

ANALYSIS OF EFFECTIVE PREDICTION MODEL OF CRM AND CUSTOMERS BY USING ARTIFICIAL INTELLIGENCE

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ABSTRACT

The integration of Artificial Intelligence (AI) into Customer Relationship Management (CRM) represents a promising avenue for enhancing organizational effectiveness. However, this process is marked by unique challenges and complexities inherent in CRM processes, posing difficulties for both academics and practitioners in understanding the organizational and managerial elements crucial for successful AI-CRM integration. This study aims to bridge this knowledge gap by identifying and categorizing the challenges that businesses encounter throughout the phases of AI integration in a CRM context, from initial discovery to the final sustain phase.

Given the multifaceted nature of AI-CRM integration, which encompasses expertise in artificial intelligence, customer relationship management, data science, and business management, our research employs a qualitative approach involving interviews with various stakeholders, including managers, consultants, and specialists across these domains. This method ensures a diverse range of insights into the challenges and opportunities associated with AI-CRM integration. The study identifies eleven specific challenges related to AI-powered CRM, emphasizing a temporal division of these challenges across the four phases of AI implementation. Additionally, the research provides practical guidelines for effectively addressing these challenges, offering valuable insights for organizations seeking to navigate the complexities of AI-CRM integration successfully.

The findings contribute empirically to our understanding of AI-CRM integration, offering a long-term perspective on leveraging AI for customer relationships. This research serves as a foundational resource for exploring the requisite activities and capabilities needed to overcome the challenges associated with AI-CRM integration. The guidelines developed in this study provide essential questions and considerations for managers embarking on the journey of integrating AI into CRM processes, facilitating a more informed and strategic approach to this transformative endeavor.

Keyword: *Artificial Intelligence, Customer Relationship Management, Integration Challenges, CRM Processes, Organizational Effectiveness*

1. Introduction:

This passage emphasizes that Customer Relationship Management (CRM) is a strategic approach involving the collection, management, and intelligent use of data with technology solutions to cultivate valuable relationships with key customers and ensure an exceptional customer experience. The next evolution in CRM is seen in artificial intelligence (AI), particularly through machine learning (ML) and deep learning (DL) techniques, enabling insights, pattern recognition, and decision-making with limited human intervention. Successful companies leverage AI in

CRM for various applications, including customer data analysis, chatbots, personalized recommendations, sentiment analysis, computer vision, voice and speech recognition, and predictive analytics.

The integration of AI into CRM has yielded significant benefits in areas such as forecasting, performance management, upselling, and cross-selling. Beyond immediate advantages, AI in CRM holds long-term strategic implications, allowing companies to adapt and thrive in a dynamic market. However, challenges associated with AI integration in CRM, especially in terms of organizational and managerial elements, still persist. Many businesses struggle with the complexity of the technology and the required organizational changes. The study aims to fill this gap by identifying challenges and opportunities in AI integration within CRM, spanning from the initial discovery phase to the final sustain phase. Through qualitative interviews with experts, providers, and managers, the research identifies eleven specific challenges associated with AI-powered CRM and presents a temporal division of these challenges across the four phases of AI implementation. Guidelines are proposed to effectively address these challenges.

The findings contribute to an empirical understanding of AI-CRM integration, offering insights into activities and capabilities required to navigate challenges. This research provides essential questions for managers embarking on the journey of AI-CRM integration, ensuring informed decisions and preventing technology investments without adequate awareness of organizational and managerial changes. The study aims to equip managers with recommendations and guidelines, considering the uncertainties, complexity, and lack of experience that hinder AI integration in CRM. Ultimately, the research bridges the gap between theory and practice, offering practical implications for organizations leveraging AI in CRM strategies.

2.1. AI-powered CRM

The literature review underscores that artificial intelligence (AI) signifies a crucial advancement in the evolution of customer relationship management (CRM) systems. AI-CRM systems, primarily driven by machine learning (ML) and deep learning (DL), are expected to empower managers by enhancing predictive and real-time suggestions through extensive data collection. Recent shifts in academia's approach to AI-CRM integration emphasize a broader, strategic perspective over specific technological applications. This shift prompts discussions on the advantages and challenges of integrating AI into CRM, including necessary organizational, cultural, and strategic changes.

Scholars highlight several advantages of AI integration in CRM, such as improved customer acquisition and retention, minimized churn, and increased customer engagement. AI seamlessly integrates diverse data sources for customer acquisition, facilitating the identification of potential clients. Moreover, AI nurtures relationships with existing customers through techniques like upselling and cross-selling, ultimately leading to increased order frequency and prolonged customer engagement. Automated customer segmentation enables personalized marketing messages, enhancing retention rates and customer engagement. AI applications, including chatbots and virtual assistants, increase operational productivity and process efficiency. Predictive analytics and recommendation engines improve decision-making regarding marketing strategy, pricing, channel management, and product-service design.

2.2. Implementing AI: Challenges and CRM Specificities

The integration of AI into CRM systems is considered promising for enhancing customer interactions, streamlining operations, and gaining a competitive edge. However, challenges exist, with a notable failure rate observed in AI projects across industries. Existing studies have predominantly focused on challenges related to AI adoption in general, with limited exploration of the CRM context.

Challenges in AI adoption within CRM include technical prerequisites, seamless integration with existing platforms, scalability, customization requirements, and defining precise objectives for AI algorithms. CRM-specific challenges involve implicit and hard-to-quantify goals, collaboration between marketing and sales teams, understanding customer emotions, transparency, explainability, and resistance to change. The emotional dimension in CRM adds complexity to AI models, setting it apart from more straightforward applications. Transparency and explainability in AI decisions, though not deeply investigated in the CRM context, are considered pressing issues, requiring a commitment to customer data privacy and ethics. The study underscores the need for a comprehensive framework tailored to the context of AI-powered CRM, considering its unique characteristics.

2.3. Understanding the AI Implementation Process

Before delving into specific challenges and stages of AI implementation in CRM, the study recognizes theoretical foundations guiding this process. The Technology, Organization, and Environment (TOE) framework offer a holistic perspective, considering how the adoption of new technologies is influenced by various factors. The AI implementation process involves phases such as Discovery, Devise, Deploy, and Sustain.

The Discovery phase involves defining the vision for desired outcomes and exploring use cases and technologies. The Devise phase focuses on capability development and pilot projects, requiring transparent communication to minimize resistance to change. Deploy phase expands initiatives, with governance playing a crucial role in orchestrating efforts. The Sustain phase emphasizes continuous transformation and progress.

Distinct challenges at each stage are vital for successful implementation, aligning the AI system with organizational goals, technical requirements, and human factors. However, there is a research gap regarding how challenges may vary within each stage of AI implementation in the CRM context, posing a challenge for practitioners seeking practical guidance on seamless integration.

3. Methodology

To achieve our research objectives, we adopted a qualitative approach employing grounded theory methodology following the guidelines outlined by Strauss and Corbin (2000). This approach enabled the observation of real-world phenomena, the collection of insights from relevant stakeholders, and the iterative analysis of data and literature for theory building, as emphasized by MacInnis et al. (2020). The significance of conducting a comprehensive analysis with sizable samples of marketers to understand their actions in the context of the AI surge was highlighted by Moradi and Dass (2022).

With this objective in mind, we developed a protocol (tested with Company 0, see Fig. 1) used during the interviews. The primary data source was the information collected through interviews, providing opinions and experiences of relevant stakeholders (Foley et al., 2021). Key questions in the protocol included inquiries about the genesis and evolution of AI application projects in CRM, steps and people involved in the project from inception to utilization, and difficulties encountered before, during, and after integration, along with the strategies employed to address them. Additional questions were posed to gather further insights based on participants' responses.

3.1. Sampling Strategy

To uncover the complexity of AI-CRM integration beyond specific technical applications and capture a broad range of industry contexts, we employed a purposeful sampling strategy focusing on the integration of an AI application in CRM as the unit of analysis.

The sampling strategy aimed for maximum variation, following a replication logic (Yin, 2014), considering the level of success (measured in terms of achieving AI application goals) and the industry as key variations (Coyne, 2018; Patton, 1990). Sample participants, our unit of observation, were required to meet two selection criteria: (1) managers with a minimum of five years of experience in CRM or related operations, and (2) direct involvement in managing the integration of one or more AI applications in CRM.

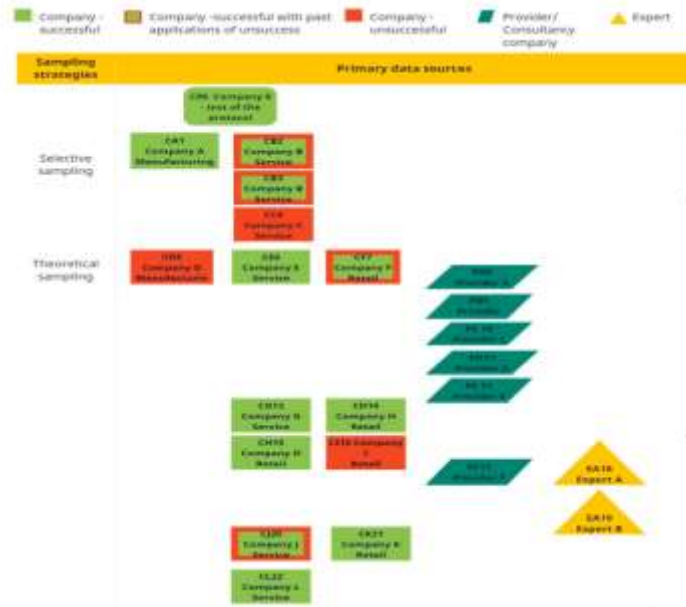


Fig. 1. Sample and data collection evolution

3.2. Data Collection and Analysis

Our research commenced with selective sampling, guiding the development of conceptual lines for theoretical sampling (Coyne, 2018; Patton, 1990). Initially, we carefully selected four top managers from three distinct manufacturing and service companies with varying levels of success in integrating AI in CRM (refer to Fig. 1). As we uncovered new concepts, we expanded our study through theoretical sampling, following the recommendation of Homburg et al. (2017). This led us to interview an additional set of top managers, totaling ten individuals from nine different companies within the retail sector. Furthermore, we engaged six managers from providers or consultancy firms specializing in AI applications for CRM, and two experts with extensive experience in specific topics, including AI ethics and human-machine relationships, broadening our information set (see Fig. 1).

Each ID within a form consists of the first letter representing the sample group (C for company, P for provider/consultant, or E for expert), the second letter denoting the interview number within the group, and the final number indicating the order of the interview.

3.3 Data Collection and Analysis Process:

The data collection and analysis proceeded concurrently (Foley et al., 2021), encompassing a total of 22 interviews (see Table 1). We transcribed the interviews verbatim and promptly organized these transcriptions, along with written memos, into a database. Subsequently, we conducted thematic and content analysis on the interviews, utilizing codes extracted from the ATLAS.ti software, a specialized tool for qualitative data analysis (refer to Ghani et al., 2022 and [additional reference]).

Representation 1: Pivot Table

ID	Type	Main Industry	Specialization	Size	Start of Working with AI in CRM
C00	Company	Test Tech, CRM Consultancy	50–200	2018	CRM Project Manager
CA1	Company	Manufacturing	1–50	2019	CRM Manager

CB2	Company	Service	10,000–50,000	2018	Head of RandI Department
CB3	Company	Service	10,000–50,000	2018	Director of Innovation and CX
CC4	Company	Service	> 50,000	2016	Head of Project, Insurance Manager
CD5	Company	Manufacturing	200–1000	2021	Head of Project, IT Manager
CE6	Company	Service	10,000–50,000	2018	Lead Data Scientist
CF7	Company	Retail	> 50,000	2021	Group Data Lead
CG13	Company	Service	> 50,000	2014	Director Center of Excellence AI
CH14	Company	Retail	10,000–50,000	2019	Chief Information Officer
CH15	Company	Retail	10,000–50,000	2019	Chief Data Officer
CI16	Company	Retail	50–200	2018	CRM Manager
CJ20	Company	Service	> 50,000	2018	Chief Data Officer
CK21	Company	Retail	50–200	2020	Chief Digital Officer
CL22	Company	Service	> 50,000	2018	Data Scientist
PA8	Provider/Consultancy	Company A	Tech, Provider of Software and Technologies for Databases	10,000 – 50,000	2005
PB9	Provider/Consultancy	Company B	Tech, AI Development Consultancy	1–50	2016
PC10	Provider/Consultancy	Company C	Tech, AI Provider of AI Software Dedicated to the Insurance Industry	50–200	2016
PD11	Provider/Consultancy	Company D	Tech, AI/ML Solutions Provider	1–50	2019
PE12	Provider/Consultancy	Company E	Tech, AI Transformation Consultancy	1–50	2018
PF17	Provider/Consultancy	Company F	Tech, AI and NLA Consultancy	200–1000	2008
EA18	Expert	A	-	-	-
EB19	Expert	B	-	-	-

Representation 2: Grouped by Type Companies (C)

ID	Main Industry	Specialization	Size	Start of Working with AI in CRM
C00	Test Tech, CRM Consultancy	50-200	2018	CRM Project Manager
CA1	Manufacturing	1-50	2019	CRM Manager
CB2	Service	10,000-50,000	2018	Head of RandI Department
CB3	Service	10,000-50,000	2018	Director of Innovation and CX
CC4	Service	> 50,000	2016	Head of Project, Insurance Manager
CD5	Manufacturing	200-1000	2021	Head of Project, IT Manager
CE6	Service	10,000-50,000	2018	Lead Data Scientist
CF7	Retail	> 50,000	2021	Group Data Lead
CG13	Service	> 50,000	2014	Director Center of Excellence AI
CH14	Retail	10,000-50,000	2019	Chief Information Officer
CH15	Retail	10,000-50,000	2019	Chief Data Officer
CI16	Retail	50-200	2018	CRM Manager
CJ20	Service	> 50,000	2018	Chief Data Officer
CK21	Retail	50-200	2020	Chief Digital Officer
CL22	Service	> 50,000	2018	Data Scientist

ID	Main Industry	Specialization	Size	Start of Working with AI in CRM	Interviewee
PA8	Company A	Tech, Provider of Software and Technologies for Databases	10,000-50,000	2005	CX Specialist
PB9	Company B	Tech, AI Development Consultancy	1-50	2016	Founder and Independent Advisor
PC10	Company C	Tech, AI Provider of AI Software Dedicated to the Insurance Industry	50-200	2016	Head of Marketing and Communication
PD11	Company D	Tech, AI/ML Solutions Provider	1-50	2019	Chief Executive Officer
PE12	Company E	Tech, AI Transformation Consultancy	1-50	2018	Associate Partner
PF17	Company F	Tech, AI and NLA Consultancy	200-1000	2008	Chief Technical Officer
Experts (E)					
ID	Interviewee				
EA18	HDR of Digital and Artificial Intelligence in Marketing				
EB19	Head of Several AI Business and Start-ups				
ID	Main Industry	Specialization	Size	Start of Working with	Interviewee

				AI in CRM	
PA8	Company A	Tech, Provider of Software and Technologies for Databases	10,000–50,000	2005	CX Specialist
PB9	Company B	Tech, AI Development Consultancy	1–50	2016	Founder and Independent Advisor
PC10	Company C	Tech, AI Provider of AI Software Dedicated to the Insurance Industry	50–200	2016	Head of Marketing and Communication
PD11	Company D	Tech, AI/ML Solutions Provider	1–50	2019	Chief Executive Officer
ID	Interviewee				
EA18	HDR of Digital and Artificial Intelligence in Marketing				
EB19	Head of Several AI Business and Start-ups				
Representation 3: Organized by Size (Small-sized Companies (1–50))					
ID	Main Industry	Specialization	Start of Working with AI in CRM	Interviewee	
CA1	Manufacturing	1–50	2019	CRM Manager	
PB9	Company B	Tech, AI Development Consultancy	1–50	2016	
PD11	Company D	Tech, AI/ML Solutions Provider	1–50	2019	
PE12	Company E	Tech, AI Transformation Consultancy	1–50	2018	
Medium-sized Companies (50–200)					
ID	Main Industry	Specialization	Start of Working with AI in CRM	Interviewee	
CI16	Retail	50–200	2018	CRM Manager	
CK21	Retail	50–200	2020	Chief Digital Officer	
Mid-sized Companies (200–1000)					
ID	Main Industry	Specialization	Start Working with AI in CRM	Interviewee	
CD5	Manufacturing	200–1000	2021	Head of Project, IT Manager	
PF17	Company F	Tech, AI and NLA Consultancy	200–1000	2008	

Large-sized Companies (> 50,000)				
ID	Main Industry	Specialization	Start of Working with AI in CRM	Interviewee
CB2	Service	10,000–50,000	2018	Head of RandI Department
CB3	Service	10,000–50,000	2018	Director of Innovation and CX
CC4	Service	> 50,000	2016	Head of Project, Insurance Manager
CE6	Service	10,000–50,000	2018	Lead Data Scientist
CF7	Retail	> 50,000	2021	Group Data Lead
CG13	Service	> 50,000	2014	Director Center of Excellence AI
CH14	Retail	10,000–50,000	2019	Chief Information Officer
CH15	Retail	10,000–50,000	2019	Chief Data Officer
CJ20	Service	> 50,000	2018	Chief Data Officer
CL22	Service	> 50,000	2018	Data Scientist

4. Challenges in the Discover Phase

4.1.1. Maintain a Culture of Data and Customer Centricity

Adopting a mindset valuing data-driven decision-making and customer feedback is crucial for successful AI integration in CRM. Establishing a culture of data and customer listening requires awareness-building and acculturation toward AI, data, and customer centricity. Interviewees emphasized the need for analytical skills in interpreting customer data, with CH14 stating, "The true culture of data and of customer listening must absolutely be well rooted within the business direction." Lack of understanding about data projects, including data management and quality issues, can hinder success, as noted by PE12.

Operational effectiveness of AI requires a cultural shift not only among management but also among employees who will utilize the AI application. Without this alignment, implementation risks minimal value addition or may not materialize at all. Success in AI-CRM integration depends on a learning orientation, incremental thinking, and empowering individuals with autonomy, as highlighted by CA1, a CRM manager: "Wanting to experiment with new things is certainly an enabler, always looking for something new that can improve the company."

Ethical considerations, encompassing data privacy, safety, fairness, transparency, and accountability, are paramount in AI-powered CRM. Adhering to ethical guidelines and regulations builds trust and upholds standards. The interviews stressed the importance of moving beyond mere compliance with regulations. "Ethics by design" involves considering ethical principles from the project's inception, requiring an interdisciplinary ethics committee to define guidelines collaboratively, as emphasized by EA18: "The company should have an ethics committee inspired by more general rules. Setting clear business objectives and defining key performance indicators (KPIs) from the project's outset is challenging but essential. Organizations often struggle to define what they want to achieve with AI, leading to project complexities. Thorough assessments of potential AI applications and their value propositions can aid in goal-setting. A maturity analysis, as mentioned by CF7, helps identify weaker domains and prioritize impactful applications: "We identified the domain where we found that we were weaker... and looked for applications with the most impact. Change management, HR consultation, and educational initiatives are vital for fostering an AI culture. Gradual change prioritizing AI solutions with clear benefits and improvements in marketing processes is crucial. Business involvement in AI projects from the early stages is essential for success, and a

supportive sponsor is crucial, as emphasized by PE11: "The project must have some sponsoring from the top management because most of the time these projects use some confidential or restricted data."

4.2.2. Ensure Data Comprehension, Collection, Accessibility, Monitoring, and Centralization

Data quality and complexity challenges are amplified in CRM due to personal customer information. Understanding useful data, addressing data comprehension challenges, and monitoring data drift are crucial. Shifting from structured to unstructured data and leveraging Natural Language Understanding (NLU) algorithms can facilitate more efficient data collection. Data accessibility, monitoring, and centralization are critical for effective AI implementation. Human involvement is critical throughout the Devise phase. Strategic actions, such as face-to-face interviews, gathering subjective knowledge, and involving front-end employees and customers in the loop, facilitate the transfer of tacit knowledge to machines. The importance of fostering trust through transparent communication and continuous engagement was highlighted by CG13 and CF7.

5. Challenges in the Deploy Phase

Project ownership by the business side, rather than solely by IT or the data office, is crucial for successful AI-CRM integration. AI projects involve investments in data management, human resources, and process enhancements. Prioritizing internal advancements, such as improved data management and CRM processes optimization, is vital, as AI project costs and benefits are not always clear at the project's inception. Siloed organizations hinder collaboration and connections between functional areas. The successful integration of AI in CRM requires interdisciplinary, multicultural, and multi-skilled teams. Facilitators within the team, with strong communication and teamwork skills, play a crucial role in fostering collaboration and effective information exchange. AI-powered CRM systems often integrate various technologies, data sources, and operational processes, posing challenges in managing complexity. Legacy systems and existing integrations can complicate the integration process. Effective management of complexity involves establishing strong connectivity, standardized interfaces, and integration frameworks. Having an IT expert within the team is essential for navigating challenges associated with integration. Organizational changes required for AI-CRM integration may face resistance and skepticism. Proactive communication of AI advantages, comprehensive training, and a culture encouraging trust are essential. Transparent communication, comprehensive training, and regular meetings for progress updates contribute to user adoption. Strategies like A-B testing, tailored interfaces based on user proficiency, and incentivizing adoption can enhance user acceptance.

6. Conclusion

In conclusion, the challenges across different phases of AI-CRM integration underscore the importance of cultural alignment, ethical considerations, clear goal-setting, effective change management, interdisciplinary collaboration, and ongoing user engagement. Addressing these challenges strategically can enhance the likelihood of successful AI implementation in CRM.

Our research delves into the nuances of AI-CRM integration, offering valuable insights for businesses navigating the complexities of this specialized field. The findings contribute to the existing literature on AI adoption and implementation, with a particular focus on industries heavily reliant on CRM. While confirming challenges identified by other authors, our study reveals specific obstacles unique to the CRM context. Several challenges identified align with existing literature, such as the formulation of clear business goals and KPIs, adherence to ethical principles, management of complexity and changes, data collection and use, trust and awareness around AI, and skillset changes. However, our study uncovers distinctive challenges arising from the inherently customer-centric nature of CRM.

One unique challenge highlighted is the need to understand customer emotions and sentiments. Traditional AI applications may not be adept at capturing and interpreting this data. A cultural shift toward data-driven decision-making and customer-centric approaches is essential. However, many businesses face difficulties due to entrenched traditional and siloed working methods. Aligning stakeholders and ensuring project ownership are particularly crucial challenges in the CRM context. With multiple departments involved, such as marketing, sales, and customer service, obtaining buy-in from all stakeholders is essential. Ensuring everyone is aligned with project goals becomes a critical success factor.

The extensive customer data collected in CRM contributes to a complex data landscape, posing challenges in comprehension, collection, use, and monitoring. Clear data governance policies and procedures are necessary to address these challenges. Seamless communication and data exchange with other systems and platforms require a clear integration strategy. A critical challenge is striking the right balance between human and AI roles in CRM interactions. While AI can automate tasks, human judgment and empathy are irreplaceable. Striking the right balance between the two becomes paramount for successful integration.

To address these challenges, we formulated practical guidelines, as depicted in Figure 2 and summarized in Table 2. Figure 2 breaks down discovered challenges based on different implementation stages, emphasizing the risk of failure if prerequisites in the current phase are not met before progressing. Table 2 provides practical actions to address challenges and enhance AI-powered CRM effectiveness. In conclusion, our findings align with existing literature on AI while providing additional insights specific to AI-powered CRM. The presented guidelines offer practical strategies for overcoming challenges at different stages of implementation. This research contributes to a deeper understanding of AI integration in CRM settings and the capabilities required to navigate obstacles. Our study has academic implications by offering a comprehensive overview of challenges in AI integration in CRM, emphasizing a temporal perspective. This research opens avenues for future exploration, suggesting promising areas for research to enhance understanding of the dynamic nature of AI integration. The identified challenges, specific to AI-powered CRM, provide valuable insights for businesses and academics alike, fostering continued exploration in this evolving field.

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