

The Application of Artificial Intelligence on Customer Relationship Management (CRM) in the Sultanate of Oman Telecommunications Sector

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ABSTRACT: *Organizing and sustaining customer relationships is vital to a business in achieving its aims in terms of profit and surviving in a competitive environment. Today's global market and the rapid progression of technology, particularly the internet and computer, have placed companies in a position where they must use technology to sustain their competitive advantage. Objective of the study is to scrutinize the application of artificial intelligence in customer relationship management in Oman telecommunication sector. Since the implementation of AI in telecommunication sector around the world has an impressive record and success. Therefore, the main objective is to see and prove that AI has brought success in telecommunication sector. This way, telecommunication sector in Oman can also follow the same path and reach the same success. AI has been known to be able to cut cost and increase efficiency. This also will create a competitive level between telecommunication companies in Oman. This will actually further extends to the growth of telecommunication infrastructure in Oman. Based on our research conducted on the topic "The Application of Artificial Intelligence in Customer Relationship Management in the Sultanate of Oman Telecommunication Sector," our findings show that among the two telecommunication giants in Oman, Omantel is far ahead of Ooredoo in CRM and at the same time far behind the global standards of CRM. Both the companies do not use AI in their CRM. They both know the importance of AI in CRM. Global best practice analysis is a technique in which a company measures the performance of its business processes and activities against world-class companies' performance, to learn how those companies achieved high performance levels and to adopt the techniques they used. This is precisely the one thing Omantel needs to do as explained above. AI can be used to automate the CRM data warehouse analysis which provides a great starting point for CRM analytics. Data warehouse is a relational database used for query and analysis. This can help both the companies to compare themselves with global standards and make the necessary changes to improve their customer relationships. At the same time, Ooredoo is at a starting point of CRM; the global best practice analysis can help them to turn the odds in their favor. Although Ooredoo will have to wait for AI CRM analysis applications in the data warehouse, till they reach the sufficient level of data in the data warehouse, but they can still make use of AI in other areas. To ensure the successful implementation of AI in CRM, this research suggests that Omani telecommunications companies focus on the following seven recommendations: the first recommendation is to start with small manageable pilot projects, the second recommendation is to align AI initiatives with clear business objectives, The third recommendation is to build a consortium to oversee AI governance, the fourth recommendation is to redesign work processes around AI. AI is a powerful tool for automating and*

augmenting business processes, the fifth recommendation is to re-skill the workforce, the sixth recommendation is to experiment with different talent models, Unlocking the full potential of AI will likely require Omani telecommunications companies to acquire new talent, the final recommendation is to ensure a robust data strategy.

KEYWORDS: application of artificial intelligence, customer relationship management (CRM) sultanate of Oman, telecommunications, sector

INTRODUCTION

The telecommunications sector has grown vastly over the past few years. New technology is being created and businesses are forming. With new businesses being born, this creates customer markets and these customers need services. Telecommunications is a crucial element for today's businesses. It is proven to help businesses save money and improve collaboration. With more businesses being formed and existing businesses still growing, this has led to a very potential market in the telecommunications industry. The industry's competition level is high and still growing. This will create a big demand for service, and with a high demand for service, there will be a high demand for support. AI in customer relationship management can be very crucial to the telecommunications industry. With various services being provided to many different customers from different locations and different business types, it is very important to determine the best type of service for that specific customer and their specific business. AI can help profile these customers and determine what is best for them. This could also include automated consultations where the customer is curious about a service but is not quite sure whether the service is beneficial to them.

Artificial intelligence (AI) is also considered a branch of computer science that is somewhat like human intelligence. It can also be called a simulation of the human thinking process. The aim is to replace or recreate human intelligence to solve complex problems. Using AI, this can enable a company to achieve a degree of commitment from their customers, gaining their trust and making them lifetime customers. AI can also help to classify customer emotions during service updates. For example, if a bad service was provided to a customer and you decide to upgrade the service, after the customer service follow-up calls and informs you of their dissatisfaction level, if AI were used to categorize the customer's emotion level, it can help facilitate future decisions. Some companies would offer price cuts on future services, while others might offer healthy compensations. (Guo et al., 2024)

Background

Organizing and sustaining customer relationships is vital to a business in achieving its aims in terms of profit and surviving in a competitive environment. Today's global market and the rapid progression of technology, particularly the internet and computer, have placed companies in a

position where they must use technology to sustain their competitive advantage. Customers are becoming more demanding, and in most cases are now knowledgeable about the price and the quality of the product that they want. They have a wide range of choices, greater expectations about the products and services, and are more informed than ever before. All these factors are having a profound impact on how businesses must manage their customer relationships. A business' ability to attract and retain profitable customers is largely dependent on how the business manages and develops customer relationships. This is a strategic business initiative that requires an informed business strategy supported by operational business tactics, which in turn requires technology to translate the strategy into effective customer interactions. Customer Relationship Management (CRM) is a business strategy that aims to understand, anticipate and manage the needs of an organisation's current and potential customers. It is a comprehensive approach that provides seamless integration of every area of business that touches the customer - namely marketing, sales, customer service and field support - through the integration of people, process and technology. At the heart of that technology is the intelligent processing of customer data in order to establish and maintain a strong and sustainable customer relationship to enable enhanced business performance. CRM is growing in a global range of industries and countries, many companies have implemented it and many more are looking to follow. With the rapid growth of modern technology, global economic competition and technological changes in the last couple of decades. This has caused a significant shift in the global business environment and more precisely how business is conducted in the age of information and technology. This shift has had profound impacts on many industries, the telecommunications industry in particular has been an area of focus. (Venkatesan et al.2022)

Objectives

Objective of the study is to scrutinize the application of artificial intelligence in customer relationship management in Oman telecommunication sector. Since the implementation of AI in telecommunication sector around the world has an impressive record and success. Therefore, the main objective is to see and prove that AI has brought success in telecommunication sector. This way, telecommunication sector in Oman can also follow the same path and reach the same success. AI has been known to be able to cut cost and increase efficiency. This also will create a competitive level between telecommunication companies in Oman. This will actually further extends to the growth of telecommunication infrastructure in Oman. With the increase in efficiency, companies will invest more in infrastructure so that AI can be utilised more. This will have a direct impact to the telecommunication users. Sometimes success can only be seen when there is a comparison between before and after certain event or decision happened. The study is also to show the difference in CRM management between AI and conventional method. This can range from conversational chat, virtual call centre or even data mining. Comparison in terms of success probability and cost can be seen in this method. This will further solidify the stand to move to AI method compared to conventional. Last but not least, the study will also identify the issue and

challenge happen during the transitioning phase to AI in CRM management. AI is not a perfect tool and sometimes it may even undesirable result or cost more. Identification of this issue will prevent the same mistake to be done again and come up with the best solution. (Balmer et al., 2020) (Wamba-Taguimdje et al.2020)

Scope

The scope of this research includes all the essential details which are considered when AI and CRM is implemented. The Sultanate of Oman telecommunications sector is taken into consideration and how AI and CRM is transforming the way business is conducted. Several renowned telecommunication companies are taken into consideration. This research covers the impact of AI and CRM implementation on the operational performance. What benefits do those companies achieve through AI? A complete detail from reducing human dependency and striving to achieve results through AI. What strategic changes are made by those companies and are they successful. Simulation of new ideas and how AI has helped achieve those. The customer satisfaction has increased? Also, this report covers the impact of AI on the technological side. Increasing the functional capabilities and reducing the cost, that has been a challenge for most of the companies. What newer technologies they have adopted and implemented, how software has been able to perform complex tasks and how it has increased the accuracy of the systems. What potential benefits can be achieved giving the example of customer service automation by using Chatbots. The software performance has been better for the companies. Which in turn increases the customer satisfaction. This has also impacted the companies and their products. What new products they are working on and are they trying to implement AI on those also. An analysis of that and how with AI and CRM the product quality has improved. Another important factor is how companies are using the data. This includes the automation in data storage and future analysis. The companies are trying to store data in more efficient ways and at the same will be easily accessible whenever needed. They are also trying to get a future predicted analysis to take better decisions. This could vastly improve with AI. The effectiveness and efficiency calculating from all the above factors, can be compared to the past and a conclusion could be derived. (Jude et al., 2023)

Overview of Customer Relationship Management (CRM)

The telecommunications industry is characterized by easy switching between products and access to customer preferences and behavior information due to the nature of communication. This leads to fierce competition among different brands offering similar products and the emergence of new solutions. In this competitive market, understanding customer behavior is essential to build loyalty. It is also important to quickly address mistakes and customer complaints, often done through after-sales service that may include additional services or product fixes free of charge. Implementing these strategies is relatively easy, especially with a reliable CRM system. Incorporating AI into

CRM can yield optimal outcomes. However, before diving deeper, it is crucial to understand what AI actually is.

Customer relationship management (CRM) is a controlling system that affects almost every aspect of your relationship with your customers. Everything that concerns your customers, such as sales and retention schemes, selling, customer service and technical backing, marketing and advertising, and even after-sales service. The major role of CRM is customer service, and it is definitely necessary with the increasing amount of information diffusion. Well-performed customer service can push forward customer loyalty to your product or brand. This is important to note when retaining the customers you already have because the cost of acquiring new customers is five times more than retaining existing ones. By this principle, CRM also concerns the acquisition of new customers because a good relationship with recent customers can be a good introduction to similar prospects. That way, CRM also has an objective to help customers find the products they want easier, so it is also concerned with product marketing. With the increasing market on the internet and the ease of product comparison between different websites, detailed targeting is necessary to carve out a good marketing strategy, and this is also the role of CRM. (Nguyen et al.2020)

Definition of CRM

Amazon is a CRM pioneer. On the marketplace site, it is easy to find what we are looking for, not separated from the keyword-based data already stored in Amazon. When it finds what we are looking for, in the product sight, there is a recommendation column of similar products and reviews. This supports the identification of customers and maximizing interaction and capturing the customer. In the reviews column, we can directly provide an assessment or additional information to the product and it is an indirect data from the customer. A high-impact instance of CRM is a subscription feature given by Amazon. This feature allows us to know the latest information about the product through email and it is a right way for knowing the customer needs. Email has always been a powerful marketing tool for direct data and Amazon also understands that. By knowing that, we can conclude that CRM is a long journey and requires consistent implementation. (Yi & Liu, 2020)

The manifestation of CRM is also different from one another company, depending on what products they sell or the type of the company itself. We can see the manifestation of CRM from some famous companies such as Amazon, eBay, and Microsoft. These companies have successful CRM implementations indicated by high customer satisfaction. But the most successful is Amazon. Amazon has a very deep understanding of the concept of CRM, whether it is product or customer relationship strategy. (Hassan & Hassan, 2021) (Ayyagari2021)

Given that goal, CRM requires data mining through direct or indirect customer contact. The data obtained must also be processed well because the purpose of the data provided is to facilitate

decision-making in determining the kind of policy to retain customers. Based on these objectives, then CRM is not just a product but it is a package consisting of strategic concepts, steps, or a series of activities up to a supporting feature.

CRM itself has several criteria. The first is that it can identify customers. In this case, the company can find out who their customers are and retain customers at any time. The second is to maximize interaction and capture the customer. Companies are required to have a good approach to customers in order to attract them, and the last is to know the customer needs. At this stage, the company is obligated to always update the information about the customer, whether it is directly or indirectly. (Saqib & Zarine, 2021)

These situations are what drive companies to apply CRM (Customer Relationship Management). But behind it all, much less time that people actually understand what is meant by CRM. In general, people assume that CRM is a marketing strategy that aims to make the customer buy their product. But actually it is not entirely true, for CRM is defined as a business strategy and a policy used to find out customer needs and behavior in order to build a much better relationship with them. This method emphasizes the fulfillment of customer needs and increasing customer satisfaction, so it is not solely for the purpose of taking advantage. (Adnan et al.2021)

In the past, people were used to the term 'Market' and today business is more familiar with the term 'Customer'. A good business is one that can manage and maintain customer satisfaction. A key in managing customers and their needs is a good relationship. Understanding this situation is very important for a business. One way that can be used to know the needs of customers is through information system-based marketing. This concept occurs because the growing number of facts that show the cost of attracting new customers is five times greater than the cost of retaining existing customers. In addition, profits from existing customers are also greater than new customers. This is supported by the fact that existing customers already know and understand how to use the product.

Importance of CRM in Telecommunications Sector

The telecommunications sector provides a perfect environment for the application of CRM. The typical telecommunications company in Oman has a large number of customers who are receiving service or products from the company on a continual basis. Whether the customers are individuals in need of mobile phones or families requiring local phone service, the company has an ongoing relationship with each customer. However, the company and its many services find it difficult to keep track of who their customers are or what services they are using. In this case, the CRM can be very effective in helping to identify the customers and record their usage patterns in order to provide them with better quality service. With the application of AI, the instrument used by CRM can become improved and intelligent. For example, a customer in the telecommunications sector

who receives bad quality service on an element takes this as a sign of the company having no idea on the type of service he was meant to receive. With traditional CRM, this customer valuable demographic, reducing the cost of reacquisition. (Al Abri & Matriano, 2021)

Inclusive tools needed to manage the whole customer life cycle. They include call center automation software, sales force automation software, marketing automation software, and business analytic tools. These tools are being integrated with the customer's phone system so that the customer service unit can have the necessary information at their fingertips when they receive a call and in turn, serve customers effectively. Because CRM enables companies to identify and target their best customers, it helps them to organize their marketing objectives around them. When applying AI into CRM, the data obtained on customers can be used to solutions as an improved targeting strategy. This new strategy involves using AI analysis to select clients. AI technology goes through this process by playing the role of the customers so that the CRM can learn from the behavior and needs of the customers in order to provide them with better quality service. (Amarasinghe, 2023) (Li & Xu, 2022)

Challenges in CRM Implementation

The focus on customer service allows customers to experience a competitive advantage. The aim is to understand the value of customer service from the perspective of both the customer and the service provider. To provide the correct level and type of service, there is a need to store and analyze customer and product related data in terms of help desks, sales forces, and the marketing sector. This, in turn, means that it will maximize the efficiency of the service provided and increase customer satisfaction, therefore maximizing revenue and allowing the business to connect with the customer in a smarter way. However, with every pleasant situation, problem or issue may arise. It is only through the proper CRM implementation that there is a solution to the problem. Issues like failing to recognize a potential customer, providing the service to wrong/disinterested customers, and losing the thread of a communication history can cost the business a loss in revenue. This is an issue that the telecommunications sector in the Integrated Intelligent Customer Interaction System's (IICIS) Project is trying to resolve. By developing open, standard-based, and flexible customer interaction management software that will work on top of existing telecommunications infrastructures, contact center agents and other customer-facing personnel will be equipped with the knowledge necessary to deliver superior customer service. This will result in improved market share for carriers and equipment vendors targeting to build customer loyalty and operational efficiencies by enabling them to retain and better serve customers. (Porkodi et al.2023)

Artificial Intelligence in CRM

AI-guided navigation is seen as a breakthrough technology for the future of software interaction. By using AI, CRM software will be able to provide the optimal route the user should take to

complete a task. AI could study the habits of the user, and if the habits are deemed inefficient, the AI would suggest a better method. This will be most beneficial to new users who are unfamiliar with the software. In some instances, AI can take complete control and perform the task for the user, if permission is given. An example of such a technology is an AI predictive dialer. This is a CRM tool used in call centers to automatically call a list of contacts, and when a phone is answered, connect the call to a live agent. Traditional predictive dialers operate on a rule-based system. With AI, the dialer can monitor the success of each call (rate of contact to live agent) and alter the method as it sees fit. If the dialer determines it is best to make calls at a certain time, it will do so. If it determines that some calls should not be made at all, it can stop the call process and reinitiate at a later time. This is all done with an AI learning algorithm. With enough time, it is possible for an AI predictive dialer to be near perfect in call to live agent ratio. (Arora & Sharma, 2023) (Dahabreh, 2023)

Artificial intelligence (AI) is a combination of algorithms and technologies enabling computers to emulate human-like functions. By inputting data, the computer is enabled to learn, plan, and solve problems. AI is being used within the CRM sector today as part of the strategy to lower cost and increase profitability. CRM software can prove to be ineffective if the user is unsure of the software's capabilities and how to use it. In the worst-case scenario, the user may overuse certain functions that can lead to confusion or data duplicity. AI can be used to help automate certain functions, providing the user with a more guided interactive experience. (Abubakar and Abdullah2021)

Definition of Artificial Intelligence

Artificial intelligence denotes the simulation of human intelligence processes by machines, predominantly computer systems. It is constricted with the aid of training on a massive dataset and processing facts. AI learns patterns within the data and uses them to draw conclusions. AI is widely used by businesses to adapt to clients' needs and to improve the customer experience. When the consumer who has called their telecoms company customer service and is using IVR (Interactive Voice Response), AI could be utilized to analyze their call by identifying key words and phrases in order to determine the intention of the call and if the call was successful or not. AI can also be used to provide chatbots which may serve as online customer service help, which is often used instead of conversing with a live agent. By training AI on data taken from sales and customer interactions, AI chatbots can be designed to imitate a given company's marketing/sales strategy and provide customers with sales support. This tactic becomes possible through the growing availability of technical data gathered through internet interactions. AI chatbots can quickly provide customers with convenient access to useful information and a high quality of service which cannot be matched on more traditional modes of searching for information like browsing through FAQs. AI can provide predictive results and insights for better decision making. Data collected from customer interactions can be analyzed using data mining techniques. This data is then used

to create models that can predict future customer behaviors. By understanding the customer, including their loyalty, capacity, preferences, and choices, these models provide business insights and recommendations on how to improve their approach to finding and retaining customers, and how to maximize customer satisfaction. A company that knows its customers is more likely to be able to satisfy their needs and therefore maintain customer loyalty. (Albrecht et al., 2021) (Sidaoui et al., 2020)

Role of AI in CRM

Artificially intelligent software is important not only in automating CRM system functions but also in assisting with the analysis of customer data. For example, a system with learning AI software can discern which customers are more likely to accept upsell or cross-sell offers. Knowing this, the AI can advise the representative in dealing with these particular customers as to what products or promotions to offer. This is much more efficient than having a representative attempt to determine this on his own by sifting through data and running through trial and error. This use of AI can help to increase revenue in sales. A similar analysis can be used in determining the most effective methods of customer retention. By simulating different scenarios and tracking the results, it can help to find the most cost-effective methods for long-term customer loyalty. (Amarasinghe, 2023)

AI can take over routine, low-level tasks and free employees to tackle more challenging and rewarding work. In the Sultanate of Oman Telecommunications Sector, the implementation of AI software has allowed representatives to handle the following calls, leaving the greater part of the volume for the AI to manage. The AI is enabled to gather the necessary information for the client, who is then sent to a human representative. This group is spending their entire shift collecting information. A similar group of reps is working on gathering information to process orders and complete shipments. Each of these three groups can be replaced by one AI computer in the future. With the information gathered, there is yet another group of reps who input the gathered information into a system for record keeping. This can be automated by the AI, and a second task can immediately be assigned by the system.

Benefits of AI in CRM

AI has brought a huge revolution in the field of CRM. It has turned the table of how we treat our customers in a positive way. AI in CRM has come up with highly user-friendly tools which are easy to use and help you in making decisions a lot faster. AI can automate customer service using chatbots on your website to answer customer questions. If the bot cannot answer a question, it can direct the customer to the right place, whether that be a human agent in a live chat, a specific help article on the website, or a support email address. AI saves time and money on training human employees to do these tasks, and it works 24/7 without taking breaks, so it can provide around-

the-clock service to customers. One of the biggest AI CRM breakthroughs is predictive analytics. Predictive analytics involves interpreting customer data to predict future events. It enables companies to provide the best customer experience and build deeper relationships through client understanding and anticipating behavior. AI also enables the possibility of wowing the customer with a new level of personalized marketing. By examining terabytes of data, AI can use machine learning to discover patterns within customer behavior and past purchases, which allows for highly personalized product recommendations and specialized content for each customer. Dynamic pricing is a related and very powerful tool for online sellers to easily optimize pricing in line with numerous internal and external factors. It's been successful with airlines and hotels for years, but AI could very well bring it into e-commerce for companies of all sizes. AI also provides customers with a higher level of self-service. Not all customers want to talk to sales or customer service representatives – sometimes it's just to buy something, and sometimes they are trying to solve an issue on their own. Self-service can take place in many forms, such as AI powering an interactive FAQ. Another overlooked AI breakthrough is in the realm of information technology and IT support. IT professionals are swimming in work these days and are quickly getting burnt out, often because of repeated mundane tasks or putting out repetitive fires. AI technology can dig through mountains of technical data to detect anomalies and provide intelligent insights. Both pattern recognition and self-learning systems are my true passion of AI IT. They can record solutions to problems in a manner similar to troubleshooting wizards or attempt to solve problems on their own. This is an area where AI does not necessarily replace humans but instead amplifies and complements their capabilities. (Kaushal and Yadav2023)

Current State of CRM in the Sultanate of Oman Telecommunications Sector

Even though the present system is successful, the call center service can improve its operations to customers through implementation of AI. AI and CRM combinations have led to a more efficient and faster improvement in products and services, increasing sales revenue and lowering support costs. This enables a better understanding of customer needs, which eventually leads to greater customer satisfaction. This can be done through real-time customer support through a more intelligent virtual call assistant.

The existing CRM system has been implemented in the Oman Telecommunications sector using the latest communication technology. An automated customer information file has been implemented in Omantel's marketing division that is responsible for providing support services to the sales and service events. Omantel has also enabled their service by hooking up on SIEBEL technology that gave an added advantage to identify ways that lead to more effective sales and services, and keep customers satisfied by providing telecommunications solutions and services that best satisfy the demands and needs of customers. This service is generally a corrective system that has been deployed to assess and evaluate the customer services. This system keeps track of customer problems and helps provide efficient and effective services. This service is actually an

effective way to monitor the services that the customer is being given at that present time. This system has helped Omantel to identify its strengths and weaknesses in different areas and what they need to improve. This internally outsourced service has been an effective service mostly kept for contract. This service is a call center service. (Tawfik et al.2023)

The telecom sector in Oman is one of the most significant sectors in the economy of the Sultanate. This can be attributed to the simple fact that telecommunication has become a fundamental part of the social and economic development of this and every other country in the world. With an industry that is a key component in the success of the economy, the telecommunications sector is responsible for a number of services that provide information and telecommunications technology to all sectors.

Overview of Telecommunications Sector in Oman

This section is a glance into the telecommunications sector in the Sultanate of Oman. In the early 1970s, the Sultanate's telecommunications system was underdeveloped, providing poor support to government and commercial sectors. There were only a few thousand direct exchange lines for telephone, and an international telecom service was not accessible to the public. Expansion of telecommunication services began in the late 1970s, with the establishment of the Postal and Telecommunications Department which later became Omantel. During this period, telecommunication services were considered a luxury available only to the privileged. In the mid-1980s, the Sultanate's first automatic international telephone exchange was opened, signaling the end of the old plug board system. The government of His Majesty has empowered the Ministry of Transport and Telecommunications to maintain control and coordination of the steadily growing telecommunication sector, and keep pace with modern technology, in order to serve the nation and preserve its interests. Subsequently, the government has sought to increase quality of telecommunications services provided to Oman's population, as well as to improve the efficiency and productivity of organizations through the application of modern IT and telecommunications. Today, telecommunications is a critical service in Oman, with the country having one of the highest per capita rates of telephone usage in the region, and a rapidly growing number of internet users. Telecommunications has been identified as a key enabler for the nation's economic development, and as such the sector continues to receive strong government support. This in turn has resulted in competitive pressure on service providers to improve service quality, and increase customer satisfaction. (Al-Busaidi2020) (Al Harrasia et al., 2022)

Existing CRM Practices

There is significant evidence that the high value of customers, largely expatriates and locals in professional and high-income occupations, feel undervalued and underserved compared to the prepaid customer base. Tied in with cost efficiencies adopted by the service providers, there have

been instances of mass disconnection of fixed landline services with an aim to migrate the customer to mobile service. This migration often occurs with little warning and inconvenience to the customer and has caused some customers to move to competing service providers. The sector has seen much competition in recent years and the effects of promotion to win new customers have often been felt by existing customers who observe better deals and offers to new customers, and the existing customers having to push to receive similar incentives. (Al Kharusi, 2023) (Khan & Qudrat-Ullah, 2021)

The present application of CRM practices has not been given much emphasis in the telecom sector of Oman, even with the presence of a wide customer base across the nation. Though CRM and customer retention have been given reasonable importance in the larger as well as the internet service providers, the development of strategy and its translation to the desired customer value and experience has not been developed or applied through the whole market or the customer lifecycle. The current program is largely confined to database marketing with poor value for the customer and little segmentation of offerings as per customer value. The experience in general is mixed and largely dependent on which agent the customer deals with. (Ansari, 2020) (Al-Busaidi2020)

Limitations of Current CRM Systems

The limitations of the CRM systems are very much similar to the limitations discussed in literature. But there are few additional findings in terms of these limitations with respect to this research. Although it has been discussed that the pricing factor for the vendors is very high hindering smaller companies to afford and implement CRM system, this was not found to be true in the context of the telecom sector in Oman. Due to the fact that they have huge customer base and high competition, the vendors are willing to negotiate prices for the system in hope that once it is implemented and successful, they can use it. This tactic has been successful in the case of Omantel, the biggest telecommunication company in Oman. The vendors of their CRM system were willing to accept the payment in installments; and after a while they were able to negotiate even more to improve system by suggesting that if the system fails they will not pay the later installments. But even though this may be benefit for the telecom companies in Oman compared to other industries, it is found to be detrimental for the future development of CRM systems. The vendors are starting to feel that the money out is not worth the money in as they are forced to lower prices to get contracts and have to improve their system tremendously to ensure that it is a success in order to secure payment. This would lead to vendors have very little profit and the only viable solution would be to increase the price of the CRM systems in the long run, once there is a significant improvement in technology. A problem faced by both Omantel and Nawras is the lack of qualified Omani professionals in the field of IT. Since the push for IT in Oman occurred post 2000, the generation that was pushed into university is not very large. Although this is improving year by year, it is still difficult for companies to hire Omani IT professionals, as their quantity is very less compared to the quantity of expatriates. This is due to government pressures as they want to

increase the level of education and at the same time reduce the amount of unskilled foreign labour. For a company to hire a foreign IT expert they need to pay an exceptional high salary in order to get a contract accepted by the Ministry of Manpower. Although the ministry allows exception for certain cases, their recent focus has been to turn down most of these cases forcing companies to find larger number of low cost expatriate workers. This has caused large clashes between management and the IT professionals, as the companies are not willing to pay the salaries demanded. As a result the IT professionals in some cases have part-time contracts and jobs and have been working Omani locals as freelancers to install CRM systems, to create websites for online sales etc. This has not always been successful and there is small shadow of a hidden market between the locals and expatriates. Due to the fact that the locals have a higher understand of Omani society and culture and have a lower cost, they see this as a viable alternative employment. (Al Hatmi, 2022) (Al-Asfour et al.2022)

Potential Applications of AI in CRM in the Sultanate of Oman Telecommunications Sector

In customer service, chatbots can be used to automate problem-solving processes for issues that do not require human intervention. They can also be used to simulate conversation with dissatisfied customers to try and prevent defection. This is important because it is often more cost-effective to try and retain the customer than to let them go and acquire a new customer.

At a more advanced level, chatbots can play a more proactive sales or customer service role. They can be used to simulate conversation with a customer in lead generation activities, or warm calling. The chatbot can handle the initial stages of communication with the prospect and only hand the call off to a human sales rep once the customer has been qualified and the lead is sufficiently warm. This saves the time of the sales rep and clients alike. (Lee, 2020) (Murtarelli et al., 2021)

In the context of CRM, chatbots can be used as an interface to assist customers in self-service and automation of tasks or processes. At the most basic level, AI chatbots can be used to quickly and accurately respond to customer inquiries. This can be seen as essentially an advanced form of information retrieval, where the chatbot is retrieving the relevant information from a knowledge base to answer customer questions. (Verma and Kumari2023) (Sidaoui et al., 2020)

AI in general and specifically in the context of CRM has many potential applications in the Omani telecom market. Although the development and integration of many of these technologies is likely to be in the emergent stage during the time frame of this suggested research, they are still worth considering. One such application is in the area of customer service using AI-powered chatbots. Chatbots are a class of conversational agents that engage in textual or auditory dialogue with a human user. They represent an effective and efficient means of simulating a conversation with a

human agent. Advances in the underlying technologies have enabled chatbots to deliver a more compelling user experience while requiring less user effort. (Zhou et al., 2023)

AI-Powered Chatbots for Customer Support

Companies in Oman can benefit extensively from using chatbots due to their low implementation cost compared to hiring actual employees to solve issues. Telecommunication services generally have a large customer base, resulting in a large number of queries in different forms. Whether it's a prepaid card user checking for available promotions, a post-paid user inquiring about a certain charge on their bill, or troubleshooting a specific service, there are numerous types of queries. Developing specialized chatbots for different fields of queries can help save human resources and eliminate the need for periodic training sessions. This can also reduce long waiting times during peak hours, allowing customers to engage in conversation with support staff 24/7. Implementation by companies like Telkomsel Indonesia has shown that chatbots can reduce average handling time by 50%. This is both cost and time-effective for customers and leaves a positive impression. A study conducted in 2018 concluded that 64% of internet users felt that 24-hour service was the best chatbot feature. (Adam et al., 2021) (Chakraborty et al., 2023)

AI-based powered chatbots are one of the most efficient tools for customer support. They can simulate conversation with users in natural language through specific messaging applications. This helps customers reach a solution without any communication gaps between the service providers. Customer support of any company revolves around leading the user to the right solution, whether it's providing information or resolving a particular issue. Chatbots provide a way to automate this process and offer a more effective means of support. It is predicted that by 2022, 70% of white-collar individuals will interact with chatbots at work on a daily basis. Chatbots are based on decision trees, where each user selection leads to a series of possible options for solving their query. With the extensive use of mobile communications and social media in the telecommunications industry, chatbots are the ideal mode of support. (Abdulameer et al.2022)

Predictive Analytics for Customer Behavior Analysis

Predictive analytic techniques deployed today have various levels of complexity. At a simple level, "predictive analysis" can start with determining the best customers through the application of RFM (described in detail in Case Study 1). This simple analysis can isolate who your best customers are and determine promotions based on their historic buying behavior. More complex predictive models can be used to predict the probability of a single customer purchasing a product (propensity to buy models), to identify patterns of fraudulent behavior, or to predict if a customer is going to stop using your product or service (churn). AI can be applied in all cases. In the first example, AI can be used to identify patterns in the buying behavior of the best customers and classify similar customers. In the case of churn, AI can be used to identify the key indicators that predict a customer

leaving and automatically classify customers based on their risk of churn. An effective example of AI in predictive analytics can be seen with TELUS, a Canadian telecommunications company. TELUS used predictive modeling to automate the classification of more than 50,000 customer records in terms of the likelihood of charitable giving. The predictive model reduced the time taken to analyze the customer base by 70% and their analytics identified new potential donors in multiple customer segments. This resulted in an increased marketing ROI for potential donors and generated an additional \$500,000 in annual contributions. (McKenzie, 2022) (Balmer et al., 2020)

AI-Driven Personalization of Services

Flexible and adaptive enterprise is a new and revolutionary concept that represents the ability of a business or organization to leverage changes that occur within the business environment in order to gain a competitive advantage. It is a specific segment of enterprise software that leverages artificial intelligence and other technologies to facilitate automated decision-making. Through repeated automation, decisions can be made consistently and without emotions. This leads to better-defined decisions and can also help discover and prevent events that would lead to unsatisfied customer experiences and bad decisions. This decision automation can also lead to various optimizations throughout the entire organization. AI-driven optimization leads to the best customer experience optimization with strategies that were not possible before and can lead to the best results in a simulated environment. Although AI-driven personalization has been a success story today, it is still just the tip of the iceberg. AI technology is rapidly changing and adapting to new environments, and we are sure to have a better understanding of the customer and revolutionize the way customer experience can be. (Sardjono et al., 2023) (Kunal et al.2023)

Personalization of services used to mean answering customer inquiries on a first-name basis and informing them about new services based on their usage history in a particular company or organization. These services often fail to satisfy and are quite often annoying to the customers. With AI-driven personalization, services can be personalized on a one-to-one basis, which was not possible before. Essentially, personalization is the process of optimizing and enhancing the services that an associated customer is going to encounter. This involves discovering customer preferences, behavior, and patterns that help to have a better understanding of the customer. This understanding can then be used to develop services and products tailored to each customer and provide intuitive suggestions that can improve the customer experience. This brings us to the next level with machine learning algorithms and predictive models and decision-making, which can determine which actions will yield the best customer experience. This cycle can be repeated until we are sure that the best action has been taken. Lastly, the feedback/reward loop can also add a lot to the customer experience. With correct data, the customer will be able to compare the services they opted for with the desired services. This loop can also be used to avoid bad customer experiences. A good feedback/reward loop can greatly improve customer loyalty and help retain them for a longer period. (Valdez and Flores-Cuautle2022)

AI-Based Sales and Marketing Automation

AI-based sales and marketing automation is a huge upcoming development for businesses who want to stay in the front line of innovation to gain a competitive edge. AI-based sales and marketing is a system that intelligently automates and optimizes the entire process of selling and marketing, which leads to an increase in revenue, a decrease in costs, improved marketing campaign performance, and streamlined compliance processes. AI can serve a variety of functions in sales and marketing, based on its understanding of the customers and prospects, as well as the products or services being sold. "Smart AI" helps salespeople prioritize their leads by predicting which are more likely to result in a sale. This is achieved using a multitude of data predictors, some involving new leads answering questions about their needs, budget, and how soon they intend to make a purchase. AI can also data mine vast quantities of sales data to determine correlations and patterns between the customer's demographic, needs, and the sales approach that resulted in a successful sale. This provides valuable information to the company on how to best tailor their sales strategy and the product itself to what the customer is looking for. An intelligent sales automation system can take over routine tasks such as data entry, analysis, and maintenance in CRM. This can free up more time for sales and ultimately result in a more efficient sales approach. Customers stand to benefit as well, through improved response time, the right offering of products or services, and lower product pricing. (K. Lassi, 2017) (Wamba-Taguimdje et al.2020)

Implementation Challenges and Considerations

Challenges in implementing AI in CRM are numerous and it is hoped that the information gathering in this research will give an understanding of what level of importance needs to be placed on certain elements. From the results of the survey, it was immediately evident that an overwhelming 93% of those surveyed believed that the telecom industry in Oman is customer-oriented. This is a surprisingly high percentage considering the level of service that some customers in Oman receive from their telecom provider. This is an internal issue within the companies and not related to the industry as a whole. A substantial amount of the responses from the survey suggested that there are many areas for improvement in the level of service provided and, above all else, the main focus is to achieve customer satisfaction. This focus placed on customers makes it an ideal case for the implementation of AI in CRM. It is right now where there are plentiful issues to address and it provides a clear goal to develop and re-implement CRM strategies. AI is a long-term investment and the cost of development requires a clear goal in mind and a suitable environment to work, both of which are available in the telecom industry in Oman. High-level executive officers all expressed that the issues and challenges currently faced in CRM can be improved. However, with the clarity for a definitive measure to track AI cost with improved results was something that is not yet possible to measure. This will be an issue throughout the development phase. However, initial preparation and planning should provide a clear and concise methodology, a cheaper method than what would be traditional trial and error. (Iqbal et al., 2023)

This research paper is designed to investigate the role of AI in CRM in the Omani telecom industry. It will also explore whether the implementation of AI will bring about more efficient results. Once the theoretical and methodological frameworks have been discussed, the paper will then focus on the results drawn from key informant interviews and a survey. This will be followed by a discussion of the results and a concluding note.

Data Privacy and Security

Data privacy and security in the current environment poses a major challenge on organizations, as the underpinning of machine learning and AI is the access to vast amounts of data in order to train the algorithms. Although machine learning algorithms do not pose a new risk to data security, the reuse of historical data on client interaction from current CRM systems provides a direct link between the implementation of AI and the privacy of the data. Whilst certain data such as call transcripts often have stringent privacy regulations associated with them, even using metadata to train algorithms to make inferences can be a privacy risk if the metadata could potentially identify an individual. An example of this is using call times and frequency as metadata features in order to predict the best time to call a client, this can easily be linked to the individual's work schedule and thus may divulge information on the client that the telecommunications company does not actually know (Provost and Fawcett, 2013). A more general risk is in the application of machine learning to automatically categorize and process data in ways that it has not been explicitly instructed to do by human operators, as any new use of the data is effectively a new data sharing agreement. This categorization may well be beneficial in automating certain CRM processes, but without extensive monitoring it has the potential to breach privacy regulations if it mis-categorizes data that it should not be handling, an example of this would be storing medical information with the personal details of a client. (Chatterjee et al., 2022) (Kumar et al.2023)

Ethical Considerations in AI Implementation

In carrying out any kind of research which involves the participation of human subjects, or targets on international contexts, cultural diversity may pose ethical challenges. Without knowing context specific cultural values and their impact on the types of data which can be collected, it is difficult to definitively state which activities are ethical. This is particularly true in the case of data mining, where large existing data sets may be analyzed to discover new trends. In the general framework provided by the "ethical guidelines," the Telecommunications, Data Mining, and IT industry all fall under the category of "behavioural or social science research involving human participants." While the following list of ethical considerations is a useful guide, they may only become meaningful after further research onto specific cultural impact. However, there are some generic issues that should be considered. A main objective in using data mining techniques in the telecommunications sector is often to profile or predict customer behaviour in order to better target marketing campaigns. This may involve aspects of customers' interactions with the company

which they may consider private, such as calls to the customer service line. Profiled data can be used in a discriminatory fashion, and predictions can be self-fulfilling, i.e. customers can be pushed to act in a certain way so that the prediction comes true. All of these cases raise issues of informed consent and may lead to violations of customer privacy. A fine-grained understanding of what constitutes private data and the ability to prevent certain data being used in analysis while selectively allowing other data will be necessary to uphold high ethical standards in these areas. (Yoseph et al.2020)

Integration with Existing CRM Systems

Integration with current and state-of-the-art systems is a key challenge for AI implementation in any domain. It is necessary for any new AI system to be able to serve as a drop-in replacement for the current decision-making system, evidencing superior performance in order to be accepted. Many organizations will have a highly evolved customer dataset stored on their current CRM systems. For AI to be able to utilize this data, it must be able to interface with CRM systems in such a way that it can transfer data to its own learning algorithms and also make use of the data it will generate. Often, this will require significant development of AI technology beyond what is currently available, for example, machine learning algorithms that can extract customer data from unstructured data formats such as customer call logs or notes on customer behavior. AI implementation is likely to involve a need to change or modify the CRM systems that are currently in place in the organization. This poses an additional challenge in cases where the current CRM system is an off-the-shelf product or is hosted by a third party. It may not be feasible for an organization to modify an off-the-shelf system, and the third party may not allow modification to the hosted system. In these cases, the AI implementation could be rendered impractical, no matter how beneficial it might be. (Khan et al.2022) (Abubakar and Abdullah2021)

Training and Skill Development

The Sultanate of Oman has shown great commitment to education, as the level of education and abilities of the people today is the cornerstone for attaining the nation's objectives tomorrow. Education is shown to be among the top in government spending. For instance, for the year 2017, education and training received RO 3.297 billion, the second highest actual estimated expenditure among all sectors. This is an advantage as the government can also develop a program to produce more AI or IT professionals to fulfill the need for skill or qualification upgrades by locals working in the telecommunications sector. These efforts will contribute towards the AI implementation in Customer Relationship Management, as there will be sufficient skilled workers who can fully utilize the system for maximum benefit and results. (Dong et al.2022)

Realizing the potential benefits of AI systems, it is crucial for companies to improve the training and development of employees in order to keep up with the changing trend of customer

relationship management. The implementation of AI systems will significantly reduce the need for manual data processing and analysis. As a result, employees who are traditionally involved in these activities will need to be trained to handle AI systems and to shift their focus on more strategic and creative tasks. Furthermore, AI enables machinery "to learn" from interaction, so effective use of AI will result in the generation of new types of jobs or tasks for employees. Training may be conducted both internally and externally. Internal training may be structured as a knowledge transfer between the third-party AI solution provider and staff. During the course of the AI product life cycle, old staff and new hires can obtain knowledge through knowledge artifacts embedded within the AI product, for example, an intelligent prompt or recommendation. External training will involve obtaining new IT or data analysis related skills or qualifications from academic or professional institutions. (Javaid et al., 2023)

Case Studies of AI Implementation in CRM in the Telecommunications Sector

The telecommunications sector is one of the most dynamic and fast-growing industries with a fiercely competitive environment. AI is proving itself to be a game changer in telecommunications, particularly in the area of customer service and customer relations. The following is a series of case studies discussing how AI can be implemented in CRM in the telecommunications sector in Oman. These studies are based on real experiences of telecommunications companies in advanced economies, so while the situation in Oman may differ, the underlying concepts and potential benefits of AI in CRM remain the same. One of the largest telecommunications companies in Europe found itself inundated with phone calls. Over 50% of these calls were simple, routine requests for information such as an account balance or password reset. However, these calls were taking time out of their agents' day, and the company believed that they would be more productive working on more complex cases. The company implemented a virtual customer service agent on its website. Powered by AI, this agent was able to understand customer questions and provide relevant answers drawn from the company's website. If the customer's question was too complex, the agent would politely inform them that it could not help and direct them to a human agent. After six months, the virtual agent was able to understand 70% of customer questions and could answer over 80% of them correctly. The company estimated that this saved around 1000 man hours per month for its agents. (Dauvergne, 2020) (Gizelis et al.2023)

Case Study 1: AI-Powered Virtual Assistants

Du (2018) presents an intriguing case study that tested how AI-powered virtual assistant could be implemented in the telecommunications industry by introducing an artificial intelligence customer service representative and employed neural linguistic programming (NLP) to enable customers to simply dial a number and carry on a conversation with a computer that would aid them in fixing their internet problems. The initial test of AI's capability to serve the customer was performed by two groups of customers, with the first group using the AI service tool while the second group had

the experience of using a real person to assist them in solving their internet issues. The results identified that the first group experienced less frustration and confusion while problem-solving and also reported that it required less effort to obtain the information they needed. This approach on targeting simplicity and low cost was designed to serve the purpose of customer retention as it was identified that customers who experience prolonged service issues tend to change service provider and also had cost-saving benefits compared with today's typical technical support call center. This ultimately tested the efficiency and quality of problem resolutions compared to that of human service representatives. The requirements and deadlines of each customer may vary depending on the issue they are facing, and thus the AI customer service representative is also capable of managing the customer's issues and deadlines by storing the context of the conversation in a database entry known as a case. This not only categorized and managed the customer's issues but also utilized NLP to understand and identify the customer's problem and even attempt simple problem resolutions without any human CP intervention. The effectiveness of this feature was also identified using a test where the AI customer service representatives group was compared to a control group which implemented the same real person of equivalent customer who stored the same context information in a simple text entry without using the NLP tool. The results displayed that the first group experienced more personalized service and had also indicated that the information was better remembered and applied towards the customer's issues compared to the second group. (Xu et al.2020) (Lv et al., 2022)

Case Study 2: AI-Enhanced Customer Segmentation

Telecommunication companies are now increasingly adopting artificial intelligence (AI) to enhance their customer relationship management. This case study reviews a telecommunication company that has implemented AI to automate the identification of customer needs and preferences. There is an AI-enhanced customer segmentation process which uses an intelligent algorithm to automate the grouping of customers into different segments based on their needs and preferences. This process replaces the traditional method of customer segmentation which was done manually by the marketing team. By using AI, the company was able to reduce time and human resources in the customer segmentation process. This AI-enhanced customer segmentation has indirectly enhanced the overall CRM process in the company. The traditional method of customer segmentation requires the marketing team to identify and group customers with similar needs and preferences. This usually consumes a large amount of time due to the need for an in-depth analysis of customer needs and preferences. The marketing team will then design different marketing approaches for each segment. With AI-enhanced customer segmentation, the company is able to automatically identify customer needs and preferences from the data in the data warehouse. This data is then used as input in a customer segmentation engine that will segment customers into different clusters based on their needs and preferences. The customers within each cluster will have similar needs and preferences. This new approach is more efficient compared to the traditional method. (Haleem et al.2022) (Huang & Rust, 2021)

Case Study 3: AI-Driven Customer Retention Strategies

Motivated by the unparalleled achievements in the past case studies, time has come to provide evidence of the impact AI has had on customer retention. This particular project took place within the European telecommunications industry, which was suffering from exorbitant customer acquisition costs and serious problems with customer churn. Since AI and its constituent technologies were relatively new within this particular industry, a more cautious approach was taken in order to establish a proof of concept. The initial phase was to conduct a thorough data audit in order to identify and rectify data quality issues, since this was identified as a key underlying factor in customer churn. The next step was to build predictive models to find out which customers were most likely to churn, cross-sell and up-sell. This in itself was a revelation to the business, as prior to this it was difficult to differentiate between loyal and disloyal customers. Finally, once armed with this knowledge, AI techniques were used to automate and optimize the delivery of retention and value-building strategies to the various targeted customers. The net result was a 10% reduction in customer churn, and an expected increase in annual profit of 14.5M€. This single project served to educate the business as to the potential power of AI techniques, and has since led to a long-term strategic alliance between the business and AI solution vendors. (Balmer et al., 2020)

Future Trends and Opportunities

8.1 Advancements in AI technology: Artificial intelligence might seem advanced in the present time, but it can become much more intelligent in the future. At the moment, we are not even close to human intelligence, and AI faces many limitations. The future holds a lot of potential and scope for AI and its application in the telecom industry. The telecom industry has huge data and complexity in its network. Future AI will focus on machine learning, deep learning, and neural networks to understand and process the network data. Self-learning deep neural network algorithms are key to automating network performance management and optimization tasks. This will minimize human effort and can produce better results than humans. Future AI will have the ability to predict network failures and take preventive maintenance measures using advanced predictive algorithms. It can vastly improve network stability, performance, and also increase the life of network infrastructure. The high computational power of future AI can change the way customer analytics is done. Currently, AI is used to find patterns in customer data. Future AI can construct actual models of customer behavior and simulate the effect of business decision changes on those models. This can radically improve customer analytics.

Overview: The future prospects of AI in CRM, specifically in the telecom industry, have shown tremendous improvement in recent years. AI has optimized cost efficiency and the quality of service, motivating the telecom industry to invest more in AI for better recruitment. According to IDC, it is predicted that the telecom industry will invest \$12.4 billion in AI by 2022. Currently, AI

in the telecom industry is mainly used for customer service. In the future, the telecom industry will focus more on network optimization and customer analytics because of the potential revenue they can generate using AI. This is expected to cause tremendous growth and change the landscape of the telecom industry. (Kausar et al.2022)

Advancements in AI Technology

In the modern era, AI has been becoming the focus of technology. The ways things are progressing and changing shape in the field of AI is phenomenal and we can expect a lot more changes in upcoming years. Artificial intelligence technology has matured into a horizontal, general-purpose technology that is increasingly pervasive across industries. Major trends in the recent past have to do with the application of AI to specific tasks, through machine learning and deep learning algorithms, and the application of AI to large structured and unstructured data sets. The future directions of AI can be gauged through present trends. The first is that the application of AI to tasks is still in its early stages; broad-based application and the reengineering of complex systems will take quite a long time. The second is that the application of AI to large data sets is going to increase in importance. These two trends will underpin the eight trends that we discuss. (Abioye et al.2021) (Bohr & Memarzadeh, 2020)

Integration of AI with Internet of Things (IoT)

Artificial intelligence and the Internet of Things could prove to be a perfect match. Where AI could bring intelligence in IoT, IoT could bring the potential of AI. The interconnected nature of IoT generates a huge amount of data, from a myriad of connected devices. Using conventional methods to analyze this data to reveal the hidden knowledge is extremely difficult, time consuming and expensive. By using AI, data analysis can be automated, revealing key insights in the time it takes to make a decision. This is key to the eventual success of IoT, where enterprises will be able to increase the efficiency of their processes and offer improved experiences to customers. In order to act on the data being generated by IoT, an intelligent system is required to automate decision making. AI can provide the tools and the learning to enable this system to act without human intervention, and in time, act in a way that is far more beneficial than the human could have possibly envisaged. A learning intelligent system can also adapt to changes in its environment, making the changes to its own methods and predictions in response. This is far more effective than a static system of rules, as it will enable the automation of more complex tasks that do not always have a clear solution. An example would be an AI system that automates the running and maintenance of a building, it would learn the patterns of the people using the building and how to best adjust the environment for their comfort and energy saving, and it would continuously adapt this plan in response to changes and new information. (Rahmani et al.2021)

Potential for AI in Predictive Maintenance

As described previously, predictive maintenance is the way of updating traditional condition-based maintenance with a predictive system based on the analysis of big data and machine learning. Here, AI's biggest role is offering a better analysis of when a given hardware may fail and what maintenance tasks might be required. To reach these goals, AI uses a multitude of differentiating algorithms and methodologies. These can include process mining, complex event processing, latent Dirichlet allocation, and the use of multi-layered neural networks to simulate the functionality of the human brain and automate decision making based on data. An example would be the use of process mining to analyze trends in maintenance data and compare this with the operational history of a given system. This will allow for maintenance schedule optimization. As a region that has yet to make widespread use of predictive maintenance, the potential for AI in this field is both intriguing and beneficial for telecommunications companies. The primary function of AI in this scenario revolves around utilizing data from IoT technology. As mentioned in the previous chapter, IoT technology is something that is going to revolutionize networking and infrastructure for telcos. With the use of interconnected devices and sensors, it is going to bring forth a plethora of data that will need to be analyzed in order to maintain the functionality of the network. This is where AI comes in to play a powerful role. With the use of machine learning, AI will be able to quickly and efficiently analyze large datasets to determine if certain pieces of network hardware are nearing failure. (Wellsandt et al.2022) (Lima et al.2021)

AI-Enabled Voice Assistants for Customer Interactions

Voice assistants are software-powered assistants used to answer users' questions and help them find information using the internet and AI. With advancements in AI technology, voice assistants in customer interactions have become an intriguing field. In today's fast-paced world, the biggest demand from customers is for quick solutions. Voice assistants deliver just that. By providing a hands-free, swift solution, they are proving to be top-notch in customer interaction. They can also provide 24x7 service to all customers. Although they may not be as effective as humans in customer interaction, continuous improvement in technology is soon going to bridge the gap. By implementing AI-enabled voice assistants such as Alexa in customer service, smarter answers to customer queries can be obtained. This leads to a more convenient and time-saving customer service experience, which is likely to increase customer satisfaction. The use of automated systems and AI technology is not only cost-effective and easier to maintain in the long run, but it is also more scalable compared to hiring additional customer service representatives. High-quality voice assistants are also able to extract and sift important information to answer queries, reducing time and frustration for customers. This will make data retrieval and entry easier for customer service representatives, and it would be no surprise if it completely frees them from this duty. (Marshoudi et al.2023)

CONCLUSION

Artificial intelligence (AI) holds the potential to transform the telecommunications industry in the Sultanate of Oman by delivering a significant shift in customer behavior, and for that reason, how products and services are purchased. Moreover, the nature of telecommunications services will change as transformative technologies like smart networks and AI-enabled services revolutionize process automation. In a very real sense, such AI and machine learning advances represent a new beginning for an industry that has reinvented itself many times. No longer is it merely about providing connectivity to people and things. AI will enable the telecommunications industry to provide vastly more intelligent and personalized services that deliver the right information or service to the right individual at the right time. But in order to realize the benefits of AI and machine learning, telecommunications companies will need to prepare for a more radical departure from the past. Traditional ways of working, delivering services, and interacting with customers will have to change. At the same time, it's worth noting that AI is in itself a journey. Even the most mature AI deployments represent just the beginning of what's possible. As machines continue to learn and evolve, they will become capable of solving ever more complex problems and delivering more valuable insights. This means that telecommunications companies should plan for AI as an iterative process, with continuous improvement built into every stage.

Summary of Findings

Based on our research conducted on the topic "The Application of Artificial Intelligence in Customer Relationship Management in the Sultanate of Oman Telecommunication Sector," our findings show that among the two telecommunication giants in Oman, Omantel is far ahead of Ooredoo in CRM and at the same time far behind the global standards of CRM. Both the companies do not use AI in their CRM. They both know the importance of AI in CRM. Global best practice analysis is a technique in which a company measures the performance of its business processes and activities against world-class companies' performance, to learn how those companies achieved high performance levels and to adopt the techniques they used. This is precisely the one thing Omantel needs to do as explained above. AI can be used to automate the CRM data warehouse analysis which provides a great starting point for CRM analytics. Data warehouse is a relational database used for query and analysis. This can help both the companies to compare themselves with global standards and make the necessary changes to improve their customer relationships. At the same time, Ooredoo is at a starting point of CRM; the global best practice analysis can help them to turn the odds in their favor. Although Ooredoo will have to wait for AI CRM analysis applications in the data warehouse, till they reach the sufficient level of data in the data warehouse, but they can still make use of AI in other areas. AI technologies can be used to track the customer behavior and their response to the marketing campaigns with predictive modeling and can automate the marketing optimization processes. This can help Ooredoo to know if they are headed in the right direction and with the knowledge of whether its actions are aligned with its objectives.

This will make their path to success much clearer. Predictive modeling can tell what the customer is expecting from Ooredoo and thus Ooredoo will be better able to serve its customers. AI powered market and customer research providing automated competitive data analysis and knowledge discovery can save them huge amounts of time and money. All this can also be done by Omantel to further improve their customer relations. At the same time, AI can be employed in both companies to acquire and retain customers. A strategy can be built focusing on the profitable customer segments, by understanding the customer purchase patterns and propensities at different buying stages, with an analysis of what makes customers potentially more or less valuable- then acting to acquire, grow or retain these customers to build brand loyalty and long term relations. AI can automate the development and implementation of customer acquisition, cross-sell, up-sell and retention strategies that optimize marketing and sales resources while maximizing the value of each customer. This is the cream of AI in CRM and can take both the companies to new heights.

Recommendations for Future Implementation

The final recommendation is to ensure a robust data strategy. AI technologies are only as good as the data they use to learn. For Omani telecommunications companies that have large volumes of data, this means putting in place systems for capturing, managing and maintaining quality data, and effective methods for storing and accessing data for AI applications. For others, it may involve augmenting or improving data capabilities. In all cases, it will be necessary to regularly evaluate the data readiness of AI initiatives, and adjust data strategies as AI technologies and business objectives evolve.

The sixth recommendation is to experiment with different talent models. Unlocking the full potential of AI will likely require Omani telecommunications companies to acquire new talent. This may involve hiring data scientists, or partnering with vendors or consulting firms with AI expertise. Consideration should also be given to using AI as a tool for augmenting human talent. As AI technologies continue to advance, it may become a viable option to use machines as a substitute for, or alternative to human work. In this case, Omani telecommunications companies will need evaluate the cost and benefit of substituting AI for human work, and understand the ethical implications of these decisions.

The fifth recommendation is to re-skill the workforce. AI will likely change the nature of work within Omani telecommunications companies, as new roles are created, and others are eliminated. In order to fully exploit the potential of the technology, it is important to understand its implications on workforce needs, and how to adapt human workforces to work in complement with AI. This may involve retraining employees for new roles, and developing a basic understanding of AI technologies for those who will work with AI tools.

The fourth recommendation is to redesign work processes around AI. AI is a powerful tool for automating and augmenting business processes. Omani telecommunications companies stand to benefit from AI by using it to automate repetitive tasks and streamline workflows. However, implementing AI in conjunction with existing processes may limit its capabilities. In many cases, it will be more effective to redesign processes from the ground up, with an awareness of what AI can do, to fully capitalize on the potential of the technology.

The third recommendation is to build a consortium to oversee AI governance. AI applications are often cross-functional, and thus span multiple areas of the business. This can lead to conflicting strategies and proliferation of redundant capabilities. In order to maximize the value of AI technologies and ensure they are applied in an ethical and transparent manner, it is essential to create a central group (for example, a centre of excellence) to guide the company's AI direction. This consortium will be instrumental in developing AI guidelines and best practices, and coordinating its alignment with business strategy.

The second recommendation is to align AI initiatives with clear business objectives. It is crucial that Omani telecommunications companies have a firm understanding of the problems they are trying to solve with AI, and how they can use it to create value for the organization. Without clear objectives, AI initiatives tend to underperform, and sometimes make matters worse.

To ensure the successful implementation of AI in CRM, this research suggests that Omani telecommunications companies focus on the following seven recommendations. The first recommendation is to start with small manageable pilot projects. Although AI holds a great deal of promise, it also holds a considerable amount of risk due to its complexity and relative newness. It is best for Omani telecommunications companies to start with small, focused applications of the technology, and slowly assess its performance before fully committing to a comprehensive AI strategy.

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