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**An Analysis on Social Customer Relationship Management in Health Sector: Examining Hospitals in United Kingdom**

**A dissertation submitted in partial fulfilment of the requirements for the degree of Master of Science.**

**Madubuko Chidubem Ogechukwu**

**[Student ID:ST20207148]**

**MSc – Information Technology Management**

**Cardiff School of Technology**

**Cardiff Metropolitan University**

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# 

# **DECLARATION**

I hereby declare that this dissertation entitled “An Analysis on Social Customer Relationship Management in Health Sector: Examining Hospitals in United Kingdom” is entirely my own work and it has never been submitted nor is it currently being submitted for any other degree

**Candidate Director of Studies**

Chidubem Ogechukwu Madubuko

# **ABSTRACT**

The development of information and communication technology (ICT) has created new avenues for businesses to take advantage of the cutting-edge methods of boosting customer happiness, customer loyalty, sales growth, and increased profitability. The healthcare sector is falling behind in adopting this cutting-edge approach, transforming institutional care into citizen-centred care with a focus on the continuum of care from prevention through rehabilitation. The global use of customer relationship management strategies has been encouraged by the internet, particularly social media. However, despite claiming to use the social CRM strategy, several business organisations are not fully utilising the possibilities of these systems. Evidence from the academic literature suggests that the implementation of this approach by healthcare organisations has not progressed effectively. Customers (patients) are continually evolving quicker than the care provided by many healthcare organisations, necessitating the need of a comprehensive system like social CRM to manage patients and families. This study looked at the top hospital in the UK to analyse how social CRM methods have been used in the healthcare industry. To get first-hand knowledge of the problem from both the customer and company perspectives, the qualitative methodology was used in this research. In the study, three renowned hospitals were investigated. Customer feedback was extracted from the NHS website, Google review, and Twitter to analyse customers' relationships with each hospital. Corresponding to the study's findings, the top three hospitals are embracing a customer-centric business model, utilising social CRM methods, as well as developing positive relationships with their customers and engaging in value co-creation. Customers, on the other hand, were discovered to place a high value on social media marketing's effectiveness in promoting the delivery of services that are focused on the needs of the customer and, as a result, influencing consumer brand resonance. The research provides the implications of the findings and recommendations.

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# 

# **CHAPTER ONE**

# **1.0 Introduction**

Every business is built on its customers and maintaining healthy connections with them is crucial to its success. The theory of interaction marketing is the foundation of the strategic business practise known as customer relationship management (CRM). Without a question, the widespread acceptance and allure of social media has prompted companies to reconsider, reorganise, and renew their strategic ambitions (Jalal, et al., 2019). Social Customer Relationship Management (S-CRM), a unique approach to customer engagement centred on communication and teamwork, has been made possible by Web 2.0 and Big Data technology (Orenga-Rogla & Chalmeta, 2016). To provide insight into client interactions and improve the efficiency of customer engagement, Kiwak (2017) defined social customer relationship management as the fusion of social media platforms with customer relationship management systems.

The two core business drivers that will have the most effects on healthcare in the next two years are enhancing patient care quality and increasing customer happiness as revealed by Healthcare Information and Management Systems Society (HIMSS). Consumer concerns were regarded as the second-most critical business problem affecting the healthcare industry in a recent survey by chief information officers (CIO) in hospitals (Yahia, et al., 2020). This study will analyse social data from United Kingdom hospitals using several methodologies and visualisation tools. Find out what customers have to say about the healthcare, Is the healthcare sufficient? and present the information to make it easier for hospital managers and other users to understand how the information will be used to manage the organization's relationship with its customers as well as its operational ramifications. Additionally, consider the potential impact that consumer evaluations on social networking sites may have on a business' bottom line.

## **1.1 Background of Study**

A transition from passive consumption to active creation of several types of information by Internet users was signalled by the growth of social media resources, or Web 2.0, such as social networks, articles, forums, information extraction services, online communities, and encyclopaedias. Social media, in contrast to traditional methods of information gathering, offers a wealth of data regarding public opinion on any topic, including healthcare, in addition to reporting facts and describing events (Kotov, 2015). With the rise of social media and its impact on customer behaviour, CRM has undergone a revolution. The task of growing the customer base has grown more difficult due to increased client acquisition costs, price-sensitive customers, and rising customer expectations as they want higher levels of quality from their purchases. As they are exposed to social media, customers are becoming more intelligent and can incorporate several channels into the purchasing process. Businesses that provide services are using CRM as a business strategy due to uncertain markets and declining brand loyalty (Harrigan, et al., 2015).

Due to the growing importance of healthcare to both individuals and governments, as well as the rapid rise in its costs, the healthcare sector is the focus of research. Health organisations place a high importance on connecting with their audience and developing robust social media programmes to engage with them is essential. Because of the clear global surge in social media usage, businesses are under intense pressure to interact where their customers are paying attention. These days, the centre of customer activity is more virtual and can be obtained on a social media or social network. (Baird & Parasnis, 2011). People's interactions with one another, businesses, and communities have all transformed because of social media. Businesses have released their obligations to their customers. Customers own, influence, and steer the dialogues, which affect brand perception and connections and, in turn, determine how businesses should modify their offerings and create relationship management (Acker, et al., 2011).

## **1.2 Research problem**

Due to the importance of social media in today's world, both academics and practitioners are interested in doing research on how to manage customer relationships efficiently as well as how consumers perceive their customer relationship management. The uncertainty about how to use Social CRM to improve organisational performance is one of the key issues that most organisations have when attempting to embrace it (Trainor, et al., 2014) . The findings of these research will enable organisations to alter their customer offers and communication strategies in line with the goal of a customer-centric approach to business. Organizations must acknowledge that various consumers supply varying economic values (Berisha-Shaqiri, 2015). The following inquiries are made in accordance with the identified research problem:

1. How much do hospitals in the United Kingdom use social CRM as a method for communicating with and connecting with customers?
2. What Social CRM technologies and tactics are being employed by healthcare business?
3. What impact does social CRM have on consumers' perceptions of the value of the healthcare organization's customer-focused service delivery in the United Kingdom?
4. Is there a major impact of social CRM on client loyalty?

## **1.3 Aim and Objectives**

The aim of this study is to critically examine social customer relationship management in healthcare organisations using hospitals in the United Kingdom as a case study, so that health organisations can better understand their customers' needs and provide better services to increase the value of their companies. Furthermore, to achieve the study's goal, a set of clear, realistic, and time-bound objectives will be achieved.

1. Examine literature on customer relationship management in the healthcare industry and other pertinent subjects critically.
2. Make use of visualisation tools to analyse data from social media sites.
3. Gain business insight and make suggestions for better customer service.
4. Identify and evaluate the research's potential limitations.
5. Compare the research results to those of related studies.
6. Offer suggestions for the project's ongoing research.

## **1.4 Research Questions**

The research study will provide answers to the following research questions:

1. How can Social Customer Relationship Management help the healthcare industry?
2. How successful and efficient is social customer relationship management in the healthcare industry?
3. How much do generic Social Customer Relationship Management benefits apply to the healthcare industry?

## **1.5 Rational of the study**

A company's capacity to grow depends on its ability to connect with its consumers. Businesses, particularly those in the healthcare sector, can suffer large losses if they do not take customer needs into account. In the case of healthcare organisations, patients are supposed to receive efficient care. The potent tool of social media can both help and hurt a business. Social customer connections have emerged because of customers using social media to provide feedback on how they were treated by various businesses. Positive customer feedback will also make this organisation more appealing to other people, which is important in today's business world. The information gathered from this input will be analysed to learn more about the customer's needs and how to better serve them.

## **1.6 Significance of Study**

This research study has given stakeholders in the healthcare sector suggestions on the effectiveness of social CRM and its capacity to create long-term customer relationships as well as a platform for businesses to improve their productivity and economical advantage. In the extremely competitive healthcare sector, developing a platform for connecting and interacting with patients and their families offers a framework for both attracting and maintaining new clients through social media marketing backed by social CRM. Additionally, the study's findings added to the body of knowledge by demonstrating how customers' perceptions of the worth and utility of the organisations' product and service offerings via social CRM are related. The outcome so points towards a new path for future research. The scope of this research will be limited to healthcare organisations in United Kingdom, with the focus on the hospitals operating in London and Newcastle Upon Tyne which are as follows: (i) St Thomas Hospital; (ii) University College Hospital London; and (iii) The Royal Victoria Infirmary. These hospitals were chosen because they were recognised as the world best hospitals by Newsweek in partner with Statista Inc in 2021.

**1.7 Research Contribution**

This study should help with the usage of technology in health-care organisations. The use of social media in business is still expanding, and few studies have focused on customer relationship management in relation to social media use in healthcare organisations. Because there has not been much research in this sector, the research approach adopted in this study would be replicated by future scholars. The technologies used in this study will be used in future investigations of a similar nature. The study's findings, particularly those relating personnel and environmental factors that contribute to the success of customer relationships, should be useful to health organisations.

## **1.8 Limitation of Study**

Due to time and resource constraints, the study's scope has been restricted to Social CRM's impact on customer service and loyalty. The other crucial Social CRM elements will not be covered due to the short study period. These include developing a customer strategy, integrating Social CRM into current business operations, and staff influence over the customer. Given that the data acquired from the NHS was sparse and the results were constrained from the perspective of a single sector, the findings could be applied to study how social CRM affects customer loyalty and service in  other sectors of the economy.

## **1.9 Chapter summary**

This chapter has provided a general overview of the study topic. The background information on the subject was given in terms of social customer interactions with healthcare organisations, along with the selection criteria, research goals, and the research issue that would be addressed. This chapter explains the motivation behind this study's creation and how it adds to it. The dissertation's structure will be explained, and each chapter's main ideas and information will be summarised. Chapter 2 will cover the literature on CRM and social CRM. Chapter 3 provides a description of the research approach that will be used for the dissertation's subject. Chapter 4 will contain the research's findings and a discussion of them. Conclusions and suggestions are presented in Chapter 5.

# **CHAPTER TWO**

# **LITERATURE REVIEW**

## **2.0 Introduction**

The first version of the internet, "web 1," included material driven by certain people or sources and could only profit from the information supplied (Jalal, et al., 2021). There was no opportunity for the user to produce new material or modify existing content. However, internet users now can produce their own material, edit the content that is offered, transmit knowledge, and express dissatisfaction (Ang, 2011; Salem, 2021). This is referred to as "customer engagement," which is the processing of data on the consumer's side, while each user may be considered both the user and the developer of the content (Al Harbi, et al., 2019; Tarofder, et al., 2017; Salem & Salem, 2019). With rivalry, market globalisation, and technical improvements, the perception that businesses have customers has shifted considerably (Orenga-Rogla & Chalmeta, 2016). The growth of information and communication technology has created new avenues for businesses to exploit customer relationship management aimed at boosting customer satisfaction, loyalty, sales, and profitability like never before (Phan & Vogel, 2010).

Business orientation was centred on customer relationship management, with each customer being treated personally and distinctively based on their preferences (Bose, 2002). The goal of customer relationship management is to shift an organization's focus from a product-focused approach to a customer-focused one. This would bring value to their clients' lives by helping them understand their requirements and providing value-added services (King & Burges, 2008). Businesses have recognised that various consumers give varied economic value and have adapted their customer products and communication tactics. This chapter would give a broad literature review, integrating, analysing, and interpreting data from a variety of qualitative investigations. Furthermore, provide an outline of significant research that has been published evolving customer relationship management (CRM) and, more recently, Social CRM in connection to healthcare, as well as its key aspects.

## **2.1. Customer relationship management (CRM)**

One strategy used by corporations is customer relationship management (CRM), which combines sales, marketing, and customer service to generate value for both the firm and its clients (Aldaihani & Ali, 2018). Establishing and keeping client relationships has become the litmus test for contemporary businesses looking to boost productivity and gain a sustainable competitive edge. In the last two decades, the Relating Marketing (RM) framework has emerged as a corporate strategy solution for business organisations looking to address the challenges presented by the modern business landscape, which has prompted businesses to establish long-term relationships with their customers (Hadidan, 2020). Given the relative cost of acquiring new customers versus keeping existing ones, Phan & Vogel (2010) connected the development of the CRM concept to businesses' and management's knowledge of the need of keeping existing clients. Effective customer relationship management is therefore regarded as essential for raising overall sales, profitability, and customer pleasure, loyalty, and retention.

According to Kim & Ko (2012), three fundamental marketing philosophies—relationship marketing, customer orientation marketing, and database marketing—led to the development of the CRM concept. CRM can be categorised into two distinct categories: technical and business viewpoints. From a technological perspective, CRM is intended to be an operational and analytical strategy, emphasising the use of technology solutions throughout the organisation to better understand the various client groups. Relationship marketing is integrated with the traditional marketing mix (i.e., product, pricing, promotion, and place) in CRM with the goal of achieving commercially advantageous results including value creation, customer satisfaction, loyalty, and retention (Senn, et al., 2013).



Figure 2.1: Architectural dimensions of Customer Relationship Management (Hadidan, 2020)

Following a review of CRM definitions and points of view, three main categories of CRM components were identified in the literature, which are represented by the architectural dimensions of CRM in Fig. 2.1: CRM collaboration, analytical CRM, and operational CRM (Peppers & Rogers, 2011), which will be expanded as follows:

1. **Collaborative CRM**: With visibility into all customer communications, purchase history, service requests, notes, and other details, customer service representatives will be better prepared to address customers' issues with this CRM, also known as Strategic CRM, which focuses on customer data where sales, marketing, and services professionals can see it (Lee & Cassie, 2022). Interaction management and channel management are the two core elements of collaborative CRM. The channel management makes use of the data obtained via interactions to choose which consumer to engage with. The interaction management keeps track of customer interactions (through email, social media, in-person, etc.).
2. **Operational CRM**: A company's customer interaction procedures may be made more efficient with the use of operational CRM. This gives users the tools they need to manage the whole client experience effectively, especially when there are many different contact points involved (Hicks, 2022). The monitoring process begins with their first engagement with a company's website, continues as they travel through the sales funnel throughout the lead management phase, and ends with their actions after they become customers. To offload part of the labour that would otherwise need to be managed by personnel, operational CRM offers automation capabilities including marketing automation, sales automation, and service automation.
3. **Analytical CRM:** CRM analytics aid top management, sales, and marketing in deciding how to best service their customers. This kind of CRM application's primary role is data analysis. To have a deeper understanding of an organization's situation, customer data from numerous touch points is analysed (Ohiri, 2020). It increases the efficiency of the CRM system and analyses the business's designated key performance metrics.

## **2.2. Social media in Traditional CRM: Social Customer Relationship Management (SCRM)**

The traditional CRM is put to the test by the social media usage's remarkable surge. An innovative CRM method known as the "social CRM approach" uses social media technology to effectively manage client contacts (Jalal, et al., 2019). The business's social features, operations, processes, and other ways of connecting with its customers are all improved by social CRM. Social CRM is all about developing strategies, methodologies, and abilities to integrate social media into CRM processes. Communicating pertinent information to customers is also made simpler by the Social CRM connection of social media with a customer database (Woodcock, et al., 2011). Social CRM enables the online distribution of information, especially that which is pertinent to current affairs and viewpoints. Social CRM users create and share their own content in addition to consuming and exchanging information (Arnold, 2012). Briefly, social CRM has paved the way for innovative methods of collaboration, sharing of knowledge, and communication. Instead of the conventional "one to many" mode, it enables users to generate and exchange ideas with others using the "many to many" communication technique. Social networks, blogs, podcasts, wikis, RSS feeds, forums, media sharing, and social bookmarking are some of the services, tools, and programmes frequently linked to social CRM (Harrigan et al., 2015; Harrigan and Miles, 2014; Küpper et al., 2015; Trainor, 2012). Social networking and microblogging websites are used for social media, an electronic communication. Users use these websites to create online communities where they may share knowledge, private messages, ideas, and other alerts in the form of videos. A list of social CRM definitions is presented in Table 2.1.

**Table 2.1: Definitions of social customer relationship management**

|  |  |
| --- | --- |
| Definition | Authors |
| Social CRM is a concept and corporate strategy that aims to engage customers in cooperative conversations to provide value in a trustworthy and transparent corporate environment. It is supported by technological platforms, business requirements, procedures, and social features. | (Orenga-Rogla & Chalmeta, 2016) |
| CRM operations can be incorporated into social media through a variety of user-centred interactions and solutions known as "social customer relationship management." | (Jalal, et al., 2019) |
| Engaging customers on social media to build rapport and brand loyalty is known as social customer relationship management in business. | (Dewnarain, et al., 2019) |
| A holistic and cross-functional approach is influenced by strategies, technology, procedures, company culture, and societal factors. Its goal is to facilitate communications between customers and other connected web users on an organization's managed Social Media accounts and platforms to deliver equally valuable content. | (Lehmkuhl & Jung, 2014) |

The comparison of the definitions of social customer relationship management (in Table 2.1) demonstrates the authors' diverse perspectives on how to understand the idea of social customer relationship management. While some authors (Jalal, et al., 2019; Lehmkuhl & Jung, 2014) described social customer relationship management as a technology-driven approach to customer relationship management, others  saw it as a marketing or commercial strategy for customer relationship management (Orenga-Rogla & Chalmeta, 2016; Dewnarain, et al., 2019). Since social media may help to improve engagement between customers and businesses as well as between customers and other customers, it can also be used as an e-commerce platform (Sago, 2010). Customer-organization relationships have transformed because of social media, with substantial economic ramifications (Aral, 2011; Todri and Adamopoulos, 2014). These contacts take on new forms through social networking platforms. Additionally, SCRM affects how users access information obtained via the usage of a Social Networking Service (SNS) on online platforms (Irani et al., 2017; Maiz et al., 2016).

Having followed a review of the literature on traditional CRM and social CRM, it is possible to draw the conclusion that both systems are simply technical solutions that assisted in relationship management between the company, consumers, and other stakeholders' suppliers and business partners in two different eras, but share the same primary emphasis of assisting in the organisation and advancement of products or services that meet the needs and expectations of customers. Social media has evolved into a vehicle for the sharing of rich information among friends and peers as people rely on it increasingly to remain in touch, and as was already mentioned, businesses that can use this information to their advantage will be more profitable. As a result, social CRM makes customers visible to the organisation and enables them to decide for themselves how to interact with the business (Greenberg, 2010; Hennig-Thurau et al. 2010). Table 2 outlines some of the most significant differences between traditional CRM techniques and Social CRM systems.

Diagram

Description automatically generated

Figure 2.2: Difference between CRM and Social CRM (Hart & Kassem, 2012)

## **2.3 Social Customer relationship Management Process**

The Jacob Morgan model (figure 3) offers the evolution of the CRM process and displays an ambitious process flow method linked to social networks (Morgan, et al., 2010). The proposed model may not be a solid foundation for the development since it cannot be scientifically examined, and there is currently no such model, although the topic is still in its initial stages.

Diagram

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Figure 2.3: Social CRM Process (Morgan, et al., 2010)

The model is workable since it depicts a social CRM's process flow in a straightforward manner and serves as a foundation for future research (Morgan, et al., 2010). The concept guarantees that the client may behave offline or online and respond in response to feedback. The information about the customer is gathered by a listening tool when the client provides online feedback via social media or other online media. The data from physical and online encounters is then entered into the CRM system. The CRM system analyses the data to provide information that can be use. For the business, the customers' issues, preferences, interactions, and transactions are particularly interesting. The appropriate employees or the social CRM team will receive the collected data. The social CRM team incorporates input into its responses (Hart & Kassem, 2012). In contrast to the macro answer, which is typically indirect and created as a broad response automatically, the micro response is sent directly to the community, the public, or specific clients. The answer from the business is entered into CRM to track down the encounters. The model is a closed system strategy that entails hearing, comprehending, and acting.

## **2.4 Social CRM in Healthcare**

Lack of awareness, inconsistent usage of social media platforms in tandem with their current CRM, and a lack of regulations and privacy protections for the data shared on such platforms are the current issues with the use of social CRM among healthcare organisations (Rupert, et al., 2020). Therefore, the current issues can be split into two groups: The first focuses on healthcare CRM or social media (Pentescu et al., 2015; Demeche et al., 2015). (Johnson, 2018; Shahid, 2019). In terms of responsiveness, dependability, and privacy on social media, as well as a functional CRM deficit, these two circumstances may result in unequal social media utilisation. Investigating the first element how healthcare providers use social media as CRM tools as well as the second the impact of social customer relationship management on businesses is crucial. (Rupert and others, 2020) The model (figure 2.4) focuses on how information could potentially be shared through social network interactions and patient connections inside healthcare organisations to improve patient outcomes (Anshari & Almunawar, 2011). The Healthcare Value Configuration, Internal Social Networks, Listening Tool Interface, and Social CRM Systems inside the Healthcare Provider were used to create the framework.

Diagram

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Figure 2.4: Social CRM in Healthcare. (Anshari & Almunawar, 2011)

It begins by identifying potential theoretical explanations that might explain how Social CRM functions as a one-stop service for fostering relationships among healthcare organisations, patients, and the public. CRM systems and enterprise social networks are linked by a dashed line, indicating that neither system directly controls the other. However, positive discussion and data from enterprise social networks should be recorded for use in developing approach, enhancing services, and simultaneously making accurate responses. The idea of integrating internal and external social networks is to include patients, export ideas, encourage the development of new services, encourage quick feedback on current services, and use technologies from people both inside and outside of the organisation. Additionally, the CRM system receives actual data from social media through the listening tool that connects social networks and social networking platforms. The technology should also be able to separate the amount of business process need from the actual data that has to be sent to CRM.

### **2.4.1 Fundamental features of Social CRM to Healthcare**

The focus of social CRM in the healthcare industry is on platforms that rely on social media and the idea that patients are the lifeline of the healthcare network (Abbasi, et al., 2018). The following are the core characteristics of social CRM in respect to healthcare (Jalal, et al., 2021):

* Patient focus (P2C): describes how the development of social CRM apps is focused on addressing patient demands through healthcare professionals.
* Patient activity (C2P): demonstrates how the design of CRM systems encourages patients to actively participate in the development and gathering of health-related information that is obviously relevant to or of interest to them.
* Patient engagement (C2H): is a reference to the capability of social CRM systems to provide patients with a conduit through which to influence certain areas of their health issues via social media platforms.
* Health communities (C2C): refers to the community healthcare element of the social CRM that facilitates the sharing of opinions regarding people, business operations, products, and resources.
* Healthcare professionals (P2P): refers to the development of social CRM platforms for healthcare practitioners to share information. For instance, discussion boards can be used to debate specific ailments, treatments, medications, surgeries, medical technology, and other healthcare-related topics. This will ensure that healthcare workers are knowledgeable about the most recent developments in the industry.

In general, using technology apps can help patients manage their medical ailments and issues more successfully. Together with the low implementation costs of social CRM, these benefits make social media platforms attractive online facilitators of social support and health-related communication. Before an organisation adopts social CRM, several factors that are based on data from pertinent publications addressing the TOE (Technology Organization Environment) structure must be taken into account. The application and operation of the TOE structure can be enhanced by looking at these traits prior to the installation of social CRM. Sambasivan M. and Esmaeilzadeh P., 2016).

## **2.5 Chapter summary**

New material regarding CRM and Social CRM principles has been discovered because of the systematic review of the literature. Due to the increased cultural acceptability of social media, businesses have acted quickly to use S-CRM techniques to interact with and maintain strong relationships with their clients. Modern commercial enterprises must implement and effectively implement an S-CRM strategy because it enables them to promote their brands to a diverse global client base, giving them a competitive advantage and increasing organisational profitability. However, for data to be leveraged to drive company modernization across the board and improve patient connections, healthcare organisations need to establish the right infrastructure and tools to decrease analytical complexity and coordinate.

# **CHAPTER THREE**

# **RESEARCH METHODOLOGY**

## **3.0. Introduction**

The purpose of this chapter is to establish and create the research approach for this study. The framework linked with a certain set of paradigmatic assumptions that is used to conduct research is known as the research methodology (O'Leary, 2004). According to Allan & Randy (2005), “Research methodology should be the most effective for achieving the study's aims and should allow for replication by other researchers of a similar kind”. This chapter's goal is to evaluate the different methodologies (figure 3.1) before describing and defending the approach chosen for the current investigation. This chapter will provide justification for the methodology chosen, as well as the methods for acquiring data and analysing it that will be used.

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Figure 3.1: Research Onion (Alturki, 2021)

## **3.1 Research philosophy**

Philosophy of research is concerned with the origin, nature, and progression of knowledge (Bajpai, 2011). Research philosophy is just an opinion on how information about a phenomenon should be gathered, analysed, and applied. Two key philosophical tenets ontology and epistemology are frequently employed to describe the theoretical foundations of most investigations in the social science and management literature (Holden & Patrick, 2004; Saunders et al. 2009; Easterby-Smith et al. 2012). The following discussion of these two philosophic presumptions is focused on how they apply to the current study in terms of developing a suitable research method.

### **3.1.1. Ontology**

Ontology is defined as “the science or study of being” (Blaikie, 2010) and deals with the nature of reality. The fundamental question of ontology is whether social entities should be viewed as objective or subjective. In other words, you need to determine if the world is external to the social world or whether social actors' perceptions and behaviours are what cause social phenomena within the parameters of your investigation (Wilson, 2010). There are two important aspect of ontology which are as follows:

1. Objectivism: this depicts the idea that social entities exist apart from the social players who are interested in them (Saunders, M, et al., 2012). On the other hand, objectivism is an ontological stance that claims that social phenomena and their meanings have a reality that is independent of social actors (Bryman, 2012).
2. Subjectivism: this believes that social phenomena are produced by social actors who are interested in them acting on their perspectives (Dudovskiy, 2021). According to the official definition, constructionism is an "ontological stance which maintains that social phenomena and their meanings are continuously accomplished by social actors". (Bryman, 2012)

### **3.1.2. Epistemology**

The study of knowledge, or epistemology, represents a particular conception of what knowledge comprises and explores the nature, potential, scope, and general foundation of knowledge. Giving a philosophical foundation for what types of knowledge are possible and how we may ensure that they are both adequate and acceptable are the goals of epistemology (Al-Ababneh, 2020). The questions posed by epistemology include: I "How can reality be known?" How does research compare to what is already known? What qualities, overarching principles, and presumptions contribute to the achievement of findings? To evaluate the calibre of the study's methodology and the reliability of its conclusions, (iv) "Can that procedure be shared and duplicated by others?" (Hatch & Cunliffe, 2006; Chia, 2002). Four research philosophies can be distinguished from an epistemological perspective, and they are as follows (Phair & Kerryn Warren, 2021):

**3.1.2.1. Positivism**

According to positivist research, knowledge extends beyond the subject matter under study. Only an objective analysis of the subject matter is allowed; the researcher is only allowed to observe without providing any interpretation. According to positivism, there is only one reality, and every meaning is the same regardless of the subject. In positivist investigations, the researcher's role is limited to data collection and impartial interpretation (Collins, H, 2010).

**3.1.2.2. Interpretivism**

This emphasises the potential impact that social and cultural variables might have on an individual. Interpretivism placed a strong focus on adopting a position on people's views and ideas while considering their sociocultural circumstances. According to Al-Ababneh (2020), interpretative methodology seeks out interpretations of the social living environment that are tied to history and culture. By using value-free, objective observation, the positivist approach, in contrast, employs the methodology of the natural sciences to find universal traits of human nature, society, and history that offer explanation and, as a result, predictability and control. Interviews and other practical methods, including observations, are emphasised in the interpretivist approach to data collecting (Dudovskiy, 2021).

**3.1.2.3. Pragmatism**

Pragmatism emphasises the importance of using the best tools available to study events. Pragmatism's main objective is to approach research from a practical standpoint, where information is continuously challenged and absorbed rather than being fixed. In practise, knowledge is quickly challenged and understood since it involves using the best tools available to study events. The pragmatic research philosophy can be paired with a variety of research approaches, such as qualitative, quantitative, and action research methods (Dudovskiy, 2021).

#### **3.1.2.4. Realism**

Researching philosophy requires an understanding of reality's independence from the intellect. The tenet of this philosophy is that knowledge is produced scientifically. Depending on the study topic, both quantitative and qualitative approaches might be used when it comes to data collection strategies (Saunders, M, et al., 2012). Critical realism, which contends that "what we see is not what we received," and direct realism, which contends that "what we see is what we get," were the two categories of realism described by Saunders, et al. in 2009. Researchers frequently see the cosmos as experiences rather than as physical objects, which necessitates a closer examination of reality.

### **3.1.3. Philosophical Assumption**

This epistemological position taken for this research will be centred on the philosophy of interpretivism paradigm. According to Myers (2008); Saunders et al., (2012), Adopting the interpretivism paradigm can lead to a thorough understanding of contexts, such as cross-cultural studies, variables driving certain development, and other contexts, through the gathering and analysis of qualitative data. interpretivism paradigm is based on individual contributions and considers many aspects, it would result in the development of highly valid data (Myers. 2008). According to the interpretivism paradigm, reality is arbitrary and prone to change when considering numerous factors (Alharahsheh & Pius, 2020). The two main Benefit of using Interpretivism philosophy:

* Relative ontology: In the research Through intersubjectivity, reality is perceived by considering meanings as well as comprehensions of social and experience aspects. (Saunders, M, et al., 2012).
* Subjective epistemology: The relationship between the research and the research subject is made evident by this method, which presupposes that human cannot be detached from their knowledge (Saunders, M, et al., 2012)

In this study, the interpretative paradigm allows for subjective social CRM analysis in healthcare organisations using social media. Data must be obtained through observation and analyses of digital text to capture the qualitative information from social media use. This philosophy is suitable for the study plan and methodology that will be used. The next sections will go through the research design, covering the study's approach, strategy, and techniques.

## **3.2 Research Approach**

The research framework may include basic guidelines for data collecting and processing as well as distinctions between qualitative, quantitative, and mixed methodologies. The strategy for doing the research should be viewed as a holistic plan (Bryman A & Bell, E, 2015). The sub-sections that follow provide a quick overview of the various approaches:

**3.2.1. Deductive Approach**

A deductive approach seeks to formulate a hypothesis based on accepted theory, then build a research plan to evaluate the hypothesis. As a means of explaining the causal connections between ideas and variables, it is helpful, Statistics can be used to quantify concepts, and study results can be generalised. (Wilson, 2010).

### **3.2.2. Inductive Approach**

An inductive technique involves looking for patterns in data and developing theories, or explanations, for those patterns using a series of hypotheses. Before the investigation is conducted, no applicable concepts or hypotheses for the inductive technique exist. The researcher is also permitted to change the study's direction once it has started (Goddard, W & Melville, S, 2004).

On the other hand, there are three main research paradigms based on the research approaches (Creswell, 2012). Firstly, the quantitative paradigm is characterized Traditional, positivist, experimental, or empiricist paradigms are all names for quantitative paradigms. Secondly, the qualitative paradigm is naturalistic, interpretive, postpositivist, or postmodern perspectives, or the constructivist approach. Thirdly, the mixed method is the gathering of both qualitative and quantitative data; combining both data types using various strategies that might not be sufficient using either strategy alone to comprehend the study challenge.

### **3.2.3. Research approach and Justification**

An inductive approach will be used in this study. There has been extraordinarily little examination of social CRM in UK healthcare organisations, notwithstanding the dearth of research in this area. This project focuses on the analysis of social media data, which will be used to support the interaction between a healthcare organisation and its customers. The qualitative research approach will be adopted because the research involves the study of behaviour and the context in which behaviour occurs. Its nature of reality is subjective, personal, and socially constructed.

## **3.3 Research strategy**

The research strategy, which also includes the research method, determines the general course of the investigation. Based on the study's goals and questions, the length of time available, the researcher's philosophical underpinnings, and the level of existing knowledge in the topic under examination, the best research strategy should be selected (Wedawatta G., et al., 2011). This study's primary methods will be case studies and action research.

1. Action research is a methodical investigation that aids in finding practical answers to challenges encountered every day. In all social contexts, complex dynamics are to be considered in this study. It was selected due to its ongoing cycles of intended research that address problems that arise scenarios and locations, allowing the development of measures to improve work efficiency and effectiveness in social organisations and agencies, human and health services, enterprises, and schools (Stringer E. , 2014). Furthermore, action research is used to examine the actual impact of social CRM in healthcare organisations and advise appropriate courses of action.
2. Case study research is a qualitative research design that involves an in-depth examination of a single person or a group of people. It provides a system for keeping track of events, gathering data, analysing information, and presenting the conclusions while examining the life of a contemporary genius in the real world. 2019 (Fivevidya). Case studies can be approached in a variety of ways, according to Crowe et al. (2011), depending on the researcher's epistemological position. They might adopt a critical approach (questioning one's own and others' assumptions), an interpretivist approach (seeking to understand both personal and collective social meanings), or a positivist approach (orienting toward the standards of natural sciences, such as emphasising generalizability considerations).

Action research is the main methodology employed in this study since it is conducted inside an organisation, where the researcher watches what happens and then spots a problem that must be fixed. Data is gathered in action research employing a single strategy that would use qualitative data.

## **3.4 Techniques and procedures**

This study will be based on action research, case studies, and observation of individuals or groups using social media as data gathering methods, as described in the section above. UK hospitals were selected as the case study for this analysis of S-CRM usage. Healthcare organisations are under intense pressure to continue offering top-notch medical care while also raising protection and cutting costs. Healthcare organisations now find it increasingly challenging to complete their jobs because of issues including rising patient demand and expectations. (Yina, 2010) claims that for effective CRM, complete data collection from both inpatients and outpatients using a multi-media platform is required.

### **3.4.1 Qualitative technique**

For the purpose of this case study research, qualitative techniques (such as observation and focus groups) will be used to gather data through scraping customer reviews of each chosen healthcare provider; St Thomas hospital, Royal Victoria Infirmary, and University College London hospital operating in United Kingdom and the way they were rendered health services from social media sites(National health system, Google, and Twitter) using Octoparse and Outscraper as the data scraping software. Octoparse8 is a innovative web data extraction tool with a visual interface that allows both seasoned users and new users to bulk extract data from websites (Octoparse, 2022). Since Octoparse estimates the relevant data fields for users, it is primarily made for non-coders to tackle challenging web scraping. This saves the analyst a tonne of time and effort because they do not have to manually select data. This study employs Octoparse for data mining, data storage, data cleansing, and other processes specifically for the NHS data throughout the data gathering phase. Outscraper is also a web data extraction software, with a clear and user-friendly interface, Outscraper offers quick and accurate data about Google Maps locations (Outscraper, 2022). The platform is sufficiently user-friendly yet having complex functionality. The google review data was extracted using this tool.

### **3.4.2 Qualitative Data Analysis**

In this study, qualitative data analysis would be done. Several open-source data mining technologies may be used to support this research, depending on the volume of data acquired. The conclusion of this phase should include a summary of the key findings, which include comments made by patients of the healthcare system under examination. The comments will be categorised using software tools for visualisation in accordance with the customer reviews. The clustering method would be used to analyse these data on Tableau. The grouping of data, observations, or cases based on resemblance is known as clustering. In contrast, clustering entails splitting the data set into smaller groups. By age range or geographic region, this technique may include grouping user records. Usually, subgrouping the data into clusters is done to prepare it for analysis. The criteria used to determine the optimal number of clusters in Tableau uses the Calinski-Harabasz criterion to access cluster quality. The Calinski-Harabasz criterion is defined as (Tableau, 2022):

X ………………………………………………(1)

Where SSb is the overall between- cluster variance , SSw the overall within cluster variance, k the number of clusters, and N the number of observations. The higher the value of this ratio (high between-cluster variance), the more distinct/separate the individual clusters are, and the more cohesive the clusters are. The Calinski-Harabasz index cannot be used to identify one-cluster situations because it is not defined for k=1. In the absence of a user-specified cluster number, Tableau determines the cluster size based on the first local maximum of the Calinski-Harabasz index. By default, k-means will be performed for up to twenty-five clusters if the first local maximum of the index is not reached for a lower value of k. A maximum of fifty clusters may be set (Tableau, 2022).

Analysis of people's opinions, sentiments, evaluations, appraisals, attitudes, and emotions about things like goods, services, organisations, people, issues, events, subjects, and their attributes is known as opinion mining, sometimes known as sentiment analysis (Caballero, 2017). The Russel Model of Affect (figure3.2), which suggested using valence (or pleasure) and arousal (or stimulation) expressed in a two-dimensional plane to build emotional interpersonal circles of affect, served as the foundation for the sentiment visualisation used in this study (Johann, 2015). The Russel Model of Affect places feelings or emotions on a 2D plane using emotional dimensions. The horizontal axis indicates pleasure, with varying degrees of pleasure between severely unpleasant on the left and highly pleasurable on the right. The natural language processing (NLP) would be used to focus on making natural human language usable by computer programs. Its tool kit (Natural language toolkit) would be utilized as a python package to analyse text and visualize text using Spyder. By and for scientists, engineers, and data analysts, Spyder is a free and open-source scientific environment written in Python. A scientific package's data exploration, interactive execution, deep inspection, and gorgeous visualisation features are paired with a comprehensive development tool's robust editing, analysis, debugging, and profiling capabilities to provide a unique solution (Spyder, 2022).

A picture containing diagram

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Figure 3.2: Russell model of affect (Johann, 2015)

## **3.5 Chapter Summary**

The research techniques employed in this study were explained in this chapter. It only used one method of investigation, a qualitative research strategy. The study methodology outlines the research design, data gathering method, and analysis approach that will be employed in this research project. The results and analysis from the qualitative research are presented in the next chapter.

# **CHAPTER FOUR**

# **RESULT AND DISCUSSION**

## **4.0. Introduction**

For healthcare organisations to better understand their customers' needs and meet those needs with better services to increase the value of their businesses, this study will critically evaluate social customer relationship management in healthcare organisations using hospitals in the United Kingdom as a case study. This chapter includes the qualitative data and findings from the data analysis. The social media data is presented first, the findings, the proposed model and discussion. The chapter finishes with a summary of the findings.

## **4.1 Collection of Data**

The information from social media is presented in this chapter's part together with each of the three chosen case studies from the healthcare industry. Each sub-section starts with a brief company profile, and then the data gathered is also provided.

### **4.1.1 St Thomas Hospital**

St Thomas Hospital is a London-based healthcare organisation that offers a comprehensive spectrum of lifetime, general, and specialty care, as well as clinical research, innovation, teaching, and training. They strive to be exceptional by providing high-quality, compassionate treatment and experiences to all their patients and family. They offer a wide range of specialties, including cardiovascular, respiratory, women's services, acute medicine and ageing and health, critical care, gastro-intestinal medicine and surgery, general surgery, plastic surgery, and eye surgery, and have one of the busiest emergency departments (A&E) in the country (ophthalmology). Their core principles are to prioritise the patient, to take pleasure in what they do, to respect others, and to behave with honesty. They have approximately 23,500 proud employees that are varied and devoted to giving services to patients, 26,851 patients recruited to research studies and 1,894 clinical studies open.

Text

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Figure 4.1: St Thomas Hospital NHS Review

Graphical user interface, text

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Figure 4.2: St Thomas Google review

The data in figure 4.1 was obtained from the NHS (National Health Service) website (NHS, 2022), whereas the data in figure 4.2 was obtained from Google reviews (Google, 2022). The names of those who offered feedback were truncated rather than using their complete identities to secure their confidentiality in accordance with the open licences (Appendix A). St Thomas hospital Google’s information includes reviewer initials, remark, rating, date, and number of likes for each comment. The St Thomas hospital information from NHS includes initials, remark, rating, date, section, and hospital response.

### **4.1.2 University College London Hospital**

The University College London Hospital (UCLH), one of the major NHS trusts in the United Kingdom, is in the centre of London and offers top-notch acute and specialty care. UCHL provides patients with the best care possible, top-notch instruction, and top-notch research. They focus on four fundamental principles: safety, kindness, teamwork, and improvement. The principles serve as the foundation for all facets of patient care and the workplace, and UCLH's success as an internationally known hospital has been made possible by upholding these values in addition to its commitment to clinical excellence. The modern UCLH is located next to six cutting-edge specialty hospitals. The UCLH Strategic Plan includes giving the best treatment possible, developing into a top-tier academic research hospital, delivering operational excellence through HER (Electronic Health Records), fully training every employee of their abilities, and enhancing financial sustainability.



Figure 4.3: UCLH NHS Review

Table

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Figure 4.4: UCLH Google Review

### **4.1.3 The Royal Victoria Infirmary**

The Royal Victoria Infirmary (RVI), located in Newcastle's city centre, offers specialised services to the region's towns. In the UK, COVID-19 patients were first treated at the RVI infectious disease unit. With over six hundred babies born there each year, it has one of the largest maternity units in the UK. A wide variety of innovative medical treatments are offered by the RVI, including cardiology, emergency care, maternity, neonatology, paediatrics, intensive care, neurosciences, ophthalmology, dermatology, gynaecology, infectious diseases, and orthopaedics. The vision of RVI is in line with the company's goals of providing services to the highest standards possible, enhancing residents' health, and using our top-tier knowledge and research capabilities. Kindness, Lofty standards, Inclusiveness, Innovation, and Proudness are RVI's five core principles.

A screenshot of a computer

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Figure 4.5: RVI NHS Review

Graphical user interface, text, application

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Figure 4.6: RVI Google Review

The characteristics of each attribute included in the data from the NHS and Google reviews, as well as how they relate to this research and their purpose, are described in Tables 4.1 and 4.2, respectively.

**Table 4.1: NHS Data Attributes**

|  |  |
| --- | --- |
| **Attributes** | **Meaning** |
| Review Title | This is the title of the overall feedback a customer/patient got from the hospital. |
| Name | The identities of all customers or patients who have provided comments about the hospital are included in this. |
| Ratings | The rating by the customer/patient given to the hospital. |
| Day | The day the review was delivered |
| Month | The day of the month the review was delivered in |
| Year | The calendar year when the review was issued |
| Comment | The comment given by the customer/patient about their experience with the hospitals. |
| Section/Department | This specifies the department where a customer or patient had their experience. |
| Response | This is the hospitals response to the comment provided by the customer/patient. |
| Reply Day | The day at which the reply was given |
| Reply Month | The month at which the reply was given |
| Reply Year | The year at which the reply was given |

**Table 3.2: Google Review Data Attributes**

|  |  |
| --- | --- |
| Attributes | Meaning |
| Name | The identities of all customers or patients who have provided comments about the hospital are included in this. |
| Review Text | The comment given by the customer/patient about their experience with the hospitals |
| Review Rating | The rating by the customer/patient given to the hospital. |
| Day | The day the review was delivered |
| Month | The day of the month the review was delivered in |
| Year | The calendar year when the review was issued |
| Review Likes | This is the number of like each comment gets, how many people reacted to feedback. |

## **4.2 Data Analysis and Visualization**

This section presents descriptive analysis and visualisation of data obtained from NHS and Google for St Thomas Hospital, The Royal Victoria Infirmary, and University College London Hospital, as well as a thorough discussion of the key findings.

### **4.2.1 NHS Dataset Analysis and Visualization**

The national Health Service (NHS) is the government-funded healthcare system in the United Kingdom. All the healthcare organisations in the nation are hosted in their website. The information acquired from the NHS website was broken down into three sections: Rating by Department, Review Title by Year, and Reviewer Comment by Response. Corresponding to the three hospitals chosen, this will be provided in subsections. All other visualization can be found in appendix E.

1. **Ratings by Department**

Each client or patient that enters one of these hospitals has in some way been admitted to one of these departments. The information received indicates that, after excluding the null, the St. Thomas hospital has 16 departments in total. The maternity unit received the highest rating, making up half of the hospital's overall rating in the bubble chart (figure 4.7). Regarding their ratings, each colour denotes a hospital department and the overall number of ratings each one receives; comments without a department are shown as Null (blue colour). The link in appendix E provides access to Tableau where the visualisation can be seen in greater detail.

Chart, bubble chart

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Figure 4.7: Rating by Department in St Thomas Hospital

Examining the Royal Victoria Infirmary Hospital (figure 4.8) revealed that it had 26 departments, excluding those for which reviewers had not provided a department. The accident & emergency and maternity departments were closely tied for first place with ratings of 56 and 51, respectively. Regarding their ratings, each colour denotes a hospital department and the overall number of ratings each one receives; feedbacks without department are shown as “Don’t”. The link in appendix E provides access to Tableau where the visualisation can be seen in greater detail.

Chart, bubble chart

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Figure 4.8: Rating by Department for Royal Victoria Infirmary hospital

The University College London Hospital's bubble chat ( figure 4.9 ) reveals that, out of the 12 departments that could be determined from the data, eliminating the Null and reviews without a department, the Accident and Emergency unit received the highest ratings. Regarding their ratings, each colour denotes a hospital department and the overall number of ratings each one receives; comments without a department are shown as Null (blue colour). Customers who can’t remember the hospital department in which their feedback is given is labelled “Don’t Know” as shown figure 4.9, with a total of 18 rating. The link in appendix E provides access to Tableau where the visualisation can be seen in greater detail.

Chart, bubble chart

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Figure 4.9: Rating by Department University College London hospital

1. **Response to Comments**

The dataset from St. Thomas Hospital included 44 customer comments that described their experiences while visiting or being admitted to the hospital. As can be seen in figure 4.10, St. Thomas hospital did not respond to any of the comments made by customers regarding their experiences.

Graphical user interface, text

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Figure 4.10: Response to Comment for St. Thomas hospital

The data acquired from the NHS website on the Royal Victoria Infirmary hospital includes a total of 99 comments about patients' experiences with the hospital. Figure 4.11 illustrates how the hospital responded to each of its customers' comments. Each comment was thoughtfully addressed in their responses, and they each provided feedback and acknowledgement.

Text

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Figure 4.11:Response to comment for Royal Victoria Infirmary hospital

A total of 24 customers provided feedback about University College Hospital in London; most of those comments indicated dissatisfaction with their experiences, and Figure 4.12 shows that University College London Hospitals had not yet acknowledged their comments, which shows a lack of customer relationship management from the ends of the hospital.

Text

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Figure 4.12:Response to comment for University College London hospital

1. **Review Title by Year**

In general, customer’s/patient’s feedback for the three hospitals that were chosen spans three years, from 2020 to 2022. Each review title corresponds with the general overview of how customer/patients view the hospital yearly. With a total of 44 reviews, St Thomas Hospital earned the most of favourable reviews in 2021 when compared to other years. The hospital also recorded the most data in the same year from the NHS website. Corresponding to the tree map, (figure 4.13) is clustered by colour and details the name of the customer/patients, year, and review title of each feedback.

Chart, treemap chart

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Figure 4.13: Review Title by Year for St Thomas hospital.

Using distribution model, Cluster algorithm was implemented to mark similar year to one another in other to ascertain the general overview of how customer perceived St Thomas hospital. The year was used to as variable to customize the cluster in Tableau, which is detailed in table 4.3. Cluster 1 has the highest number of positive titles, which represents year 2021 in the data and denoted by “blue colour” in figure 4.13; the cluster algorithm looks for correlation, which in this section is correlated by the year. The higher values for theses variables are the signal to look out for, and cluster 1 has more than half of the total number of points, cluster 2, and 3 represents year 2020 and 2022 respectively and the values with null are assigned to “Not clustered” category (table 4.3).

**Table 4.3: Review title by year cluster summary tab**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Inputs for Clustering**   |  |  | | --- | --- | | Variables: | Year | | Level of Detail: | Review Title, Year, Name | | Scaling: | Normalised |   **Summary Diagnostics**   |  |  | | --- | --- | | Number of Clusters: | 3 | | Number of Points: | 44 | | Between-group Sum of Squares: | 2.9091 | | Within-group Sum of Squares: | 0.0 | | Total Sum of Squares: | 2.9091 |  |  |  |  | | --- | --- | --- | |  |  | **Centres** | | **Clusters** | **Number of Items** | **Year** | | Cluster 1 | 32 | 2021 | | Cluster 2 | 8 | 2020 | | Cluster 3 | 4 | 2022 | | Not Clustered | 0 |  | |  |

The summary tab as shown in table 4.4, gives information on the inputs and some statistics that were used to create the clusters as well as certain properties that describe each cluster.

Table 4.4: Description of Clusters summary tab (Tableau, 2022)

|  |  |
| --- | --- |
| Variables | identifies the fields that Tableau uses to compute clusters. These are the fields that are listed in the Variables box of the Clusters dialogue box. |
| Level of Detail | lists the fields that decide how much aggregation is done or the fields that affect how detailed the display is. |
| Scaling | demonstrates the scaling pre-processing method. The main scaling method used by Tableau right now is normalisation. The formula for this method, also referred to as min-max normalisation, is (x - min(x))/(max(x) - min(x)). |
| Number of clusters | how many distinct clusters there are in the clustering. |
| Number of points | how many markings are in the view |
| Between group sum of squares | a cluster separation metric that considers the average value in the centre of each cluster, weighted by the cluster's allotted number of data points and the data set's geographic centre. The separation between clusters is improved with a larger value. |
| Within group sum of squares | A measure that adds up the squared distances between each cluster's centre and each of its separate markings to determine how cohesive the clusters are. The clusters are more coherent as the value decreases. |
| Total sum of squares | totals both the within-group and between-group sum of squares. The proportion of variation explained by the model is calculated as (between-group sum of squares)/(total sum of squares). Values range from 0 to 1, with bigger values often indicating a better model. |

The NHS website contained 99 reviews of the Royal Victoria Infirmary hospital, which covered the years 2020 and 2021. Most of their response came in the year 2021, which was particularly good overall. The tree map (figure 4.14) gives a visual representation of the review title, the year the feedback was written by the customer/patient and is coloured based on each year. Colours are used to indicate the years. For example, the blue colour cluster 1 stands for the year 2021, while the orange and sky-blue cluster 2 and 3 represent the years 2022 and 2020, respectively. Cluster 1 had the most title and was rated higher compared to cluster 2 and 3, accounting for more than half of all reviews, the cluster summary details can be found in the appendix B.

Chart, treemap chart

Description automatically generated

Figure 4.14: Review title by year for Royal Victora Infirmary hospital

According to the NHS website, there have been 24 comments made about University College Hospital in London for 2020, 2021, and 2022. Even if the year isn't through, 2022 is lagging 2020 in terms of favourable feedback compared to 2021, which led the list of years with the most positive statistics. The review's title and year are included in the tree map, which can be seen in figure 4.15. The years are distinguished by colour; cluster 1 (blue) represents the year 2021, while clusters 2 and 3 (orange) and (pink) represent the years 2022 and 2020, respectively. the cluster summary details tab is detailed in appendix B.

Chart, treemap chart

Description automatically generated

Figure 4.15: Review Title by year for UCHL

### **4.2.2 Google Dataset Analysis and Visualization**

As an open-source social network, Google Review is a platform used by users throughout the world to share their experiences with their daily activities. The total number of ratings in a year and customer’s ratings are the two subsections into which the data from Google Reviews will be analysed and visualised. This subsection's discussion will centre on the three UK hospitals that were chosen.

1. **Total number of ratings per year**

After scrapping customer reviews for the three hospitals that were chosen for this study, a total of 247 reviews from St. Thomas Hospital were acquired and analysed annually as shown in figure 4.16. The greatest rating received between 2020 and 2022, accounting for more than half of the total ratings recorded, was received in 2021, when there were 615 reviews from customers. It recorded 15 ratings for 2020 and 370 for the remainder of 2022.

Chart, line chart

Description automatically generated

Figure 4.16: Total number of ratings in a year for St Thomas hospital

A total of 248 reviews from Google were examined for the Royal Victoria Infirmary Hospital. The data ranges from 2016 to 2022, and the line graph ( figure 4.17) indicates that 2019 had the highest rating (317), followed by 273 and 239 in 2017 and 2020, respectively.

Chart, line chart

Description automatically generated

Figure 4.17: Total number of ratings in a year for Royal Victoria Infirmary hospital

Google Reviews provided 245 sets of data, totalling 901 ratings, for the University College Hospital in London between 2019 and 2022. The line graph in figure 4.18 shows that there is some partial increase within these years, with a small difference between the 303 and 303 ratings for 2020 and 2021, respectively.

Chart, line chart

Description automatically generated

Figure 4.18: Total number of ratings in a year for University College London hospital

1. **Customer’s rating**

Every day, thousands of people post reviews on Google that reflect how they feel about a company or their experience dealing with that company. Rating a company based on how they felt or were treated reflects their opinions about it. Most reviewers were mediocre with the services provided by St. Thomas Hospitals, based on analysis of their rating (figure 4.19).

Chart, bar chart

Description automatically generated

Figure 4.19: Customer’s rating for St. Thomas hospital

In this part, the hierarchical clustering connection models were used to create distance connectivity between each star rating provided by the customer/patient at St. Thomas Hospital. The Tableau cluster, which is described in table 4.5, was customised using the star ratings as a variable. The cluster algorithm searches for correlation, which in this part is provided by the star ratings. Cluster 1 has the maximum number of ratings, which in the data corresponds to star rating 5, which is indicated by blue in figure 4.19. The signal to watch out for is the increase in these variables' values, and cluster 1 has more than half of the total points, while clusters 2, 3, and 4 reflect the star ratings 3, 4, 1, and 2, respectively, and values with null are assigned to "Not Clustered" category. The summary tab as shown in table 4.5, gives information on the inputs and some statistics that were used to create the clusters as well as certain properties that describe each cluster

**Table 4.5: Customers rating cluster summary tab**

**Inputs for Clustering**

|  |  |
| --- | --- |
| Variables: | Avg. Review Rating |
| Level of Detail: | Name |
| Scaling: | Normalised |

**Summary Diagnostics**

|  |  |
| --- | --- |
| Number of Clusters: | 5 |
| Number of Points: | 247 |
| Between-group Sum of Squares: | 39.312 |
| Within-group Sum of Squares: | 0.0 |
| Total Sum of Squares: | 39.312 |

|  |  |  |
| --- | --- | --- |
|  |  | **Centres** |
| **Clusters** | **Number of Items** | **Avg. Review Rating** |
| **Cluster 1** | 166 | 5.0 |
| **Cluster 2** | 11 | 3.0 |
| **Cluster 3** | 17 | 4.0 |
| **Cluster 4** | 48 | 1.0 |
| **Cluster 5** | 5 | 2.0 |
| **Not Clustered** | 0 |

The Royal Victoria Infirmary's customer satisfaction evaluation revealed that most respondents were happy with their care. The bar chart (figure 4.20) revealed that even though some customers complained about their services, people's perspectives can vary depending on the organisation. Cluster 1 has the maximum number of ratings, which in the data corresponds to star rating 5, which is indicated by blue in figure 4.20, cluster 2, 3, 4, 5 represents star rating 1, 3, 4, 2 respectively. The cluster summary details can be found in the appendix C.

Chart, bar chart

Description automatically generated

Figure 4.20: Customer’s rating for Royal Victoria Infirmary

If an organisation does not address the issue brought up by its customers, it cannot be effective, efficient, or of high quality. Reviews of University College Hospital London (UCHL) vary as shown in their visualisation (figure 4.21), and one's review may have an impact on how others evaluate the organisation after seeing others' ratings. Cluster 1 has the maximum number of ratings, which in the data corresponds to star rating 5, which is indicated by blue in figure 4.21, cluster 2, 3, 4, 5 represents star rating 2, 1, 3, 4 respectively. The cluster summary details can be found in the appendix C.

Chart, bar chart

Description automatically generated

Figure 4.21: Customer’s rating for university college hospital London

### **4.2.3 Sentiment Analysis**

The field of text mining research known as sentiment analysis (SA) is still developing. The subjectivity, ideas, and feelings expressed in a document are treated algorithmically (Medhat, et al., 2014). With the use of Python and sentiment analysis, this research would be analysing data from Twitter about St. Thomas Hospital, Royal Victoria Infirmary, and University College Hospital London.

1. **Sentiment Viz**

This is a web-based sentiment visualisation tool that allows users to type in a keyword and have it taken from Twitter, where it may be examined in the sentiment tab, topics, Heatmap, timeline, and other areas.

Chart, scatter chart

Description automatically generated

Figure 4.22: St Thomas hospital sentiment analysis

On the Sentiment tab for each clinic, each tweet is presented as a circle, with sentiment indicating an evaluation of the emotion contained in the tweet's text. Unpleasant tweets are represented by blue circles on the left, while pleasant tweets are represented by green circles on the right.

A screenshot of a computer

Description automatically generated

Figure 4.23: Royal Victoria Infirmary sentiment analysis

Active tweets are shown as brighter circles on top, while inactive tweets are shown as darker circles on the bottom. St. Thomas Hospital (figure 4.22) had 104 tweets altogether that were analysed, and most of them were positive and happy, along with Royal Victoria Infirmary (figure 4.23) and University College London hospital (figure 4.24). However, for hospitals to provide better services, the administration needs to pay attention to and address the unpleasant tweets. If you drag your mouse around the sentiment tab, you can see details of each circle.

Chart, scatter chart

Description automatically generated

Figure 4.24: University College London hospital sentiment analysis

1. **Using Natural Language Processing (NLP)**

In conducting sentiment analysis using python, libraries were imported for examining the data. The first is pandas, an open-source Python library that provides basic data structures and analytic capabilities. NLTK, a powerful Python library, is employed as the second tool. Natural Language Toolkit (NLTK) is a popular NLP library with a big corpus, models, and algorithms. (Octoparse, 2019). The customers comment from NHS website was scrapped using Octoparse and was imported as an excel file in Spyder. Sentiment Intensity Analyzer was a function used by the nltk.sentiment.vader. The sentiment analyser will implement and facilitate sentiment analysis tasks using the NLTK technique and features, allowing sentiment scores to be computed without the usage of sophisticated code. The functions shown in the Appendix  F would be used to generate the polarity scores. The four different sorts of scores are negative, neural, positive, and compound. Each review is given a score, which can be negative, neutral, favourable, or a compound score. The outcome of adding the first three scores is the compound score. This value could be anything from -1 to 1. I set a threshold for the compound score to ascertain the sentiment. A review's overall composite score is deemed positive if it is more than 0.2. If the compound score of a review is less than 0.2, it is deemed unfavourable. If the review's composite score is between -0.2 and 0.2, it is neural.

**Table 4.6: Sentiment Analysis using Natural language toolkit**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hospitals** | **Percentage of positive reviews** | **Percentage of neural reviews** | **Percentage of negative reviews** | Polarity | Subjectivity |
| **St Thomas** | 68.18 | 4.54 | 27.27 | 0.31 | 0.77 |
| **Royal Victoria Infirmary** | 82.82 | 6.06 | 11.11 | 0.56 | 0.66 |
| **University College London hospital** | 62.50 | 0.0 | 37.5 | 0.39 | 0.79 |

Table 4.6 demonstrates that while the three hospitals' aggregate percentage of favourable evaluations is admirable, there needs to be improvement in the ratio of negative reviews. Working with textual data and complicated analysis are both done with Textblob. Textblob generates two outputs when given a sentence: subjectivity and polarity. Polarity, where [-1] represents a negative sentiment and [+1] a positive sentiment, is the output that lies between [-1,1]. Subjectivity is the output that is between [0,1] and relates to private opinions and evaluations (James, 2021).

## **4.3 The Proposed model for Social CRM in Healthcare**

The proposed model (fig 4.25) was constructed to solve the research question after the data on the chosen healthcare organisation gathered from social media sites was analysed. The arrow heads indicate the flow of a relationship and indicates how information is passed.

Diagram

Description automatically generated

Figure 4.25: SCRM proposed model for healthcare

The framework was created so that patients or their families may communicate with hospitals. This can be accomplished via communication in one of two ways: through social media or another channel, as seen in figure 4.25. The other method was developed to assist folks who lack computer literacy in using these social media platforms. The social media text is analysed to extract the patient information so that management can cross-check it against their database. The contents of the complaint are handed on to the SCRM, which consists of the marketing department, customer service, management, and others, after meticulous database inspection, so they can confirm and address the problem at hand before passing it on to the response team. The response team has two options to contact the patient or family: via social media or other channels via which the patient or family contacts them. Getting back to the patient or family is problematic for healthcare organisations since the effectiveness of SCRM in these organisations is low, as indicated by the data obtained . Regardless of the matter what the criticism or complaint may be, acknowledging it demonstrates the "care" the patient is seeking to get. The objective is to link traditional communication channels and social networks to involve patients, promote the development of new services, acquire timely feedback on current services, and use technologies from both inside and outside the organisation.

## **4.4 Discussion of findings**

Building and managing customer relationships utilising social media has become a top priority for many businesses, since customers are increasingly to be viewed as the focus aspect of all marketing operations in modern corporate environments. (Alamgir & Shamsuddoha, 2015) These studies contend that adopting a customer-oriented strategy is now essential for businesses to thrive in the competitive markets of today. Customer orientation illustrates the idea that any corporate organisation should prioritise understanding and meeting customers' demands, which is consistent with the strategic marketing literature (Luo & Seyedian, 2003). The customer-oriented strategy of all three healthcare organisations received favourable reviews. The customer-oriented approach is crucial for service businesses, especially those that deal with matters of life, like the UK's healthcare system. According to the analysis of the top three hospitals in the UK, healthcare services are increasingly embracing a customer-centric strategy to better serve their clients and patients. In the current digital era, technical analysis of customer journeys has emerged as a key component of marketing, allowing businesses to map out consumers' behaviour from the point at which they inquire about or complain about services to provide a better one and address complaints. In agreement with (Davenport , et al., 2006) idea that businesses who can analyse their business data systematically will always do better than their rivals. According to the study's findings and customer feedback, getting quality healthcare services benefits the organisation in question in terms of greater service innovation and higher customer engagement due to the development of stronger brand loyalty.

During the research and analysis process, the use of social media by healthcare organisations was also examined. All three businesses claimed to have created numerous social media platforms for communicating with and interacting with their customers. Other cutting-edge platforms are being used by the businesses interacting and engaging with customers in addition to the well-known social media channels like Twitter, Facebook, and YouTube. For instance, the Royal Victoria Infirmary connected with their customers via the NHS website to address any issues they must have encountered. An internet-based channel on their websites is also employed in St Thomas Hospital and the University College London Hospital to communicate with their customers in real time. Therefore, combining social media and customer relationship management is a valuable business technique for fostering stronger customer relationships (Woodcock, et al., 2011). The main goal of social CRM is to boost customer interaction and insight, which has an impact on the customer lifecycle value of acquisition, retention, and value creation. Social CRM may assist businesses in putting the customer at the centre of their company strategy by providing insight into customer attitudes and behaviour (Greenberg, 2010). Less evident, though, is how customer engagement and loyalty efforts are strategically and tactically supported within the organisation as well as in social CRM, and how value may be derived from them (Trainor, et al., 2014). As a result, organisations who are receptive to implementing social CRM systems face significant hurdles, although it is nonetheless seen realistic to present the following hypotheses:

H1: Social media usage by customers directly and favourably affects how they view the worth of social CRM efforts.

H2: Customers' assessments of the value of customer-focused service provided by healthcare organisations are positively impacted by the perceived value of social CRM tactics.

H3: Brand resonance is positively correlated with how customers view the company's customer-focused service delivery.

## **4.6 Chapter summary**

The findings and discussion from the study, which examined the top three hospitals in the United Kingdom to analyse social CRM in healthcare, are presented in this chapter. The results of the data analysis shows that the chosen hospitals are embracing a customer-centric strategy for doing business. Customers were found to mostly utilise Google and NHS, and it is recommended that the healthcare organisation investigate that social network as well. Given that most individuals visit social media platforms more than ten times every day, businesses might concentrate on Twitter as another significant social media channel.

# **CHAPTER FIVE**

# **CONCLUSION AND RECOMMENDATION**

## **5.0 Conclusion**

The goal of this dissertation was to analyse social CRM in healthcare organisations and to investigate at how it impacts things like brand reputation and customer loyalty for the organisation. The top three hospitals in the United Kingdom were selected as a case study to fulfil the dissertation's objectives. The research's conclusions shed light on how social CRM is being used in the UK. This dissertation has been able to offer a greater understanding of how healthcare organisations have adapted social CRM and establish how it translates to customer behavioural results, which is in line with the research goal. The study examined the adoption and implementation levels of social CRM strategies and evaluated the relationships between consumer use of social media, perceived value of social media and social CRM strategies of healthcare firms, perceived utility of customer-oriented service delivery by healthcare firms, and social media engagement and interaction levels between consumers and firms.

This study aids healthcare providers in effectively employing SCRM by offering guidance for practitioners to select appropriate techniques to introducing Social CRM in healthcare and, as a result, to increase its value. This study provides a foundation for managerial choices regarding the envisioned advantages of social CRM implementation in the healthcare industry. This study provides experimental data on the perceived advantages as strategic, social, and operational advantages to assist management in determining whether investing in SCRM for healthcare businesses is profitable. After carefully analysing and researching the business insight on the chosen hospitals, critically evaluating prior social customer relationship management literature, and acquiring business insights, it can be concluded that relationship management in the healthcare sector is crucial for both patients and healthcare providers. As a result, maintaining customer relationships is a crucial component for healthcare providers to maintain their business in a cutthroat market.

## **5.1 Recommendation**

The usage of ICT in healthcare companies has expanded in a manner like how the wider industry landscape has expanded. As part of an ICT initiative, the usage of web technologies, database management systems, and network infrastructure will have an impact on how healthcare is provided and managed. The use of social CRM by healthcare providers will enhance patient care and avoid patient-healthcare organisation conflicts. The suggested Social CRM framework offers the healthcare provider an alternative to existing solutions. The model considers how the advancement of ICT will affect the healthcare industry's future directions. Due to potential organisational variations, the state of the economy, and most significantly, culture, this study was done and limited to the United Kingdom domain and has not been generalised. Finally, this study recommends that additional comparative research be conducted to generalise the implications of SCRM across other regions for upcoming work.

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# **APPENDIX**

# **Appendix A - NHS Open Government License**

A picture containing text

Description automatically generated

For full licence view: <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

# **Appendix B – Cluster Summary for Review Title by Year**

**St Thomas Hospital**

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Year |
| **Level of Detail:** | Review Title, Year, Name |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 3 |
| **Number of Points:** | 44 |
| **Between-group Sum of Squares:** | 2.9091 |
| **Within-group Sum of Squares:** | 0.0 |
| **Total Sum of Squares:** | 2.9091 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Year** | | | |  |
| **Cluster 1** |  | 32 |  | 2021.0 | | | |  |
| **Cluster 2** |  | 8 |  | 2020.0 | | | |  |
| **Cluster 3** |  | 4 |  | 2022.0 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Year** |  | 20.5 |  | 6.743e-07 |  | 2.909 | 2 |  | 2.909 | 41 |

**Royal Victoria Infirmary**

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Year |
| **Level of Detail:** | Name,Review Title,Year |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 3 |
| **Number of Points:** | 94 |
| **Between-group Sum of Squares:** | 11.726 |
| **Within-group Sum of Squares:** | 0.0 |
| **Total Sum of Squares:** | 11.726 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Year** | | | |  |
| **Cluster 1** |  | 47 |  | 2021.0 | | | |  |
| **Cluster 2** |  | 25 |  | 2022.0 | | | |  |
| **Cluster 3** |  | 22 |  | 2020.0 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Year** |  | 45.5 |  | 2.01e-14 |  | 11.73 | 2 |  | 11.73 | 91 |

University College London Hospital

|  |  |
| --- | --- |
| **Variables:** | Year |
| **Level of Detail:** | Name, Review Title, Year |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 3 |
| **Number of Points:** | 24 |
| **Between-group Sum of Squares:** | 3.7396 |
| **Within-group Sum of Squares:** | 0.0 |
| **Total Sum of Squares:** | 3.7396 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Year** | | | |  |
| **Cluster 1** |  | 9 |  | 2021.0 | | | |  |
| **Cluster 2** |  | 8 |  | 2022.0 | | | |  |
| **Cluster 3** |  | 7 |  | 2020.0 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Year** |  | 10.5 |  | 0.0006905 |  | 3.74 | 2 |  | 3.74 | 21 |
|  |  |  |  |  |  |  |  |  |  |  |

# **Appendix C – Cluster summary for Reviewer rating**

St Thomas Hospital

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Avg. Review Rating |
| **Level of Detail:** | Name |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 5 |
| **Number of Points:** | 247 |
| **Between-group Sum of Squares:** | 39.312 |
| **Within-group Sum of Squares:** | 0.0 |
| **Total Sum of Squares:** | 39.312 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Avg. Review Rating** | | | |  |
| **Cluster 1** |  | 166 |  | 5.0 | | | |  |
| **Cluster 2** |  | 11 |  | 3.0 | | | |  |
| **Cluster 3** |  | 17 |  | 4.0 | | | |  |
| **Cluster 4** |  | 48 |  | 1.0 | | | |  |
| **Cluster 5** |  | 5 |  | 2.0 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Avg. Review Rating** |  | 60.5 |  | 0.0 |  | 39.31 | 4 |  | 39.31 | 242 |

Royal Victoria Infirmary

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Avg. Review Rating |
| **Level of Detail:** | Name |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 5 |
| **Number of Points:** | 248 |
| **Between-group Sum of Squares:** | 26.209 |
| **Within-group Sum of Squares:** | 0.0 |
| **Total Sum of Squares:** | 26.209 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Avg. Review Rating** | | | |  |
| **Cluster 1** |  | 185 |  | 5.0 | | | |  |
| **Cluster 2** |  | 28 |  | 1.0 | | | |  |
| **Cluster 3** |  | 7 |  | 3.0 | | | |  |
| **Cluster 4** |  | 26 |  | 4.0 | | | |  |
| **Cluster 5** |  | 2 |  | 2.0 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Avg. Review Rating** |  | 60.75 |  | 0.0 |  | 26.21 | 4 |  | 26.21 | 243 |

University College London Hospital

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Avg. Review Rating |
| **Level of Detail:** | Name |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 5 |
| **Number of Points:** | 245 |
| **Between-group Sum of Squares:** | 49.469 |
| **Within-group Sum of Squares:** | 0.020377 |
| **Total Sum of Squares:** | 49.49 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Avg. Review Rating** | | | |  |
| **Cluster 1** |  | 145 |  | 5.0 | | | |  |
| **Cluster 2** |  | 9 |  | 2.037 | | | |  |
| **Cluster 3** |  | 71 |  | 1.0 | | | |  |
| **Cluster 4** |  | 9 |  | 3.0 | | | |  |
| **Cluster 5** |  | 11 |  | 4.0455 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Avg. Review Rating** |  | 59.98 |  | 0.0 |  | 49.47 | 4 |  | 49.49 | 240 |

# **Appendix D – Cluster summary for Most like Comment**

St Thomas Hospital

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Sum of Review Likes |
| **Level of Detail:** | Review Text |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 3 |
| **Number of Points:** | 189 |
| **Between-group Sum of Squares:** | 5.21 |
| **Within-group Sum of Squares:** | 0.72081 |
| **Total Sum of Squares:** | 5.9308 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Sum of Review Likes** | | | |  |
| **Cluster 1** |  | 145 |  | 1.0552 | | | |  |
| **Cluster 2** |  | 15 |  | 15.8 | | | |  |
| **Cluster 3** |  | 29 |  | 7.2414 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Sum of Review Likes** |  | 81.7 |  | 0.0 |  | 5.21 | 2 |  | 5.931 | 186 |

Royal Victorin Infirmary

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Sum of Review Likes |
| **Level of Detail:** | Review Text |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 4 |
| **Number of Points:** | 169 |
| **Between-group Sum of Squares:** | 5.1447 |
| **Within-group Sum of Squares:** | 0.57154 |
| **Total Sum of Squares:** | 5.7163 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Sum of Review Likes** | | | |  |
| **Cluster 1** |  | 120 |  | 0.475 | | | |  |
| **Cluster 2** |  | 34 |  | 2.1765 | | | |  |
| **Cluster 3** |  | 8 |  | 4.0 | | | |  |
| **Cluster 4** |  | 7 |  | 7.2857 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Sum of Review Likes** |  | 49.5 |  | 0.0 |  | 5.145 | 3 |  | 5.716 | 165 |

University College London Hospital

Inputs for Clustering

|  |  |
| --- | --- |
| **Variables:** | Sum of Review Likes |
| **Level of Detail:** | Review Text |
| **Scaling:** | Normalised |
|  |  |

Summary Diagnostics

|  |  |
| --- | --- |
| **Number of Clusters:** | 3 |
| **Number of Points:** | 189 |
| **Between-group Sum of Squares:** | 5.21 |
| **Within-group Sum of Squares:** | 0.72081 |
| **Total Sum of Squares:** | 5.9308 |
|  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Centres** | | | |  |
| **Clusters** |  | **Number of Items** |  | **Sum of Review Likes** | | | |  |
| **Cluster 1** |  | 145 |  | 1.0552 | | | |  |
| **Cluster 2** |  | 15 |  | 15.8 | | | |  |
| **Cluster 3** |  | 29 |  | 7.2414 | | | |  |
| **Not Clustered** |  | 0 |  |  |  |  |  |  |

Analysis of Variance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  | **Model** | |  | **Error** | |
| **Variable** |  | **F-statistic** |  | **p-value** |  | **Sum of Squares** | **DF** |  | **Sum of Squares** | **DF** |
| **Sum of Review Likes** |  | 81.7 |  | 0.0 |  | 5.21 | 2 |  | 5.931 | 186 |

# **Appendix E – Tableau Visualization**

Google Data Analysis

<https://prod-uk-a.online.tableau.com/#/site/myvisuals/workbooks/190462?:origin=card_share_link>

NHS Data Analysis

<https://prod-uk-a.online.tableau.com/#/site/myvisuals/workbooks/190463?:origin=card_share_link>

**Excel files – data from NHS and Google review**

[Ratings and reviews - St Thomas\_ - NHS.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EY4Vb29xGHZMp6jbyPbEPjUBNPVA2QcuSj-MN5lW5UEfQg?e=TebMPu)

[Ratings and reviews - The Royal Victoria Infirmary - NHS.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EbD09pyWleNOkUYDUN-maPcB1kfySl4VBeveJr7SymndMA?e=WBPTzj)

[Ratings and reviews - University College Hospital - NHS.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EaB8pNEXk0JHqkXrHQ2kpIcB7ElZ1Rk-aLgSif3_8FTWew?e=M0AGvI)

[Royal Victoria Infirmary - Google Review.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EbFh5_110IJGhCxsvGdJHvgBW4MYPEybEqiDzCOXo7egpQ?e=s0Wctb)

[St Thomas - Google Review.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EYk-fIzicxpOtHxA-YrFjE0B6v8COK1v1StBfApafM5XHw?e=uSvUJX)

[University College Hospital - Google Review.xlsx](https://outlookuwicac-my.sharepoint.com/:x:/g/personal/st20207148_outlook_cardiffmet_ac_uk/EayQuggs1jdEvGc2raPl9ggBMpzEO0ngH7vOjn2JywXdrA?e=lcnnoP)

# **Appendix F – Python Code for Sentiment Analysis**

**St Thomas Hospital**

# -\*- coding: utf-8 -\*-

"""

Created on Wed Jul 20 19:47:36 2022

@author: chikk

"""

#import nltk

#nltk.download('vader\_lexicon')

import pandas as pd

from nltk.sentiment.vader import SentimentIntensityAnalyzer

#import tweets

Reviews = pd.read\_excel('Ratings and reviews - St Thomas\_ - NHS.xlsx')

print (Reviews)

#call the function

sia = SentimentIntensityAnalyzer()

#apply sia and transform them into the dataframe

Reviews['neg'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neg'])

Reviews['neu'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neu'])

Reviews['pos'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['pos'])

Reviews['compound'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['compound'])

pos\_Reviews = [j for i, j in enumerate(Reviews['Comment']) if Reviews['compound'][i] > 0.2]

neu\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if 0.2>=Reviews['compound'][i]>=-0.2]

neg\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if Reviews['compound'][i]< -0.2]

print()

print ("percentage of positive Reviews:{}%".format(len(pos\_Reviews)\*100/len(Reviews['Comment'])))

print ("percentage of neural Reviews:{}%".format(len(neu\_Reviews)\*100/len(Reviews['Comment'])))

print ("percentage of negative Reviews:{}%".format(len(neg\_Reviews)\*100/len(Reviews['Comment'])))

#sample reuslt

print(Reviews.head())

from textblob import TextBlob

feedback = str(Reviews)

ob = TextBlob(feedback)

print(ob.sentiment.polarity)

print(ob.sentiment.subjectivity)

print(ob.sentiment)

**Result:**

**Python 3.8.8 (default, Apr 13 2021, 15:08:03) [MSC v.1916 64 bit (AMD64)]**

**Type "copyright", "credits" or "license" for more information.**

**IPython 7.22.0 -- An enhanced Interactive Python.**

**runfile('C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation/st thomas.py', wdir='C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation')**

**Review Title ... response**

**0 Amazing care and staff ... St Thomas' has not yet replied.**

**1 Great eye department ... St Thomas' has not yet replied.**

**2 Traumatising ... St Thomas' has not yet replied.**

**3 THE AMT COFFEE SHOP AVOID LIKE THE PLAGUE ... St Thomas' has not yet replied.**

**4 Post Natal - 6th Floor. ... St Thomas' has not yet replied.**

**5 fantastic start to finish ... St Thomas' has not yet replied.**

**6 Awful service and waiting time. ... St Thomas' has not yet replied.**

**7 Extremely shocked and disappointed ... St Thomas' has not yet replied.**

**8 Great experience despite staff shortages ... St Thomas' has not yet replied.**

**9 Excellent care ... St Thomas' has not yet replied.**

**10 Too much waiting ... St Thomas' has not yet replied.**

**11 Excellent care and support - thank you ... St Thomas' has not yet replied.**

**12 Worse Postnatal department ... St Thomas' has not yet replied.**

**13 Postnatal care needs attention! ... St Thomas' has not yet replied.**

**14 Service with a smile 😊 ... St Thomas' has not yet replied.**

**15 vaccination hub ... St Thomas' has not yet replied.**

**16 GOOD PRENATAL CARE, TERRIBLE BIRTH EXPERIENCE ... St Thomas' has not yet replied.**

**17 Sincere thank you from our family ... St Thomas' has not yet replied.**

**18 Nothing short of perfection ... St Thomas' has not yet replied.**

**19 Keeping patients in the loop ... St Thomas' has not yet replied.**

**20 Excellent and caring attention from all staff ... ... St Thomas' has not yet replied.**

**21 Disappointed with maternity care ... St Thomas' has not yet replied.**

**22 Wonderfully helpful! ... St Thomas' has not yet replied.**

**23 Amazing hospital 9 ... St Thomas' has not yet replied.**

**24 Outstanding care ... St Thomas' has not yet replied.**

**25 Fantastic service ... St Thomas' has not yet replied.**

**26 Baby Martina Mileva ... St Thomas' has not yet replied.**

**27 Great practice ... St Thomas' has not yet replied.**

**28 Maternity care unresponsive ... St Thomas' has not yet replied.**

**29 Efficient and friendly service despite pandemic ... St Thomas' has not yet replied.**

**30 Excellent service ... St Thomas' has not yet replied.**

**31 Excellent maternity care ... St Thomas' has not yet replied.**

**32 Awful postnatal experience ... St Thomas' has not yet replied.**

**33 Amazing care and treatment ... St Thomas' has not yet replied.**

**34 Excellent and friendly hospital ... St Thomas' has not yet replied.**

**35 Need to do better ... St Thomas' has not yet replied.**

**36 Tower team have true heart ... St Thomas' has not yet replied.**

**37 Poor discharge service ... St Thomas' has not yet replied.**

**38 Missed tongue-tie ... St Thomas' has not yet replied.**

**39 Misleading information to patients ... St Thomas' has not yet replied.**

**40 The Eye department is excellent. ... St Thomas' has not yet replied.**

**41 Excellent Service and Care ... St Thomas' has not yet replied.**

**42 THIS IS A 5 STAR HOSPITAL ... St Thomas' has not yet replied.**

**43 Not happy with antenatal ward ... St Thomas' has not yet replied.**

**[44 rows x 9 columns]**

**percentage of positive Reviews:68.18181818181819%**

**percentage of neural Reviews:4.545454545454546%**

**percentage of negative Reviews:27.272727272727273%**

**Review Title ratings ... pos compound**

**0 Amazing care and staff 5.0 ... 0.213 0.5574**

**1 Great eye department 5.0 ... 0.381 0.9627**

**2 Traumatising 2.0 ... 0.072 -0.7086**

**3 THE AMT COFFEE SHOP AVOID LIKE THE PLAGUE 2.0 ... 0.030 -0.7030**

**4 Post Natal - 6th Floor. 2.0 ... 0.146 -0.6682**

**[5 rows x 13 columns]**

**0.3138888888888889**

**0.7770833333333332**

**Sentiment(polarity=0.3138888888888889, subjectivity=0.7770833333333332)**

**Royal Victoria Infirmary**

**# -\*- coding: utf-8 -\*-**

**"""**

**Created on Wed Jul 20 20:23:12 2022**

**@author: chikk**

**"""**

**#import nltk**

**#nltk.download('vader\_lexicon')**

**import pandas as pd**

**from nltk.sentiment.vader import SentimentIntensityAnalyzer**

**#import tweets**

**Reviews = pd.read\_excel('Ratings and reviews - The Royal Victoria Infirmary - NHS.xlsx')**

**print (Reviews)**

**#call the function**

**sia = SentimentIntensityAnalyzer()**

**#apply sia and transform them into the dataframe**

**Reviews['neg'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neg'])**

**Reviews['neu'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neu'])**

**Reviews['pos'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['pos'])**

**Reviews['compound'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['compound'])**

**pos\_Reviews = [j for i, j in enumerate(Reviews['Comment']) if Reviews['compound'][i] > 0.2]**

**neu\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if 0.2>=Reviews['compound'][i]>=-0.2]**

**neg\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if Reviews['compound'][i]< -0.2]**

**print()**

**print ("percentage of positive Reviews:{}%".format(len(pos\_Reviews)\*100/len(Reviews['Comment'])))**

**print ("percentage of neural Reviews:{}%".format(len(neu\_Reviews)\*100/len(Reviews['Comment'])))**

**print ("percentage of negative Reviews:{}%".format(len(neg\_Reviews)\*100/len(Reviews['Comment'])))**

**#sample reuslt**

**print(Reviews.head())**

**from textblob import TextBlob**

**feedback = str(Reviews)**

**ob = TextBlob(feedback)**

**print(ob.sentiment.polarity)**

**print(ob.sentiment.subjectivity)**

**print(ob.sentiment)**

**Result:**

**runfile('C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation/RVI.py', wdir='C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation')**

**Review Title ... reply comment**

**0 Genuine, hard working and dedicated staff ... Thank you for taking the time to leave your fe...**

**1 \n Excellent maternity care ... Thank you for taking the time to leave your fe...**

**2 \n Caring medical and nursing team ... Thank you for taking the time to leave your fe...**

**3 \n Excellent service ... Thank you for taking the time to leave your fe...**

**4 \n Ward 20 Opthalmology Surgery ... Thank you for taking the time to leave your fe...**

**.. ... ... ...**

**94 \n Best care! ... Thank you for taking the time to leave your fe...**

**95 \n Went like clockwork ... Thank you for taking the time to leave your fe...**

**96 \n Outstanding care ... Thank you for taking the time to leave your fe...**

**97 \n Wonderful staff ... Thank you for taking the time to leave your fe...**

**98 \n Lovely people ... Thank you for taking the time to leave your fe...**

**[99 rows x 12 columns]**

**percentage of positive Reviews:82.82828282828282%**

**percentage of neural Reviews:6.0606060606060606%**

**percentage of negative Reviews:11.11111111111111%**

**Review Title Ratings ... pos compound**

**0 Genuine, hard working and dedicated staff 5.0 ... 0.120 0.9523**

**1 \n Excellent maternity care 5.0 ... 0.532 0.9300**

**2 \n Caring medical and nursing team 5.0 ... 0.315 0.9713**

**3 \n Excellent service 5.0 ... 0.042 0.1779**

**4 \n Ward 20 Opthalmology Surgery 5.0 ... 0.452 0.9972**

**[5 rows x 16 columns]**

**0.5675925925925926**

**0.662962962962963**

**Sentiment(polarity=0.5675925925925926, subjectivity=0.662962962962963)**

**University College London Hospital**

**# -\*- coding: utf-8 -\*-**

**"""**

**Created on Wed Jul 20 20:25:43 2022**

**@author: chikk**

**"""**

**#import nltk**

**#nltk.download('vader\_lexicon')**

**import pandas as pd**

**from nltk.sentiment.vader import SentimentIntensityAnalyzer**

**#import tweets**

**Reviews = pd.read\_excel('Ratings and reviews - University College Hospital - NHS.xlsx')**

**print (Reviews)**

**#call the function**

**sia = SentimentIntensityAnalyzer()**

**#apply sia and transform them into the dataframe**

**Reviews['neg'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neg'])**

**Reviews['neu'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['neu'])**

**Reviews['pos'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['pos'])**

**Reviews['compound'] = Reviews['Comment'].apply(lambda x:sia.polarity\_scores(x)['compound'])**

**pos\_Reviews = [j for i, j in enumerate(Reviews['Comment']) if Reviews['compound'][i] > 0.2]**

**neu\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if 0.2>=Reviews['compound'][i]>=-0.2]**

**neg\_Reviews = [j for i, j in enumerate(Reviews['Comment'])if Reviews['compound'][i]< -0.2]**

**print()**

**print ("percentage of positive Reviews:{}%".format(len(pos\_Reviews)\*100/len(Reviews['Comment'])))**

**print ("percentage of neural Reviews:{}%".format(len(neu\_Reviews)\*100/len(Reviews['Comment'])))**

**print ("percentage of negative Reviews:{}%".format(len(neg\_Reviews)\*100/len(Reviews['Comment'])))**

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**feedback = str(Reviews)**

**ob = TextBlob(feedback)**

**print(ob.sentiment.polarity)**

**print(ob.sentiment.subjectivity)**

**print(ob.sentiment)**

**Result:**

**runfile('C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation/UCHL.py', wdir='C:/Users/chikk/OneDrive - Cardiff Metropolitan University/Dissertation')**

**Review Title ... response**

**0 Outstanding Care ... University College Hospital has not yet replied.**

**1 Excellent care ... University College Hospital has not yet replied.**

**2 Great treatment ... University College Hospital has not yet replied.**

**3 Fantastic birth centre ... University College Hospital has not yet replied.**

**4 Terrible ... University College Hospital has not yet replied.**

**5 Great care and great people ... University College Hospital has not yet replied.**

**6 Fantastic ... University College Hospital has not yet replied.**

**7 Keep Cancelling and Wrong Doctors ... University College Hospital has not yet replied.**

**8 Incredible care ... University College Hospital has not yet replied.**

**9 T 10 Ward and Staff are OUTSTANDING ... University College Hospital has not yet replied.**

**10 Excellent treatment ... University College Hospital has not yet replied.**

**11 Superb treatment for Covid patient ... University College Hospital has not yet replied.**

**12 Ableism at UCLH ... University College Hospital has not yet replied.**

**13 Terrible would not recommend ... University College Hospital has not yet replied.**

**14 Amazing Team of Midwives and Doctors ... University College Hospital has not yet replied.**

**15 Excellent A&E team & service ... University College Hospital has not yet replied.**

**16 Lack of respect ... University College Hospital has not yet replied.**

**17 Not so good ... University College Hospital has not yet replied.**

**18 Rude and off-putting member of staff ... University College Hospital has not yet replied.**

**19 Great Care ... University College Hospital has not yet replied.**

**20 Very professional experience ... University College Hospital has not yet replied.**

**21 Great hospital, highly recommend! ... University College Hospital has not yet replied.**

**22 Appointment system is broken ... University College Hospital has not yet replied.**

**23 Security staff dangers ... University College Hospital has not yet replied.**

**[24 rows x 9 columns]**

**percentage of positive Reviews:62.5%**

**percentage of neural Reviews:0.0%**

**percentage of negative Reviews:37.5%**

**Review Title Name day ... neu pos compound**

**0 Outstanding Care Brian Francis 13 ... 0.676 0.306 0.9898**

**1 Excellent care The lady in bed 4 6 ... 0.821 0.094 0.2023**

**2 Great treatment Dr Peter Riach 2 ... 0.606 0.336 0.9001**

**3 Fantastic birth centre Anonymous 14 ... 0.688 0.298 0.9940**

**4 Terrible Anonymous 31 ... 0.777 0.000 -0.9147**

**[5 rows x 13 columns]**

**0.3969565217391305**

**0.7943478260869565**

**Sentiment(polarity=0.3969565217391305, subjectivity=0.7943478260869565)**