Omnichannel Sentiment Analysis and Personalised Journey Orchestration: AI-Powered Frameworks for Customer Experience Management in Retail

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1. Introduction

Today, successful retailing is all about creating exceptional customer experiences that go beyond the ordinary. Those who fail to do so will end up competing primarily on price or product features. These experiences need to be relevant, engaging, consistent, and seamless—personal, yet scalable. A positive retail customer experience exists across the complete customer journey including browsing, purchasing, contacting customer service if needed, and post-purchase. Despite an overall positive outlook for retail customer experience quality, only a small percentage of consumers find that retailers excel across all the purchase and customer service areas evaluated.

Driven by changing consumer behaviors and a renewed interest in the power and potential of data, the practitioners of customer experience management (CEM) within retail organizations have adapted their approach to better keep pace. Technologies such as artificial intelligence, robotic process automation, and machine learning are already being put to work, often under the umbrella of CEM, to change how customers interact with retailers and how customer service is offered and delivered. This paper aims to illustrate the impact of CEM technologies on the relationship between retailers and customers in today's markets. The focus is on AI technologies, being at the forefront of this digital arms race. The energy, time, and money being spent on them signifies the urgency of the situation. Strategically, it is timely for retailers to engage more deeply with the notion of CEM and introduce these powerful tools. There is a tension at the heart of retail—consumers need them to adopt these CEM tools just as much as they want to prevent retailers from overstepping the line of what is acceptable, all of which will add a layer of scrutiny and potential backlash. The right time, the right place, is the key.

1.1. Background of Customer Experience Management in Retail

1.1 Background Customer experience management has been recognized as an important marketing management concept popularized in the late 1990s. It has progressively evolved into one of the retail industry's strategic drivers and has led to a retail market where transactions are no longer solely about the purchase and possession of goods, but about the overall consumption experience, which includes shopping, leisure, relaxation, entertainment, and socializing. In recent years, rapid technological advances have contributed to revolutions in the behavior and preferences of today's sophisticated and demanding customers. Customers have integrated various technologies into their retail activities, demonstrating that they expect seamless service whether they are shopping in-store or online. To meet these evolving consumer requirements, companies have traditionally relied on customer relationship management techniques, which are designed to create a complete view of each customer by utilizing transaction data, customer profiles, and different customer interaction points to increase customer value, loyalty, and retention. However, the implementation of such a strategy is increasingly difficult for transactional-based businesses due to the rapid development of information technology. One phenomenon that challenges CRM logic is the internet and e-business generally, where various digital marketing strategies have become important parts of retailers' marketing strategies. Additionally, the rise of digital commerce has supposedly resulted in a new paradigm shift in customer engagement by offering channels that are available 24 hours a day. However, the use of technology has indeed added to the complexity of managing multiple customer interactions and relationships. Thus, an innovative approach like artificial intelligence should be developed to maintain and enhance customer satisfaction and loyalty.

2. Fundamentals of Machine Learning

Machine learning is a key discipline of computer science with a range of applications. In general, machine learning focuses on providing systems with the ability to learn from data. This data-driven approach allows machine learning systems to make predictions or decisions that improve over time. A machine learning system is trained using a set of data, referred to as training data. During training, the model learns patterns from this data. This learning process allows the system to make predictions on future, unseen data.

From this perspective, there are several types of problems that can be tackled by machine learning applications. One of the most widely used and studied methods is supervised learning. In this paradigm, a machine learning algorithm trains a model by making predictions on a set of feature observations for which the correct value is known. Unsupervised learning methods leverage data that is not labeled and learn to identify and extract patterns from such data, such as detecting clusters of data that have similar characteristics. Reinforcement learning, finally, refers to a machine learning paradigm in which an agent learns which actions to take in an environment in order to maximize some notion of cumulative reward. These different paradigms rely on distinct techniques and can be applied for various retail use cases. Irrespective of the approach or application, a critical requirement is to construct models that are trained on a diverse, high-quality dataset. Moreover, highly accurate predictions and system decisions require robust machine learning algorithms that avoid overfitting a complex learning function to the training data.

Another challenge in constructing machine learning models is the need for algorithms that can overcome noisy data and rules and constraints explicitly specified by the retail domain expert. Finally, consistent with each selling proposal, the model may need to respect constraints, e.g., only selling items that are currently in stock. A further problem is how to enable the human to interpret the explanations provided by the model. Decisions by modern machine learning systems are taken based on a very large number of predictions made by the model across the variables that are used by the model to make decisions. A conflict may arise, and it often requires the model to use fewer predictors in order to comply with regulations or company policies. Such constrained models are sometimes called interpretable or fair and account for the inherently social and economic nature of the challenges they are addressing.

2.1. Types of Machine Learning Algorithms

In the retail sector, machine learning algorithms can be divided into four generic classes: decision trees, neural networks, instance-based learning, and clustering algorithms. Decision trees work by splitting the available instances or features based on a specific value, providing an automated "if-then" rule based on the nature of the decision. Neural networks are another breed of machine learning that uses a modern ability to compute from a powerful and straightforward model. It uses various sets of algorithms derived

from neuroscience, which can adapt efficiently, allowing the model to be "trained" over time. Clustering is an excellent way to find new clusters, which are groups of customers using one or more features or characteristics. When working with problems in which customer behaviors can't be labeled, clustering can still deliver good results.

While there are many algorithms one can use, selecting the proper one based on face validity and empirical testing with external and internal criteria is paramount. Without the knowledge of retail managers and retail-data specific empirical research, an algorithm needs a best fit and must be selected. However, as a rule of thumb, decision trees can be used for easy customer segmentation and product portfolio management, while clustering applications can be great customer segmentation techniques. There has been little research on instance-based learning methods in the literature. ANNs can be applied to time series through forecasting data, obtaining predictive associations in purchasing behavior. As with any sophisticated statistical procedure, the continuous fine-tuning of the algorithm is important to prevent overfitting or applying a training set of store data too aggressively. The excellence in the development of these techniques is promising for the continuing development of machine learning techniques.

3. Applications of AI in Retail Customer Experience Management

There are numerous customer-focused applications where AI, and specifically AI analytics, can help improve customer interactions and reduce customer churn within the retail industry. AI-powered customer relationship management in retail, for example, integrates chatbots and AI-powered analytics to provide a variety of new capabilities, including streamlined automated customer service, intelligent chatbots that can answer inquiries, and artificial intelligence tools that can evaluate trends to improve decision-making in customer experience management within the retail industry. AI can also be used to better manage inventory in retail settings, applying specific predictive analytics to gauge when demand for different materials will fluctuate, allowing for real-time inventory management. One of the most studied applications of AI in retail is customer-focused recommendation systems, which utilize a variety of proxy techniques, including sentiment analysis to gauge customer feedback and preferences in real-time. Of course, those recommendations are then integrated into consumer management use cases, where retailers can build brand loyalty and personalize marketing messages through AI-driven analytics tools. Retailers have also pursued the implementation of applications

for customer journey mapping to improve store design and consumer-facing layouts and have examined the feasibility of further personalizing these consumer journey customization efforts with AI in the retail industry. Like other aforementioned AI use cases, the ultimate goal of combining customer journey mapping and AI is to reduce operational expenses while simultaneously improving overall customer satisfaction.

3.1. Personalization Techniques

Today's retail customer experience is data-driven and can be personalized to meet the needs of the individual customer more effectively than ever before. By being able to predict the customer's future preferences and behaviors, we are able to take steps to better engage with them and put a stop to any potential 'bad' experiences for them. Targeted Recommendations With increased data on the consumer and better analytics, retailers can better predict the products and services each customer might have a greater interest in buying. By then taking educated best guesses around the types of other items that someone might want to buy, the retailer will then be able to make a range of recommendations for them if they are to buy. Transactional Personalization In the same way as targeted recommendations, we can use predictive data to bring simple transactional information to the customer's attention. By doing the same for a potential repeat purchase, we ensure the customer doesn't feel forgotten and knows we are looking out for them. Customized Marketing Messages Customer personalization also allows us to send more custom content out to consumers. The offers are not just tailored to general demographic groups, but shopping behaviors and what we know will be of interest to a consumer based on historic data. Best Practices Many companies are already seeing the benefits of personalization. They know that consumers are more likely to spend more when their experience is personalized, and that they are likely to become more loyal when they are satisfied with their shopping experience. A report found that 93% of companies surveyed saw an uplift in conversion rates as a result of their personalization efforts. More than half (55%) of such companies saw an uplift of greater than 10%. Three in five companies have also reported higher average order values following the implementation of personalization on their site (56%), with one in four reporting an uplift greater than 10%. While we are a nation that loves a good bargain, it seems that we're also suckers for a tailored shopping experience and are happy to spend more for the pleasure.

4. Benefits and Challenges of Implementing AI in Retail

Retailers have to keep pace with the advancements in technologies and their utilization in retail customer experience management. AI solutions are surging in the retail marketplace. As customer-centric technologies evolve, there is an increasing intersection between customer experience management and retail IT staff. The multiple benefits of AI in retail customer experience management include increases in efficiency and improved insights into their customers. The use of AI enables personalization of the store environment, which can directly offer a more personalized service and instant solutions to customer issues depending on strong customer relationships. AI technologies are also beneficial for the internal customer experience team, where their client team can meet a greater volume of customer questions in a shorter amount of time. An efficient automated ecosystem in retail business helps to increase competitiveness and customer satisfaction in terms of service.

However, implementing continuous improvement for employees and advanced technology in a legacy retail environment is challenging. Retailers need to understand their existing systems, their technical and managerial employees, and the costs to implement such advanced solutions. Although there is significant interest and investment being made in AI, the majority of retailers are not yet ready for it. In addition to the technology investment, employees of retailers need to be trained to comprehend and advance customer experience through AI. Retailers are also concerned with the ethical use of AI from a customer perspective. Customers' personal information and how it will be used are important elements, and retailers need to embark on a path of customer trust in order to receive benefits from AI ticketing systems. Being ahead in innovation and technology can backfire; customers may want to avoid sales staff and desire less interaction with them. Depending on the business from which their insights are gathered, salespersons may offer AI improvements. In accordance with these disparities, retail customer experience management is implementing a balance of AI and traditional approaches. AI is considered to be a commodity.

4.1. Ethical Considerations

Customer trust has always been at the core of retail business success and has become a key differentiating factor in an environment of competitive markets. The increased use of AI in customer experience management imposes a set of questions: What are the

ethical dimensions related to the use of AI for retail customer experience management? In this section, we provide an initial exploration of this foundation and initiate a discussion on some of the potential ethical implications of this application of AI technology.

Several ethical issues are commonly associated with AI. Humans are increasingly demanded to trust AI systems and expect these systems to meet unbiased and ethical principles. Ethical principles and guidelines stress transparency about data and the systems using that data, freedom from algorithmic bias, the need for explanation or transparency regarding the outcomes of AI, and the right to informed consent in use. From a retail customer experience management lens, these issues are relevant for customer expectations of a trusting customer-retailer relationship, fair prices, and receiving products and services that best match their individual preferences and needs. Retailers have obligations, and it is not solely a regulatory imperative, to promote and protect ethical practices throughout their value chain. Ethical use of AI in retail customer experience management is essential for sustainable value creation.

Ethical consideration is accompanied by economic benefits for the retailer. For example, during the early days of the pandemic, a fashion retailer began offering its customers AI-driven garment fitting advice. However, customers demanded more details about the system used and expressed concern about bias due to predominant images used for training. The retailer stopped the service and engaged in a dialogue with the AI community to understand and adopt principles for its future AI use. The result was a better understanding of the elements needed for transparency, bias detection, and treatment, which in turn contributed to improving customer trust and engagement. This study aims to advance an understanding of the ethical implications of using AI-driven technologies in retail and contribute towards principles and best practices required for the successful adoption of this technology.

5. Case Studies and Best Practices

Case studies and best practices: Understanding how AI is implemented today and the outcomes it delivers will provide valuable insights for retailers exploring AI's possibilities. We share case study snapshots from several leading retailers' AI implementations in customer experience management. We identify the business initiative driving AI adoption, the technological base, the results achieved, and the

challenges encountered. Best practices from the use cases will also be discussed. Each case includes a timeline showcasing each implementation phase and its duration to help understand the differences in the amount of effort and complexity retailers encounter with AI projects. Noticeable across all use cases is the pertinence of aligning AI initiatives with business initiatives and customer needs. Retailers agree that testing and learning is key to the success of AI; systems and predictions need to be evaluated and iterated upon continuously.

Case 1 showcases a localized approach to AI application in retail. The goal of a technology provider in the retail sector was to personalize and optimize customer communication through future-looking predictions, loyalty, and individual customer preferences. The initiative was not only to align with a business strategy but also to create a disruptive effect within the membership-based warehouse club; in a second phase, it would also assess member experiences online and offline to personalize interactions in any area. Integration of external data resources supports the development and complexity of personalized predictions. Full business process integration was imperative for developing a completely digital and highly personalized one-on-one interaction. Predictive machine learning was key to realizing the goal at scale as well as a necessity for identifying relevant attributes across the operation. Predictive analytics and performance of sub-models can be evaluated with external performance specialists or in tests, where we calculated the predicted effectiveness of a communication on the expected engagement and the incremental impact on customer transactions.

5.1. Successful Implementation Examples

This section gives practical examples of AI's successful implementation at the retail level. These instances provide value as managers may draw valuable insights and lessons for the planning and execution of their technology strategies. The specific changes brought by AI applications that are especially important to customer experience are discussed in length.

1. Southern States – AI for personalized shopping. Southern States' AI engines predict what the consumer is looking for in their online shop and automatically display those products first and in a preferred order. It, in principle, personalizes the shopping experience for visiting web visitors to the level of broadly defined segments, such as whether they are a commercial agribusiness customer or a consumer. The system

evolved relatively quickly into automated sales, as rather than simply rearranging and prioritizing products in the usual way of web merchandising, product recommendation capability was added to the mix.

3. IKEA – AI for supply chain optimization. IKEA operates its own supply chain since it produces what it sells. This means that up to and including 2020, all of the company's visibility into its internal supply chain was due to its own production model. The critical change in this scenario occurred during the first half of 2020 when IKEA introduced a service where "click-and-collect" was added to the order fulfillment options. Overnight, IKEA not only sold to the home but became a "make-to-collect," shifting the entire distribution and storage model for its nearly 520 stores and additional collection and delivery points. AI analytics tools were trained to provide insights derived from the vast quantities of operational data collected by IT systems over many years. These tools were implemented at a particularly favorable time, as using the past as a yardstick for making forward predictions was no longer a very constructive planning method due to the rapid change in purchase patterns seen due to the impact of COVID.

6. Future Direction

Automation of Routine Tasks: Current implementations of AI-CX solutions also involve a fair amount of manual involvement. In the future, as the technology evolves further, vendors will be able to offer even greater sophistication in creating and delivering an unparalleled customer experience. Retailers will also likely prefer and use AI-powered CX solutions that will offer greater automation. Better utilization of real-time data: With enhancements in technology, retailers will be able to use data more quickly and efficiently. Real-time interaction management using IoT data, voice of the customer data, social listening, etc. will enable a faster, richer CX-driven approach. Omnichannel Strategy: The future of retail is likely to see an increase in the implementation of simpler and smarter omnichannel strategies provided by AI-powered CX vendors. Corporations have made it clear through their actions that in the digital age, focusing on multiple channels is important. Similarly, customers also expect corporations to make channels more accessible and simpler.

Changing Customer Expectations: A change in the buying cycle has become apparent in today's digital age. Consumers demand companies to create and sell products that match their requirements. Advanced recommendation models will be key for retailers to

push products that may not be currently on a customer's list, yet cater to what they may require. Authorities and rules related to customer confidentiality and privacy: Using AI also has ethical considerations. All of this is likely to create barriers as well as drive the direction that customer interactions can go. New terminologies, new configurations: AI technologies are likely to introduce new terminologies, new jargon, and new configurations, compliance requirements, and interoperability challenges that vendors and retail corporations need to be aware of and plan for today. It's important for corporations to talk about the future and begin setting the rules of the playing field today in order to be the architect of the future of augmented AI-CX-driven corporations.

7. Conclusion

It is inevitable for retailers to offer AI-powered CX solutions due to the ever-changing and increasing customer expectations. Integration of AI technologies provides multiple benefits but offers some challenges for retailers as well. Therefore, information about the contributions and challenges should be considered effectively, and retailers should take the necessary steps. Sustainability in customer relationships is essential for retailers. In this context, curating individual customer journey designs and allowing customers to have a unique shopping experience is in the foreground for retailers, and provides enormous loyalty and wealth. Therefore, the use of AI in making the shopping journey unique and increasing the customer's shopping pleasure should be pragmatic and ethical. The ease and value brought by AI technologies to the lives of all layers of society should be monitored and adjusted according to this principle. Thus, the intelligent retail industry based on relational and sustainable customer management can take the necessary precautions that will satisfy all parties, especially the customer and the individual-sector employee, by the experience and develop the union about the industry in the direction of the expectations of the customer, which always progressed, and all the new generations and technologies of humanity. The trend for the future in terms of retail will be change management according to the customer's expectations and demands, digital transformation and the experience and new organizational structure.