

# **Individual Coursework Submission Form**

# Specialist Masters Programme

Surname: Joshi		First Name: Rutva Dharmend	Ira
MSc in: Business Analytics		Student ID number: 2200525	55
Module Code: SMM 799			
Module Title: Applied Research Pro	oject		
ARP Tutor: DR. Matteo Devigili		Submission Date: 1 <sup>st</sup> Septem	ber 2023
Declaration:  By submitting this work, I declare that this work is entirely my own except those parts duly identified and referenced in my submission. It complies with any specified word limits and the requirements and regulations detailed in the coursework instructions and any other relevant programme and module documentation. In submitting this work, I acknowledge that I have read and understood the regulations and code regarding academic misconduct, including that relating to plagiarism, as specified in the Programme Handbook. I also acknowledge that this work will be subject to a variety of checks for academic misconduct.  We acknowledge that work submitted late without a granted extension will be subject to penalties, as outlined in the Programme Handbook. Penalties will be applied for a maximum of five days lateness, after which a mark of zero will be awarded.			
Marker's Comments (if not being n	narked on-line):		
Deduction for Late Submission:		Final Mark:	%

# "Analysing Audience Dynamics and Transition strategies for Abarth's Electric Transformation"

This report is submitted as part of the requirements for the award of the MSc Business Analytics

Rutva Dharmendra Joshi

September 1, 2023

#### Abstract:

The automotive industry is undergoing a significant change as a result of the switch to electric vehicles (EVs) and changing consumer preferences. Abarth, a well-known brand within the Stellantis group, is making the switch from its conventional high-performance combustion engines to electric mobility in order to navigate this transformation. An important turning point in this voyage is the release of the New Abarth 500e, which brings both chances and difficulties. With the introduction of the electric model, the Abarth audience's dynamics have changed, and this study attempts to understand these dynamics and their implications for the brand's stance in the market. This study uses a thorough technique to examine online debates about the Fiat 500e and the New Abarth 500e, including data scraping, topic modelling, clustering, and data visualization. We obtain insights into consumer behaviour and preferences by defining distinctive qualities of customer segments and mapping the landscape of Fiat and Abarth customers. In addition, we examine the possibility of audience overlap and look into how the New Abarth 500e may affect the existing Fiat 500e and Abarth 595/695 client base. Our research reveals subtle changes in Abarth's customer base following the launch of the electric model, shedding light on the difficulties in persuading ardent fans to accept electrification. An in-depth insight of market dynamics is provided by the comparative analysis of customer feedback for the New Abarth 500e, Fiat 500e, and Abarth 595/695. This study also highlights factors that can help or hinder a smooth transition, offering practical advice for Abarth on how to take advantage of new opportunities and avoid possible obstacles. In conclusion, this project creates a link between academia and business by giving Abarth useful information about the development of its audience, allowing the company to adapt its strategy to changing consumer demands.

# Acknowledgement:

I would want to express my sincere thanks to the people and organisations that have helped make this endeavour possible. Starting this research journey has been both enlightening and satisfying.

I want to start off by sincerely thanking the Abarth Group for their cooperation and assistance during this process.

I am indebted to Dr. Matteo Devigili for his invaluable guidance, mentorship, and insightful discussions. His expertise and dedication have been pivotal in shaping the trajectory of this study.

I would like to express my sincere gratitude to Professor Vali Asimit and Dr. Matteo Devigili for their persistent support and wise counsel. The study questions and procedures have both benefited from their perspectives.

I am appreciative of Giuseppe Cava from Stellantis for being willing to share his experience of the industry and enhancing the quality of this study.

I want to offer my sincere gratitude to my family and friends for their neverending encourage, and understanding.

And a particular thanks to my colleague Lily A-Un, who travelled with me on this adventure and provided encouragement and support throughout this study project.

Thank you all for being part of this rewarding journey.

# **Table of Contents**

ABSTRACT:	3
ACKNOWLEDGEMENT:	4
1. INTRODUCTION	7
2. LITERATURE REVIEW	9
3. METHODOLOGY	10
3.1 Data collection	10
3.2 Data Cleaning	10
4. AUDIENCE PROFILING	12
4.1 TOPIC MODELLING	12
4.1.1 Pre-processing	
4.1.2 Vectorization	
4.1.3 Choosing topic modelling model	13
4.2 Word Distribution Analysis for Topics	14
4.3 Analysis of topics	14
5. RESULT ANALYSIS	16
5.1 TOPIC MODELLING	16
5.2 CUSTOMER COMPARISON RESPONSES	
5.3 OVERALL CUSTOMER INSIGHTS	22
6. CONCLUSION	25
BIBLIOGRAPHY	26

# List Of Figures

FIGURE 1 SHOWS CUSTOMER DISCUSSION BETWEEN DIFFERENT CAR MODELS FROM SPEAK EV FORUM	11
FIGURE 2 TIME BASED ANALYSIS FOR ABARTH 500E FROM TWITTER	11
FIGURE 3 DEMONSTRATES THE BASIC OPERATION OF TOPIC	12
FIGURE 4 SHOWS LIST OF TOPICS FOR ABARTH500E	14
FIGURE 5 TOPIC LABELLING ABOUT ABARTH 500E	15
FIGURE 6 TOPIC MODELLING FOR ABARTH 500E	17
FIGURE 7 TOP CLUSTERS AND LABEL FOR ABARTH 500E	17
FIGURE 8 TOPIC MODELLING FOR FIAT500E	19
FIGURE 9 TOP 5 CLUSTER AND LABEL FOR FIAT 500E	19
FIGURE 10 CHARACTER FEATURES FOR ABARTH 500E	
FIGURE 11 CHARACTER FEATURES FOR FIAT 500E	21
FIGURE 12 SHOWS THE SENTIMENT ANALYSIS FOR ABARTH500E	
FIGURE 13 SENTIMENT ACROSS TOPICS FOR ABARTH500 E	23
FIGURE 14 SENTIMENT ANALYSIS FOR FIAT 500	
FIGURE 15 SENTIMENT ACROSS TOPICS FOR FIAT 500	

#### 1. Introduction

The rapid development of electric vehicle (EV) technology and consumers' shifting preferences are causing a seismic shift in the automobile industry's environment. Abarth has established itself as a key factor in this transitional era thanks to its reputation for great performance, fascinating design, and evocative exhaust notes. Abarth has made a name for itself with iconic models like the 595, a spirited take on the well-known Fiat 500 that boasts improved power, dynamic prowess, and contemporary aesthetics, as well as their 695 and 124 Spider ("The history of Abarth," 2021).

Abarth is leading the charge in embracing the undiscovered world of electric transportation as the automobile industry forges new paths. The launch of the New Abarth 500e, a daring leap that redefines the brand's identity and ushers in a world of previously unheard-of chances and difficulties, marks a crucial turning point in this journey. The rapid uptake of electric vehicles, driven by environmental awareness, government incentives, and technological advancements, highlights how electrification is transforming the automobile industry across all vehicle segments ("Why the automotive future is electric," McKinsey & Company).

The New Abarth 500e's planned introduction fits in perfectly with the global movement toward clean, sustainable mobility. But in order to make this change, Abarth must venture into unexplored territory. The Abarth 500e deviates from conventional gasoline or diesel engines as a stylish compact automobile powered exclusively by electricity, demonstrating the brand's dedication to a greener future ("Abarth 500e review," Whatcar?). Abarth, known for its expertise in combustion engines, is about to embark on an exciting but unpredictable voyage. The difficulty of maintaining the brand's essence while appealing brand aficionados and luring a fresh group of fans drawn to high-performance electric mobility is embodied by this strategic transformation, which represents more than just a technical transition.

The analysis of the complex processes behind Abarth's electric evolution lies at the heart of this study. Our goal is to determine how the New Abarth 500e will affect current models like the Fiat 500e and the Abarth 595/695. In addition, we work to identify tactics for navigating this transformative phase through an examination of customer input, market trends, and online media debates. Beyond environmental considerations, Abarth's transition to electrification captures the essence of pure elation and strong competition ("Bright spark: Vivid new electric Abarth 500e," This is Money).

This report is neatly organized and proceeds logically. The adoption of electric vehicles, consumer behaviour, and brand loyalty are covered at first. The process used for data analysis, consumer segmentation, and the creation of insightful conclusions is then described. The research findings and their implications for Abarth's strategic approach are presented in the following sections. The report culminates in a thorough summary of major findings and strategic suggestions before highlighting potential directions for further research in this dynamic and changing environment.

Through this project, you will get the chance to interact with the rapidly changing automotive industry, understand the challenges of making the switch to electric mobility, and provide practical advice for guiding Abarth to a prosperous future in the electrified era.

#### 2. Literature Review

The fast advancement of electric vehicle (EV) technology and changing consumer tastes are driving a transformation in the automobile sector. The transition of well-known automobile brands to electric mobility, the difficulties and opportunities they face, and implications for brand identification and customer behaviour are all covered in-depth in this part.

Over the coming ten years, the electric vehicle (EV) market is expected to continue its rapid expansion. The number of EVs on the road rose sharply between 2011 and 2021, rising from roughly 22,000 to well over 2 million. Continued growth in EV adoption is predicted for the years 2021 through 2031, spurred by environmental awareness, a wider variety of available vehicles, improved battery technology, and suitable financial incentives. ("Charging into the future: the transition to electric vehicles," 2023). However, switching to electric cars (EVs) has both benefits and drawbacks. Concerns regarding expenses, mileage, charging time, battery life, safety, and reliability are among the main reasons why many consumers are reluctant to move to EVs. Potential purchasers have expressed concerns, particularly over the battery range. At the moment, attempts are being made to improve range and charging effectiveness through technological advancements. The three main battery designs show that weight reduction is a crucial component of battery development (Mihala, 2023).

The debut of the New Abarth 500e is more than simply the introduction of a new product; it is a strategic step towards adopting electrification as a way to address environmental issues and promote sustainable practices ("Charging into the future: the transition to electric vehicles," 2023). The choice by Abarth to start this electrified journey is representative of a larger trend in the automotive sector, which is marked by a global push toward cleaner energy source. For the New Abarth 500e transition to be successful, Abarth must understand the changing preferences and expectations of its customer base, both current and potential. Automotive companies enjoy strong consumer loyalty because of their uniqueness in terms of design, branding tactics, and user experiences. By utilizing these recognizable qualities, there is a chance to build a loyal and passionate customer base and smoothly transition them into the world of electric mobility (Witvoet, 2022)

This study intends to provide useful insights into how Abarth's customers have adopted electric cars, with a special emphasis on the New Abarth 500e. The study investigates how brands are handling the transition to electric vehicles in an ever-changing automotive environment by contrasting the audience of the New Abarth 500e with that of the Fiat 500e and Abarth 595/695.

# 3. Methodology

This study's research technique aims to thoroughly examine the audience dynamics and customer profiles of Abarth in the context of their switch to electric vehicles. The methods used, the data sources accessible, and the analytical tools used are described in this section.

#### 3.1 Data collection

The Data was gathered from two important sites, Twitter and the Speak EV forum, in order to get a better insight of how Abarth's audience thinks and acts. These sites are rich sources of user-generated debates and content that focuses on subjects relating to Abarth's electric vehicles. Using tools like BeautifulSoup and Twitter API, a scraping pipeline was developed to carry out the process of collecting this data. This pipeline made it easier to extract essential dialogues, points of view, and feelings. The strategy entailed using a technique taken from GitHub, where the Twitter API was utilized. Several commands were used to modify this API in order to retrieve useful comments and keywords, which were then organized into a data frame. The data frame was then transformed into a CSV file for further study and analysis. (Mehranshakarmi / Al\_Spectrum, 2022).

#### 3.2 Data Cleaning

To assure the quality and consistency of the collected data, a thorough cleaning procedure was used. Textual data was pre-processed to standardize formats, reduce noise, and improve readability. Irrelevant or duplicate content was eliminated. This phase is essential for ensuring correct analysis and reliable results.

We carried out a descriptive analysis once the data had been cleaned up in order to spot any notable trends or patterns that might have emerged in the discussions. Both the Twitter platform and the Speak EV forum provided text data that we used. The process involves segmenting the material into distinct prompt commands, such as "Abarth 500e," "Fiat 500," and "Abarth 500," as seen in Figure 1. This graphic displays a perceptive visualization of customer conversations about various automobile models taken from the Speak EV forum.

Additionally, we examined the statistics over time, paying particular attention to the month of June, which happened to be the same month as the Abarth 500e's beginning. This temporal analysis is illustrated in Figure 2, which provides a graphical representation of the conversations that took place over that crucial time. These visualizations provide essential early understandings that will guide our further research.

# Prompt Abarth+500 Abarth+500e Fiat+500 40 20 Abarth Aba

Figure 1 Shows customer discussion between different car models from Speak EV forum

Month

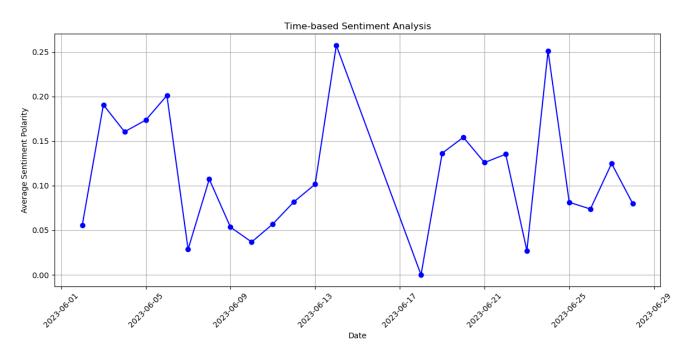


Figure 2 Time based analysis for Abarth 500e from twitter

# 4. Audience profiling

#### 4.1 Topic Modelling

A complex method used in text analysis and natural language processing called topic modelling can reveal hidden thematic structures in a corpus of text documents. When dealing with huge amounts of textual data, it is especially helpful since it makes it possible to identify underlying themes, topics, and patterns that might not be immediately obvious. Topic modelling is crucial in our investigation of Abarth's audience perceptions and behaviours because it helps us glean important information from the textual discussions we gathered from Twitter and the Speak EV forum. The operational workflow and basic mechanics of topic modelling are shown in Fig. 3 (DataJameson,2020) With the help of this graphic depiction, we get a general idea of the subject modelling supporting processes as well as the way it works.

The following steps are included in the topic modelling process:

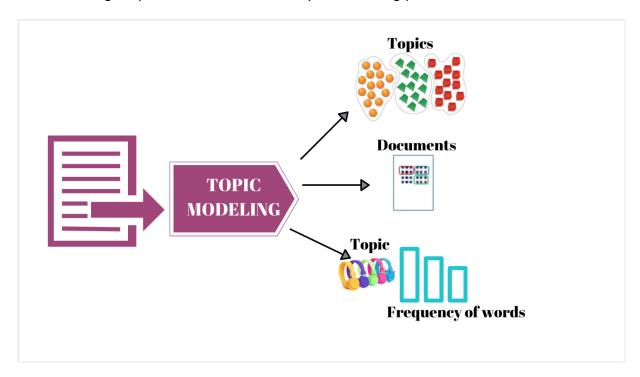


Figure 3 Demonstrates the basic operation of topic

#### 4.1.1 Pre-processing

The precise preparation of the text data is one of the key early steps in the topic modelling process. By methodically addressing various parts of the raw text, this initial stage aims to improve the overall quality of the upcoming analysis. It includes activities like tokenization, which separates the text into understandable chunks, the elimination of stopwords (frequently occurring words like "and," "the," and "is," among others), stemming to break down words to their simplest forms, and deft use of special symbols and punctuation. The textual data is prepared for efficient topic modelling through these methodical adjustments, improving the accuracy and applicability of the insights that will be derived.

#### 4.1.2 Vectorization

In order to convert textual data into a format that machine learning algorithms can use efficiently, vectorization is an essential step. The cleaned text needs to be transformed into numerical representations after text pre-processing, which involves activities like tokenization, stopword removal, stemming, and managing special characters.

This translation is necessary since machine learning algorithms by their very nature function largely on numerical data. The Term Frequency-Inverse Document Frequency (TF-IDF) method has been used. This technique can be used to assign weights to words in a document based on their frequency inside the document and how frequently they occur within a collection of documents. This strategy will underline the value of terms that are distinctive to certain documents while downplaying the significance of words that are used frequently across various publications.

Word embeddings are a different method we also used. This is employed to record words' contextual and semantic relationships. It aids in a more nuanced understanding of the semantic nuances of words and their relationships. We used word embeddings from the spaCy library in our analysis. SpaCy is a strong library for natural language processing that provides pre-trained word vectors and extensive linguistic analysis tools. This enables algorithms to process, examine, and derive insights from text data, ultimately contributing to the analyses or model-building's larger goals.

#### 4.1.3 Choosing topic modelling model

In building our subject modelling framework, we go through two crucial stages: model selection and model training. We choose Latent Dirichlet Allocation (LDA) as our final technique, and the tomotopy library is used to implement it.

We select the widely utilized Latent Dirichlet Allocation (LDA) technique during the first "Choosing the Model" phase. LDA uses a probabilistic approach, assuming that documents are made up of a variety of themes with varying word counts. A crucial element, the number of topics, is chosen through experimentation or domain knowledge. We seek to elucidate underlying themes in the data using LDA, exposing hidden factors influencing textual content.

The LDA technique is used to process vectorized text data in the following "Training the Model" phase. By assigning words to themes and documents to combinations of subjects, this iterative procedure increases the possibility that data will be observed. These mimics the complex word relationships found in various papers, improving the algorithm's capacity to find significant links.

Finally, using the tomotopy package, we implement Latent Dirichlet Allocation (LDA) as our model. This particular tool gives us the capabilities we need for precise LDA modelling, revealing latent themes in textual data. Our use of LDA and tomotopy demonstrates our commitment to using cutting-edge methods to uncover latent structures in written data.

#### 4.2 Word Distribution Analysis for Topics

After using LDA, we used tmplot to calculate the probability for nine distinct topics. The corpus produced a unique set of words linked with each topic. We performed a degree distribution study for each of these areas to better comprehend their importance. We were able to determine the frequency and distribution of words within each topic using this approach, which helped us determine their relative significance and relevance.

This degree distribution study, in particular, assisted us in determining the importance of individual terms within each topic, highlighting their frequency and potential significance in influencing the underlying theme material. We were better able to understand the coherence and cohesion of words inside different topics by viewing the distribution patterns.

The topics that have been selected are presented in detail visually in Figure 4, highlighting their distinctive characteristics and the relationships between the individual words. This image is quite helpful for comprehending the results of our subject modelling efforts. It enables us to better understand the underlying themes that emerge from the textual information, especially when viewed in the context of conversations about the Abarth 500e's characteristics as they are experienced and discussed by customers.

```
Topic #0: electric, ev, new, review, test, kona, drive, hot, hyundai, vehicle
Topic #1: range, come, life, scorpion, making, blog, city, enzari, real, similar
Topic #2: ev, year, month, cost, uk, drive, sell, california, little, buy
Topic #3: know, charger, want, don, need, charge, come, go, leaf, cheap
Topic #4: week, new, talk, chance, see, matt, steve, dacia, spring, autocar
Topic #5: like, battery, ll, look, get, good, issue, mile, charge, range
Topic #6: drive, mile, dealer, work, go, range, get, week, say, like
Topic #7: cool, abarthelectric, newabarth500e, newabarth500erange, teamabarth, trick, mph, fun, mean, charge
Topic #8: new, electric, power, design, contact, range, scorpion, catch, performance, let
Topic #9: love, premium, fun, open, variant, review, gain, warrant, new, autocar
```

Figure 4 Shows list of topics for Abarth500e

#### 4.3 Analysis of topics

The following figure 5. undoubtedly graphically illustrates the top five issues that were determined through analysis of conversations surrounding the Abarth 500e. These themes and subjects are a condensed depiction of the common themes and discussions that customers have had while talking about the Abarth 500e. In the corpus of textual data, the subjects are essentially groups of words and phrases that regularly co-occur.

Each theme highlights a particular quality, characteristic, or element of the Abarth 500e that has caught users' eye. These subjects, which are effectively "bundles" of linked terms, reveal what buyers are talking about the Abarth 500e the most. If one of the subjects is "performance," for instance, it suggests that buyers are talking about the car's numerous performance characteristics, such as acceleration, handling, and power.

A discussion of these topics enables a better knowledge of customers' primary areas of interest as well as their preferences, worries, and points of

interest with relation to the Abarth 500e. The company may find this information useful for customizing its marketing plans, product advancements, and customer interaction initiatives to meet the needs and preferences of its target market.

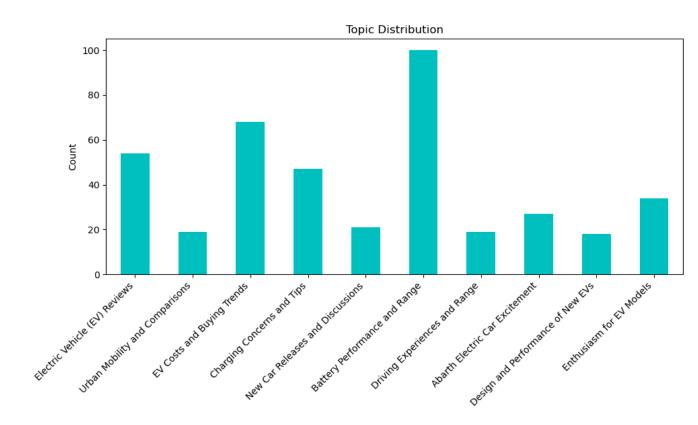


Figure 5 Topic labelling about Abarth 500e

# 5. Result analysis

We present a full analysis of the resulting findings from the topic modelling and clustering phases of the research in this part. The analysis's objective is to extract useful information from the textual data while showcasing the synergistic impacts of several analytical techniques.

#### 5.1 Topic modelling

Following the topic modelling procedure, a number of unique topics were revealed in the textual data. Each topic is identified by a group of words and phrases that shed light on the overarching ideas that are present throughout the conversations. Each topic's keywords were thoroughly evaluated to establish their contextual applicability and any potential effects.

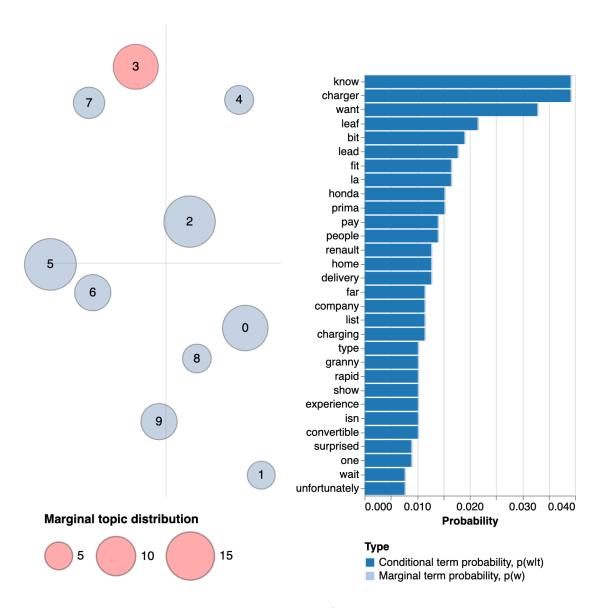


Figure 6 Topic Modelling for Abarth 500e

Car Model	Topics	Topic Label
		Battery Performance and
	1	range
Abarth 500 e	2	Costs and buying trend
	3	Electric vehicle review
	4	Battery Life
	5	Enthusiasm of models

Figure 7 Top clusters and label for Abarth 500e

By integrating topic modelling and clustering, we were able to produce insightful results that shed light on distinct customer segments and their preferences. Figure 6 shows the distribution of Topic 2 and the associated probability. In instance, the table in figure 7. focuses on a specific client cluster where Topics 1 and 2 are prominent themes. This cluster exhibits a significant interest in elements including battery performance, general cost concerns, and current purchasing trends. The New Abarth 500e stands out as the first sporty-appealing high-performance electric hatchback; yet, customer feedback suggests that it is not the only player in its market. (Ilya Verpret, 2023).

The analysis then looks into each topic's qualities one at a time. The main conversation is focused on Topic 3, which is mostly about reviews of electric automobiles. This subject is quite useful for understanding client thoughts and opinions because it gives a thorough picture of loves and dislikes related to the car. Additionally, Topics 4 and 5—which are centered on battery longevity and the passion surrounding the model—emerge as important focal areas. Through these subjects, we reveal the distinctive features that devotees find fascinating, illuminating battery-related issues and the tangible fervour surrounding the particular car model.

We can generalize by saying that these subjects together help us comprehend the features of the New Abarth 500e that appeal to the audience the most. The focus of talks on battery performance, cost considerations, reviews, and model fervour provide critical insights into the characteristics that hold strong attraction. A multidimensional perspective on consumer behaviour and preferences is provided by the merging of topic modelling and clustering. This method helps us find underlying patterns that are difficult to see through individual analysis. We enable Abarth to effectively adjust its strategy and offers to satisfy certain requirements and aspirations by identifying key themes within various client categories.

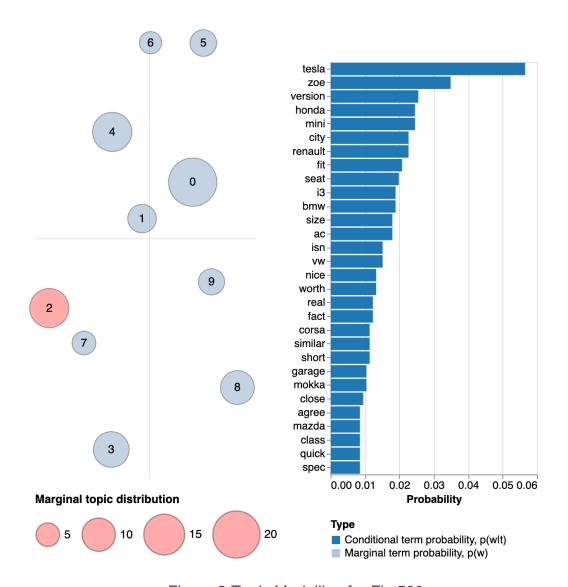


Figure 8 Topic Modelling for Fiat500e

Car Model	Topics	Topic Label
	1	Charging Availability
		Electric Vehicle Model
	2	showcase
Fiat 500e		EV User experience &
	3	Challenges
	4	Cost and pricing EV
	5	Market Trend and insights

Figure 9 Top 5 cluster and label for Fiat 500e

We repeated the strategy for the Fiat 500e to delve into client segmentation by using a similar analytical methodology as applied for the Abarth 500e. The relevant insights, which depict the themes and the corresponding probabilities, are shown in Figure 8. The selected clusters, which constitute

the two most significant clusters from the above table 9 that displays the cluster for the Fiat 500e, focus on customer involvement in themes 1 and 2. These clusters are focused on the Showcase of Electric Vehicle Models and Charging Availability. This finding emphasizes the car's battery, concentrating in particular on the infrastructure for charging and the display of electric vehicle models. By extending our study, topics 3 and 4—which focus on user experience and customer challenges—become clear. The cost and pricing aspects of the Fiat 500e are also taken into account in relation to these discussions. The final topic, number 5, focuses on market developments and broader perspectives on the Fiat 500e. This in-depth analysis highlights the different objectives and preferences of customers while highlighting the wide range of features within the Fiat 500e that appeal to people. With three distinct trim levels, two battery pack variants, and choices between hatchback and convertible body designs, the Fiat 500 electric vehicle has a notably long range. The charging aspect is given a lot of attention in the article. This shows that the charging feature of the Fiat 500e is the one that people find to be of the highest level of appreciation ("Fiat500e review,").

#### 5.2 Customer Comparison responses

#### Abarth 500e

Car Model	Features	
Abarth 500e	Battery, looks, charger, range, mile  EV, cost, little, buy, drive  Electric, new, reviews, test	
	Charger, want, charging, cheap	
	Fun, variant, autocar, love, open	

Figure 10 Character features for Abarth 500e

The comments acquired from customer comparisons offer insightful information on the features of the Abarth 500e that appealed to people the most, highlighting important elements that received favourable feedback.

The necessity of an effective and dependable battery system in electric vehicles was highlighted by the battery component, which stood out as a noteworthy feature. Customers' favourable responses to the battery feature show how important battery performance is becoming in the spread of electric automobiles. Additionally, the visual appeal and appearance of the Abarth 500e were emphasized, demonstrating that style and design play a crucial role in determining how likeable a product is to customers. According to the comments, a key factor in how customers view electric vehicles is the charging infrastructure. The focus on chargers serves as evidence that promoting the use of electric vehicles requires a reliable and convenient charging infrastructure. The debates over range and mileage also highlight the importance of extended range capabilities by addressing a major worry among prospective purchasers.

The responses also mentioned financial issues, showing that customers are sensitive to the expense of owning and operating electric vehicles. This emphasizes how crucial competitive pricing methods are for luring in new clients and keeping existing ones. Additionally, references to "new," "reviews," and "test" show that customers rely on reviews and tests to help them make educated selections, highlighting the importance of reliable information dissemination. Last but not least, the words "fun," "variant," "love," and "open" imply that buyers value the thrilling driving experience and variety of model choices. These replies suggest that providing a variety of options and highlighting the fun of operating an electric vehicle could help draw in and keep customers.

This business-related information can direct Abarth's product development and marketing efforts. Abarth may match its offerings to customer preferences and strengthen its competitive edge in the electric car industry by putting a priority on battery performance, concentrating on appealing designs, building a strong charging network, assuring competitive pricing, and utilizing favourable reviews. The focus on entertaining and interesting variations also creates opportunities for new product development and niche marketing initiatives.

#### Fiat 500e

Car Model	Features	
Fiat 500e	New, good, go, battery Model, version, mini, range Dealer, speed, issue, test	
	Petrol, time, try, work	
	Market, level, price, company, offer	

Figure 11 Character features for Fiat 500e

The Fiat 500e's primary selling points are revealed by customer feedback, which reveals future marketing plans. The word "new" denotes consumers' admiration for innovation, indicating that the Fiat 500e's novelty struck a chord. Positive attitudes toward "good" indicate contentment with the car's features. The focus on "battery" highlights the significance of dependable electric power, which has an impact on client perceptions. The words "model" and "version" imply a preference for variety, and the word "mini" emphasizes the car's agility. Discussions on "range" highlight the importance of longdistance capabilities, which address a widespread worry. Customer loyalty depends on service satisfaction, which is reflected in "Dealer" references. "Speed" and "issue" suggest that performance matters, pointing out potential areas for improvement. The word "test" denotes a dependence on practical knowledge. The terms "petrol" and "time" might be referring to similarities with conventional automobiles, underlining the opportunity for consumers to transition. The word "market" emphasizes an understanding of the sector, indicating informed clients. Discussions of "price" and "company" bring up costs and reputation of brands. Competitive strategies are influenced by an

understanding of pricing preferences. The word "offer" suggests enticing rewards for influencing purchases.

Fiat may deliberately emphasize the novelty and excellence of its electric vehicle offering by utilizing these findings. Its attraction can be increased by emphasizing distinctive qualities like its small size. Concerns can be addressed, and features like range and speed can be improved to meet client expectations. A wide audience can be drawn in through improving dealer relations and catering to various consumer needs while offering affordable pricing. Fiat may take advantage of market trends and rivalry by keeping an eye on both. These insights can be used to target specific marketing campaigns that will appeal to customers and help Fiat succeed with its electric vehicle initiatives.

#### 5.3 Overall Customer Insights

Figure 12 presents the findings of sentiment analysis and offers insightful information about the general attitudes of customers. According to the study, 54.3% of all reviews are positive, which indicates that the majority of them are. This suggests that customers are favourably responding to the product. Additionally, a neutral emotion is present in about 30.7% of the reviews, indicating a balanced range of reactions. On the other hand, 15% of the ratings are unfavourable, indicating potential improvement areas. On the other hand, Figure 13 displays the sentiment distribution across several themes, allowing us to see which topics are more likely to earn positive, negative, or neutral evaluations. By linking these views to specific themes, we may pinpoint the precise areas that evoke overwhelmingly positive responses as well as those that may need improvement. Companies are provided with the resources they need to strategically focus on enhancing customer experiences, resolving problems, and enhancing product characteristics based on real-time information thanks to this in-depth analysis.

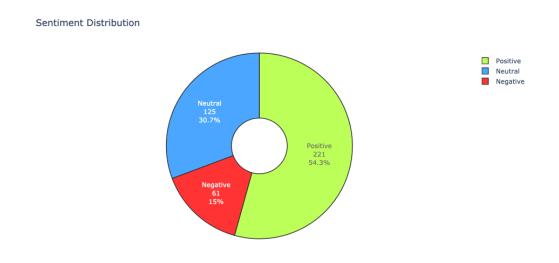


Figure 12 Shows the sentiment analysis for Abarth500e

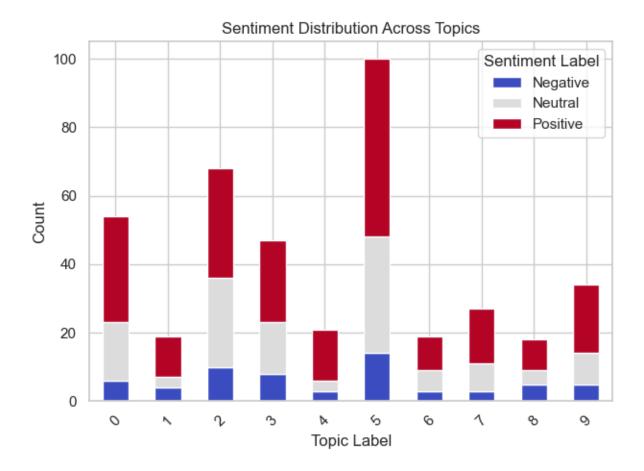


Figure 13 Sentiment across topics for Abarth500 e

The sentiment analysis findings for the Fiat 500e are shown in Figure 14, providing an interesting look into the general customer sentiment. Notably, 59.9% of the opinions are positive, indicating that a sizeable proportion of customers have favourable opinions of the product. On the other hand, around 28% of sentiments are classified as neutral, showing a balanced range of reactions. Additionally, negative sentiments account for 12.1% of the total, indicating possible areas for concern. Figure 15 on the other hand shows the sentiment distribution across different topics, allowing us to determine which subjects are more likely to receive positive, negative, or neutral assessments.

The customer comparison analysis provides profound insights into the factors that shaped preferences for the Abarth 500e and Fiat 500e. Focusing specifically on the Abarth 500e, we uncover the distinctive features that resonated with individuals and delve into the underlying motivations. This approach grants a deep understanding of the intricate dynamics that influenced impressions and attracted diverse audience segments. This indepth analysis offers a comprehensive view of the Abarth 500e's appeal, revealing the multifaceted drivers behind customer preferences. By exploring customer responses thoroughly, we uncover compelling reasons that fostered positive sentiments, enhancing our understanding of the elements that captivated customers. This approach delves into core motivations, perceptions, and emotional triggers, yielding valuable insights for informed decision-making, tailored marketing, and refined customer experiences in the electric vehicle landscape.



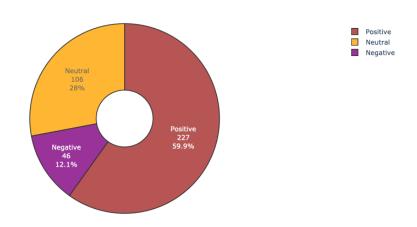


Figure 14 Sentiment analysis for Fiat 500

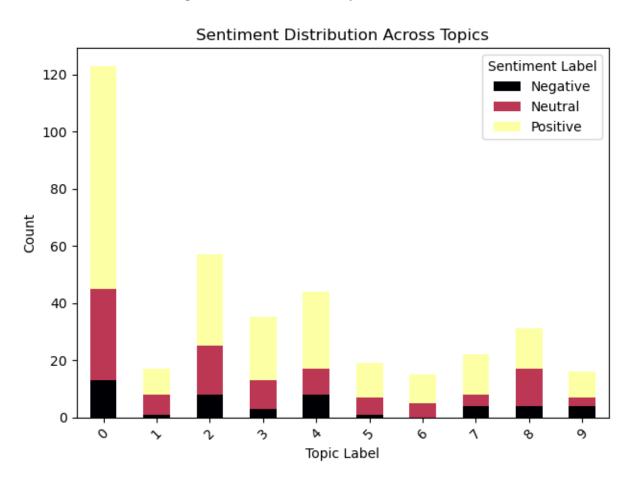


Figure 15 Sentiment across topics for Fiat 500

#### 6. Conclusion

The Abarth 500e is the most recent chapter in the brand's illustrious history and a vibrant complement to its rich heritage. It's exhilarating reimagining of the famous Abarth 500 seamlessly combines performance and sophistication with an eco-friendly design. Due to its 42-kWh battery, the 500e prioritizes sustainability and boasts a remarkable range of up to 199 miles. The Abarth 500e bridges the gap between performance and electrification with a top speed of 93 mph and an amazing 0-62 mph acceleration time of under 7.2 seconds. For ecologically aware drivers who also seek speed, its improved acceleration and increased battery life make it an attractive option. ("The All-New Abarth 500e: Everything You Need to Know," BlogF1.it, 2022)

The Abarth 500e features cutting-edge technology in addition to pure power. Its cornering capabilities is improved by a sophisticated torque-vectoring system, which increases stability during high-speed manoeuvres. The Abarth 500e becomes a personification of style and substance, making a statement both on and off the road, when you combine this with its sleek, alluring look.

Along with these elements, our analysis has highlighted client preferences, revealing crucial aspects that have struck a chord with them deeply. Performance of the battery, aesthetics, and charging infrastructure were identified as crucial components that attracted good attention. Abarth has the chance to improve its marketing efforts by highlighting these assets and addressing customer complaints now that it is armed with this information. The Abarth 500e is ready to alter perceptions of electric vehicles by fusing innovation with customer-centric values and catering to people looking for both a thrilling driving experience and a responsible decision.

Due to the Abarth 500e's greater performance, outstanding range of up to 199 miles, and strong focus on environmental sustainability, audiences are starting to prefer it over the Fiat 500 more frequently. Battery performance and charging infrastructure are distinctive selling advantages that appeal to customers. This change indicates shifting consumer preferences toward electric cars with better features and a smaller environmental impact, indicating changing consumer behaviour in the automobile industry.

The Abarth 500e stands as a light of electric innovation, bending traditions and providing a blend of performance and environmental responsibility in a world where sustainability is being defined more and more by it. The Abarth 500e is at the vanguard of the transition of electric vehicles from being merely functional to being desired symbols of advancement. It ushers in a new era of electric driving that combines power, style, and conscience.

Word Count: 4933

# **Bibliography**

- 1. ("The history of Abarth," 2021), The history of Abarth, [Online]. Available: <a href="https://www.carparisonleasing.co.uk/blog/the-history-of-abarth">https://www.carparisonleasing.co.uk/blog/the-history-of-abarth</a> (Accessed: June 18, 2021)
- ("Why the automotive future is electric," McKinsey & Company,2021), Why the automotive future is electric, [Online] McKinsey & Company. Available: <a href="https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric">https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/why-the-automotive-future-is-electric</a> (Accessed: September 7, 2021)
- 3. ("Abarth 500e review," Whatcar?), Abarth 500e review, [Online] Whatcar?https://www.whatcar.com/abarth/500/hatchback/review/n25801
- ("Bright spark: Vivid new electric Abarth 500e," This is Money), Bright spark: Vivid new electric Abarth 500e has an artificial roar made to sound like its petrol predecessors, [Online]. Available:
   <a href="https://www.thisismoney.co.uk/money/electriccars/article-11452899/Bright-spark-Vivid-new-electric-Abarth-500e-hot-hatch-revealed.html">https://www.thisismoney.co.uk/money/electriccars/article-11452899/Bright-spark-Vivid-new-electric-Abarth-500e-hot-hatch-revealed.html</a>
- ("Charging into the future: the transition to electric vehicles," 2023). Charging into the future: the transition to electric vehicles, [Online] Available: <a href="https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm">https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm</a> (Accessed: February 16, 2023)
- (Mihala, 2023). Automotive Transition to EV's Creates New Challenges and New Opportunities. NeoGraf Solutions, [Online]. Available: <a href="https://www.neograf.com/2023/05/25/automotive-transition-to-evs-creates-new-challenges-and-new-opportunities/">https://www.neograf.com/2023/05/25/automotive-transition-to-evs-creates-new-challenges-and-new-opportunities/</a> (Accessed: August 23, 2023)
- (Witvoet, 2022). The Transition to Electric Vehicles: An Effective Path Forward for The Industry. Forbes, [Online]. Available: <a href="https://www.forbes.com/sites/forbesbusinesscouncil/2022/05/31/the-transition-to-electric-vehicles-an-effective-path-forward-for-the-industry/?sh=5bd8f2f9466d">https://www.forbes.com/sites/forbesbusinesscouncil/2022/05/31/the-transition-to-electric-vehicles-an-effective-path-forward-for-the-industry/?sh=5bd8f2f9466d</a> (Accessed: May 31, 2022)
- 8. (Mehranshakarmi / Al\_Spectrum, 2022). Mehranshakarmi / Al\_Spectrum. GitHub repository URL:

  <a href="https://github.com/mehranshakarami/Al\_Spectrum/blob/main/2022/Twitter\_API/twitter\_data\_users.py">https://github.com/mehranshakarami/Al\_Spectrum/blob/main/2022/Twitter\_API/twitter\_data\_users.py</a> (Accessed: 2022)
- (DataJameson,2020) DataJameson (2020). Topic Modelling NLP-Amazon reviews, BBC news, Kaggle. Available:
   <a href="https://www.kaggle.com/code/datajameson/topic-modelling-nlp-amazon-reviews-bbc-news">https://www.kaggle.com/code/datajameson/topic-modelling-nlp-amazon-reviews-bbc-news</a>

- (Kapadia, 2019) Shashank Kapadia. Topic Modelling in Python: Latent Dirichlet Allocation (LDA), Towards Data Science. Available:
   <a href="https://towardsdatascience.com/end-to-end-topic-modeling-in-python-latent-dirichlet-allocation-lda-35ce4ed6b3e0">https://towardsdatascience.com/end-to-end-topic-modeling-in-python-latent-dirichlet-allocation-lda-35ce4ed6b3e0</a> (Accessed: April 15, 2019)
- 11. (Li, 2018) Susan Li. Topic Modelling and Latent Dirichlet Allocation (LDA) in Python, Towards Data Science. Available: <a href="https://towardsdatascience.com/topic-modeling-and-latent-dirichlet-allocation-in-python-9bf156893c24">https://towardsdatascience.com/topic-modeling-and-latent-dirichlet-allocation-in-python-9bf156893c24</a> (Accessed: May 31, 2018)
- 12. (Ilya Verpret, 2023). Illya Verpret. Abarth 500e review. Autocar <a href="https://www.autocar.co.uk/car-review/abarth/500e">https://www.autocar.co.uk/car-review/abarth/500e</a> (Accessed: August 18, 2023)
- 13. ("Fiat500e review,"). Fiat500 e review [Online]. Electrifying the electric car experts. https://www.electrifying.com/reviews/fiat/500e/review
- 14. Yasmin (2018). Yasmin. LDA and T-SNE Interactive Visualization, Kaggle [Online]. Available: <a href="https://www.kaggle.com/code/ykhorramz/lda-and-t-sne-interactive-visualization">https://www.kaggle.com/code/ykhorramz/lda-and-t-sne-interactive-visualization</a> (Accessed: 2018)
- 15. ("The All-New Abarth 500e: Everything You Need to Know," BlogF1.it, 2022) The All-New Abarth 500e: Everything You Need to Know, BlogF1.it [Online]. Available: <a href="https://www.blogf1.it/en/2022/11/26/new-abarth-500e/">https://www.blogf1.it/en/2022/11/26/new-abarth-500e/</a> (Accessed: November 26, 2022)
- Deepika Saini. Kmeans clustering, Kaggle [Online] Available: <a href="https://www.kaggle.com/code/deepikasaini2001/kmeansclustering">https://www.kaggle.com/code/deepikasaini2001/kmeansclustering</a> (Accessed: 2020)
- 17. Twitter sentiment Extraction-Analysis, EDA and Model, Kaggle. Available: <a href="https://www.kaggle.com/code/tanulsingh077/twitter-sentiment-extaction-analysis-eda-and-model">https://www.kaggle.com/code/tanulsingh077/twitter-sentiment-extaction-analysis-eda-and-model</a> (Accessed: 2020)
- 18. Twitter Sentiment Analysis [Online], Kaggle. Available: <a href="https://www.kaggle.com/code/shinhaijin/twitter-sentiment-analysis">https://www.kaggle.com/code/shinhaijin/twitter-sentiment-analysis</a> (Accessed: 2023)
- 19. Simone santoni. GitHub repository URL: <a href="https://simonesantoni.github.io/NLP-orgs-markets/bare-bone-Ida-with-tomotopy.html">https://simonesantoni.github.io/NLP-orgs-markets/bare-bone-Ida-with-tomotopy.html</a> (Accessed online)
- 20. Maksim Terpilowski,2023, 'Tmplot' [PDF]. Available: <a href="https://tmplot.readthedocs.io/">https://tmplot.readthedocs.io/</a> /downloads/en/latest/pdf/ (Accessed: August 27, 2023)