



A Project Report on  
**NPS Survey Results Analysis**

Submitted in partial fulfilment for award of degree of

**PGDM**  
**In Business Analytics**

Submitted by

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R19DM002

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**February 2021**



### **Candidate's Declaration**

I, Hitesh Sanwal hereby declare that I have completed the project work towards the first year of PGDM in Business Analytics at, REVA University on the topic entitled NPS Survey Analysis under the supervision of Akshay Kulkarni, Lead Data Scientist. This report embodies the original work done by me in partial fulfilment of the requirements for the award of degree for the academic year 2021.

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Place: Bengaluru

Name of the Student: Hitesh Sanwal

Date: 04-03-2021

Signature of Student:



## Certificate

This is to certify that the Project work entitled NPS Survey Analysis carried out by Hitesh Sanwal with R19DM002, is a bonafide student of REVA University, is submitting the first year project report in fulfilment for the award of PGDM in Business Analytics during the academic year 2021. The Project report has been tested for plagiarism and has passed the plagiarism test with the similarity score less than 15%. The project report has been approved as it satisfies the academic requirements in respect of PROJECT work prescribed for the said Degree.

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## Acknowledgement

I would like to express my immense gratitude to our Chancellor **Dr. P. Shyama Raju, Dr. S.Y. Kulkarni**, Ex-Vice Chancellor **Dr. D.K. Mallikharjuna Babu**, Vice-Chancellor and **Dr. Dhanamjaya**, Pro- Vice-Chancellor, for supporting the RACE program specifically designed for working professionals and providing facilities and infrastructure required and conducive conditions to offer the best learning experience. It has been a great journey so far and a great learning experience to be associated with this program and REVA University.

I would like to thank **Dr. Shinu Abhi**, Director, RACE (REVA Academics for Corporate Excellence), Bengaluru for her timely help and constant inspiration during the tenure of the Project work and course.

Sincerely I acknowledge our deep sense of gratitude to **Mr. Akshay Kulkarni**, Lead Data Scientist at Publicis Sapient, for his constant encouragement, timely help, and valuable guidelines.

I wish to extend my sincere thanks to all the **Mentors** of RACE, REVA, Bengaluru who has encouraged and guided us throughout the course. Last but not the least, I express my heartfelt gratitude to the Almighty, family and friends for the constant support and encouragement.

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## List of Abbreviations

Sl. No	Abbreviation	Long Form
1	NPS	Net Promoter Score
2	CES	Customer Effort Score
3	CX	Customer Experience
4	SaaS	Software-as-a-Service
5	KPI	Key Performance Indicator
6	SOW	Statement of Work
7	SFTP	Secure File Transfer Protocol

## List of Figures

No.	Name	Page No.
5.1	CRISP-DM Methodology	17
7.1	Snippet of Raw Data	22
9.1	Creating New Features	25
9.2	Generated WordCloud Positive Sentiment	25
9.3	Generated WordCloud Negative Sentiment	26
9.4	Generated WordCloud Neutral Sentiment	26
10.1	NPS Dashboard	28
10.2	CallBack Dashboard	28
11.1	Average NPS V/S Industry Average	29
11.2	Brand Comparison	30
11.3	CallBack	30
11.4	NPS & CallBack	31
11.5	NPS & NoCallBack	31
11.6	Word Frequency Sentiment Analysis	32
11.7	Word Frequency NPS Sentiment	32
11.8	Pearson Correlation	33
11.9	Sentiment Score Negative VS NPS Score Positive	33

11.10	Sentiment Score Positive VS NPS Score Negative	34
11.11	Neutrals Mismatch	34

## Abstract

One of the large Telecom company<sup>1</sup> runs CX surveys through a SaaS Survey platform to capture key metrics NPS for key touchpoints of the services [*Internet services, Billing, Network equipment, Customer Care etc.*] they offer to their customers globally. The NPS question is followed up with an open-end question which allows the user to input the reason for the score provided.

At this point, the survey platform only provides the capability of data collection. The goal of this project is to go an extra step and with the help of Data Science framework effectively analyze the collected survey data to gather insights that help the Company to decide what needs to be improved and what is working. The power of NPS Score is limited as the score can be mis-leading. A '10' does not imply that a customer is always happy with the service likewise a '0' does not mean that the client is un-happy. Therefore, not just the score but how the collected data is analyzed will be a key to understand how effective the NS Survey results are in predicting customer loyalty. After a client sends out the first NPS survey campaign and data gets collected what is next?

As a part of the study analysis was performed on the collected survey data aimed to find the key insights and check if these insights are actionable so that each member in the team can easily understand and dig into the "why" behind the NPS score, analyze the NPS Distribution, find any un-expected insight based on the analysis and also using machine learning models like Sentiment Analysis compare the NPS comments sentiments (Positive, Negative, Neutral) and outline if using these ML techniques are adding significant value to the analysis and suggest management if more focus should be given to use them. Once, the analysis is complete, all the key actionable analysis is presented with the help of easy to visualize dashboard.

Findings showed that NPS data does provide insights which can help companies in grouping the customers under three key bins Promoters, Neutrals and Detractors. However, there is no guarantee that the data is giving a correct representation and it is very likely the analysis can be misleading. One of the key finding was that a basic Sentiment Analysis showed a big mismatch in the main keywords were analyzed using the NPS comments with help of word cloud visualization. As the survey participants grow in numbers and the duration of survey is increased, we advise using ML technique which helps in making a direct comparison between NPS Score and the Sentiment Score.

**Keywords:** *NPS, Natural Language Processing, CES, Sentiment Analysis*

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<sup>1</sup> Due to confidentiality, the name is not disclosed.



## **Contents**

Candidate's Declaration.....	2
Certificate.....	3
Acknowledgement .....	4
Similarity Index Report.....	5
List of Abbreviations .....	6
Abstract .....	8
Contents .....	9
Chapter 1: Introduction .....	10
Chapter 2: Literature Review .....	13
Chapter 3: Problem Statement .....	14
Chapter 4: Objectives of the Study .....	15
Chapter 5: Project Methodology .....	16
Chapter 6: Business Understanding .....	18
Chapter 7: Data Understanding.....	19
Chapter 8: Data Preparation.....	21
Chapter 9: Data Modeling.....	22
Chapter 9: Data Evaluation .....	26
Chapter 10: Deployment .....	27
Chapter 11: Analysis and Results .....	28
Chapter 12: Conclusions and Recommendations for future work .....	35
Bibliography .....	36
Appendix.....	37
Plagiarism Report.....	37

## Chapter 1: Introduction

Let us start by asking ourselves what is that one thing without which a business cannot survive? Majority of us will answer: **Money!** Every business needs money to survive and to make money one of the most important asset a businesses need is customers. In an ideal world, these customers are happy with the services you offer, they always talk good about the business and keep coming back. True? If only things were so simpler.

Keeping a long-term relationship with customers is hard work. Every business needs to keep delivering quality service time and time again. They need to keep the customer satisfied. As the White House Office of Consumer Affairs estimates that loyal customers are worth up to 10 times their initial purchase value (Katerina Sinitskaia, n.d.). So, the big question is how to measure customer satisfaction?

In current times there are many metrics, but the two key ones are: NPS and CES. Since 2003, Net Promoter Score is a metric that was first developed in 1993 by Fred Reichheld (Frederick F. Reichheld, 2003) and later adopted in 2003 by Bain & Company and Satmetrix to predict customer purchase, loyalty and referral behaviour. After collecting results from 20 different questionnaires survey to thousands of customers in six different industries, Reichheld's research team found that a single question stood out as being the most correlated with the purchase and referral behaviour of customers. This question became the basis of NPS and is widely adopted by companies to gather customer feedback.

### How to Calculate the NPS Score?

A simple rating question: **How likely are you to recommend [Company Brand] service/product/brand to your colleague, friends or family on a scale on 0 to 10 (where 10 is extremely likely)?** does the job.

Based on the rating given by the customers, three bins are created:

**Promoters (Score 9 – 10):** When a customer scores 9 or 10 it implies; they are very happy by the services provided by the company and will always speak good about the business and will bring more customers due to positive recommendations.

**Passively Satisfied or Neutrals (Score 7 -8):** Those who score 7 or 8 are okay with the services and may or may not switch to other competitors.

**Detractors (Score 0-6):** They are the customers who had a bad experience and can possibly churn. They are the ones who are likely to damage the brand by bad reviews.

The percentage of promoters minus the percentage of detractors gives the NPS score which is used as a measure of customer satisfaction and future growth potential of the business.

Across many industries net promoter score is now used as a key KPI for every department. However, it is key to understand that there is more to an NPS survey than the score itself. There are various elements of the NPS data that will help us collect in-depth customer insights which very easily are missed, but nevertheless, very important for an effective NPS analysis. The key aspects to invest time and effort are:

- Understand the Net Promoter Score Analysis
- Take a Closer Look at Your NPS Distribution
- Find which survey channels work best
- Focus on Customer Engagement
- Feedback Sentiment Analysis
- Take Feedback Analysis Seriously, and Act on It

(Alex, 2019)

**Different elements considered as part of the study are:**

**More Fields:** Currently, the world is divided into two groups: NPS Supporters and Non supporters. A lot of studies are also being conducted to ascertain if NPS is as good as it was once thought. A lot of recommendations were given to use NPS question with an open end and other questions which capture more information from the client. The survey used for this study uses this approach and adds different questions with the NPS question to capture more key fields which when analysed by combining the NPS Score should give more actionable insights. The analysis will help in understanding if this approach is aiding the analysis and how the comments can be explored to gain insights on keywords, sentiments by using key features of text analytics like Sentiment analysis (Muhammad Farooq et al., n.d.).

**Only NPS:** Most of the businesses use NPS to measure the loyalty of their customers and back the claim only based on the score. This approach has been the cause of debate and using the survey data collected we will do the analysis to check if NPS score on itself is a good measure of customer loyalty.

**No Analysis capability:** A lot of Data collection companies in Market Research industry allow ways to capture the NPS data by providing effective survey building technology but do not add any analysis element to the data collected other than providing basic data exports. Their clients must use other third-party vendors that offer analytics tool to get the insights for the data collected. One of the key goals of the project is to present the key insights for such survey data by building an interactive dashboard which has the scope to be fully automated. The addition of the analytics in the product offering will not only lead to adding value in the product offering but will serve as a mean to get more business as the clients will no longer require using a different vendor and there is always a scope to add more bespoke additions depending on how complex and varied feature the client wants as part of the service.

**Not much use of ML:** Many companies offer insights as part of the offering but only rely on the score to classify the NPS comments as Promoters, Detractors and Neutrals. This approach has many pitfalls as not always the score will match emotions provided in the comments. A customer can give a good score but may comment on a specific service he wants the company to improve and if overlooked in no time the customer can churn, vice versa. For small surveys and studies where customer do not offer many comments relying on just the NPS score can give better results but in cases where the comments are being provided and there are other fields that provide more inform just the score as way to capture the sentiments is not the best approach. In this study we aim to use ML algorithms to understand the sentiments of the comments and capture key emotions. The keyword will be compared with the NPS sentiment analysed just by using the NPS score to understand which results are more accurate. If a simple ML model can provide better results it will be an eye opener for the company management to invest more time and money to use ML for better analysis results.

The key scope of the study is to conduct a thorough analysis on collected data to make recommendation to the business if the existing approach is good enough and how interactive dashboards can help all members of the team to understand the raw collected data with ease, so it enables them to act and make improvements to the survey to further collect key features which can be helpful in making more powerful business decisions.

## Chapter 2: Literature Review

Since 2003 (Frederick F. Reichheld, 2003) NPS has changed the way companies think about loyalty. Customer loyalty is one key factor for any organization growth and NPS is the concept aimed to measure that loyalty. The implementation of NPS is very easy and it is the ease of the setup which is preferred by most of the companies. In this study we did see it is quite easy to set up the NPS survey and one can add a lot of other questions as part of the process to help capture more information.

No doubt, since 2003 (Frederick F. Reichheld, 2003) NPS has changes the way companies think about loyalty but the crucial element of analysis makes it easy for the business to get answer to the question is NPS the method they would like to adopt for measuring customer satisfaction. With the advances in data science techniques a lot of research studies are being conducted to study if it is the only metric the companies should aim for? Companies are trying to understand if NPS is the single most reliable indicator of a company's ability to grow and if NPS is superior to customer satisfaction and the latter has no link to growth.(Muhammad Farooq et al., n.d.)(Timothy L. Keiningham et al., 2008)

According to (Katerina Sinitskaia, n.d.), Telecom industry has long underperformed in customer experience and it holds the lowest industry average NPS Score average of 24. In our study, we wanted to check how the NPS average score have varied during the 4-year duration of data collection.

As per (M.W. Krol et al., 2015), NPS is not a definitive but a decent expectation of customer loyalty. In general, the NPS results are shared very rapidly as they are received. Managers/team leaders are rapidly asked to contact the detractors to understand the reason grievances so that they feel valued. Based on this, we understand it becomes very important to have a great analysis process in place so that the results analysed are as accurate as possible as only NPS Score will lead to a lot of faulty data.

As per (Jared M. Spool, 2017), the user experience and NPS score rarely match and if the power of NPS analysis lies in the “Why” question than why the score is needed? This is a great question, and, in this study, we will try to explore answer to these questions. Executives are mostly fixated on the number and NPS is one such number. An effective analysis interactive dashboard can help the executives to not just rely on the numbers but also other areas like how the key sentiments are different when using ML techniques like Sentiment Analysis analysed.

## **Chapter 3: Problem Statement**

A Software-as-a-Service (SaaS) company which currently provides survey products that enable Market Researchers, CX specialists collect customer feedback wants to add the flavour of Data Analytics into its toolkit of features. Data is collected for a variety of different surveys; they want to start the analysis process by analysing one key survey for one of their client which collects NPS and CES score data through a web-based survey created through the platform.

The company wants to provide key actionable insights, which are easy to understand after the thorough analysis of the collected survey data via a dashboard. The default dashboard will be provided for each survey created through the platform and will serve as a baseline to promote the scope for a bespoke more quality dashboard that can provide more advanced analytics features that the clients can use to drive their business.

## Chapter 4: Objectives of the Study

This project aims at analysing CX survey data which captures NPS data (Quantitative & Qualitative). The survey also captures the ease of using products or services on a scale of "very difficult" or "very easy" which help in generating a Customer Effort Score (CES).

The key business goal is that the company wants its clients to not only collect the data via the platform but at the same time provide them with an analytic flavour by sharing some default analysis on the collected data. The analysis will be helping the client in:

- Understanding the NPS Score.
- Categorization to quantify the results of the comments for NPS Score which helps to provide context to the NPS scores given by participants of the survey.
- Discover root causes by analysing answers to the follow-up question in NPS. Simply put, what is causing an issue.
- Detect Trends and Measure Changes Over Time.
- Text analysis will help in understanding the key Sentiment. keywords, word cloud in the NPS comments.

The overall anticipated outcome is to get more analysis business because:

- **Clients will ask for more:** once they realize the platform can offer great analytics and like the default dashboards, they will request for bespoke use cases which will result in expanding the analytics side of the business, in turn, would lead to more revenue.
- Company can suggest more better approaches than NPS to gauge customer loyalty by scoping it as additional project.

## Chapter 5: Project Methodology

CRISP-DM methodology was used to execute this project structurally, where all the project activities were grouped into the following five predefined steps –

- Data understanding
- Data preparation
- Modeling,
- Evaluation
- Deployment

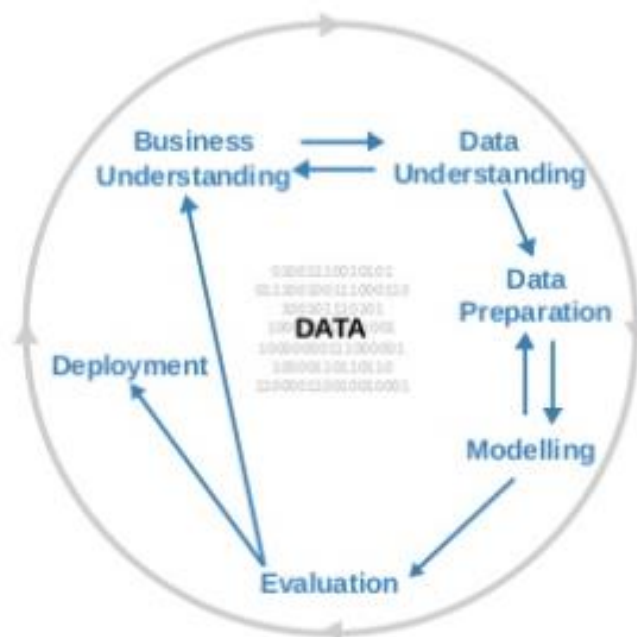


Figure No. 5.1 CRISP-DM Methodology

Each step mentioned above has been explained in detail in the following sections.

Extensive information on the problem statement and business case has been gathered by researching business competitor's offerings for the same survey capabilities and meeting with senior management of the company to understand what new additional to the toolkit features



are among business priority lists. After a few discussions, an ideal format of the data and the required survey to be used were decided.

We had to choose one key survey of interest, belonging to a key client to whom the company can offer more value to continue using the survey platform by providing key analysis insights as a default offering.

The complete data operations from loading, cleaning, transforming, and modeling was done in Python and Excel. Excel is used to create initial version of an interactive dashboard to exhibit all the insights obtained after analysis.

## **Chapter 6: Business Understanding**

This step focuses on understanding the objectives and requirements of the project. Key steps followed were:

### **What are the business objectives?**

The business objective was clearly understood. The company wants to add the feature of data analysis in its features toolkit to increase its product offering to its customers. Initially, the plan is to provide some free key insights on the data collected in the survey platform and later use different marketing channels to make the customer aware the company can do much more to meet their customers' analysis requirement. The expectation is that clients will like these insights on the data they collected using the SaaS platform and will like to combine the data collection feature along with analysis as it would resolve the need to get the analysis done from a third party. In turn would lead to a bigger scope for the projects as analysis will also be part of the offering and features of advance analytics will be part of bespoke offerings.

### **What is the data analysis goals?**

The analysis goals for this project were focused on one survey. For the data collected for this survey, key insights were to be analysed with the help of data science techniques and present those insights utilizing a dashboard so that the client can make actionable decisions. This project will serve as a prototype which aims to demonstrate how the collected data can also be presented in the form a great visualization which do not require the client to go with any other company to get the analysis done to get key answers from the data. If the analysis is liked by the client and they decide to use it, the sales team will pitch the budget for enhancing the dashboard to make it as real-time such that every new data collected will be available for the team in dashboard.

## Chapter 7: Data Understanding

A summary of the steps followed during the Data Understanding phase are:

### **Initial Data Collection:**

The data collected for this project is from a survey platform. The survey platform enables its client, to send email invitations daily at different time intervals with a web survey link. Survey targets all those customers who interacted with key touchpoints for different services offered like Internet services, Network Equipment's, Customer Support, Logistics, and Billing. The survey link enables the participants to answer a short, branded questionnaire that is not too long, focuses on capturing the experiences of the customer, uses NPS as one of the key metrics. The process of data collection is fully automated and real-time as a customer takes the survey the data is available for the Company to export in different file formats (xlsx, CSV etc). For the duration, the project runs in the platform survey data will be collected daily for the survey.

### **Describe data:**

For this project data collected from Feb-2016 till Jan-2021 is used. Dataset consisted of a total of 5698 records. The key columns in the collected data are:

- **TimeStamp**

This column captures the date when data was collected

- **CASE\_ID**

A unique id is given to each survey attempt by the customer

- **CompanyName**

This captures the customer's company name which has contacted the client for its Internet services

- **Department\_Name**

This column provides the department name of Company which is providing service to the customer like Billing, Customer support, logistics, etc

- **Product**

Product used by the customer

- **Service**

The type of service taken by the customer

- **NPS\_Score**

The score for the NPS question from a scale of 0 to 10

- **NPS Comment**

The reason was given for the NPS Score

- **Ease\_of\_Contacting,  
Total\_Time\_Needed,  
Completeness\_Answer,  
Number\_of\_Contacts\_Needed,  
Knowledge\_and\_Expertise,  
Friendliness**

For each of these variables a rating scale question type is provide to the customer so that they can rate their experience for each on a scale of 1 to 3 where 5 = Excellent and 1 = poor

- **Company\_in\_comparison**

This column captures how the customer rate the services of Company in comparison to its competitors.

In the Data understanding phase, we signed off the Data quality as the survey questionnaire is designed in such a way that key metrics are made mandatory for the user to answer. There were cases where the NPS comment had text and score at the same time as “Would Recommend 10”, to understand the reason the survey scripts were analysed and the error was in the survey tool which captured value and labels when a user-selected 10, this was fixed by making a release to the platform. A lot of users did not comment on NPS scores and a lot of columns had no data. To check this the survey session logs for such participants were examined and the business concludes that customers were opting-out from the survey after answering a couple of questions. All these findings were to be reported in the analysis phase. The below figure represents the sample of data extracted.

TimeStamp	CASE_ID	Compa	Department	Product	Solution	Service	NPS_Score	NPS Comment	Ease_of	Total_Tim	Complete	Number	Knowledge	Friendline	Company	Delivery	CES_Score	CES_Score_Q	Callback
1/19/2021 13:44	1 379			1	63	1	45	8 keep the up the	4	4	4	4	4	4	4	2	4	2	0
1/19/2021 12:39	2 807			2	34	1	46	5 Yes always sayi	4	3	3	4	3	4	4	3	3	0	0
1/19/2021 10:02	3 183			1	58	2	39	7 The accounts M	3	2	4	2	4	4	4	3	1	3	0
1/19/2021 9:42	4 864			3	60	3	39	Would Recommend 1 working with Co	5	5	5	5	5	5	5	1	5	1	0
1/19/2021 6:52	5 786			2	34	1	46	0 long response t	2	1	3	1	1	3	5		4	1	0
1/18/2021 20:21	6 236			2	49	1	48	7 I got good answ	5	4	5	4	5	5	5		2	0	1
1/18/2021 14:01	7 19			4	58	2	39	8 No Comment Given											
1/18/2021 10:10	8 1			2	34	1	46	0 Since internet c	2	3	4	4	4	4	4	4	3	0	0
1/17/2021 19:50	9 621			5	65	1	31	5 I have called 3 i	1	1	1	1	1	1	5		5	1	1
1/17/2021 9:45	10 172			1	58	2	39	8 No Comment Gi	5	5	5			5	3		2		
1/17/2021 7:47	11 373			2	34	1	46	9 Continue the gc	4	4	4	4	4	4	3		2		0
1/16/2021 18:25	12 464			2	58	2	39	Would Recommend 1 No comments, I	5	4	4	5	5	5	5	2		1	0
1/16/2021 11:08	13 423			2	34	4	22	5 No Comment Given											
1/15/2021 11:55	14 546			4	34	1	48	4 No Comment Given											
1/15/2021 8:33	15 577			1	58	2	39	2 Sorry but this ca	3	1	1	1	1	2	5	1	5	1	1
1/14/2021 16:28	16 247			4	63	5	53	7 You did a huge	5	5	3	1	2	5	3	3	2	0	0
1/14/2021 15:14	17 211			5	58	2	39	9 We got good re	4	4	4	4	5	4	3		2	0	0
1/14/2021 12:20	18 250			5	19	2	38	4 NO COMMENT!	4	1	3	1	3	4			3	0	0
1/14/2021 12:11	19 464			5	58	2	39	8 No Comment Given											

Figure No. 7.1 Snippet of Raw Data

## Chapter 8: Data Preparation

In this phase all the features available in the excel export from the data collection platform were checked for any errors. As the data is collected with the help of a web survey, there were lot of responses which were not complete. It was evident a lot of participants started the survey by clicking the link but did not follow it through. After a check with project team, such responses were removed from the data as they bring no value to the analysis and it is likely that the participant may complete it at a later stage as the survey had a time out value of a week.

Other steps that were taken as part of the Data Preparation were:

- Features containing sensitive information were masked using Python
- The Date field was used to create new fields Year, Quarter and month. These fields play an important role when we will create an interactive dashboard for the data.
- The key field like NPS Score was mandatory for the participant to input but the comments were optional. A lot of participants did not provide comments. Such data was imputed with No comment as it will be good to understand what % of the users did not provide the feedback.
- Just by looking at the NPS score it was not easy to correlate the score with the comments. Therefore, a new feature NPS Sentiment was created. This helped in binning the score into positive, neutral and negative sentiments. This field was then used to filter the data further into promoters, detractors and neutral customers and calculate NPS Score for each month by calculating % of promoters and detractors
- For CES score two fields high effort and low effort were created and they were used to get the CES score for each month

This prepared data set will be the basis of the interactive dashboard will be created to analyse and show the team the score each moth and further drill down based on different department and solution type.

## **Chapter 9: Data Modeling**

After Data preparation and EDA process it was evident that we will have to use Sentiment Analysis to make sure we correlate the NPS sentiments with NPS Score. To make use of the sentiment analysis the key column was NPS comment. Before running sentiment analysis on the comments, the following pre-processing steps were implemented by making use of NLTK:

- Lowercasing
- Removal of Punctuations
- Spelling Correction
- Stemming
- Lemmatization
- Stop word Removal

### **Sentiment Analysis**

TextBlob (a python library) is used for checking sentiments of the NPS and CES comments. TextBlob returns polarity of a sentence. The polarity lies between  $[-1,1]$ , in our use cases we classified the sentences with polarity greater than 0.2 as positive sentiments, less than -0.2 as negative and in between -0.2 and 0.2 as neutral sentiments. These sentiments were added to the data set by creating a new feature. A correlation between the score given by sentiment analysis and NPS score gave us a very low co-relation.





### Negative Sentiment WordCloud



Figure No. 9.3 Generated WordCloud Negative Sentiment

### Neutral Sentiment Word Cloud



Figure No. 9.4 Generated WordCloud Neutral Sentiment

## **Chapter 9: Data Evaluation**

In the initial stage, each day the survey data will be manually exported from the results section of the account to be used in the dashboard and for running the sentiment analysis on the NPS comments.

Complete responses for the survey will be considered. Partial completes will be send to projects team for reminders after the survey time out expires. Any more changes based on the analysis results will be shared with the team to improve the dashboard.

A subset of this dashboard will be automated to provide some key insights to the customer. If clients want more features a bespoke SOW will be generated and shared. This will allow the business the resource to make the entire process an automated one, survey data each day is exported with the help of an automation in a timely manner (multiple frequencies).

Alert email will be sent to each team member daily to ensure the data is getting exported and being fed to the dashboard via API or an SFTP integration.

The dashboard will also have a time indictor showing the latest date and time the dashboard was last updated.

## Chapter 10: Deployment

The analysis dashboard and sentiment model results will be tested and monitored for 3-4 months and would require manual efforts to upload the daily data into the excel dashboard. Once the business decides to invest the same rules can be deployed across different more advanced tools like Tableau etc. The entire process will be automated by using automated data transfer to the dashboard tool via SFTP data upload or an API.

Below is the snapshot from the Excel Dashboard.

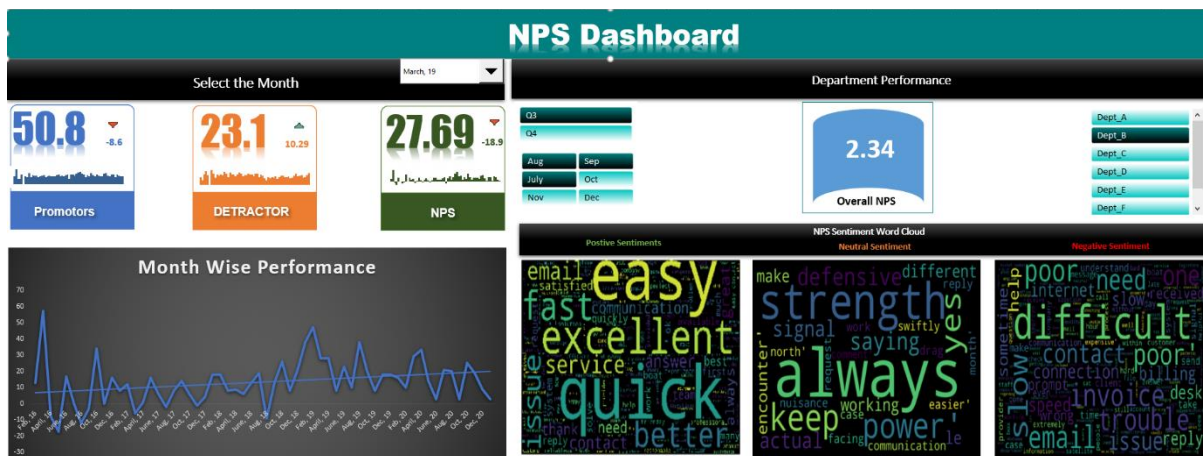


Figure No. 10.1 NPS Dashboard

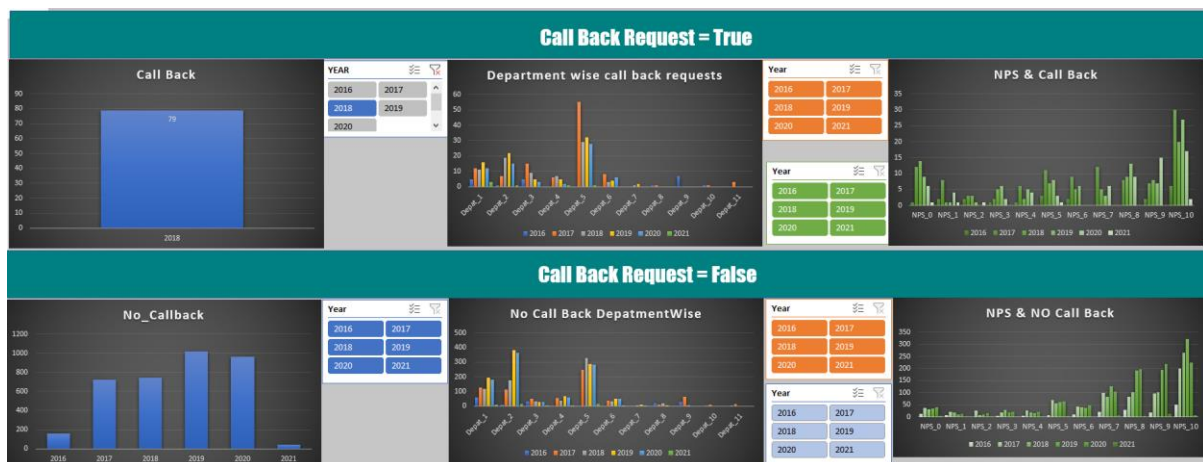


Figure No. 10.2 CallBack Dashboard

## Chapter 11: Analysis and Results

The key insights and results after the complete cycle of Data Analysis are:

1. Since the pilot which started in Feb 2016 the number of participants has been consistent, max being in **2019**
2. The Average NPS Score showed an **increasing trend from 2017** and was the highest in the year **2019 and it dropped in 2020**. As per reports the telecommunications industry has long underperformed in customer experience. The industry has an average NPS Score of 24, telecom holds the lowest industry average according to the NPS Benchmarks Report 2018.(Katerina Sinitskaia, n.d.)

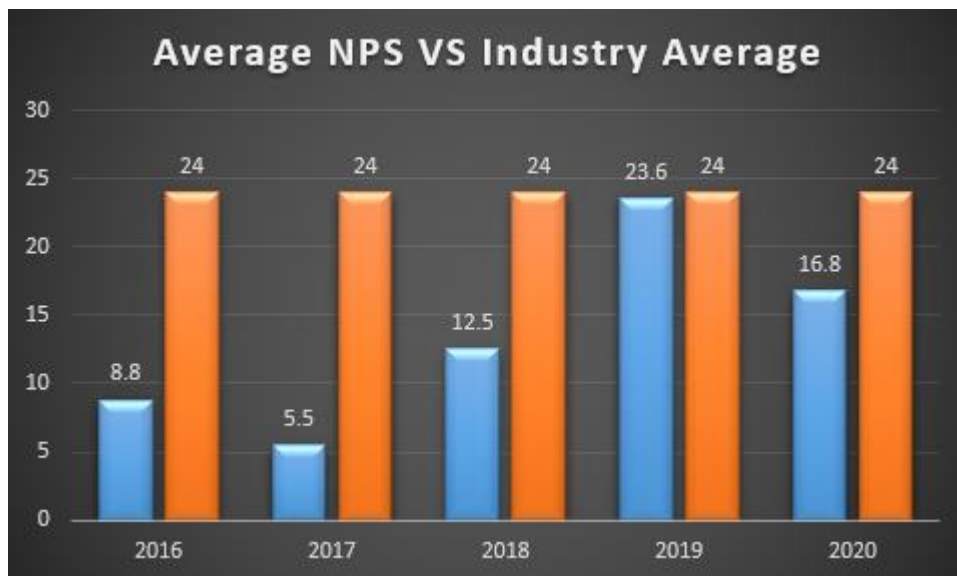


Figure No. 11.1 Average NPS V/S Industry Average

3. One reason of the drop could be the number of participants taking part in the survey were less (100) low compared to 2019.
4. When it comes to comparing CompanyABC with other providers, the top 3 comparison from 2016 to 2020 are: **Better than Most, About the same, Better than All**

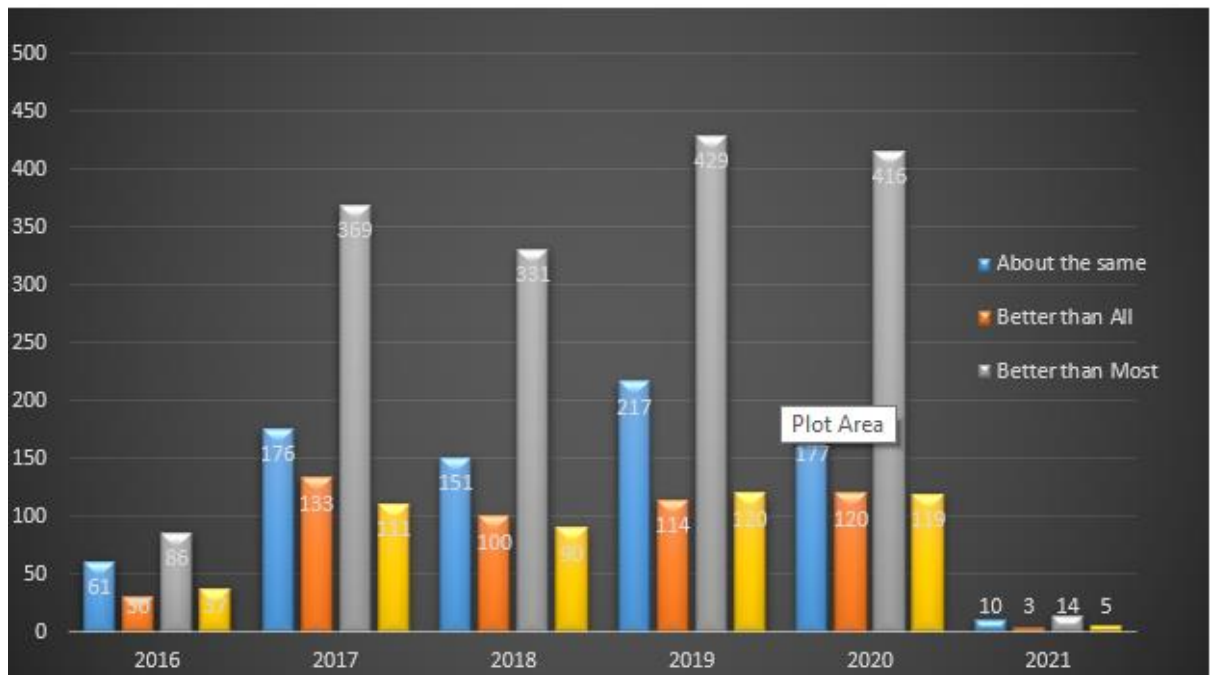


Figure No. 11.2 Brand Comparison

5. One of the most striking insight came from the call back field, the field was captured the participant willing to speak to Company Support staff. This question was kept as an additional measure to capture if any participant providing a bad score would like to share more details and the support staff can provide more TLC to make sure the client does not become a detractor.
6. We saw a **decreasing trend in the number of participants requesting call back.**



Figure No. 11.3 CallBack

7. The general understanding was that participants providing a good NPS Score (9 & 10) will not be requesting for call backs, however, the analysis showed the **high call back requests were given by participants giving 9 and 10 NPS score**. This becomes very critical for the business to monitor these support calls to understand why the call back is requested and in case any dissatisfaction is shared it is acted upon immediately so that these promoters do not become passives or Detractors.

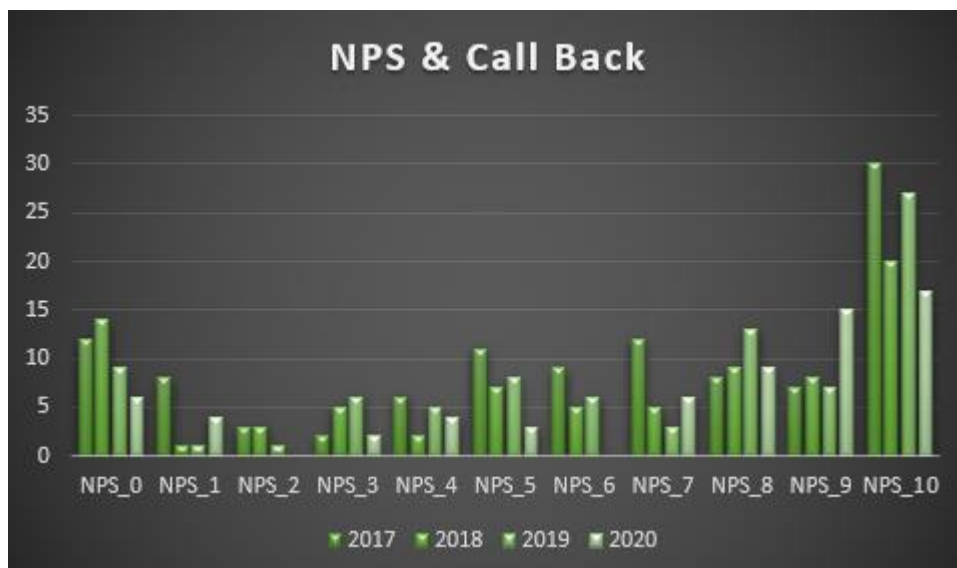


Figure No. 11.4 NPS & CallBack

8. For participants who did not request the call backs the results were in line with the general understanding, participants giving high NPS Score were did not request for call back.



Figure No. 11.5 NPS & No CallBack

9. The sentiments generated by the **Sentiment Analysis model** gave a far better **frequency of the words most used words in comments via word cloud**. The below graph shows the top twenty words for positive NPS sentiment via creating word cloud from direct comments and from Comments after running sentiment analysis.

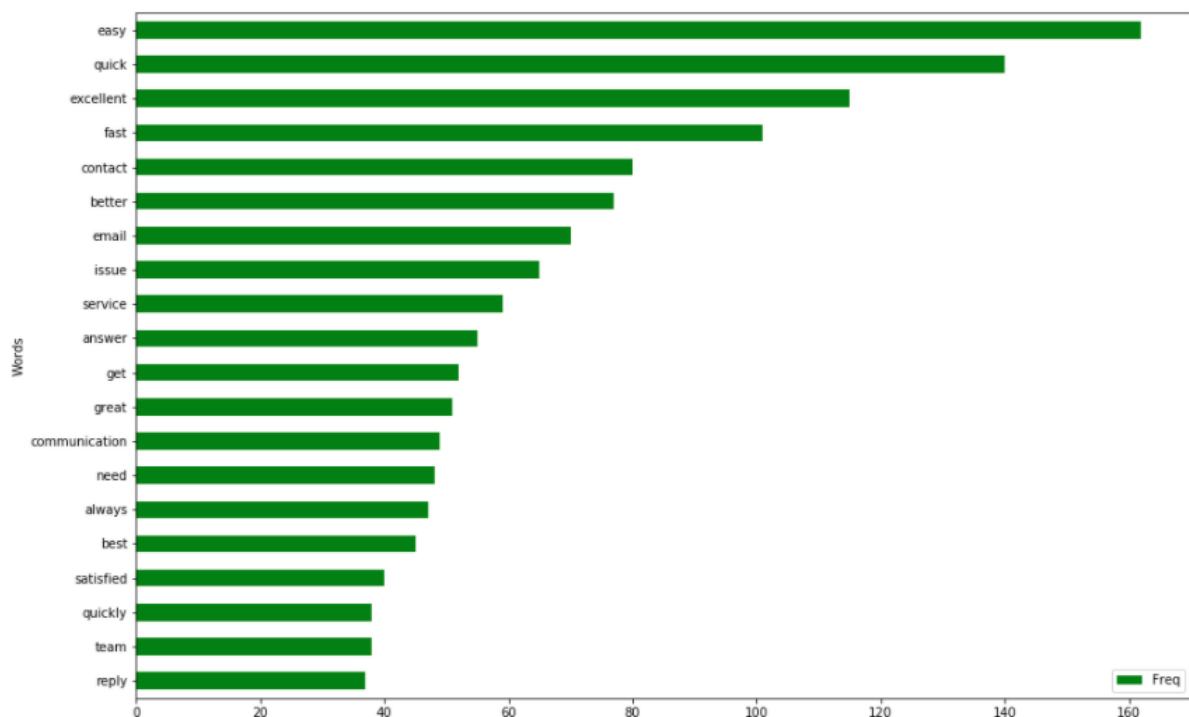


Figure No.11.6 Word Frequency Sentiment Analysis

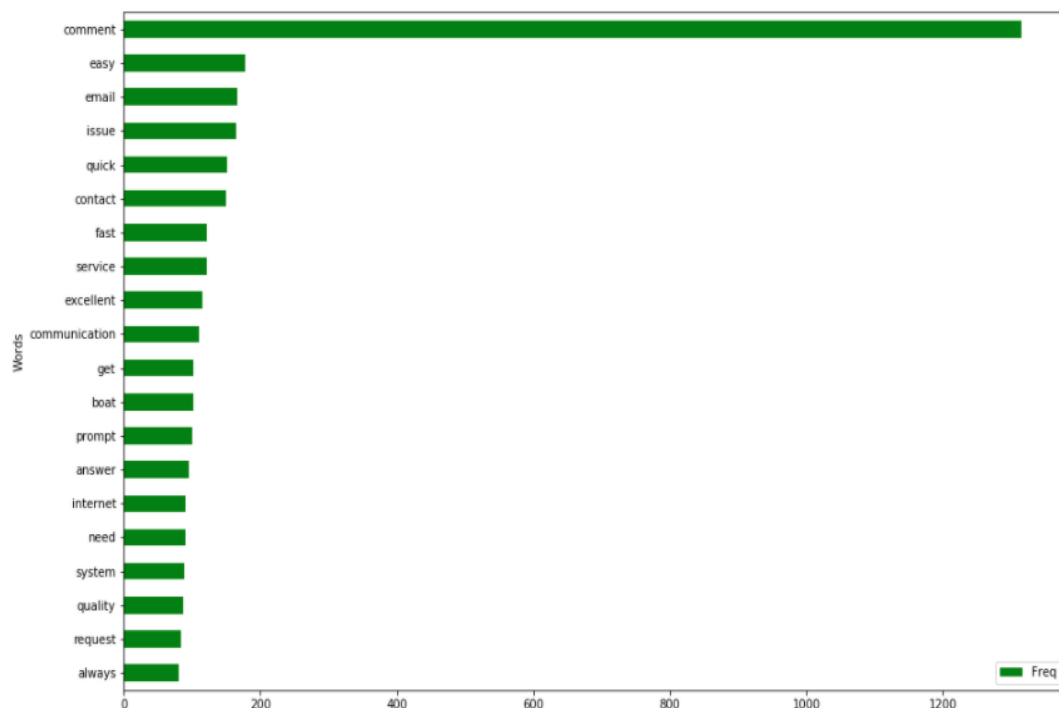


Figure No. 11.7 Word Frequency NPS Sentiment

10. The lower the CES the better, as per the analysis we found a negative co-relation between the NPS & CES SCORE

Pearson Correlation		
	<u>NPS Score</u>	<u>CES Score</u>
<u>CES Score</u>	<b>-0.6258374</b>	<b>1</b>

Figure No. 11.8 NPS & CES Correlation

## 11. Analyzing

Mis

Match:

One of the big highlights was that a basic **sentiment analysis gave far better keywords in the word cloud for NPS comments**. To check it further wordcloud were created for two cases:



<b>Sentiment</b>	<b>Score</b>	<b>Negative</b>	<b>VS</b>	<b>NPS</b>	<b>Score</b>	<b>Positive</b>
------------------	--------------	-----------------	-----------	------------	--------------	-----------------

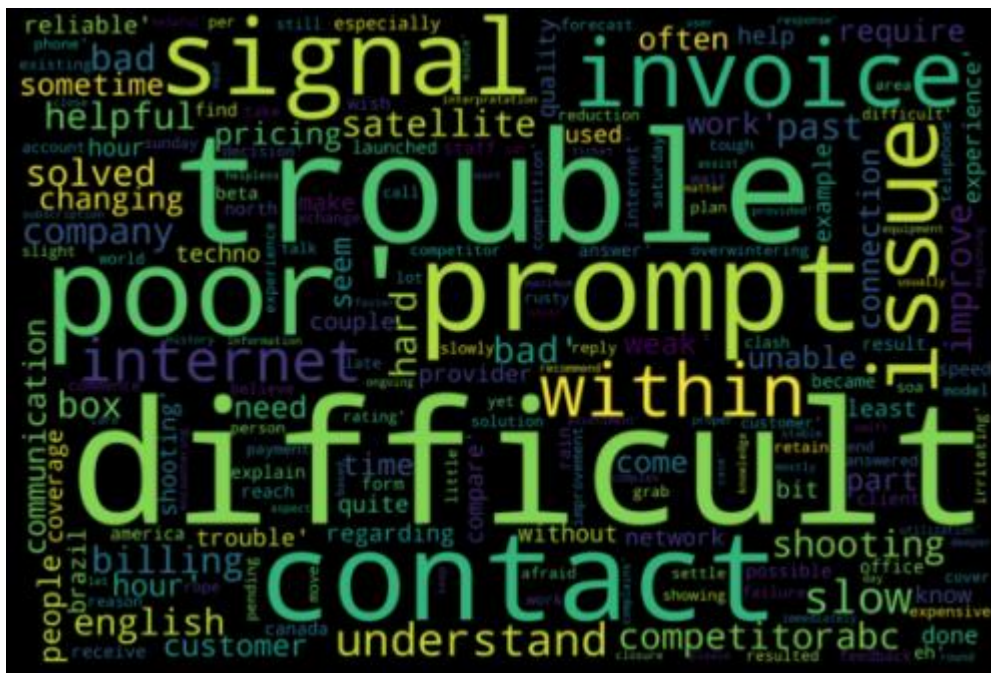
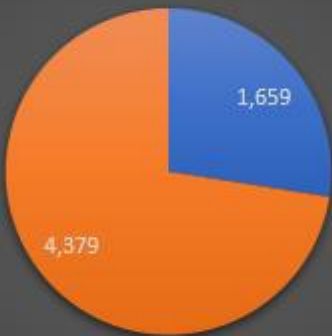


Figure No. 11.9 Sentiment Score Negative VS NPS Score Positive

## MisMatch:Neutrals

### Neutrals



Sentiment	Count
NPS_Neutral	1,659
Sentiment_Neutral	4,379

Page 34 of 38

## **Chapter 12: Conclusions and Recommendations for future work**

As discussed, the overall goal of this project was to generate an interactive dashboard which can provide key insights for the data collected by the survey platform. The survey data was for a Telecom client, but the approach is scalable for industries. Dashboard designed here will support the team (Project managers, support staff, senior management etc.) to get a quick overview of how participants of the survey have shared their experience and help them in taking quick action to support the customers better and keep them engaged with the company for a longer duration. The Dashboard also provides Sentiment analysis for the NPS and CES comments which allows the team to easily understand the emotions of the participants and narrow down if the NPS Score is really a good predictor for customer retention. Wordcloud helps in providing a good essence about the emotions and verbs used in the comments. With the help of lot of filters, it becomes easy for the team to pinpoint a particular area they want to monitor.

Considering the above designed Dashboard and outputs, below are some of the recommendation for future work:

- Scale the size of the project and make automation the backbone for each the task required to generate the Dashboard like:
- Data export for the surveys, Data transfer/upload to the Dashboard. Alerts notification based to ensure any issues with the dashboard are notified to the respective teams.
- Use more advanced Data Science tool to add value to the analysis. Automated recommendations to the clients so they can get an understanding if they need to make changes to the type of surveys and metrics they are capturing.
- To have some sort of Data purging settings so that the Dashboard can show the latest Data and old Data is archived effectively for performance enhancement
- As we saw a simple Sentiment analysis is giving far better results in gaining insights on the key emotions, we should push the client to adopt more of ML as part of analysis and this opens big scope for more money and bigger SOW's.

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## Appendix

### Plagiarism Report<sup>2</sup>

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