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The Impact of Artificial Intelligence (AI) on Customer Relationship Management: A Qualitative Study

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ABSTRACT

Ever since the commercialization of the Internet in the '90s, technology has been evolving faster than ever with the advent of cloud computing, social media, ubiquitous mobile devices, Internet of things (IoT), blockchain, and more. A staggering number of three billion internet users, five billion mobile users, and six billion devices are now connected through this massive global network of networks, facilitating customer information exchange and interaction never before seen in history. Driven by recent technological advances in computing power, big data, high-speed internet connection and easier access to models built with advanced algorithms, Artificial Intelligence (AI) is the next wave of innovation, which has already come into widespread awareness in the consumer world with the emergence of virtual assistants and chatbots (e.g., Amazon's Alexa, Apple's Siri, Google's Assistant), image recognition (e.g., Facebook Photos, Google ImageNet), personalized recommendations (e.g., Netflix, Amazon) and autonomous driving (e.g., Tesla, Google Waymo). This qualitative research study intends to learn about the impact of AI on customer relationship management (CRM), specifically in the area of customer service of problem resolution. Most prior research focuses on the AI technologies leveraged in CRM systems, such as machine learning, natural language processing, voice recognition, chatbots, data analytics, and cloud infrastructure. Few extant studies have used a qualitative research methodology to gather data from industry experts to truly understand the impact of AI technologies on customer relationship management, especially in the area of customer service and problem resolution. This study aims to fill this research gap. This research contributes to the literature on AI in the context of CRM and is of value to both academics and practitioners as it provides a detailed analysis and documentation of the impact of AI on the customer service domain.

Keywords: Artificial intelligence (AI), Internet of things (IoT), and Customer relationship management (CRM).

INTRODUCTION:

The objective of this qualitative research study is to learn about the impact of AI on customer relationship management (CRM), specifically in the area of customer service of problem resolution. The focus of this qualitative study is to conduct depth interviews using

proper protocols on the relevant informants who have extensive real-world industry experiences with AI-driven CRMs. Since the adoption of AI in the CRM systems is a relatively new phenomenon, the qualitative research methodology will enable us to have an in-depth understanding of its behavior and impact and

also better interact with the interviewees through an emergent design. In addition, the qualitative research provides an opportunity for us to examine existing theoretical and conceptual foundations in the AI-driven CRM context. The central questions of the study are designed to analyze the general, industry, and firm-specific impact of AI on customer service and problem resolution

- 1) What are the most remarkable features of AI used in the area of customer service and problem resolution?
- 2) How did these AI features come about and what factors drove the implementation of these AI features?
- 3) What were the key factors that made the AI features impactful in the area of customer service and problem resolution? What were the key barriers that had to be overcome?
- 4) What is the nature and pace of the change in customer service and problem resolution that these AI-driven CRMs have produced? Will this pace of change slow down, remain the same, or accelerate over the next decade?
- 5) What role has the specific respondent's firm played in the area and how has it assisted other firms? What key accomplishments and challenges have been encountered?
- 6) What are the specific steps or programs the firm has taken (or helped other firms) to support customer service and problem resolution using AI technologies?

Also, the main threats posed by AI are job losses as a result (Siau & Wang, 2018; Siau & Yang, 2017) and the skills of these professionals may also shift from a

series of hard-selling or simple customer service to soft skills such as the relationship building and emotional connectivity (Singh *et al.*, 2019). Therefore, this study also aims to learn the impact of AI on customer service job loss and change of job roles.

- 1) What is the firm-specific or the industry-level impact of AI on service job loss and change of job roles of customer service personnel?
- 2) How would AI change the job roles and required skills of customer service professionals?

Conceptual Background

General Literature Review of AI in the CRM Space

Recent technological advances in Artificial Intelligence (AI) technologies, especially in the fields of machine learning, deep learning, neural networks and big data (Moreno and Redondo, 2016; Zhang *et al.*, 2018), ubiquitous mobile computing (He *et al.*, 2019) have fueled the growth of the next-generation digital platforms (Khalid *et al.*, 2019; Rai *et al.*, 2019; Zhang *et al.*, 2019), which have progressively achieved human (sometimes super-human) level of performance in the various areas including autonomous driving, medical diagnosis (e.g., cancer screening), the robots/ drones, chatbots, virtual assistants, the language translation, the governance monitoring (e.g., copycats, content violation), complex game playing and recommendation systems. AI features embedded in customer relationship management (CRM) platforms also create new possibilities for customer experience, with rich insights into customer needs (Kumar Deb *et al.*, 2018). These innovations have been driven by a manifold increase in processing power, lower-cost hardware, and the exploding creation and availability of customer data (Gantz *et al.*, 2017).

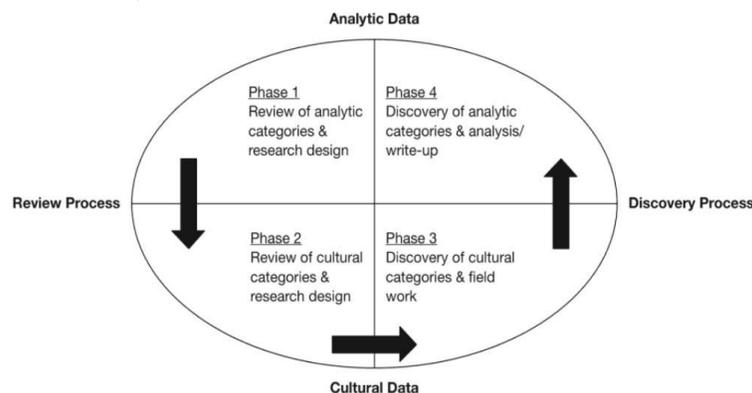


Fig. 1: The Four-Part Method of Inquiry for Ethnography (Chakravarti & Crabbe, 2019).

The qualitative depth interview employed by this study is based on McCracken, (1988) four-phase implementation framework, which calls for a careful review of “analytical categories and relationships” and “cultural categories and relationships”. This framework (**Fig. 1**) has been adapted by (Chakravarti & Crabbe, 2019) to fit a variety of ethnographic methods.

Analytic Categories and Concepts

The analytic categories establish the domain of the investigation & organize the knowledge in the domain. In the specific domain of AI-driven CRM systems, a plethora of technologies, including *machine learning (ML)*, *deep learning (DL)* or *neural network*, *natural language processing (NLP)*, *voice speech/ recognition*, *image recognition*, and other tools are used to discover insights, identify patterns, answer inquiries, the solve

problems and the provide recommendations. These technologies have produced effective applications for customer service & problem resolution, including *Next Best Action (NBA)* systems based on *the predictive analytics*, *chatbots*, *virtual agents* and *agent assist systems*. The impacts of these AI technologies on the customer service & problem resolution are multifold, including *operational excellence*, *customer intimacy*, *service productivity & quality*, *competitive advantage*, *service excellence*, *customer satisfaction*, & *ultimately, return on investment (ROI)*. These analytic categories are identified in the formal inter-view protocol as the elaboration probes and are used during the inquiry. The relationships of these analytic categories are the depicted in the following figure and are the further explored in the depth interview.



Fig. 2: Relationships of Analytic Categories.

Table 1 explains the analytic categories and concepts of AI technologies most relevant to the customer service and problem resolution context. Some of these

key technical terms appeared frequently in the answers from various informants during the interviews.

Table 1: Analytic Categories and Concepts.

AI Analytic Category	Definition	CRM Context
Artificial Intelligence (AI)	AI is the concept of having machines “think like humans” & perform tasks. such as reasoning, planning, learning, and understanding language (Salesforce.com, 2017).	AI can be further classified into Weak and Strong AI. Weak AI, also known as narrow artificial intelligence, focuses on specific narrow tasks such as customer service and problem resolution. The strong AI, or general AI, where machines acquire cognitive and self-aware capabilities similar to human intelligence, will take years to appear in CRM systems. The term AI is widely used in the CRM space. AI-driven CRM refers to CRM systems with various levels of AI capabilities for handling specific tasks.
Machine Learning (ML)	ML is the core driver of AI and involves computers learning from data with minimal programming. ML programs the desired outcome and feeds data to train the machine to achieve the outcome on its own (Salesforce.com, 2017).	All AI-driven CRMs are powered by machine learning, which analyzes and learns from massive amounts of customer data.
Deep Learning (DL) and Neural Network	DL is a subset of machine learning and uses complex algorithms that mimic the brain’s neural network to learn a domain with little or no	The reason for the recent surge in the use of AI in CRM is mainly due to relatively recent advances in deep learning, which creates outputs in much more sophisticated ways using multiple layers of interconnected neurons (called

	human supervision (Salesforce.com, 2017).	Neural Networks).
Natural Language Processing (NLP)	NLP uses machine learning techniques to find patterns within large data sets in order to recognize natural language (Salesforce.com, 2017).	NLP is widely used in customer service applications such as chatbots and virtual assistants. It is also capable of doing sentiment analysis to understand how customers feel about products or services.
Voice Recognition (VR)	VR, alternatively referred to as speech recognition (SR), is the ability of a machine or program to receive and interpret dictation or to understand and carry out spoken commands (Rudrapal <i>et al.</i> , 2012).	Voice recognition has gained prominence and use with the advent of intelligent personal assistants, such as Apple's Siri, Amazon's Alexa, and Microsoft's Cortana. It has been increasingly used in customer service applications to address customer needs.
Image Recognition (IR)	IR is a term for computer technologies that can recognize certain people, animals, objects, or other targeted subjects through the use of algorithms and machine learning concepts (Techopedia, 2019).	IR, or computer vision, is a subfield of machine learning, which has already been extensively used in autonomous driving, security, healthcare, social media, and visual search. It has a lot of potential in the customer service area. Salesforce has launched Einstein Vision with a set of application program interfaces (APIs) designed to help companies build customer relationship management apps with image recognition features.
Big Data	Big Data is the raw fuel of AI, which includes large amounts of structured or unstructured information that provide the inputs for surfacing patterns and making predictions (Salesforce.com, 2017).	The recent explosion of high volume, high velocity, and high variety of customer data provide the ideal inputs for CRM machine learning models, which make these systems smarter and smarter.

Cultural Categories and Concepts

The cultural categories call for a detailed inventory of the key features of the researcher's experience with the focal topic (Chakravarti & Crabbe, 2019, p. 75). This also allows recognition and admittance of matches and mismatches with other cultural categories which may merge from the respondent's subjective experience (McCracken, 1988). As a former practitioner in the management and IT consulting industry, my personal experience tells us that it is crucially important to assess the cultural categories from the industry and functional area perspectives. In the domain of AI-driven CRMs, the following are the cultural categories identified based on the major stakeholders in the CRM ecosystem (the functional cultures) for this specific study. The depth interview questions and probes are designed to analyze the relationships among these entities.

1) *AI leaders* conduct fundamental AI research and development, e.g., Google, Microsoft, Amazon, and IBM.

- 2) *CRM vendors* produce the AI-driven applications utilizing AI leaders' frameworks or the research work, e.g., Salesforce, NetSuite, and SAP.
- 3) *CRM implementers* are the usually IT consulting firms partnered with multiple CRM vendors, e.g., Accenture, Deloitte & Touche, and Perficient.
- 4) *CRM Facilitators* are usually technology evangelists from AI leaders, CRM vendors, & implementers, who coach and train customers and advocate the adoption of AI-driven CRMs, e.g., Microsoft IT evangelists, IBM Watson consultants, Salesforce Einstein Analytics & Discovery consultants, and Perficient AI consultants.
- 5) *CRM Followers* adopt the AI frameworks or applications from the leaders and vendors once the tools are well established. Both CRM implementers & customers can fall under this category.
- 6) *CRM customers/clients* are companies of various sizes that use CRM systems to serve their own users.

Qualitative Study Design

Available Methods

Compared with other research methods in which researchers' hypotheses and the procedures are predetermined, the research design in qualitative research

remains flexible both before and throughout the actual research (Marshall & Rossman, 2014). It encompasses a variety of accepted methods and structures, including four major types which are the most commonly used. They are summarized in **Table 2**.

Table 2: Qualitative Study Design Methods, Adapted from Astalin, (2013, pp. 120-122).

Method	Description
Phenomenology	This refers to a study of phenomena (e.g., events, situations, experiences, or concepts), which describes something that exists as an integral part of the world in which we are living.
Ethnography	This refers to a methodology for descriptive studies of cultures and peoples, which requires fieldwork by the investigator using data collection techniques including: Participant-observation Interactive depth interviews Interactive group interviews Life histories/autobiographies Other (unobtrusive) observational methods (e.g., garbology) Other elicitation methods (nonverbal)
Grounded Theory	This refers to a type of qualitative research methodology that allows theory/theories to emerge from the data that is collected. It employs a systematic yet flexible process to collect data, code the data, make connections, and see what theory/theories are generated or are built from the data.
Case Study	This refers to a research method, which is used to describe an entity that forms a single unit such as a person, an organization, or an institution.

Chosen Method

This qualitative study aims to the conduct personal interviews with four industry experts to gain insights into the impact of AI technologies on customer service and the problem resolution. Therefore, the proposed research method for this study is an interactive depth interview which is a commonly used ethnographic data collection technique. Moreover, following Brinkmann, (2016) interview guidelines, this study has chosen the semi-structured interview method among the spectrum of different types of the interviews (i.e., structured, unstructured, & semi-structured). The semi-structured interview is defined as “an interview with the purpose of descriptions of life world of the interviewee in order to interpret the meaning of described phenomena” (Brinkmann & Kvale, 2015, p. 6). Compared with the structured and unstructured interviews, the semi-structured interview has the following characteristics (Cohen & Crabtree, 2006), which fit the requirements of this study well.

- 1) The interviewer and respondents engage in a formal interview.
- 2) The interviewer designs and uses a formal interview protocol, which is a list of questions

and topics that need to be covered during the conversation, usually in a particular order.

- 3) The interviewer follows the protocol but is able to follow topical trajectories in the conversation that may stray from the guide when he or she feels this is appropriate.

Interview protocol

Preliminary Draft

The preliminary interview protocol was the developed based on the central research questions of this study, a careful literature review of the use of AI in the space of customer service and problem resolution, and an assessment of the professional backgrounds of the respondents so that the scope of topics are appropriate for the interactive depth interview. In addition, elaboration probes are developed to the facilitate data collection according to the proposed analytic and the cultural categories in the section 3. The preliminary inter-view protocol was initially tested with a senior product manager with the Coupa Software and responsible for delivering a roadmap for the search and shopping module within the larger Coupa platform suite. Based on the initial interview observations and the expert feedback, we made the following adjustments to the

preliminary interview protocol.

- 1) For Q1, the time frame was specified to be “the last 10 years” of the AI implementation in CRMs to avoid any confusion about earlier AI features used in legacy systems; the scope of implementation was specified to be the general application space for various businesses to avoid potential confusion with firm-specific implementation.
- 2) For Q2, the question was made more concise by removing “to the best of your knowledge”, which was a given condition.
- 3) For Q5, the question was modified to distinguish between the firm-specific versus industry-level impacts on jobs and change of job roles.
- 4) The time checks were also adjusted accordingly based on the initial test observations.

Final Interview Protocol

The final interview protocol (Appendix A) is comprised of six questions in a particular order to facilitate the flow of the interview and also standardize the data to be collected from the respondents. Elaboration probes are developed in case topical trajectories in the conversation stray from the interview guide. Standard introduction and closing statements are also used to ensure the formality and consistency of the interview. Following Brinkmann’s, (2016) guidelines, the final interview questions are designed with a *purpose* and refined to invite respondents to give *descriptions* of their experiences of and insights (*lifeworld*) into the AI-driven CRM space and seek to obtain data for *interpretation of meaning*. The key strength of this formal interview protocol is that it has adhered to the guidelines and best practices of the semi-structured interview. This allows the interviewer to be prepared and appear competent during the interview while giving the informants the freedom to express their views on their own terms (Cohen & Crabtree, 2006). With a standardized set of questions, it can provide reliable, consistent, and comparable qualitative data from respondents across different functional domains and various professional levels. In the meantime, the interactive elaboration probes offer flexibility in discovering analytic and cultural categories and an opportunity for identifying new ways of seeing and understanding the topic at hand. Besides the strengths mentioned above, there are also several weaknesses of UniversePG | www.universepg.com

this interview protocol. First, the open-ended questions are difficult to analyze due to the varied responses from respondents. Second, the flexibility of using the elaboration probes in the interview may reduce reliability, as respondents may not receive the same probe questions and it would be hard to compare answers. Third, in order to get enough data from respondents during the one-hour-long interview, the questions are designed to include subparts, which makes it cumbersome for respondents to remember to answer all parts of a specific question.

Informant Selection Process/Criteria

In order to obtain reliable and useful data for this qualitative study, the informants of this study are the selected based on the following criteria.

- 1) Who has relevant and useful information? Informants should have extensive experience and knowledge in the AI-driven CRM space.
- 2) Who is interested and available? Informants should be interested in the research topic and be available for a one-hour-long interview.
- 3) Who is willing to provide reliable information? Informants should have a good professional reputation and be willing to share their honest answers to the interview questions.

Based on these three key criteria, we selected four industry professionals for the final interview from my own professional network, which represents a good mix of professional levels (2 executive levels and 2 middle management levels), cultural domains (3 from the U.S. and 1 from China), functional sectors (3 from consulting firms, 1 from an e-commerce company). All four respondents have agreed to share their names in the study.

Informant Description

Respondent 1

Respondent 1 is the Chief Strategist of the Customer Experience Platforms at Perficient, Inc. He has more than 35 years of the strategic technology advising experience. He and his team build great customer, partner, and employee experiences. His primary focus is on the actual technology used in a customer experience environment and takes into account his experience with digital platforms such as web content management, portals, search systems, the marketing

platforms, and the marketing systems. Looking to the future, he and his team are expanding their focus to understand how emerging technologies, such as the artificial intelligence (AI), relate to those customer experience platforms. It's quite a broad range of the technology, but the common thread is they all connect with the customer. His primary role is to help his clients understand the technology that they need to have in place, why it's important, and how it integrates and affects all parts of their business. He has a B.S. in Computer Science from Purdue University and an M.B.A. from the Cleveland State University (Adapted from respondent's Perficient profile and respondent-supplied information, 2019).

Respondent 2

Respondent 2 is the practice leader and Chief Strategist for artificial intelligence (AI) at Perficient, Inc. She brings a background in the analytics and unstructured information management to design and deliver transformative AI solutions. Her engineering background aids in her analysis of complex business problems and her ability to develop innovative cognitive applications. She and her team help clients uncover hidden insights, create differentiated experiences, identify trends and anomalies, enhance existing applications, and scale their knowledge in AI. She created an award-winning center of excellence for AI and participated in a panel with IBM CEO Ginni Rometty to share her knowledge on the AI solutions and strategy. She also frequently demonstrates thought leadership through speaking engagements at various industry and technology conferences, such as the AI Summit. She has two engineering degrees, including a B.S. in Engineering Physics from the Taylor University and an M.S. in Mechanical Engineering from the Columbia University (Adapted from respondent's Perficient profile, 2019).

Respondent 3

Respondent 3 is a management consultant within the Talent & Organization practice at Accenture, servicing clients within the Utilities & Resources industry. His current role at Accenture is Analytics and Business Readiness Lead, responsible for the monitoring and reporting on the progress/state of the overall transformation using various data analytics and the metrics tracking tools. His current project is at a leading US utility company implementing a new customer inter-

action software across their regional call centers. Before joining Accenture, He was a senior consultant at Capgemini, where he focused on the digital transformations using technologies such as NetSuite and Salesforce. He later shifted to talent and organizational effectiveness work with a heavy emphasis on mergers and integrations, talent learning and development, and change management. He has a B.S. in the Information Systems from Marietta College (Adapted from respondent-supplied information, 2019).

Respondent 4

Respondent 4 is a data analyst from the Chief Customer Office (CCO) department at the Alibaba's headquarters in Hangzhou, China. Alibaba is a Chinese multinational conglomerate holding company specializing in e-commerce, retail, Internet, and technology. His current role is focused on improving the customer experience for more than 20 million users of the Ali Express, an online retail service owned by Alibaba. Currently, 70% of employees working at the CCO are computer engineers. He and his team embed artificial intelligence into customer services to serve both buyers and sellers. This system has helped to reduce more than 100 thousand customer agents for the platform. He has a B.S. in the Information Systems from Marietta College and an M.S. in Management Information Systems from Texas Tech University (Adapted from respondent-supplied information, 2019).

Nature of Material Collected

The materials collected from respondents are mostly non-numerical, the descriptive data and therefore, not appropriate for quantitative analysis using advanced statistical tools. Most of the descriptive data are fairly current, with only a small number of the references to historical contexts. None of the materials collected are deemed classified, private use only, or confidential. Most of the materials collected from the respondents are the experience-based while some of them are knowledge-based derived from other industry sources (e.g., Gartner, CIO Daily). Some materials are business-oriented in the nature, especially during the discussions on the demand-side of the AI features. Some materials, on the other hand, are technical in nature with many acronyms used. These technical acronyms are manually noted in the full interview transcripts (Appendix B).

RESULTS:

General Interpretative Approach

Qualitative data analysis entails certain distinct activities. The first and most important one is the ongoing discovery, which is about identifying themes and the developing concepts and propositions (Taylor *et al.*, 2015). Following Brinkmann, (2016) guidelines on the semi-structured interviews, this study has adopted a general interpretative approach and conducted a broad thematic analysis on the interview transcripts. Taylor *et al.* (2015) recommend identifying themes by the thoroughly exploring the data & propose the following steps to maintain focus.

DEVELOPING THEMES AND CONCEPTS

1. Read and reread your data.
2. Keep track of hunches, interpretations, and ideas.
 3. Look for themes that occur frequently.
 4. Construct typologies.
5. Develop concepts and theoretical propositions.
 6. Read the literature.
7. Develop charts, diagrams, and figures.
8. Write analytical memos.

Fig. 3: Developing Themes and Concepts (Taylor *et al.*, 2015).

After reading and rereading data collected from the respondents, we kept track of the hunches, the interpretations, and ideas by using the Microsoft OneNote, which allowed us to write down ideas anytime and anywhere. We looked for broad themes and the major topics that emerged from the interview transcripts and developed a coding scheme (**Fig. 4**) to analyze the data. One key observation that has emerged from the interviews is the dynamic relationship between the demand-side (CRM system customers/clients) and the supply-side (technology providers) of the implementation of AI features. Based on the coding template suggested by (Taylor *et al.*, 2015, p. 184), I modeled my coding scheme to the highlight the cultural and analytic categories that frequently appeared in the respondents' accounts of their experiences (**Fig. 4**). The coding scheme is applied using a red font to some sections in the transcripts (Appendix B) to demonstrate the process.

Demand Side	Supply Side
M Customer/Clients	Key AI Technologies
ROI (Return on Investment)	Artificial Intelligence (AI)
Profits maximization	Machine Learning (ML)
Costs & benefits	Deep Learning (DL) and Neural Network
Cost reduction	Natural Language Processing (NLP)
Customer intimacy	Voice Recognition (VR)
Customer experience	Image Recognition (IR)
Customer intent	Big Data
Personalized experience	AI leaders (e.g., Google, Microsoft, Amazon, IBM)
Operational excellence	R&D
Service excellence	PaaS (Platform as a Service)
Customer satisfaction (CSAT)	AI Tools
Efficiency	CRM vendors (e.g., Salesforce, NetSuite, SAP)
Accuracy	Application platform
Productivity	Embedded AI
Quality	Integrated AI
Competitive advantage	Cloud service
Black box effect	Next Best Action (NBA)
Expectation gap	Predictive analytics
Hybrid intelligence	CRM implementers (e.g., Accenture, Deloitte & Touche, Perficient)
Job loss	System integration
Role changes	Strategic planning
Data privacy	Implementation roadmap
Data security	Chatbots
	Virtual agents
	Agent assist systems
	Next Best Action (NBA)
	Client training and education
	Predictive analytics
	Custom solutions
	Personalization technology
	CRM facilitators (e.g., Microsoft IT evangelists, IBM Watson consultants, Sales force Einstein Analytics and Discovery consultants)
	CRM Followers (Both CRM implementers and customers can fall under this category)
	In-house development
	Data privacy & Data security

Fig. 4: Analysis: Coding Scheme for the AI-Driven CRM Space.

Emergent Themes

Cultural Categories

The cultural categories emerged when all four (4) respondents were talking about the key stakeholders in the AI-driven CRM space, especially the AI leaders, CRM vendors, CRM implementers, & CRM customers/clients. One emergent theme is that CRM customers/clients want AI features in the CRM system in order to achieve their strategic goals, such as the reducing operational costs and improving customer satisfaction. These are key demand-side factors that drive the implementation of AI features in CRM systems. From the supply-side perspective, one emergent theme is that CRM vendors (e.g., Salesforce, NetSuite, SAP) are the leveraging the tools and platforms from AI leaders (e.g., Google, Microsoft, Amazon, IBM) that conduct fundamental research & development in AI technologies. These tools are increasingly accessible through PaaS (platform as a service). The CRM vendors either embed the AI capabilities in their own applications or integrate with the AI leaders' platforms (e.g., IBM Watson). According to respondent 1, the supply side is playing a predominant role in pushing the adoption of

AI features in CRM systems. Another emergent theme from the supply side is that CRM implementers (e.g., Accenture, Deloitte and Touche, Perficient), usually partner with multiple CRM vendors and advise and facilitate the adoption of these AI-driven the CRM systems based on the assessment of customers' needs. The availability of advanced AI technologies and the promotion and adoption campaigns by CRM vendors and implementers are key supply-side factors that drive the implementation of the AI features in CRM systems. All four respondents predict that due to the dynamic growth of this ecosystem, the pace of change in customer service produced by AI-driven CRMs will accelerate over the next few years. However, she predicts that the acceleration will not continue all the way through a decade, though, because 80% of the adoption will probably come in the next three to five years due to the current high demand for AI features in CRM systems. Following Taylor *et al.* (2015) guidelines, I constructed the following analytic diagram (Fig. 5) to illustrate the dynamics of the key cultural categories.

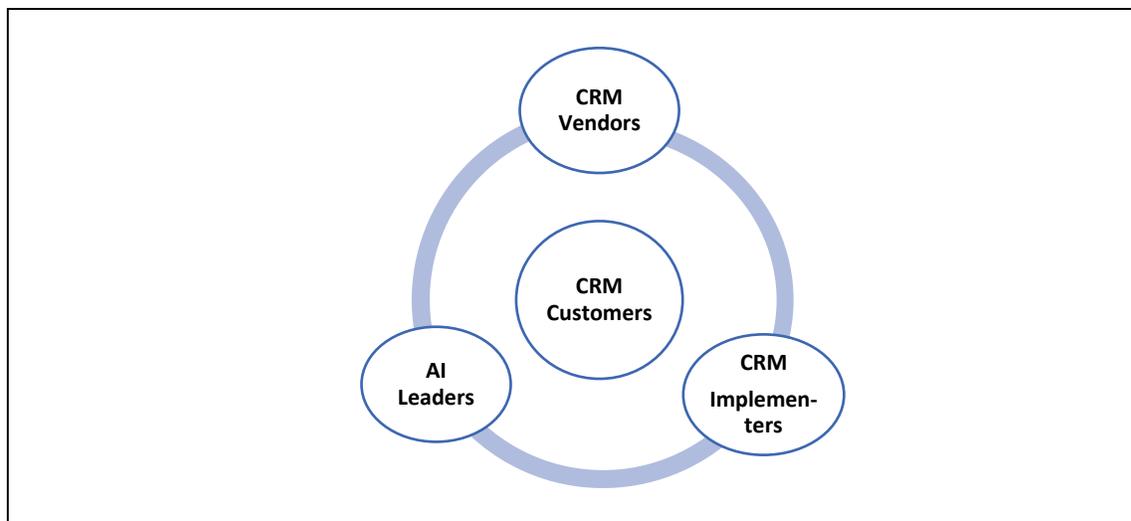


Fig. 5: Analytical Diagram: Key Cultural Categories in AI-Driven CRM Space.

Emergent Themes

Analytic Categories

The analytic categories establish the domain of the investigation and the organize the knowledge in the domain. In the specific domain of AI-driven CRM systems, a plethora of AI technologies are identified and defined in Fig. 2, which are used in CRM systems to discover insights, identify patterns, answer inquiries, UniversePG | www.universepg.com

solve problems, and provide recommendations. These analytic categories were used as elaboration probes in the formal interview protocols. The respondents have converged on the several AI technologies which are frequently mentioned in their responses, including the artificial intelligence (AI), machine learning (ML), natural language processing (NLP), voice recognition (VR), image recognition (IR), and big data. Several

common emergent themes include

- 1) Data has fueled the growth of the AI adoptions in the customer service space in recent years. Machine learning (ML) is the engine that powers these AI features.
- 2) Voice recognition (VR) and natural language processing (NLP) are among the top AI features adopted in the CRM systems. Virtual agents, chatbots, and agent assist systems are the predominant use cases in this space. The major challenge understands user intent & sentiment.
- 3) Predictive data analytics are on the rise and Next Best Action (NBA) systems are demanded by CRM customers to utilize the customer data better.
- 4) Image recognition (IR) or visual recognition has seen new use cases in the customer service space.

The respondents have also converged on several themes regarding the impact of AI on customer service and problem resolution, which include

- 1) Dramatically reducing the number of service personnel answering simple & routine customer inquiries;

- 2) Understanding each customer individually and providing personalized user experience to the achieve customer intimacy;
- 3) Offering fast & accurate answers and efficiently resolving problems;
- 4) Achieving higher customer satisfaction and the obtaining competitive advantages over competitors;
- 5) Ultimately realizing a satisfactory return on the investment (ROI) and maximizing profits;
- 6) Reducing the number of the low-level customer service personnel and transitioning them to more value-added roles, e.g., virtual agent managers and trainers. The impact is more about the role changes, rather than simple job loss.

Integrated Interpretation

The descriptive data collected from respondents support the relationships of the cultural and analytic categories proposed in earlier sections. That is, a plethora of AI technologies are becoming increasingly accessible through AI leaders, and are leveraged by CRM vendors and implementers to embed or integrate into CRM systems as useful AI features, which in turn impact customer service and problem resolution.

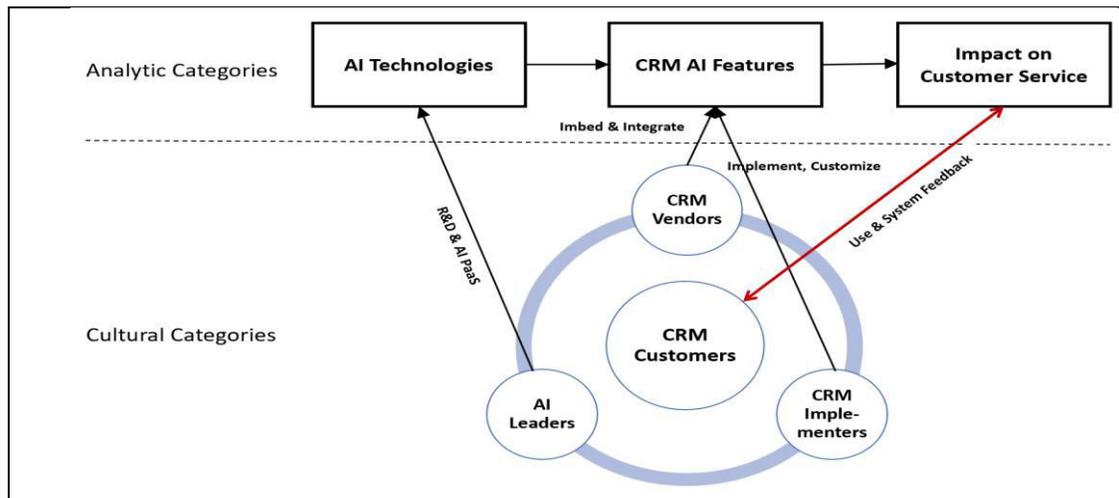


Fig. 6: Integrated Cultural & Analytic Categories in AI-Driven CRM Space.

DISCUSSION:

Summary of Findings

This qualitative research study intends to learn about the impact of the AI on customer relationship management (CRM), specifically in the area of customer service of problem resolution. The following are the

key findings based on the qualitative analysis of the data collected through semi-structured interviews with four respondents who have the extensive industry experiences in this space.

- 1) Overall, AI adoption by businesses for the various purposes has continued to the gain momentum in

recent years. With a focus on the customer service and problem resolution domain, the pace of adoption will accelerate in the next few years.

- 2) The most impactful AI features used in CRM systems include 1) virtual agents, chatbots and agent assist systems, which rely on voice/ speech recognition and natural language processing (NLP); 2) Next Best Action (NBA) systems, which leverage predictive data analytics; and 3) personalization technology, which is powered by advanced machine learning (ML) and the big customer data. The key factors that made these AI features impactful in the area of customer service and problem resolution include 1) cost savings from reducing the number of low-level service personnel; 2) faster and more accurate answers to customer inquiries; 3) personalized customer experience; and 4) overall improved quality of customer service & customer satisfaction.
- 3) The factors that drive the implementation of these AI features are mainly two folds – 1) from the demand-side perspective, an increasing the number of companies want AI features in their CRM systems to the obtain both tangible and intangible benefits and achieve their strategic goals; 2) from the supply-side perspective, AI leaders, CRM vendors, implementers, especially, are making the AI technologies and AI-driven CRMs more accessible to companies of various sizes. The key stake holders of AI-driven CRMs have formed an ecosystem, which is pushing the accelerated adoption of AI features in this space.
- 4) AI has been replacing the jobs of low-level customer service personnel and the some of the employees have transitioned to the more value-added roles, e.g., virtual agent managers and trainers. The impact is more about changing job roles, rather than simple job loss.
- 5) All respondents stated that their firms have formal programs to embrace new technologies (or help other firms), including AI. There is also a formal process to evaluate the success of such programs.

Limitations & Future Research

This study has several limitations. First, the sample

size of this study is very small and the informant selection process is not random, thereby limiting the generalizability of the findings. Second, due to the project time constraints, the four informants were selected from our own professional network. Further research could explore strategies to minimize biases linked to informant selection, ensuring a more objective and comprehensive analysis. Two informants are from the same company and three informants are from the IT consulting industry, thereby increasing the chance of biased responses. A longer vetting process would help in this aspect. Moreover, for conducting an in-depth interview, the researcher's personal interviewing skills (e.g., proper use of elaboration probes) could affect the quality of data collected. The test interview helped us immensely before conducting the actual interviews. Lastly, the flexibility of using elaboration probes in the interview may reduce reliability, as the respondents did not receive the same probe questions, which made it difficult to compare answers. Future research could increase the sample size and explore strategies to minimize biases linked to informant selection, ensuring a more objective & comprehensive analysis. In addition, further research could delve deeper into the transition of job roles resulting from AI implementation. Analyze how employees are adapting to new roles such as virtual agent managers and trainers, and assess the factors influencing a smooth transition.

CONCLUSION:

In conclusion, this qualitative study sheds light on the transformative impact of AI on CRM, particularly in the domain of customer service & problem resolution. The findings underscore the accelerating pace of AI adoption in businesses, with AI features like virtual agents, Next Best Action systems, and personalized technology leading the charge. These technologies, primarily driven by voice & natural language processing, predictive data analytics, & machine learning, are significantly enhancing customer service by enabling cost savings, faster and more accurate responses to inquiries, personalized experiences, and heightened customer satisfaction. Both demand-side factors, where companies seek AI integration to attain strategic objectives, & supply-side dynamics, wherein AI leaders and CRM vendors facilitate accessibility

and integration of AI technologies, contribute to this rapid AI adoption. Job roles in customer service are evolving, with AI replacing low-level service personnel and necessitating a shift towards higher-value roles. While this study's small sample size and the potential biases due to informant selection underscore its limitations, it serves as a foundational exploration of AI's impact in the CRM landscape. Future research should address these limitations, aiming for a broader and more objective analysis to the further our understanding of this evolving paradigm.

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CONFLICTS OF INTEREST:

I hereby declare that I have no conflicts of interest, financial or otherwise, that could have influenced or biased the work presented in this manuscript.

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APPENDICES

Appendix A. Interview Protocol

Thank you for agreeing to participate in this interview. This research aims to explore and understand the impact of artificial intelligence (AI) on the customer relationship management (CRM), specifically in the area of customer service and problem resolution. I am currently interviewing a small number of experts like you, so that I can draw on your experience to help us understand the nature of the AI impact in this space - how it happens and what determines its success and impact on customer service and problem resolution. I am very interested in your views and opinions on this topic as they reflect your experiences. Although I will

take notes during the interview, it will be very helpful if I have your permission to video record this conversation so that I accurately capture your opinions and input. To begin the interview, I would like to know a little bit more about you. Please take 3 minutes to talk about your background and current role in the organization, including how long you have worked here & the nature of your current professional responsibilities.

Time check: 3 minutes

INTERVIEW QUESTIONS

Q1. Think about the implementation of artificial intelligence (AI) features in CRM systems by businesses in the last ten years. What comes to mind as among the most remarkable features of AI used in the area of the customer service and problem resolution? What makes these AI features stand out in your mind?

Elaboration Probes

- 1) At least three AI features implemented in the customer service and problem resolution (e.g., chatbots)
- 2) Focus on the impact on the customer service and problem resolution
- 3) Nature of impact
- 4) Note terms that the respondent uses to describe the scale and locus of impact.
- 5) If needed, help respondents using an unrelated the AI example (e.g., the AI-driven fraud detection systems).

Time check: 8 minutes

Q2. How did these AI features come about and what factors drove the implementation of these AI features?

Elaboration Probes

- 1) The three AI features identified in Q1.
- 2) Origins: Needs for operational excellence and customer intimacy
New development in AI technologies & big data
- 3) Implementation Drivers:

AI technology development (e.g., machine learning, deep learning, the natural language processing, neural networks)

Industry actions and trends

Firm actions on the supply-side (e.g., the R&D, operations, excellence)

Firm actions on the demand-side (e.g., customer satisfaction, service excellence)

Other

Time check: 8 minutes

Q3. What, in your opinion, were the key factors that made the AI features impactful in the area of customer service and problem resolution? What do you think were the key barriers that had to be overcome?

Elaboration Probes

- 1) AI Technology, BIG data, personalization, data privacy, regulation, development costs
- 2) Market level Benefits/costs (e.g., customer insights, incremental productivity, work without breaks,
 1. content curation & recommendation; application dev and maintenance costs)
 2. Compatibility
 3. Competitive advantages
 4. Agility
 5. Other
- 3) Market access Product versions
 1. Service infrastructure
 2. Customer communication (traditional and new media)
 3. Service and distribution logistics
 4. Other
- 4) Role of firm size and resources
- 5) Contrast: AI implementations in CRM that failed

Time check: 8 minutes

Q4. How would you describe the nature and pace of change in customer service and problem resolution that these AI-driven CRMs have produced? Will this pace of change slow down, remain the same, or accelerate over the next decade?

Elaboration Probes

- 1) Note terminology used: Disruptive/radical/incremental/application/other
- 2) Note Categorization criteria: Scale, speed, competitive impact, convergence etc.

3) Explore the basis on which the predictions are made regarding both the nature and pace of the change

4) Explore factors related to change in pace

5) Explore the potential relationship between the supply and demand-side factors

Time check: 10 minutes

Q5. Given the nature, pace and impact of AI technologies used in customer service and problem resolution, describe the role that your firm has played (or help other firms) in the area. What have been the key accomplishments and challenges? Have you witnessed any firm-specific or industry-level impact on service job loss and change of job roles of customer service personnel?

Elaboration Probes

- 1) Note terminology used: (e.g., Leader, Follower, Challenger, Disrupter, Implementer, Facilitator)
- 2) Note implicit criteria Demand side, Supply side
- 3) Specific key accomplishments: Demand side, the Supply side
- 4) Specific key challenges: Demand side, Supply side
- 5) Specific challenges (product, process, technology)
- 6) Specific impact on job loss and roles if any

Time check: 10 minutes

Q6. Thinking about the time between the year 2000 and now, describe any specific steps or programs that your firm has taken (or help other firms) to support customer service and problem resolution using AI technologies. Is there a formal process in place? How (were) are these programs evaluated? Which ones were effective (ineffective)? What made the difference?

Elaboration Probes

- 1) Note whether the program is formal/informal
- 2) Focus Employees (esp. service employees)
 1. Customers/channel partners
 2. Vendors/other business partners
 3. External experts (consultants)
 4. Other
- 3) Criteria was evaluation done? Formal/informal
 1. ROI/Profits (short and long term)

2. Productivity (short and long term)
 3. Tangible demand-side impact (e.g., customer relationships, esp. customer satisfaction)
 4. Tangible supply-side impact (new service product, process, technology)
 5. Intangible work environment impacts (morale, empowerment, interaction)
- 4) Note effectiveness differentiators

Time check: 13 minutes

Before we close for today, would you like to add any other comments related to AI-Driven CRM in the area of customer service and problem resolution that we may not have covered in our conversation so far?

Elaboration Probes None

Thank you again for your time and your insights. We

truly appreciate your participation and willingness to share your views with us. We would like to reaffirm our original assurance of confidentiality. Would you have any problems with us thanking you by name for your help in our finished report (without attributing any opinions)?

Record response: [] Yes - feel free to thank me by name [] No - do not identify me. Finally, we will be very pleased to share a copy of our final report with you. The report should be completed by the end of this summer. Once again, thank you so much for your help.

Total: 60 minutes

The full interview transcripts are available at:

https://drive.google.com/file/d/1fTF1IIFEt-v89o9v3ohIxHIjUhFdN_v0/view?usp=sharing

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