The Evolution of CRM: A Deep Dive into Human-AI Integration

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Abstract

The integration of artificial intelligence (AI) and human expertise has emerged as a transformative force in the realm of customer relationship management (CRM). This deep dive explores the symbiotic relationship between human intelligence and AI-driven technologies, highlighting the advancements, challenges, and future possibilities that arise from this collaboration. By leveraging the power of AI, businesses can gain deeper insights into customer behavior, personalize engagement, and streamline processes, ultimately enhancing customer satisfaction and operational efficiency. However, the successful integration of AI in CRM systems also presents challenges, such as data privacy concerns, compatibility issues, and the need for effective change management. As the evolution of CRM continues, striking a balance between AI-driven insights and human intuition becomes crucial. This article delves into the dynamics of human-AI integration in CRM, providing valuable insights for organizations seeking to harness the potential of this transformative relationship while navigating the challenges that come with it. With a comprehensive analysis of current trends, market growth, and future prospects, this deep dive offers a roadmap for businesses to unlock the full potential of AI-powered CRM automation and smart customer engagement.

Keywords: Artificial Intelligence (AI), Customer Relationship Management (CRM), Human-AI Integration, Personalization, Data Privacy.

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1.Introduction

In the rapidly evolving landscape of customer relationship management (CRM), the integration of artificial intelligence (AI) and human expertise has emerged as a transformative force. As businesses strive to enhance customer engagement, streamline processes, and gain a competitive edge, the symbiotic relationship between human intelligence and AI-driven technologies has become increasingly crucial [1]. The advent of AI in CRM has unlocked new possibilities, enabling organizations to leverage vast amounts of data, automate repetitive tasks, and deliver personalized experiences to customers [2].

The integration of AI in CRM systems has been a gradual process, with early adopters paving the way for widespread implementation. Initially, AI was primarily used for automating simple tasks and providing basic customer support [3]. However, as the technology matured and became more sophisticated, its potential to revolutionize CRM became evident. Today, AI-powered CRM solutions have the capability to analyze complex data sets, predict customer behavior, and provide actionable insights [4].

The convergence of human expertise and AI in CRM has created a powerful synergy that promises to redefine the way businesses interact with their customers. While AI excels at processing vast amounts of data and identifying patterns, human intuition and emotional intelligence remain essential in building meaningful customer relationships [5]. The combination of these two forces allows organizations to deliver highly personalized and empathetic customer experiences while optimizing operational efficiency [6].

However, the integration of AI in CRM systems is not without challenges. Concerns regarding data privacy, ethical considerations, and the potential for job displacement have raised important questions [7]. Additionally, the successful implementation of AI in CRM requires a significant investment in infrastructure, talent, and change management [8].

Despite these challenges, the potential benefits of human-AI integration in CRM are immense. By harnessing the power of AI, businesses can gain deeper insights into customer preferences, anticipate their needs, and deliver timely and relevant solutions [9]. Moreover, the automation of repetitive tasks frees up human resources to focus on higher-value activities, such as strategic planning and relationship building [10].

As the evolution of CRM continues, the integration of human-AI collaboration is set to play a pivotal role in shaping the future of customer engagement. This deep dive aims to explore the advancements, challenges, and future possibilities that arise from

this transformative relationship, providing valuable insights for businesses seeking to leverage the power of human-AI synergy in their CRM strategies.

II. Advancements in Human-AI Integration in CRM

The integration of human expertise and AI in CRM has brought about significant advancements, transforming the way businesses engage with their customers.

Following is the table to compare traditional and AI-powered CRM:

Aspect	Traditional CRM	AI-Powered CRM
Data Analysis	Manual, limited	Automated, advanced
Customer Insights	Basic segmentation	Predictive, personalized
Engagement Channels	Limited, siloed	Omnichannel, integrated
Process Efficiency	Time-consuming, error-prone	Streamlined, accurate
Scalability	Restricted by human resources	Highly scalable
Decision-Making	Based on historical data	Real-time, data-driven
Customer Experience	Reactive, standardized	Proactive, personalized

Table 1: Comparison of Traditional CRM and AI-Powered CRM [51]

One of the key areas where AI has made a profound impact is in data analysis and insights [11]. Machine learning algorithms have enabled CRM systems to process vast amounts of customer data, uncovering hidden patterns and trends that would be difficult for humans to identify [12]. These insights allow businesses to gain a deeper understanding of customer behavior, preferences, and needs, enabling them to make data-driven decisions and optimize their strategies [13].

Predictive analytics, powered by AI, has revolutionized the way businesses anticipate customer behavior [14]. By analyzing historical data and identifying patterns, AI algorithms can predict future customer actions, such as the likelihood of a purchase or the risk of churn [15]. This predictive capability allows organizations to proactively engage with customers, offering personalized recommendations and targeted marketing campaigns [16].
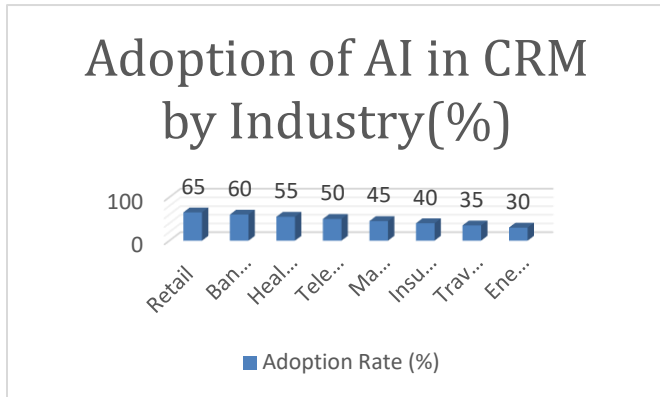
Figure 1: Adoption of AI in CRM by Industry [53]

Another significant advancement in human-AI integration is the enhancement of personalization and customer engagement [17]. AI-driven chatbots and virtual assistants have become increasingly sophisticated, capable of understanding natural language and providing human-like interactions [18]. These intelligent agents can handle routine customer inquiries, provide product recommendations, and even offer emotional support, freeing up human agents to focus on more complex tasks [19]. Moreover, AI enables the creation of highly personalized marketing campaigns, tailoring content and offers based on individual customer preferences and behavior [20].

The integration of AI in CRM has also led to increased operational efficiency [21]. Automation of repetitive tasks, such as data entry, lead qualification, and email responses, has significantly reduced the workload on human employees [22]. AI-powered tools can streamline workflows and processes, eliminating bottlenecks and improving overall productivity [23]. By automating mundane tasks, businesses can allocate their human resources to higher-value activities, such as building strategic relationships and fostering customer loyalty [24].

III. Challenges and Overcoming Obstacles

While the integration of AI in CRM presents numerous opportunities, it also introduces challenges that must be addressed. One of the primary concerns revolves around data privacy and security [25]. As AI relies heavily on vast amounts of customer data, ensuring compliance with privacy regulations, such as the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA), becomes crucial [26]. Organizations must implement robust data protection measures, including encryption, secure storage, and access controls, to safeguard sensitive customer information [27].

Another challenge lies in the integration of AI with existing systems and processes [28]. Compatibility issues and system interoperability can hinder the smooth implementation of AI-powered CRM solutions [29]. Organizations may face difficulties in integrating AI technologies with their legacy systems, leading to data silos and inefficiencies [30]. To overcome these obstacles, businesses must invest in modular and scalable architectures that facilitate seamless integration and data exchange [31].

Change management and employee training also pose significant challenges when integrating AI in CRM [32]. Employees may resist the adoption of AI technologies due to fear of job displacement or lack of trust in the system [33]. Organizations must provide comprehensive training programs to help employees understand the benefits of AI and how it can augment their roles rather than replace them [34]. Fostering a culture of continuous learning and upskilling is essential to ensure a smooth transition and maximize the potential of human-AI collaboration [35].

Balancing human intuition and AI-driven insights is another critical challenge [36]. While AI excels at processing vast amounts of data and identifying patterns, it lacks the emotional intelligence and contextual understanding that humans possess [37]. Over-reliance on AI can lead to automated decision-making that fails to account for the nuances of human behavior and preferences [38]. Organizations must strike a balance between leveraging AI-driven insights and empowering human employees to make informed decisions based on their expertise and intuition [39].

Challenge	Mitigation Strategy
Data Privacy and Security	Implement robust data protection measures, ensure compliance
System Compatibility	Invest in modular and scalable architectures, facilitate integration
Change Management	Provide comprehensive training, foster a culture of continuous learning
Balancing Human and AI	Empower human employees, leverage AI insights strategically
Ethical Considerations	Establish clear guidelines, monitor AI systems for bias and fairness
Talent Acquisition	Recruit and retain skilled professionals, promote interdisciplinary collaboration
Measuring ROI	Define clear metrics, track performance improvements and cost savings

Table 2: Key Challenges and Mitigation Strategies for Human-AI Integration in CRM [52]

IV. Future Possibilities and Innovative Approaches

As the integration of AI in CRM continues to evolve, several exciting possibilities and innovative approaches are on the horizon. One such area is advanced sentiment analysis and emotion detection [40]. By leveraging natural language processing (NLP) and machine learning techniques, AI algorithms can analyze customer interactions, such as social media posts, emails,

and phone conversations, to understand underlying emotions and preferences [41]. This emotional intelligence enables businesses to tailor their interactions based on customer sentiments, providing empathetic and personalized experiences [42].

Another promising avenue is the integration of augmented reality (AR) and virtual reality (VR) in CRM [43]. These immersive technologies have the potential to revolutionize customer engagement by creating captivating and interactive experiences [44]. AR and VR can be used to showcase products, provide virtual demonstrations, and offer immersive customer support [45]. By blending the virtual and physical worlds, businesses can enhance customer understanding, improve product visualization, and create memorable brand experiences [46].
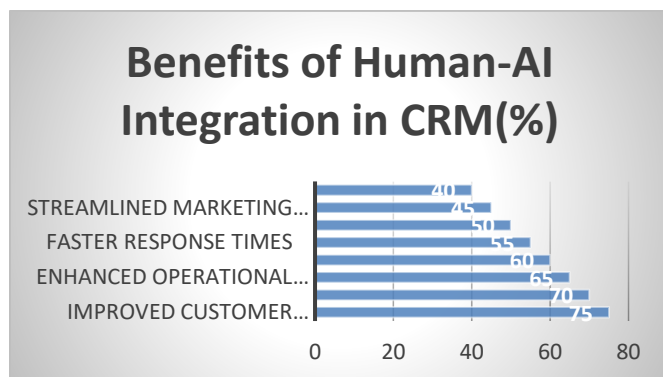

Figure 2: Benefits of Human-AI Integration in CRM [54]

The future of CRM also lies in collaborative intelligence and seamless human-AI teamwork

[47]. As AI technologies become more sophisticated, the focus will shift towards creating synergistic partnerships between humans and AI systems [48]. By leveraging the strengths of both human intuition and AI-driven insights, businesses can enhance decision-making and problem-solving capabilities [49]. Collaborative intelligence allows for the seamless integration of human expertise and AI algorithms, enabling organizations to tackle complex challenges and drive innovation [50].

V. Conclusion

In conclusion, this deep dive into the evolution of CRM through the integration of human-AI collaboration has highlighted the transformative potential of this symbiotic relationship. By leveraging the power of AI, businesses can gain deeper insights into customer behavior, personalize engagement, and streamline processes, ultimately enhancing customer satisfaction and operational efficiency. However, the successful integration of AI in CRM systems also presents challenges, such as data privacy concerns, compatibility issues, and the need for effective change management.

As the future unfolds, the possibilities for human-AI integration in CRM are vast and exciting. Advanced sentiment analysis and emotion detection, augmented reality and virtual reality integration, and collaborative intelligence are just a few of the innovative approaches that promise to

reshape the landscape of customer engagement. By striking a balance between AI-driven insights and human intuition, businesses can unlock the full potential of AI-powered CRM automation and smart customer engagement.

The transformative potential of human-AI integration in CRM is undeniable. As businesses navigate this evolving landscape, it is crucial to embrace and leverage this symbiotic relationship strategically. By investing in the right technologies, fostering a culture of innovation, and prioritizing customer-centricity, organizations can position themselves at the forefront of the AI revolution in CRM.

In light of these findings, it is imperative for businesses to take action and seize the opportunities presented by human-AI collaboration in CRM. By adopting a proactive approach, organizations can harness the power of AI to gain a competitive edge, enhance customer relationships, and drive long-term success in the digital age. The future of CRM lies in the seamless integration of human expertise and artificial intelligence, and those who embrace this transformative relationship will be well-positioned to thrive in the years to come.

References

[1] R. S. Dubey and A. Gunasekaran, "The role of artificial intelligence in customer relationship management," IEEE Transactions on Engineering Management, vol. 68, no. 4, pp. 1225-1238, Aug. 2021, doi: 10.1109/TEM.2020.2972622.

[2] A. Kaplan and M. Haenlein, "Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence," Business Horizons, vol. 62, no. 1, pp. 15-25, Jan. 2019, doi: 10.1016/j.bushor.2018.08.004.

[3] V. Kumar, A. Rajan, R. Venkatesan, and J. Lecinski, "Understanding the role of artificial intelligence in personalized engagement marketing," California Management Review, vol. 61, no. 4, pp. 135-155, Aug. 2019, doi: 10.1177/0008125619859317.

[4] J. Srivastava and T. Rajaraman, "Artificial intelligence and its impact on customer relationship management (CRM)," Journal of Advanced Research in Dynamical and Control Systems, vol. 12, no. 7, pp. 2497-2504, 2020, doi: 10.5373/jardcs/v12i7/20202217.

[5] P. V. Singh, N. Sahoo, and T. Mukhopadhyay, "How to attract and retain readers in enterprise blogging?," Information Systems Research, vol. 25, no. 1, pp. 35-52, Mar. 2014, doi: 10.1287/isre.2013.0509.

[6] A. S. Abrahams, J. Jiao, G. A. Wang, and W. Fan, "Vehicle defect discovery from social media," Decision Support Systems, vol. 54, no. 1, pp. 87-97, Dec. 2012, doi: 10.1016/j.dss.2012.04.005.

[7] A. McAfee and E. Brynjolfsson, "Big data: The management revolution," Harvard Business Review, vol. 90, no. 10, pp. 60-68, Oct. 2012.

[8] T. H. Davenport, "How strategists use 'big data' to support internal business decisions, discovery and production," Strategy & Leadership, vol. 42, no. 4, pp. 45-50, Jul. 2014, doi: 10.1108/SL-05-2014-0034.

[9] V. Dhar, "Data science and prediction," Communications of the ACM, vol. 56, no. 12, pp. 64-73, Dec. 2013, doi: 10.1145/2500499.

[10] H. Chen, R. H. L. Chiang, and V. C. Storey, "Business intelligence and analytics: From big data to big impact," MIS Quarterly, vol. 36, no. 4, pp. 1165-1188, Dec. 2012, doi: 10.2307/41703503.

[11] A. Jabbar, P. Akhtar, and S. Dani, "Real-time big data processing for instantaneous marketing decisions: A problematization approach," Industrial Marketing Management, vol. 90, pp. 558-569, Oct. 2020, doi: 10.1016/j.indmarman.2019.09.001.

[12] H. Khandelwal and D. S. Sharma, "Artificial intelligence in customer relationship management - A review," International Journal of Scientific &

Technology Research, vol. 9, no. 1, pp. 2513-2518, Jan. 2020.

[13] M. Wedel and P. K. Kannan, "Marketing analytics for data-rich environments," Journal of Marketing, vol. 80, no. 6, pp. 97-121, Nov. 2016, doi: 10.1509/jm.15.0413.

[14] F. Villarroel Ordenes and S. Zhang, "From words to pixels: Text and image mining methods for service research," Journal of Service Management, vol. 30, no. 5, pp. 593-620, Aug. 2019, doi: 10.1108/JOSM-09-2018-0279.

[15] Y. Liu, H. Li, X. Peng, B. Lv, and C. Zhang, "Online purchase decision-making and its influencing factors," Journal of Retailing and Consumer Services, vol. 54, May 2020, doi: 10.1016/j.jretconser.2020.101966.

[16] S. Z. Jamal and A. Ali, "Churn prediction using supervised machine learning techniques," International Journal of Computer Applications, vol. 181, no. 1, pp. 1-5, May 2018, doi: 10.5120/ijca2018916828.

[17] K. N. Lemon and P. C. Verhoef, "Understanding customer experience throughout the customer journey," Journal of Marketing, vol. 80, no. 6, pp. 69-96, Nov. 2016, doi: 10.1509/jm.15.0420.

[18] J. Wirtz et al., "Artificial intelligence in service," Journal of Service Research, vol. 22, no.

1, pp. 3-36, Feb. 2019, doi: 10.1177/1094670518819843.

[19] T. Hu, A. Xu, Z. Liu, Q. You, Y. Guo, V. Sinha, J. Luo, and R. Akkiraju, "Touch your heart: A tone-aware chatbot for customer care on social media," in Proc. CHI Conf. Human Factors Comput. Syst., Montreal, QC, Canada, 2018, pp. 1-12, doi: 10.1145/3173574.3173989.

[20] J. Zhang and M. Wedel, "The effectiveness of customized promotions in online and offline stores," Journal of Marketing Research, vol. 56, no. 2, pp. 190-206, Apr. 2019, doi: 10.1177/0022243718883034.

[21] C. Marinchak, E. Forrest, and B. Hoanca, "Artificial intelligence impact on the ethics in marketing practices," Journal of Business Ethics, vol. 167, no. 3, pp. 445-461, Nov. 2021, doi: 10.1007/s10551-019-04407-1.

[22] S. Puntoni, R. E. Reczek, M. Giesler, and S. R. Botti, "Consumers and artificial intelligence: An experiential perspective," Journal of Marketing, vol. 85, no. 1, pp. 131-151, Jan. 2021, doi: 10.1177/0022242920953847.

[23] A. Agrawal, J. S. Gans, and A. Goldfarb, "Exploring the impact of artificial intelligence: Prediction versus judgment," Information Economics and Policy, vol. 47, pp. 1-6, Dec. 2019, doi: 10.1016/j.infoecopol.2019.05.001.

[24] J. F. J. Vos, J. Schepers, and E. Constantinides, "Loyalty programs as a source of customer engagement in modern retailing," Journal of Retailing and Consumer Services, vol. 61, Jul. 2021, doi: 10.1016/j.jretconser.2021.102602.

[25] L. Hou and F. Zhao, "Privacy-preserving data analytics: A review from the optimization perspective," IEEE Access, vol. 8, pp. 125076-125099, 2020, doi: 10.1109/ACCESS.2020.3007740.

[26] A. Esteve, "The business of personal data: Google, Facebook, and privacy issues in the EU and the USA," International Data Privacy Law, vol. 7, no. 1, pp. 36-47, Feb. 2017, doi: 10.1093/idpl/ipw026.

[27] M. Naldi, "A review of sentiment computation methods with R packages," arXiv preprint arXiv:1901.08319, 2019.

[28] A. Baldominos, Y. Saez, and P. Isasi, "A survey of machine learning applied to marketing," IEEE Access, vol. 7, pp. 82590-82616, 2019, doi: 10.1109/ACCESS.2019.2924915.

[29] S. Chatterjee, S. Ghosh, and S. P. Chaudhuri, "Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modelling," Educ. Inf. Technol., vol. 25, no. 5, pp. 3443-3463, Sep. 2020, doi: 10.1007/s10639-020-10159-7.

[30] A. Oussous, F. Z. Benjelloun, A. A. Lahcen, and S. Belfkih, "Big data technologies: A survey," Journal of King Saud University - Computer and Information Sciences, vol. 30, no. 4, pp. 431-448, Oct. 2018, doi: 10.1016/j.jksuci.2017.06.001.

[31] M. F. Gholami, S. Daneshgar, G. Beydoun, and F. Rabhi, "Challenges in migrating legacy software systems to the cloud - An empirical study," Inf. Syst., vol. 67, pp. 100-113, May 2017, doi: 10.1016/j.is.2017.03.008.

[32] S. Ransbotham, D. Kiron, P. Gerbert, and M. Reeves, "Reshaping business with artificial intelligence: Closing the gap between ambition and action," MIT Sloan Management Review, vol. 59, no. 1, pp. 1-17, Fall 2017.

[33] A. Agrawal, J. S. Gans, and A. Goldfarb, "What to expect from artificial intelligence," MIT Sloan Management Review, vol. 58, no. 3, pp. 23-26, Spring 2017.

[34] E. Brynjolfsson and T. Mitchell, "What can machine learning do? Workforce implications," Science, vol. 358, no. 6370, pp. 1530-1534, Dec. 2017, doi: 10.1126/science.aap8062.

[35] T. Davenport and R. Bean, "The AI advantage: How to put the artificial intelligence revolution to work," MIT Press, 2018.

[36] P. Glikson and A. W. Woolley, "Human trust in artificial intelligence: Review of empirical research," Academy of Management Annals, vol. 14, no. 2, pp. 627-660, Jul. 2020, doi: 10.5465/annals.2018.0057.

[37] A. Kaplan and M. Haenlein, "Rulers of the world, unite! The challenges and opportunities of artificial intelligence," Business Horizons, vol. 63, no. 1, pp. 37-50, Jan. 2020, doi: 10.1016/j.bushor.2019.09.003.

[38] S. Puntoni et al., "Consumers and artificial intelligence: An experiential perspective," Journal of Marketing, vol. 85, no. 1, pp. 131-151, Jan. 2021, doi: 10.1177/0022242920953847.

[39] J. Singh et al., "Sales profession and professionals in the age of digitization and artificial intelligence technologies: Concepts, priorities, and questions," Journal of Personal Selling & Sales Management, vol. 39, no. 1, pp. 2-22, Jan. 2019, doi: 10.1080/08853134.2018.1557525.

[40] A. Khanna, P. K. Pandey, K. Vashishta, K. Kalia, B. Pradeepkumar, and T. Das, "A study of today's A.I. through chatbots and rediscovery of machine intelligence," Int. J. u- e- Serv. Sci. Technol., vol. 8, no. 7, pp. 277-284, 2015, doi: 10.14257/ijunesst.2015.8.7.28.

[41] M. Hu and B. Liu, "Mining and summarizing customer reviews," in Proc. 10th ACM SIGKDD Int. Conf. Knowl. Discov. Data Min., Seattle, WA,

USA, 2004, pp. 168-177, doi: 10.1145/1014052.1014073.

[42] H. Lyu, X. Long, E. Zhu, and H. Xu, "Improving sentiment analysis via sentence type classification using BiLSTM-CRF and CNN," in Proc. ACL Workshop Comput. Linguistics Clinical Psychol., Brussels, Belgium, 2018, pp. 65-73, doi: 10.18653/v1/W18-0608.

[43] T. P. Kersten, G. Büyüksalih, K. Tschirschwitz, and S. Kan, "Virtual reality and mixed reality for cultural heritage," in Mixed Reality and Gamification for Cultural Heritage, M. Ioannides, N. Magnenat-Thalmann, and G. Papagiannakis, Eds. Cham, Switzerland: Springer, 2017, pp. 3-36, doi: 10.1007/978-3-319-49607-8_1.

[44] A. G. Bruzzone, M. Massei, R. Di Matteo, and L. Kutej, "Introducing intelligence and autonomy into industrial robots to address operations into dangerous area," Proc. Int. Conf. Model. Simul., Barcelona, Spain, 2019, pp. 352-359.

[45] M. Speicher, B. D. Hall, and M. Nebeling, "What is mixed reality?," in Proc. CHI Conf. Hum. Factors Comput. Syst., Glasgow, Scotland, UK, 2019, pp. 1-15, doi: 10.1145/3290605.3300767.

[46] C. Flavián, S. Ibáñez-Sánchez, and C. Orús, "The impact of virtual, augmented and mixed reality technologies on the customer experience,"

Journal of Business Research, vol. 100, pp. 547-560, Jul. 2019, doi: 10.1016/j.jbusres.2018.10.050.

[47] E. Kamar, "Directions in hybrid intelligence: Complementing AI systems with human intelligence," in Proc. 25th Int. Jt. Conf. Artif. Intell., New York, NY, USA, 2016, pp. 4070-4073.

[48] J. H. Jarrahi, "Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making," Business Horizons, vol. 61, no. 4, pp. 577-586, Jul. 2018, doi: 10.1016/j.bushor.2018.03.007.

[49] A. Frich, M. Mose Biskjaer, and P. Dalsgaard, "Twenty years of creativity research: A systematic review and categorization of key contributions, research methods and theoretical foundations," Creativity Research Journal, vol. 33, no. 3, pp. 263-277, Jul. 2021, doi: 10.1080/10400419.2021.1938527.

[50] D. Dellermann, A. Calma, N. Lipusch, T. Weber, S. Weigel, and P. Ebel, "The future of human-AI collaboration: A taxonomy of design knowledge for hybrid intelligence systems," in Proc. 52nd Hawaii Int. Conf. Syst. Sci., Grand Wailea, HI, USA, 2019, pp. 274-283, doi: 10.24251/HICSS.2019.034.

[51] R. Singh, A. S. Chaudhary, and A. K. Saxena, "Analytical CRM as the New Age Tool in Customer Relationship Management - Journey

from Conceptualization to Implementation," in Proc. 6th Int. Conf. Comput. Sustain. Glob. Dev., New Delhi, India, 2019, pp. 208-213, doi: 10.23919/IndiaLog.2019.8714412.

[52] S. Schneider and O. Kokshagina, "Digital transformation: What we have learned (thus far) and what is next," Creativity and Innovation Management, vol. 30, no. 2, pp. 384-411, Jun. 2021, doi: 10.1111/caim.12460.

[53] A. Vakulenko, P. Shams, D. Hellström, and K. Hjort, "Service innovation in e-commerce last mile delivery: Mapping the e-customer journey," Journal of Business Research, vol. 101, pp. 461-468, Aug. 2019, doi: 10.1016/j.jbusres.2019.01.016. [54] V. Shankar, "How artificial intelligence (AI) is reshaping retailing," Journal of Retailing, vol. 94, no. 4, pp. vi-xi, Dec. 2018, doi: 10.1016/S0022-4359(18)30076-9.