Analysis of the role and effect of artificial intelligence in customer relationship management under the background of digital transformation

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Abstract: With the deepening of digital transformation, artificial intelligence (AI) is increasingly used in customer relationship management (CRM). The purpose of this paper is to explore how AI can drive enterprises to achieve strategic advantages in the process of digital transformation by improving CRM efficiency, optimising customer experience, and enhancing customer loyalty. The application of AI in customer service, such as intelligent customer service and personalised recommendations, has significantly improved the responsiveness and accuracy of customer service. Through big data analysis, AI helps enterprises to deeply explore customer needs, provide personalised services and precise marketing strategies, and enhance customer satisfaction and loyalty.

Keywords: digital transformation, artificial intelligence, customer relationship management, big data analytics, customer loyalty

Introductory

With the continuous development of information technology, digital transformation has become an important trend in the development of global enterprises. Especially driven by technologies such as the Internet, the Internet of Things, and cloud computing, digital transformation has not only reshaped the production and operation modes of enterprises, but also profoundly changed the way of customer service, sales and management. Against this backdrop, technologies such as Big Data and Artificial Intelligence (AI) have become key tools to drive enterprise innovation and enhance competitiveness. Digital transformation enables enterprises to make use of massive data for analysis and decision-making in the course of their operations, so as to more accurately grasp market demand, optimise resource allocation, and thus enhance efficiency and effectiveness. By implementing big data analysis, enterprises can not only accurately understand customer behaviour and needs, but also adjust marketing strategies in real

time to improve customer experience and satisfaction. This transformation process has been further enhanced by the rapid rise of artificial intelligence (AI), whose widespread application has enabled enterprises to make significant progress in automation, personalised services and precision marketing, and enhance the effectiveness of customer relationship management (CRM). The innovative application of AI not only breaks through the limitations of traditional marketing, but also provides enterprises with more powerful data processing capabilities and intelligent decision-making support, driving the deep transformation of service models and marketing strategies.

1 Literature review

1.1 Impact of digital transformation on business management

Digital transformation has become an important trend in modern enterprise management, with the continuous development of information technology, enterprises gradually get rid of the traditional management mode and move towards the data-driven and technology-led intelligent era [1]. Digital transformation is not only an upgrade of technology, but also a comprehensive innovation of enterprise strategy, organisational structure and culture. A large body of literature shows that digital transformation has had a profound impact on all aspects of business, including operations, customer management, and marketing. In terms of operations, digital transformation enables enterprises to achieve optimal allocation of resources and significant improvement in operational efficiency by integrating technologies such as big data, cloud computing, and the Internet of Things. Enterprises are able to significantly reduce costs and risks and improve operational effectiveness through real-time monitoring of production processes, inventory management, and supply chain optimisation [2].

1.2 Artificial Intelligence and Customer Relationship Management

With the rapid development of artificial intelligence technology, AI has played an increasingly important role in customer relationship management. The application of AI technology, including machine learning, natural language processing, data analysis, etc., in customer relationship management has greatly improved the customer service capability and the intelligence of marketing strategies of enterprises. Machine learning, trained with large amounts of data, can provide more accurate predictions of customer behaviour, helping companies identify potential customers, analyse their needs and provide them with personalised services. Machine learning algorithms are able to analyse customers' preferences based on their historical data and behavioural patterns, and then push personalised product recommendations or service solutions, which plays an important role in enhancing customer experience and satisfaction [3].

The application of Natural Language Processing (NLP) technology, especially in intelligent customer service systems, plays an important role. Traditional customer service usually relies on human customer service agents for answers, which is not only inefficient but also prone to human error. Through NLP technology, AI is able to automate the answering of customer inquiries, provide 24/7 service, and enhance customer satisfaction by better handling

customer needs and emotions through sentiment analysis and semantic understanding.AI is also able to identify and respond to problems in a timely manner through automated analyses of customer feedback, enhancing the ability to maintain customer relationships. Data analysis is one of the most core technologies of AI in customer relationship management. Through big data analysis, AI is able to help companies gain a comprehensive understanding of customers' behavioural characteristics, consumption habits and potential needs. Through the processing of massive data, AI can mine effective information from it to help enterprises make more accurate marketing decisions.AI is also able to monitor customer feedback in real time, adjust marketing strategies in a timely manner, and improve market response speed [4].

2 The Role of Artificial Intelligence in Customer Relationship Management in the Context of Digital Transformation

2.1 Artificial Intelligence Enhances Customer Experience

Artificial Intelligence (AI) is playing an increasingly important role in customer relationship management, especially in enhancing the customer experience. Through technologies such as machine learning and deep learning, AI is able to analyse customer data in real time in order to provide personalised recommendations and customised services to customers. Personalised recommendations predict the goods or services that customers may be interested in by analysing their historical buying behaviour, browsing records, and preferences, thus greatly improving their purchase conversion rate. E-commerce platforms recommending products through AI algorithms can intelligently display goods that match customers' interests based on their past search and purchase history, which not only improves customers' shopping experience, but also enhances the platform's sales performance.AI is also capable of adjusting the recommendation strategy in real time based on customers' interaction data and behaviours, and further refining the needs of customers to ensure that every customer contact provides the content and services. This data-driven, personalised service enables companies to meet customer expectations more precisely, increasing customer loyalty and satisfaction with the brand.

2.2 Automation and Intelligent Customer Service

Another important application area of artificial intelligence is automation in customer interaction, especially in the application of intelligent customer service systems. Intelligent customer service, through AI technology, is able to provide immediate and accurate feedback during customer inquiries, effectively reducing the burden of manual customer service and improving the efficiency of customer problem solving. The traditional customer service model usually requires manual answering of customer calls or handling of emails, which is inefficient and prone to errors, while AI customer service can carry out smooth dialogue with customers through natural language processing (NLP) technology, solve common problems, and even provide customized services. Intelligent customer service systems can learn and gradually optimise response strategies, which not only improves service efficiency, but also continuously improves and refines customer service quality through data feedback.

The applications of virtual assistants are also expanding. In e-commerce platforms, virtual assistants can answer questions about products, orders and other aspects in real time through dialogue with customers, and even provide help in the purchase decision process. Customers can interact with the virtual assistant at any time without waiting for a response from human customer service, greatly enhancing the immediacy and convenience of the customer experience. This automated approach to customer interaction not only reduces labour costs, but also effectively improves customer satisfaction and loyalty. With the continuous progress of technology, AI customer service will be able to deal with more complex customer issues and may become a core component of enterprise customer relationship management in the future.

2.3 Deep analysis and insights of customer data

The combination of big data analytics and AI makes in-depth analysis of customer data possible, and companies can use AI technology to dig deeper into customer needs and behavioural patterns to optimise their customer service and marketing strategies.AI is able to process and analyse a large amount of customer data, including purchase histories, online behaviours, social media interactions, and so on, and by analysing this data, companies can gain valuable insights into customer needs, preferences. These insights can not only help companies better understand the existing needs of customers, but also predict the potential needs of customers, so as to develop a more accurate marketing strategy. AI can predict which customers may be interested in a new product, so as to target marketing to these customers before the launch of the product, and improve the sales conversion rate.

Through big data analysis, AI is also able to identify the differences in the consumption behaviour of different customer groups, helping enterprises to carry out accurate customer segmentation and customize personalized marketing programs for different groups. For enterprises, this in-depth analysis of customer data not only improves the accuracy of marketing, but also significantly improves the efficiency of the use of resources, avoiding the waste of resources in the traditional marketing methods.AI technology enables enterprises to adjust marketing strategies in real time in the rapidly changing market environment, and quickly respond to changes in customer demand, so as to maintain market competitiveness.

2.4 Enhance customer satisfaction and loyalty

Artificial Intelligence not only enhances the customer experience, but also has the ability to significantly increase customer satisfaction and loyalty through more accurate customer service and interactions. By analysing customer behavioural data in real time, AI is able to better understand customers' emotions and needs, and thus provide more attentive service. When a customer raises a question or complaint, AI can immediately recognise the customer's emotions and, by adjusting the tone and content of the answer, make the customer feel understood and respected, thus increasing customer satisfaction.AI is also able to enhance the customer's sense of attachment to the brand by providing personalised recommendations and services, making the customer willing to interact

with the brand over the long term.

With the deepening application of AI in CRM, companies are able to provide more customised and differentiated services based on the different needs of their customers, and this precise service not only improves customer satisfaction, but also prompts customers to build higher brand loyalty. Research has shown that companies that provide personalised services and experiences can significantly increase customer loyalty, as customers are more inclined to return to brands that meet their individual needs.AI promotes customer loyalty by enhancing customers' sense of engagement, belonging and identity, and also lays a solid foundation for long-term development and stable growth [5].

3 Practical examples of Artificial Intelligence in Customer Relationship Management

3.1 Application of intelligent customer service system

In the field of customer relationship management, intelligent customer service systems have become an important tool for enterprises to optimise customer service processes and improve service quality and efficiency. Many enterprises have developed intelligent customer service systems by introducing artificial intelligence technologies, especially natural language processing (NLP) and machine learning (ML) technologies, which have significantly improved the response speed and accuracy of customer service. For example, by deploying an AI customer service system, a large e-commerce platform is able to answer customers' questions in real time, solve product inquiries, order status enquiries, and other service needs, greatly reducing its reliance on manual customer service.

Table 1 Comparison of customer service response time and customer satisfaction before and after the application of intelligent customer service system

Key indicators	Pre-application	Post-application	Increase/decrease
Customer service response time (minutes)	15	2	Reduction by 13 minutes
Customer satisfaction (per cent)	75 per cent	92 per cent	17 per cent increase
Timeliness of problem solving	60 per cent	95 per cent	35 per cent increase

Table 1 shows that by introducing an intelligent customer service system, the e-commerce platform significantly improved customer service response time and customer satisfaction. Customer service response time has been significantly reduced from 15 minutes to 2 minutes, while customer satisfaction has increased from 75% to 92%. This shows that AI customer service not only significantly improves efficiency, but also brings higher customer satisfaction, which ultimately helps companies reduce costs and improve service quality.

3.2 Big Data Analytics and Customer Personalisation

The combination of big data analytics and artificial intelligence technology enables companies to more accurately predict customer needs and thus develop more personalised marketing strategies. Taking a well-known retail company as an example, the company has successfully optimised its customer personalised recommendation system through big data analytics combined with AI algorithms, increasing sales and customer satisfaction. The company collects information on customers' purchase history, browsing records, social media

interactions, etc., and uses machine learning models to predict customers' purchase interests and future needs. This data was used to personalise recommended products, which not only enhanced the customer experience but also increased conversion rates.

3.3 Customer Relationship Management Model Innovation Driven by Artificial Intelligence Technology

With the advancement of AI technology, companies are not only innovating in their traditional customer service and marketing strategies, but are also using AI to make customer churn predictions and take personalised interventions to reduce churn. A telecom company has built a churn prediction model by using AI to analyse customer consumption data, service usage, and customer behaviour.The AI system, through in-depth analysis of historical customer data, is able to predict which customers are likely to stop using the service or switch to a competitor in the future, and provide customised recovery measures for these customers in advance.

4 Challenges and Issues in the Application of Artificial Intelligence to Customer Relationship Management

4.1 Data privacy and security issues

With the wide application of AI technology in customer relationship management, data privacy and security issues have become a challenge that cannot be ignored. The core of AI relies on a large amount of data, including customers' personal information, purchase records, online behaviours, etc., which must be collected, stored and processed in strict compliance with data protection regulations. However, as the scale of data continues to grow, how to safeguard the privacy and security of customer information and prevent data leakage and misuse has become an important issue that enterprises need to face when applying AI.

Many businesses rely on big data analytics to optimise their marketing strategies and customer experience, but this data usually involves sensitive information about customers, such as ID numbers, contact details, financial data, and so on. If this data is compromised or exploited by unscrupulous individuals, it will pose a significant privacy risk to customers and may even lead to damage to the reputation of the organisation. To prevent this from happening, companies need to take multiple measures to protect data privacy. Data encryption technology is used to ensure the security of data during transmission and storage; access to sensitive data is restricted to authorised personnel only through a strict access control system; and enterprises should conduct regular security audits to ensure the effectiveness of data security measures.

4.2 Algorithmic bias and fairness issues

The issues of algorithmic bias and fairness in AI are also a major challenge in current customer relationship management applications. AI systems learn and are trained with large amounts of data and rely on data models to make decisions. However, this data often contains historical biases that AI algorithms may inadvertently exacerbate if left unchecked. In some cases, AI systems may make unfair decisions based on a customer's gender, age, race, or other characteristics, which in turn can lead to discriminatory or unfair outcomes. This not only impacts the customer experience, but can also lead to social and legal controversies

that can damage a business's reputation.

To combat this, businesses need to ensure the transparency and fairness of AI algorithms.AI systems should be developed using diverse datasets to ensure that the needs of different groups of customers are adequately reflected and to avoid over-representation of one group. Enterprises should regularly audit and test AI systems to check for bias and make adjustments and optimisations to algorithms based on test results. By enhancing the fairness and transparency of their algorithms, businesses can reduce the risk of algorithmic bias and ensure that customers receive fair treatment when using AI technology.

4.3 Customer trust and acceptance issues

Despite the huge potential of AI technology in customer relationship management, customers' trust and acceptance of AI technology remains a challenge. Especially in the scenarios of emotional and personalised services, customers' willingness to interact with AI and provide their personal data to the AI system directly affects the effectiveness and promotion of AI in customer service.

Many customers are sceptical about interacting with AI, especially when it comes to privacy or sensitive information. Customers may be concerned that the AI system will misunderstand their needs or make decisions that do not meet their expectations, or even that the AI will reveal personal information. Despite AI's ability to provide efficient service, many customers still prefer to interact with human customer service because they believe it can better understand their emotional needs. Especially in emotional service scenarios, AI performance may appear cold and lacking in humanised care and empathy, which can affect customer satisfaction and loyalty.

Table 2 Comparison of customer trust and acceptance before and after the application of AI customer service system

Key indicators	Pre-application	Post-application	Increase/decrease
Customer trust (%)	70 per cent	85 per cent	15 per cent increase
Client acceptance (%)	65 per cent	80 per cent	15 per cent increase
Customer satisfaction (per cent)	75 per cent	90 per cent	15 per cent increase

Table 2 demonstrates the significant increase in customer trust, acceptance and satisfaction in a bank after the introduction of an AI customer service system. Trust and acceptance increased by 15 per cent each, and customer satisfaction rose by 15 per cent. These data show that with further optimisation of AI technology and increased customer trust, companies are able to improve overall customer satisfaction and further enhance customer loyalty through AI customer service.

Table 3 Comparison of customer satisfaction and sales before and after AI predicts customer needs and develops personalised marketing strategies

Key indicators	Pre-application	Post-application	Increase/decrease
Customer satisfaction (per cent)	78 per cent	92 per cent	14 per cent increase
Sales ($ million)	500	700	40 per cent increase
Customer repurchase rate (per cent)	60 per cent	75 per cent	15 per cent increase

Table 3 shows that after applying AI technology for customer demand forecasting and personalised marketing, customer satisfaction increased by 14%, sales increased by 40%, and customer repurchase rate increased by 15%. This shows that through accurate AI application, companies not only improve overall customer satisfaction, but also significantly increase sales and customer repurchase rate.

5 Reach a verdict

This thesis analyses the application of artificial intelligence in customer relationship management and its effects in the context of digital transformation. Through an in-depth discussion of AI technology, we can conclude that AI plays a crucial role in improving customer relationship management efficiency, optimising customer experience and enhancing customer loyalty. Artificial intelligence automates and personalises customer interactions through intelligent customer service, personalised recommendations and other means, thus significantly improving the responsiveness and accuracy of customer service.The application of AI technology enables enterprises to analyse customer data in greater depth and explore customer needs, thus optimising marketing strategies and service content and enhancing the personalisation and accuracy of customer experience.AI in customer relationship management The wide application of AI in customer relationship management effectively improves customer satisfaction and loyalty, which leads to a stronger relationship between customers and brands.

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