis Between Islamic and Conventional Banks, *Journal of Finance*, Vol. 4, No. 1, p. 99-111.

Nazari, E., Sarafraz, A. and Amini, S.N. (2016). The Effect of Key Factors of Knowledge Management Success on Improving Customer Relationship Management (Case Study: Financial and Credit Institutions of Parsabad), *International Journal of Humanities and Cultural Studies (IJHCS)* ISSN 2356-5926, pp. 915-923.

Özaslan, Y. and Meydan Ugur, S. (2014). Negatif Agizdan Agiza Iletisim (Wom) Ve Elektronik Agizdan Agiza Iletisim (E-Wom): Yiyecek-Icecek Isletmelerine Yonelik Bir Arastirma (Negative Word of Mouth Communication(Wom) and Electronic Word of Mouth Communication (E-Wom): A Research of Food and Beverage Business), *Journal of Ataturk University Economics and Admininstrative Sciences*, Vol. 28, No. 33, pp. 69-88.

Özdağoğlu, A., Özdağoğlu, G. and Oz, E. (2008). Musteri Sadakatinin Saglanmasinda Musteri Iliskileri Yonetiminin Onemi: Izmir'de bir Hipermarket Arastirmasi (The Importance of Customer Relationship Management in Providing Customers' Loyalty: a Hypermarket Research in Izmir)", *Journal of Ataturk University Economics and Administrative Sciences*, Vol. 22, No.1, pp. 367-383.

Özgül, P. (2007). Musteri Memnuniyeti ve Musteri Sikayetleri Uzerine bir Alan Arastirmasi (A Field Research on Customer Satisfaction and Customer Complaints), Kahramanmaras Sutcu Imam University, Social Science Institute, Business Administrator, Master Thesis, Kahramanmaras.

Özkaynar, K. (2010). Turkiye'de Sanal Sikayet Uygulamalarinin Algilanmasina Yonelik bir Arastirma: sikayetvar.com ornegi (A Research on Issue of Turkey Perceived Complaints of Virtual Applications), Sakarya Universitesi, Sosyal Bilimler Enstitusu, Unpublished Master Thesis, Sakarya.

Pala, E. and Kartal, B. (2010). Banka Musterilerinin Internet Bankaciligi ile ilgili Tutumlarına Yonelik bir Pilot Arastırma (An Empirical Study of the Attitudes of Turkish Bank Customers Regarding Internet Banking), *Journal of Management and Economic*, Vol. 17, No. 2, pp. 43-61.

Park, C. (2005). Complaints of Asian Shoppers Toward Global Retailer: A Content Analysis of E-Complaining to Carrefour Korea, *Asia Pacific Journal of Marketing and Logistics*, Vol. 17, pp. 25-39.

Rogers, R. (2014), Foreword: Debanalising Twitter: The Transformation of an Object of Study, In Weller,K., Bruns, A., Burgess, J., Mahrt, M., Puschmann, C. (Eds.). Twitter and Society. ix-xxvi, Digital Formations, 89, New York: Peter Lang.

Sarıman, G. (2011). Veri Madenciliginde Kumeleme Teknikleri Uzerine Bir Calisma: K-means ve K-medoids Kumeleme Algoritmalarinin Karsilastirilmasi (A Study of Clustering Techniques in Data Mining: Comparison of The KMeans and K-Medoids Clustering Algorithms), *Journal of Suleyman Demirel University Sciences Institute*, Vol. 15, No. 3, pp. 192-202.

Sarno, D. (2009). Twitter Creator Jack Dorsey Illuminates the Site's Founding Document, Part I, Los Angeles Times, 2009a, Accessed Address: http://latimesblogs.latimes.com/technology/2009/02/twitter-creator.html.

Sezgin, K.E., Efilti, S., Kalıpci, B.M. and Algur, S. (2012). A Content Analysis about E-complaints of the Hospitality Enterprises in Manavgat Regions, *Journal of Cukurova University*, Vol. 16, No. 2, pp. 111-118.

Sharms, G., Rehman, M.A., Samad S. and Rather, R.A. (2020). The Impact of the magnitude of Service Failure and Complaint Handling on Satisfaction and Brand Credibility in the Banking Industry, *Journal of Financial Services Marketing,* Vol. 25, pp. 25-34.

Sparks, BA, So, K., Bradly, K.F. and Graham L. (2016). Responding to Negative Online Reviews: The Effects of Hotel Responses on Customer Inferences of Trust and Concern, *Tourism Management*, Vol. 53, pp. 74-85.

Spence, P.R., Lachlan, K.A., Edwards, A. and Edwards, C. (2016). Tweeting Fast Matters, but only If I Think about It: Information Updates on Social Media, *Communication Quarterly*, Vol. 64, No. 1, p. 55-71.

Sütçü, C.S and Aytekin, C. (2018). *Veri Bilimi*. Ankara: Paloma Yayınevi.

Şiker, P. (2012). An Exploratory Research on Consumer Adoption of Internet Banking, *Journal of Internet Applications and Management,* Vol. 2, No. 2, pp. 35-50.

Turkey Banking Association Reports, (2020). *Bank Branch Information* https://www.tbb.org.tr/modules/banka-bilgileri/banka_sube_bilgileri.asp and https://verisistemi.tbb.org.tr/index.php?/tbb/dashboard/YgLMjWsB885QQzOMlag7, (accessed May 27, 2020).

TESK, Ahilik in 50 Question, 2005, http://www.tesk.org.tr/tr/yayin/124.pdf, (accessed February 20, 2016).

Tripp, T.M. and Grégoire, Y. (2011). When Unhappy Customers Strike Back on The Internet, *MIT Sloan Management Review*, V. 52, No. 3, pp. 37-44.

Tyrell, B. and Woods, R. (2004). E-complaints: Lessons to Be Learned from the Service Recovery Literature, *Journal of Travel & Tourism Marketing*, Vol. 17, No. 2-3, pp. 89, 183-190.

Ülgen, H. and Mirze, S.K. (2013). *İsletmelerde Stratejik Yonetim (Strategic management in Business*). 6.Edition. İstanbul: Beta Yayınları.

Varadarajan, R. (2020). Customer Information Resources Advantage, Marketing Strategy and Business Performance: A Market Resources Based View, *Industrial Marketing Management*, Vol. 89, pp. 89-97.

Wang, Y., Lewis, M., Cryder, C. and Sprigg, J. (2016). Enduring Effects of Goal Achievement and Failure within Customer Loyalty Programs: A Large-scale Field Experiment, *Marketing Science*, Vol. 35, No. 4, pp. 565-575.

Winch, G. (2011). The Squeaky Wheel: Complaining the Right Way to Get Results, Improve Your Relationships, and Enhance Self-Esteem, Bloomsbury, USA.

Yıldırım Güngör, G. (2012). Bankalarin Kurumsal Kredi Potfoyu ve Kredi Riskinin Olcumu (Banks' Corporate Credit Portfolio and Measurement of Credit Risk), TCMB Bankacilik Finansal Kuruluslar Genel Mudurlugu Uzmanlik Yeterlilik Tezi (TCMB General Directorate of Banking Financial Institutions Specialization Qualification Thesis), Ankara.