Big Data using for examining customer behaviour

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Abstract

For any company or organisation, studying customer behaviour and activity is becoming a more crucial and vital endeavour. Businesses want to know how their customers use or interact with their products in order to get useful data that can be applied to key business choices like challenging fresh features or products, decontaminating remaining models, or launching fresh marketing campaigns. To assist businesses and organisations in more efficiently focusing their efforts, data regarding consumer behaviours is gathered and evaluated. The growth of big data has led to the development of new Customer Relationship Management (CRM) techniques that facilitate individualization and customization of sales, products, and customer support. Big data demands new technologies and tactics to gather, store, and interpret information and is utilised to enhance decision-making for better customer administration. Big data analytics gives several opportunities to develop novel viewpoints on hospitality industry and to support this industry's judgement. Hospitality industry can benefit from customer content (UGC) by gathering customer reviews and enhancing specific areas of their products or services to boost brand value and help marketing campaigns. This manuscript analyses and contrasts the factors of hotel visitors' happiness and discontent. Text analytics were used to analyse the association between hotel satisfaction and guest reviews after they were dissected. This paper demonstrates how may be applied using already available software and undertaken in different hospitality-related research topics, including customer and employee happiness, hotel performance, purchasing habits, etc. The findings of this study illustrate how customers express their experiences in recommendations, despite the fact that they are based on online reviews that have been placed on a specific hotel website. Second, examining user-generated content (UGC) provides researchers with a fresh angle on examining Compared to survey approaches, service quality yields more detailed depiction of customers' perceptions.

Keywords: Big data analytics, social media, consumer behaviour, consumer perception, Customer satisfaction

1. Introduction

Studying customer behaviour and activity is becoming an increasingly important and significant endeavour for any business or organisation. Businesses desire to understand how their customers interact with or use their goods in order to get valuable information that may be used to make important business decisions, such as testing new features or products, improving current models, or launching new marketing initiatives. Data about user behaviour is gathered and studied to help businesses and organisations focus their activities more effectively. Additionally, client feedback is crucial for enhancing the calibre of a company's goods or services because it is the most accurate indicator of user experience. Social media and communication technology developments have had a significant impact on how well businesses and organisations can now understand their target audiences. Speaking, ancient cave paintings, questionnaires, contact centre operations, internet chats, evaluations, and feedback systems, as well as social networking conversation forums have all advanced throughout history [1]. To understand and improve user engagement and user's sentiments regarding businesses' products and services, department shops and commercial organisations must increasingly mine customer behaviour and feedback from a number of data sources, including both structured and unstructured data. To mine both user activity patterns and input, increasingly sophisticated and automatic big data analytical procedures are urgently required as organisations have access to daily volumes of data on customer activity and feedback in various ways. For instance, sequential time-series data from user networks and customer actions is quite vast. Furthermore, linguistic customer feedback data is quite noisy and comprises a lot of slang, harsh language, misspellings, poorly translated words, etc. because anyone from anywhere in the world can send comments [2].

Customer satisfaction is a subject that is receiving more attention from businesses and academic studies. business is one of the key justifications for this interest. In reality, a lot of empirical research show that there is a connection to customer behaviour. For example, favourable correlations between customer happiness and loyalty [3, 4] and between customer satisfaction and inclination to refer other customers to the supplier's offer [5] have been found.

The literature on customer satisfaction has little empirical data since it is rarely evaluated empirically. Theoretically, people's reactions to both positive and negative events are anticipated to be uneven [6, 7], but the literature in which such theory exists rarely discusses the specific behaviour variables that are thought to follow from customer satisfaction. Regardless, the bivariate view of customer satisfaction suggests a different approach to think about how much Satisfaction levels affect the link among behaviors and contentment. When both contentment and dissatisfaction are permitted to take on the values "low" and "high," one may consider disparities in terms of the nature of the connection.

On the other hand, feedback to the supplier would be a crucial tenet of the "learning organisation" and might have an impact on expenses as well as revenues because consumer feedback is utilised to design new goods, enhance existing ones, etc. In other words, learning is likely to encourage the supplier to adjust their

behaviour, which will ultimately result in better performance. Finally, a number of academics have asserted a beneficial relationship between profitability and loyalty [8]. When deciding whether to buy something or not, customer behaviour patterns are also becoming more significant. The likelihood that clients will make a purchase or not is essential information for an electronic market place owner or management. There aren't many studies that have looked at online customer behaviour using modern data mining tools rather than established ideas of customer behaviour. We can analyse online consumer behaviour using cutting-edge methods for data mining, such as decision tree algorithms and artificial neural networks.

In the technological environment, where the general public generates massive volumes of data across all industries, big data has advanced dramatically. Essential thing for businesses, the sciences, the government, and society as a whole was captured in the volume of data that organisations acquired, obtained and processed using digital storage, processing, communications, and sensing [/9]. a vast amount of data coming from parking metres, computers, buses, trains, and shops. Each day, search engine businesses gather large amounts of data, which they then use to create knowledge that is both beneficial for themselves and for others. Open Government Data (OGD), social networking, photo processing, audio recording, video recording, and online user behaviour are just a few of the digital resources that make up various datasets. These acts are retrieved in order for the company to comprehend the patterns or behaviour of its clientele [10]. Both public and private organisations recognise the value that can be extracted from big data. Customer behaviour and feedback mining using big data analytics has proven a potent tool for resolving these issues. Ethics in the Mining of Customer Feedback and Customer Behavior Human computer interaction ethics and privacy have long been a topic of debate. From data mining to AI research, there has long been concern about technology gaining too much power. With the amazing power and accessibility of big data collecting, preservation, accessing, and distribution, big data analytics, necessary and conspicuous. In terms of data collecting, fusion and enrichment, analytics, deep learning, and the applications of the results of such operations to commercial activities, there has been some investigation and research into ethical implications.

1.1 Big data

Big data is a large volume of data that is rarely processed with conservative methods to determine its worth [11]. Big data creates opportunities for companies looking to exploit it to generate revenue. By allowing analysis to proceed quickly, the goal is to benefit from large and diverse amounts of data [12]. Volume, Velocity, Variety, Value, and Veracity are the five Vs that make up this model. Processing huge amounts of data of any type is what is meant by volume. Increased information exchange and public awareness are two benefits of the explosion in data volumes [13]. Large data volumes with multiple massive data sets are referred to as "big data," and they cannot be handled, processed, or managed with standard database techniques. Velocity refers to the collection and analysis of data in real time. Velocity performs real-time processing of incredibly huge amounts of data. Big data also accelerates at a rate that surpasses that of traditional computer techniques. Variety encompasses a wide range of data types from multiple sources, including unstructured data such as text, audio, video, and photos, as well as structured data from traditional sources like webpages and Google Maps. Certain semi-structured data sources can be processed with Hadoop.

Its main objectives are data mining, large-scale data analysis, and intricate computations. Last but not least, veracity has to do with how accurate the data is in relation to social media, corporate content, Web log files, transactions, and data applications. For Date's security and legitimacy to be ensured, it needs a valid power of attorney. To benefit from big data analytics, several firms have implemented big data applications in the management of their company operations. Big data processing creates value that aids in making the best choice. To benefit from big data analytics, organisations must refine and process the data. For instance, the benefits of big data analytics can be used to record, examine, or analyse each infant's heartbeat in order to determine the newborn's problems and potentially save his or her life [14]. The improvement of machine or device performance is one of the uses for big data. For instance, the Toyota Prius is equipped with cameras, GPS, high-tech computers, and sensors to automatically ensure road safety. Big data also lowers the cost of upkeep. For instance, businesses use cloud computing, which stores data on cloud servers. The growth of cloud computing has made big data analytics more accessible, reliable, and economical. Because cloud computing falls under the purview of the cloud service provider, it is robust, dependable, and problem-responsive. Since the business does not accept subpar customer service. Every time a data analytics system fails, it disrupts marketing efforts and makes clients wonder whether they can trust such a system. Therefore, cloud computing's competitive edge in big data applications is reliability [15].

Therefore, the goal of this essay is to fill the gap between these two disciplines. The specific goal is to evaluate the differences between "low" and "high" levels of customer satisfaction in the correlations between three different categories of consumer behaviour (loyalty, supplier feedback, and word-of-mouth) and customer satisfaction. Because of the likelihood that these particular actions will affect the supplier's profitability, they have been selected

Literature review

The research study [16] uses a sentiment mining method of big data analytics to evaluate the many variables of helpfulness and readership of online consumer reviews. It is concluded that the reading and usefulness of online consumer evaluations are positively correlated with the length and durability of those reviews. According to the researcher's study [17], products are advised by using social media data to anticipate the consumer's personality. A framework for personality-based product recommenders was also proposed. This paper's framework is based on the five-factor personality theory of [18]. The information available on social media and the basis of evaluated literature are the main topics of this research work [19]. They conducted their research by emphasising the different cutting-edge methods and superior qualities that aid in analysing social media performance. The writers of the research report [20] examined the phases of data discovery, collection, and training. In this work, they comprehend the issue that social media analytics researchers confront, namely the issue that arises before the data is analysed, and they also provide a fix for these issues. They talked about the numerous difficulties the researcher had while conducting the studies. Social media analysis can be used to solve the problem in three steps: determine the expected data volume, identify the most crucial aspect of your research, set up the necessary infrastructure to handle the format and volume of the data, and, if necessary, learn how to separate structured information from unstructured information. The

research [21, 22] concentrated on the technological knowledge on the amount of effort and media platform research that increased significantly between 2009 and 2016. The fields of human and medical sciences have seen an increase in social networks, online media, online systems, and information systems. In the social sciences, the information system has been more relevant to societal requirements, and issues resulting from these needs are frequently examined.

Big data is information that cannot be processed by traditional methods. In other words, a large number of datasets (the conventional method of collecting or organising big data) contain big data, which is complex information that cannot be handled manually. Nevertheless, Davenport et al. [23] conducted a subjective analysis of the data and discovered that the key factors that differentiate big data from little data are the quantity of datasets and the accessibility of a wide range of texts, images, videos, and sounds. Large datasets contain a wide variety of data types, including streaming, relatively unstructured, multi-structured, and unorganised data. These data kinds include textual content, information gathered from different web-based devices or programmes, and information from social media platforms. While big data is considered essential for organisations to monitor their environment efficiently, BDM is an essential part of most businesses. The term "big data management" can also apply to the process of handling massive data to achieve organisational objectives. Other scholars have further elucidated this position [24], asserting that big data management is the process of managing enormous amounts of data (to store it and analyse it while following to ethical privacy rules). This qualitative study claims that BDM is a multifaceted concept that encompasses data integration, data warehousing, data quality analysis, data governance, data content organisation, database administration, and processing, among other phases. Nevertheless, many companies that have embraced big data are currently battling a range of problems, like how difficult it is to manage the datasets and locate personnel with the necessary skills to utilise them. Furthermore, the various industries that use big data and engage in big data management are not covered by the referenced research. Previous research [25, 26] did not completely explain why BDM is necessary in this particular setting, which created questions about how much the retail business should be involved in this process. The current study examined this subject.

More precisely, data sets this complex cannot be managed or assessed with traditional data analysis software; instead, organisations must hire experts and outsource big data infrastructure [27]. This is why the phrase "big data" has been used to describe these types of data sets. However, Lee (2017) suggested the three big data dimensions, or the 3 Vs, as a standard paradigm to define big data in the computer sector [28, 29]. The three variables are variety (the number of different forms of data), velocity (the rate at which data are generated and processed), and volume (the quantity of data that a company or an individual collects and generates). In order to generate value from the vast amount, velocity, and variety of data being gathered, big data necessitates processing tools, methods, and technical infrastructure. Data management and data analytics are the two areas into which Big Data implementation tools and techniques fall. Belarbi et al. [28] state that big data analytics can be beneficial to the retail industry by helping decision-makers in the following ways: First, using consumer targeting helps gauge customer satisfaction by observing a person's characteristics. Secondly, inventory control that can enhance stock predictions and foresee changes in demand. The final phase is to

analyse in-store activities and consumer mood. In order to determine the optimal price, price optimisation is used to assess consumer demand for price or product alterations.

3. Methodology

The study looks into the variables that a company considers when adopting big data. Investigating recent big data usage in an organisation is the study's goal. Since LSA provides an effective method for analysing large amounts of text, realistically speaking, this technique provides significant insights for hotels. Hotel management commonly uses big data analysis to pinpoint the components of patron contentment and unhappiness over time. As a result, hotel management can evaluate the effectiveness of their establishments and actively implement particular improvement strategies. Big data usage does not guarantee the hotel's success. The approaches included a thorough review of the most recent studies on big data in corporate organisations.

Some theoretical advancements are made in this essay. First, by employing user-generated material, this research illustrates how big data can contribute to creative approaches to studying consumer behaviour. This paper demonstrates how examination on large statistics may be applied using already available software and undertaken in different hospitality-related research topics, including customer and employee happiness, hotel performance, purchasing habits, etc. The findings of this study illustrate how customers express their experiences in recommendations, despite the fact that they are based on online reviews that have been placed on a specific hotel website. Second, due to the open format of the texts, analysing UGC provides researchers with a fresh angle on examining consumer happiness that produces more accurate evaluations of customers' experiences than survey approaches like customer surveys or interviews. Compared to consumer evaluations, online reviews more thoroughly and clearly represent consumer impression [2]. Customer and service provider information can be found in hotel guest evaluations. Consumers utilise suggestions as a tool to make hotel booking decisions and regard user-generated content (UGC) leverage recommendations from hotel guests to compile customer feedback and create and assess marketing plans. Customer reviews provide accurate and thorough information and serve as a vital conduit for guests and hotel managers to communicate. Both positive and bad reviews have an impact on potential customers' attitudes on booking hotels online since they have an effect of the online transaction. The use of LSA gives an efficient approach for analysing big amounts of text, therefore practically speaking, this work offers substantial insights for hoteliers. Big data analysis is frequently used by hotel management to define the elements of customer happiness and dissatisfaction over time. As a result, hotel management may assess the performance of their properties and actively carry out specific improvement measures. Using big data does not ensure the hotel's success. Commercial predictors are needed to turn complicated data into insightful knowledge. Hotel managers should therefore be aware of the value that big data may add and the ways in which they might enhance hotel success. Potential customers can learn useful information from hotel guests' opinions about the services and amenities offered during their stay. Hotel management can better understand customer experiences and what influences their pleasure or dissatisfaction by categorising customer feedback into the following categories: "positive," "negative," or "neutral." By making changes to specific aspects of their services, hoteliers may be

able to employ e-WOM more successfully. This can be done by defining the elements that influence consumer happiness and discontent [2].

4. Result and Discussion

The company is aware that its most valuable assets are the relationships it has with its clients and other stakeholders. Building interpersonal and social connections has actually become a key component of marketing [30]. The characteristics that distinguished between positive reviews and guest satisfaction and between negative reviews and dissatisfaction among customers were attempted to be captured by these suggestions. Four factors—a wonderful accommodation, an ideal location, a wide selection of services, and friendly staff—had a substantial impact on customers' satisfaction, while four factors had a major impact on their dissatisfaction (old facilities, subpar services, inconvenient location, and expensive rates). Location and accessibility are essential factors in evaluating customer satisfaction since they make it easier for customers to choose hotels quickly that offer stunning views of the surroundings and to save time while visiting nearby attractions. The value of connections as assets with a market base that add to the value of customers [31]. Some commercial firms use cutting-edge, highly effective computers with enormous storage to handle, resulting in significant cost savings. Businesses manage structured and unstructured data sources, including social media, retail databases, customer activity records, and logistics. To do this, they must have the skills or knowledge to identify big data's benefits. Big data analytics, on the other hand, is a method for exposing the variety of data kinds within big data. Big data and big data analytics can be used to implement various CRM methods.

Because big data can provide a pattern of customer information, businesses can predict and presume what the demands of their customers are now. Big businesses definitely profited from this shift, especially internet giants like Google and Amazon, who would continue to gain from the massive volumes of data they generated. Data Mobility provided real-time statistics on website and social media activities as well as real-time data to marketers.

The terms that convey customer experience and satisfaction most frequently appear in online evaluations are included in Table 1. These terms can be categorised into groups that relate to the main product, food, amenities, hotel features, personnel, and experience evaluation.

Table 1: Most frequently used words in online reviews.

Word	Frequency	Word	Frequency
Hotel	1024	Price	98
Location	784	View	87
Room	636	Balcony	85
Services	609	Hot/Cold water	81
Clean	501	Design	78
Staff	449	Spacious	71
Breakfast	353	Luxury	71
Pool	307	Modern	71
Area	216	Friendly	70
Place	179	Helpful	70
Food	173	Kind	70
Beach	158	Stairs	70
Facilities	135	Expensive	52
Bed	101	Restaurant	31
Shower	99	Towel	30

Based on both good and negative hotel visitor evaluations that detailed their happiness and dissatisfaction, a Latent Semantic Analysis (LSA) was provided. These suggestions tried to capture the variables that distinguished between positive reviews and guest contentment, and between negative reviews and consumer unhappiness. Customers' contentment was highly impacted by four criteria (lovely room, convenient location, variety of services, and pleasant personnel), whereas discontent was significantly influenced by four elements (old facilities, subpar services, inconvenient location, and expensive rates). Since they make it simpler for clients to choose hotels quickly that offer breathtaking views of the surroundings and to save time when visiting nearby attractions, location and accessibility are crucial elements in determining customer happiness. The results demonstrated that every distinctive phrase was included in the criteria. This suggests that both good and negative aspects of internet hotel guests' reviews were considered [32].

Location and accessibility are important factors in determining customer satisfaction since they make it easier for customers to locate hotels quickly, which offer stunning views of the surroundings, and to save time while visiting neighbouring attractions. If the hotel was near a hub for public transportation, the levels of customer satisfaction went up (e.g., an airport). Some hotels offered a complimentary shuttle service, which improved customer happiness and enhanced the advantages of the hotel's location. Customer satisfaction was influenced by how close the hotel was to the attractions. If they are close to attractions, visitors will spend less time travelling [33]. Then, the hotel's stunning views increased visitors' happiness with the area. There are certain hotels that offer rooms with views of parks or mountains, among other things, and having these views boosted customers' enjoyment with the hotel, leading to higher hotel visitor satisfaction. [34, 35]

To examine this kind of data, big data analytics is useful. Consumer behaviour data are currently being created in large quantities. Different types of consumer behaviour data are always emerging. Because consumer behaviour on social media is crucial, the big data analytics method is helpful for forecasting social networking activity. Complicated big data analytics process that involves examining a wide range of large amounts of data in order to uncover hidden information that helps businesses make wise decisions. This

hidden information may include concealed patterns, undiscovered perceptions, and customer preferences. Figure 1 illustrates the five dimensions of quantity, speed, diversity, worth, and reliability.
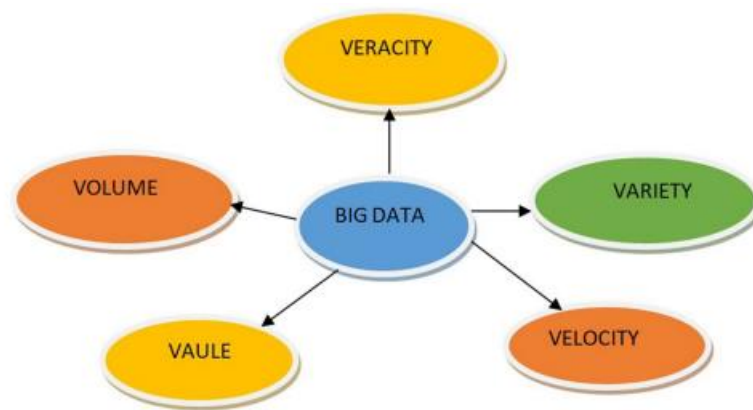

Figure 1: Characteristics of big data

Model of consumer behaviour on social media We are projecting customer behaviour on social media behaviour. We have developed a model of social media user behaviors. Figure 2 provides the model's framework. In this model, information from Facebook, YouTube, LinkedIn, and Twitter has been taken into account. Cleaning the data includes extracting distortion, errors, duplication, and outliers in order to generate reliable data. In research study [36], consumer assignation with collective mass media, where customer meeting integrated consumer responses to marketing communications. The author debates that convincing claim in this book social media usage motivations serve as precursors to general attitudes towards social networking sites, which subsequently affect attitudes towards sellers' social networking sites. According to a study [37], customers' attitudes towards may be influenced by aspects including the innovative idea, the specific social component being emphasised on, the specific comparison with the trademark and social networking platform.
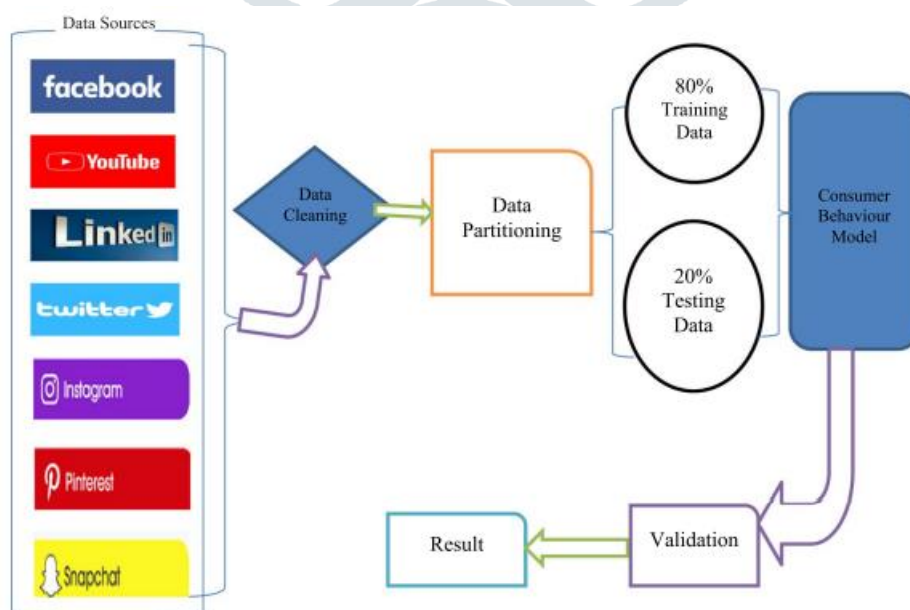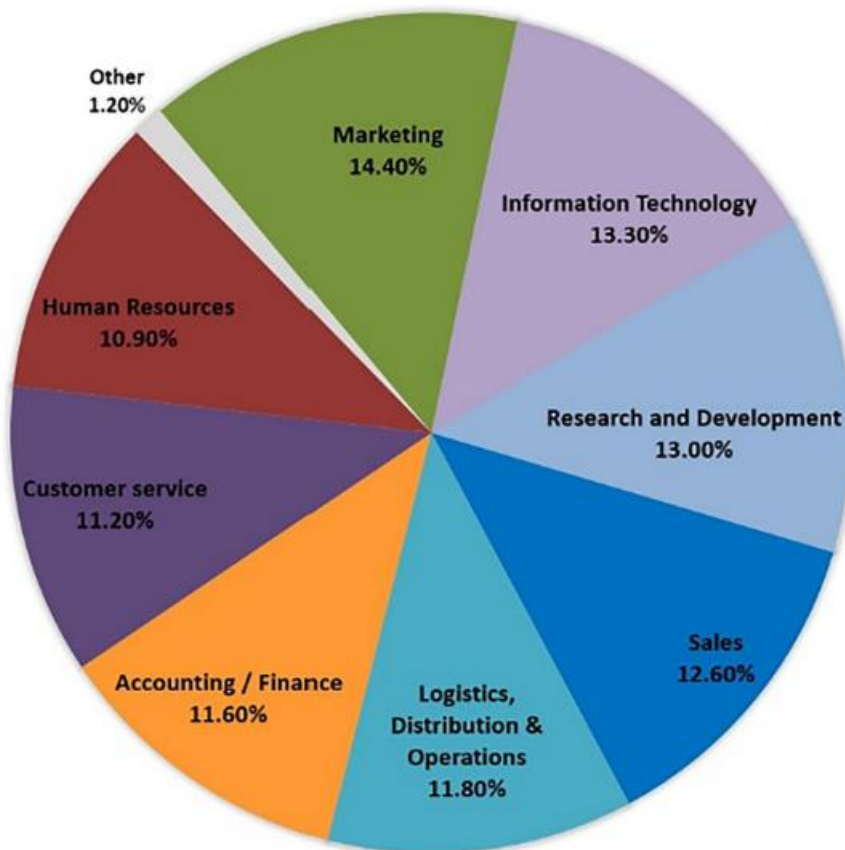

Figure 2: Consumer behaviour mode [38]

According to Figure 3, consumer perception and attitude determine consumer behaviour, which has an impact on social media. To examine the total effects of consumer activity Big data analytics are used on social networks.The section titled "Big data analytics for social media consumers" describes big data analytics for these users. The section under "Social media consumer behaviour model" provides a description of this model. Data pre-processing is covered in the "Data pre-processing" section.
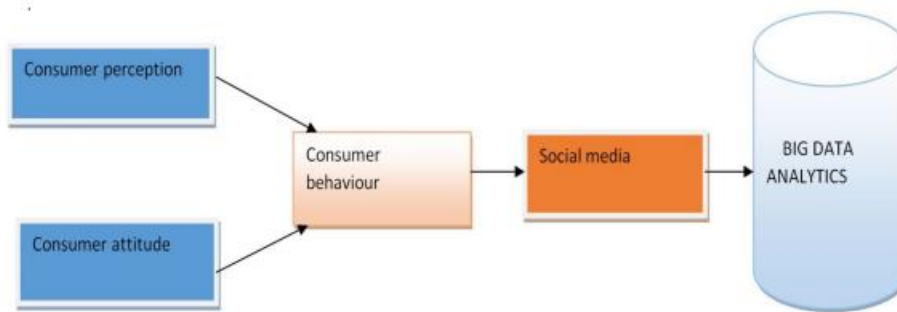
Figure 3: Consumer perception and attitude

Businesses have also aggressively based their structure around ability to use huge data. The sad fact is that only 8% of marketers actually have complete and efficient methods for gathering and analysing the data [39]. Big data and advanced analytics in organisations were the subject of a survey by Evans Data Corporation (Figure 4).

Figure 4: Big data analytics usage in organization [40]

Three significant stakeholders and several relationships with distinctive behaviours were found through the examination of consumer behaviour in this context. There are three types of relationships: the current consumer-brand relationship, the consumer-consumer relationship, and the potential consumer-brand relationship, as shown in Figure 5.
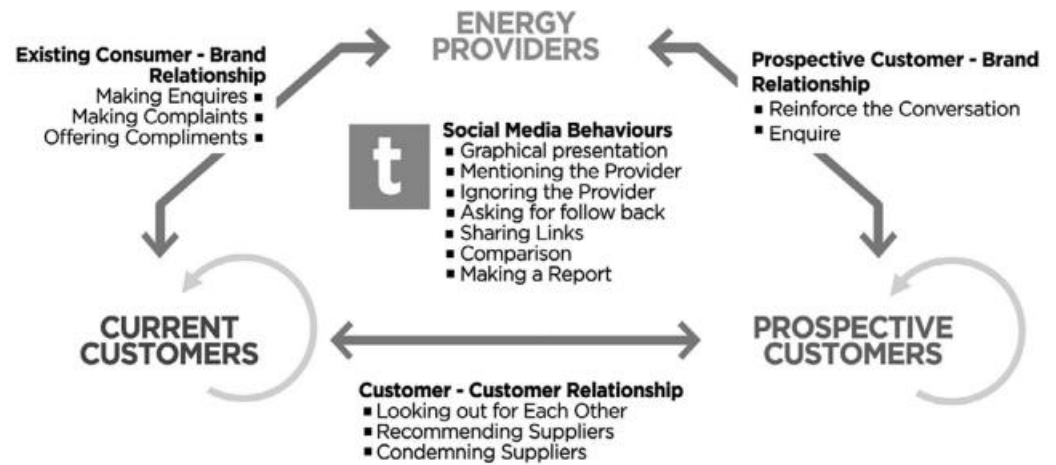

Figure 5: Thematic analysis of consumer relationships and behaviours

Due to their comparatively stable popularity, hotel or attraction rankings have remained rather stable over time.
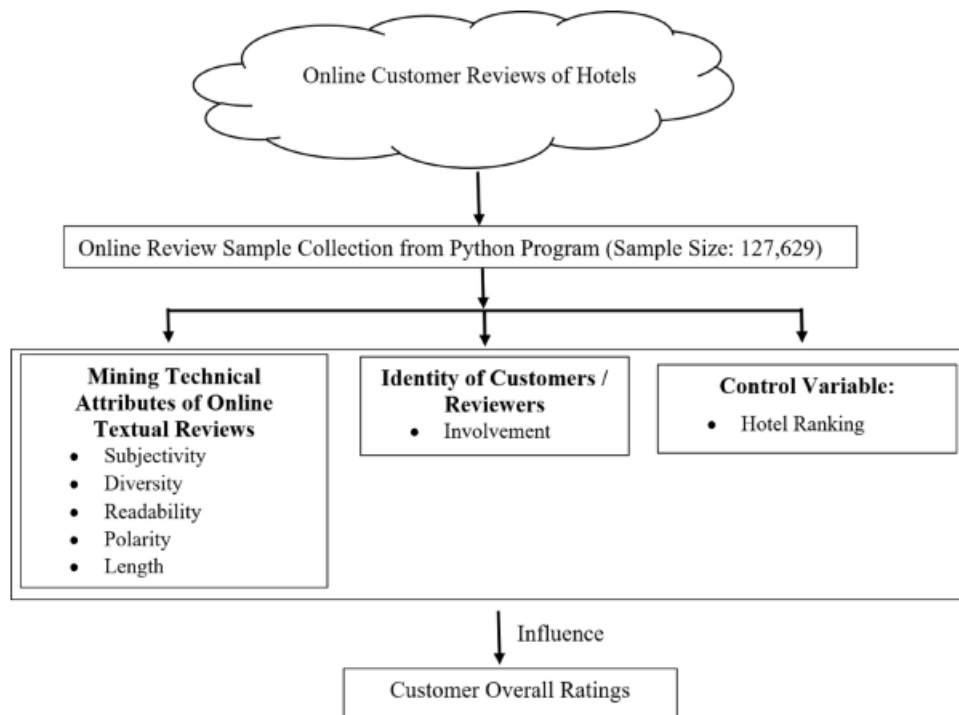

Figure 6: Research design framework

4.1. Customer profiling

After an advertisement, a business will acquire a new client, and that client will evaluate the value of each service they received from the business. If the buyer thinks the value is good, they will be happy and satisfied. If not, they should consider looking for an other company—even a rival—that can meet their requirements.

Offering individualised and tailored services is a means of ensuring the whole CRM life cycle (sales, marketing, and customer service). Because it enables each customer to have a personalised experience based on their wants and interests, client segmentation is vital for organisations. Big data can help with client profiling because it includes firm activity tracking. Big data analytics can examine past purchases made by customers as well as their online interactions with the company's goods and services. Businesses will be better able to anticipate the tastes of potential new customers and will have a greater understanding of what clients want from them. In particular, big data analytics have a huge impact. The sustainability of intermediate marketing organisations is threatened by an increase in the number of suppliers and service providers who engage directly with clients. Customer profiling can provide an advantage over competitors by leveraging big data analytics to extract invaluable insights. For all of these companies, using personalization adds value to their operations. Amazon.com developed a system for product recommendations based on an examination of customer purchase history, as an example of consumer profiling. Grocery retailer Target is able to track the purchases made by expectant mothers by using a predictive model [41]. UPS, a package delivery company, created an app to improve its fleet by rearranging the daily routes taken by its drivers.

Businesses now have access to more accurate data, enabling customer profiling, thanks to big data analytics that may reveal the value of the underlying data correlations and patterns. Additionally, by providing the most information possible, it improves business decisions. The CRM team creates customer knowledge profile to enhance enterprises and better identify target audiences. Because big data analytics may uncover the value of the underlying data relationships and patterns, firms have access to more precise data, making customer profiling possible. Additionally, it helps enhance business decisions because it offers the most information possible [42]. To improve businesses and better understand target audiences, the CRM team develops customer knowledge profiling. This information is used to personalise messages for each potential consumer and to tailor messages to match with their interests and preferences. Big data analytics combined with CRM may produce comprehensive customer knowledge for decision-making. Rolls-Royce, a company that manufactures aviation engines, use big data analytics in the manufacturing sector to predict when and where an engine breakdown may occur by placing censors to gather data [43]. As a result, in addition to selling engines, they also provide packages that include monitoring services and engines. They generate revenue by charging customers according to consumption, repairs, and replacements. This service, which uses big data to give them a competitive advantage, today generates more than 70% of their yearly revenue in the aviation engine industry.

5. Conclusion

According to this study, customers' inclinations to leave digital footprints of big data on social media are shaped by a number of factors, including technology, privacy, security, and the impact on society. Not every client would utilise social media with the same fervour or attention. Thus, when using social media sites like Facebook and Instagram to promote their goods and services and gather client information, businesses need to be mindful of the intricacies, especially with regard to their users' privacy and security. Big data analytics advancements in recent years have enhanced operations, produced revenue, and developed aggressive sales

methods that have benefited every customer and prospective customer. Customers take part in effective CRM activities provided by CRM with big data capabilities, and marketing teams within the companies translate the ideas into workable marketing campaigns. Customer relationships should be strengthened by big data's capacity to appropriate arrangements, two-way communications, personalization, and personalization. Using big data does not ensure the hotel's success. Business analysts are needed to turn complicated data into insightful knowledge. Among the criteria determining customer happiness, location was the one that had the biggest impact on guest satisfaction. Future hotels must consider accessibility and hotel location because they are crucial components in consumer satisfaction. Hotel managers should therefore be aware of the value that big data may add and the ways in which they might enhance hotel success. Potential customers can learn useful information from hotel guests' opinions about the services and amenities offered during their stay. The most important element affecting guest pleasure among the customer satisfaction factors was location. Because they are important factors in customer happiness, accessibility and hotel location must be taken into account for future hotels. Because customer performance is largely influenced by customers' satisfaction, managers should integrate it in their marketing strategy.

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