Intelligent Product Lifecycle Orchestration: Predictive Analytics and Decision Automation in Retail Category Management

Dr. Fumihiko Matsuno, Associate Professor of Mechanical Engineering, Nagoya Institute of Technology, Japan

1. Introduction to Retail Product Lifecycle Management

Introduction Retail Product Lifecycle Management (RPLCM) encompasses a collection of plant and corporate processes related to how a company brings a new product to market, decides on discontinuing a product, develops a new generation version of a product, and covers a variety of other product-related issues. Due to the far-reaching effect the product can have on the corporation, both in terms of tangible and intangible costs and benefits, it is of paramount importance to manage the extended reach of a product from its inception to its discontinuation for the firm's benefit. Whereas the creation of new product designs has been studied at length, the management of a product has not, though one might argue that its importance far outweighs that of the new product design aspects due to its potential impact. A product has different profitability over its lifetime in a market. In order to be competitive, one must select the management strategies that can effectively improve their product value, and thus the supply chain value. One of the reasons for this is that much of the potential of the retail channel to improve product profitability and reduce channel uncertainty is lost because it is not recognized that the retail channel can achieve this. Because of the significantly increased complexity of the retail landscape caused by competition and the speed of technological change, and the fact that customers have to make decisions at each stage of the supply chain, the potential to improve the performance of the total supply chain is very high. One means of collaborating to quantify and correct this is to have customer targeting at the core of product lifecycle management.

1.1. Definition and Importance

Retail Product Lifecycle Management (RPLCM) refers to the systematic process and framework of managing a product from its inception, which may include adapting and tailoring the product to a particular market, to the product's retirement. In brief, RPLCM defines the flow of work and points to the craftsmen executing employment at every niche. It includes concept generation, product development, modifications, evaluating performance, and public responses until withdrawing the product from the market. In conclusion, RPLCM aligns business pace with market tempo, and continuous support can facilitate strategic decisions that are more responsive. This approach is also a compendium of various concepts that a critical analyst should keep in mind; for instance, product unitization, timetable for withdrawal, cleverness, modus operandi, and product life expectancy are greatly impacted by adding product features or modifications to the original item and are also influenced by the introduction of the succeeding version. Managing each of the articulated facets can be highly beneficial in terms of product costs, sales, and derived profits, particularly by ensuring profitable exchanges of resources for the higher contribution margins much in demand. RPLCM can also adopt a continuous process for innovating business dimension paradigms. Innovative ideas now feel the heat of cut-throat competition. This compels continuous updating, refining, and reinventing to manage the competitive edge with an enhanced RPLCM for product enrichment and consumer protection in technical and market expectations worldwide. The concept of a product is defined, and RPLCM outlines the guidelines to see the product dimensions from possible modifications or adaptations from time to time. These enhancing processes then become vital in achieving organizational objectives. RPLCM ascertains the strategic angles on a time scale and ensures that adequate resources are allocated and justified as per the life phase. Services are required to manage the forces, flows, and controls within the product life phase, with current monitoring and sufficient foresight during the life phase, to enhance profitability and, therefore, the socio-economic benefits of society by matching consumer desires with performance.

1.2. Challenges in Traditional Approaches

Traditional Product Lifecycle Management is known to face several challenges, including those of inefficiency and poor predictability. Everyday operational jobs such as data consolidation, validations, and cleaning are a substantial part of these processes

and often pose considerable time constraints. The lack of automation during manual data cleansing and validation leads to an increase in the incidence of human errors. A direct consequence of these inefficiencies is the increased average response time toward any given query or issue resolution. As an effect of the aforementioned challenges, quick and responsive decision-making is heavily delayed due to network or structural inefficiencies. Another critical mention in the retail sector varies changes in variables such as customer preferences, fashion trends, demographics, and so forth. These components relate to the evolution of social norms and conditions that are unknown beforehand and cannot be easily quantified. Therefore, over-reliance on historical data in any lifecycle policy becomes irrelevant for dynamic structural changes. It is exactly for this reason that rapid changes in the market environment should not be ignored.

The traditional retail sector has insufficiently utilized the information contained within their sales data, studies of customer traffic, and consumption preferences as far as these pertained to products with different labels and stores, and studies of the conversion of these factors into actual consumer demand. Through analyzing this data, it is believed that the traditional retail product lifecycle will reach a whole new level. Although traditional management mainly focused on determining marketing and channel position, it did not recognize the extensive underlying factors that could ultimately reflect the economic value of the product. In short, the evaluation of demand was not sufficient or profound. Consumer behavior and corporate brand strength have shifted retail sector expectations toward the management of product lifecycle. Even though the traditional demand management system is already being replaced or partially adjusted into an actual demand-based system, a more novel and practical approach is emerging. To illustrate, a different categorization method is necessary for product management, such as unified and universal categorizations, and horizontal integration is needed among all product categories. No matter what stage of product endorsement, promotion, or selling, this approach is based on useful products that directly affect product sales. These products, in a lifecycle system, will be managed constantly during their lifecycle.

2. Role of AI in Retail Product Lifecycle Management

Artificial intelligence (AI) refers to simulated intelligence in machines or processes that enable them to execute tasks that generally necessitate human cognitive functions such

as learning, perceiving, problem-solving, language processing, and the like. Machine learning, a subset of AI, emulates the way humans learn to improve their performance by giving systems access to data, enabling them to learn autonomously. AI has applications in almost every sector, and in retail, it is considered a potential game changer. Smart algorithms for AI are heavy on analysis and are generally used to derive bite-sized data from data lakes. In a retail context, this allows them to digest and leverage the vast amounts of data available on customer behavior, demand levels, inventory status, market expectations, etc. Retail product lifecycle management (RPLCM) is a complex domain where operations management is handled optimally through informed decisions. AI algorithms can offer the necessary insights to aid in decision-making for various operational management aspects such as demand forecasting, inventory optimization, assortment planning, price optimization, and stock reordering. AI has a major role to play in effectively managing a retail product through its lifecycle on technical, operational, and strategic levels.

RPLCM is a field where the rate of data inflow and the data heterogeneity are very high. Further, the processing of data needs to be done in near real-time to ensure quick decision-making and timely results. The data volumes, velocities, and variety requirements of the operational world are perfectly addressed by AI algorithms, and their application guarantees the introspection of scientifically insightful factors of RPLCM conducted on data. Furthermore, the application of AI would help individuals in these areas of retail to concentrate on wealth creation rather than wealth management, i.e., the physical and scientific aspects of value creation. AI acts as a catalyst and standards evangelist for collaborative decision-making and supply chain management, thus making the function adaptive and answering the needs of demanding consumers. The role of technology should be to maximize the potential of markets for goods and the research and development that go into them. In the midst of the AI era, people who were absorbed in mundane tasks such as data manipulation, extraction, and structuring can spend more time on reviewing with experience-based decision-making that will support the micro- and macro-functions of an organization in the retail sector.

2.1. Overview of AI and Machine Learning

The terms artificial intelligence (AI) and machine learning (ML) have become increasingly popular in modern software products and computer science. While many

may have a working understanding of these broad concepts, we delve deeper into the technical foundation of AI and ML in this section. Artificial intelligence generally refers to the simulation of human intelligence in computer systems. When it comes to business problems, AI involves software performing tasks that usually require human intelligence. This can include computation of complex problems, understanding natural language, recognizing objects in images, or making strategic decisions. The most promising and often discussed AI technique is called machine learning (ML). ML algorithms are developed to teach machines how to think; in other words, algorithms learn from data to make decisions.

Prior to a deeper dive into the technical aspects of AI, it is essential to underline the principles of machine learning and how it empowers AI in practice. Machine learning allows the algorithms to automatically learn from data, identify patterns, and make decisions with minimal human intervention. The process of finding parameters or coefficients is called training, and a trained model can then make predictions on new, unseen data. Supervised, unsupervised, and reinforcement learning are the three main approaches to ML. Algorithms trained using labeled training data are classified as supervised learning, whereas those trained with unlabeled data fall under unsupervised learning. Finally, reinforcement learning algorithms train by learning from feedback received in terms of rewards or penalties. Many applications of AI and ML in software products are relevant to RPLCM as well. In retail, such AI techniques are already utilized for a wide range of functions. Logistics uses ML to optimize complex routes and stock/warehouse management through the demand forecast. For marketing, recommendation systems utilize a form of reinforcement learning to recommend items based on past purchases or clicks. Similarly, demand forecasting in retail has already been using some form of ML for over a decade to forecast sales of different items at varying levels of aggregation.

2.2. Benefits of AI in Retail Product Management

As it can efficiently create actionable insights from various sources of information, making it easier for companies to make the best possible decisions about the products in their portfolios. This comes with several important benefits which can, for example, enhance a company's strategic ability to create high-quality products as well as effectively communicate their unique selling points to consumers. A company

enhancing with AI in their retail product management can design and develop products with increased strategies in producing and creating high-quality products and create an efficient product portfolio. This will result in finding the right combinations of products that reach targeted customers and improve the consumer product lifecycle value. In operations, companies can apply AI to manage their entire retail product lifecycle more efficiently and effectively.

Through this, companies will have the ability to: (i) free up people from routine tasks and assist them in the critical decision-making process; (ii) better forecast and more accurately predict future macro-demand, pricing, and market insights; (iii) evaluate in advance the potential success of marketing materials and strategies including new advertising strategies before actually spending any money; and (iv) be able to apply advanced maintenance strategies in retail to decrease waste from unavailable products. Leading technological advancement is the application of AI to consumer-related retail and consumer goods. It's no surprise that this is the area of fastest growth, as retailers are well aware that they live in an age of the customer. It is their ability to provide increasingly personalized, unique, and competitive experiences to the consumer that will give them the competitive edge. In short, AI-driven insights enhance productivity and therefore ultimately provide a high competitive advantage.

3. Optimizing Product Launches with Machine Learning

The benefits of data-driven product development are clear to see. Drawing on historical data at each stage of the product lifecycle can help retailers devise a clearer brief based on real consumer preferences, from historical sales patterns to market trends. But machine learning does more than just aid in the design phase – it allows retailers to model different launch strategies and choose the optimal time for a new product launch, generate new product features based on trend analysis, and use predictions to optimize safety stocks. There are major benefits to unearthing insights that wouldn't be visible or properly understood without machine learning. Running a deep analysis of large datasets to inform business decisions can uncover nuances and hidden secrets. Predictive demand analytics provide powerful, real-time insights and are poised to change the retail sector at a fundamental level. The ability to forecast market demand means it's not just your marketing team and strategies that benefit – integrated into other systems and processes, predictive demand models can support and inform

everything from your pricing strategy to range availability and allocation. However, there are even more profound implications around strategic planning – being able to predict market response gives retailers a powerful new tool at their disposal to anticipate and counteract consumer indifference, building agility and adaptability into strategic retail planning. By simulating different launch scenarios, not only can retailers gauge potential demand spikes or predict how well a new product will be received, but they will also glean insight into how to market and whom to target when the new product hits the shelves. Are you a typical early tech adopter? Then, the marketing spike will be short and shallow before settling in for the longer term. Or are you likely to wait to see what others think first? The deeper your pockets and the less budget-sensitive you are, the sharper the spike is likely to be.

3.1. Data-driven Product Development

Unique products are exclusive to every retailer. They are essential for showcasing retailer personality and driving a brand message. Retailers use products to solve customers' problems and express innovative trends. Product lifecycle management advanced from manual sketched designs to digital 3D designs. The design process often requires a close connection of cross-functional teams to confirm that the concept is feasible and has low costs. In recent years, there has been a focus on data-driven product management. Leveraging internal data helps design products that resonate best with your customer base and are the most innovative. This is hoped to make product managers' lives easier by decreasing the overall testing surface. Compute the offer that presents the property preferred by the retailer's customers. This creates the best scenario. Segmentation based on insights derived from data, mostly from understanding what customers say is most important to them, combines customer feedback and preference data to develop new or enhance existing product features. Analytics selects a part of the market to target new products. Alternatively, data can also identify market gaps. These calculations reduce the risk of product innovation that becomes a completed product. Metrics measure the adaptation and acceptance of the drawn insights. This reinforces success and promotes the failing product to a point of success. The subsequent product production process takes this information into consideration. The question, however, is if this is actually enough now.

The release of PLM in larger organizations still mixes departments by the data source and the information reasoning. It enforces a less united product vision. Although this issue has been pointed out, the platform still only synergizes data insights on different categories related to customer needs in the home space. Additionally, it can be very protracted to re-curate the data if a retailer extends their range or enters a new industry. If retailers can concentrate on inferring insights from internal sources, the development becomes more actionable as the retailer has access to their own data. Products can be created using a data-driven management strategy. A ranged approach can acknowledge the shoppers and form an overall store's identity. The frequency with which clients are looking at aligned products and social engagement could mature this method into a way to constrain content fit for client aesthetics. Data can be slightly aggregated to understand the difference in 'likes' and 'dislikes.' The rate of how many times a product is being viewed and the difference in engagements can require products to be tweaked to achieve a common goal. The views and engagements might be supported by the same customer; if compounded through identity conclusions, the engagement link between the aesthetics can be determined. The chosen approach has to guarantee the capabilities of the considered products. View counts and times are essential in identifying trends based on the aesthetic touchpoint. Continuous monitoring of these averages can estimate renewal cycles.

3.2. Predictive Analytics for Market Demand

Initially, predictive analytics is focused on understanding and forecasting market demand. Predictive models combine historic sales and data to forecast future sales and consumer behavior. These are effective tools to better anticipate future sales and trends. Aggregated sales data from the past is commonly used to understand purchasing behavior, considering seasonality if any, and to forecast future sales. By applying these techniques, retailers seeking to reduce stocks can avoid "out-of-stock" and "out-of-sales" scenarios. Predictive analytics needs to be complemented by other analytics, including trend analytics, particularly to manage non-listed products.

One of the key advantages of adding these forecasting techniques to the analytics toolbox is the possibility to anticipate in which regions types of stores are needed, at what time, and at what level of inventory. Marketing teams will also be directly impacted as these predictive models guide a range of decisions, including market

positioning and placement. They can answer questions such as, "What is the optimized number of stores and size for each region?" More relevant placement for products can be directly influenced by predictive trend analysis. This allows marketers to align promotions and ongoing strategy in line with where the consumers are with respect to the product lifecycle. The importance of effective product placement is underlined by relationships between store locations and purchases, where products often referred to as "spontaneous purchases" are located in high-volume traffic areas. Another application is to use past purchase history to analyze the type of consumers in that area. Retailers can gain agility by using this data analysis to respond quickly to the products most in demand at any given time of day. This agility can make a retailer more resilient compared to less data-driven competitors.

4. Leveraging AI for Promotions and Marketing Strategies

Engaging consumers with the right promotions and advertising messages is crucial in retail. Marketing executives who personalize marketing campaigns see an increase in sales and customer lifetime value, with personalized messaging being twice as effective as generic promotions. Artificial intelligence applications can leverage data from various internal sources about consumers and shopper behavior to execute promotions and attract new customers. Since we are currently in a retail market where price and promotions reign, investment in AI is sure to grow in the next few years. Below, we explore a few ways AI can be used.

AI and dynamic pricing strategies can be used to optimize revenue with some limitations that should be disclosed to consumers, such as pricing increases based on demand, competition, or other causes. Dynamic pricing uses real-time data analytics, machine learning algorithms, and predictive analytics. Retailers can use a variety of techniques that can help them appeal to and engage with consumers. Predictive and advanced analytics are the top areas of focus. One retailer is augmenting its experience by hiring analysts, mostly to leverage its vast amount of data to build sophisticated predictive models that help the company come up with the right promotions that resonate with shoppers. For example, predictions can be built for which customers would most likely respond to a direct mail promotion, while also weeding out people who probably wouldn’t buy from the retailer either way, making the predictive model more efficient.

4.1. Personalized Marketing Campaigns

Personalizing messages that you communicate with your customers is a clear way of enhancing customers' feel-good sensations or will at least engage them in reading your content. During their free leisure time, customers do not want to read about unnecessary, useless things. Their time is precious, and consumers are ready to read marketing messages only if it can help make their life or the lives of their families, friends, or pets better or easier. The recent advancements in AI enable retailers to gather customer data and create marketing messages that resonate with individual consumers. The implementation of machine learning algorithms underlines the proper attitude toward the marketing variables that may trigger a response. Moreover, if the customer does not precisely respond as anticipated, AI keeps adapting the marketing strategies continuously. Sending the right message to the right audience at the right time increases the response rate by at least two-digit percentages. AI and advanced statistical analyses can identify the right touchpoints associated with the highest customer value and thus will help the retailer further improve personalization launched on its activation. It becomes evident that the more the number of meaningful communication touchpoints, the stronger the relationships forged over time among brands and customers.

The most important part of retailing is attracting the potential customer. To do that, the retailer decides what target and message to present in the media and sets their volume. Based on available historical data, within 24 hours of the media flight, the most successful potential targets, creativity, and time spots are chosen that have the best response—e.g., the most potential customers walk into stores, visit the e-shop, order the retailer's offer, etc. This technique delivers a considerable increase in conversion. The customer database can be segmented and analyzed in multiple ways, allowing retailers to understand their customers' true needs and buying behavior. The combined knowledge makes it possible for retailers to compose a message offering a solution to customers' problems or just to fulfill their personal needs.

4.2. Dynamic Pricing Strategies

One of retail’s pillars is dynamic pricing, made even more relevant during the current context of market uncertainty and consumer behavior dynamics. Thanks to artificial intelligence, this pricing strategy is implemented with the premise of maximizing opportunities at each moment. For that purpose, AI algorithms evaluate different

aspects such as inventory levels, costs, demand forecasting, competitor pricing, previous sales behavior, and market pricing conditions in order to determine the right price. Prices are not arbitrarily set once a month or quarter, but are optimized in real time, significantly reducing the time to respond to market situations according to the data collected and the rules set.

Adopting a dynamic pricing strategy has several advantages. Of these, one of the most important aspects is finding the ideal trade-off for the company between increasing profit margin and offering more attractive prices to consumers. One of the strengths of these algorithms is that they allow companies to constantly attract different market segments. When setting prices, they do not select markets relevant only to one specific segment, but are instead able to serve a wide variety of different, even slightly contradictory, segments. For investors, adopting this type of technology enables the company to become a 'cash machine', that is, a company that generates cash flow without necessarily increasing general stock levels, but by increasing the value of the funds in stock. Moreover, yet another advantage can certainly be considered the opportunity to satisfy the customer by guaranteeing the chance to buy the item at the best market price compatible with the company's earnings. The AI algorithm sets prices to maximize revenues by optimizing choices according to variables such as quantity of items, time of offer, length of offer, local rituals, or custom start times. Businesses therefore have an efficient tool available to manage excess inventory or replenish inventory, making it possible to achieve marginal benefit or significantly reduce losses. For the final customer, the advantage is that the price in the shopping cart is the best offer they can find, even online. In summary, this pricing strategy helps retailers maintain a competitive edge by attracting a wide variety of customer segments.

In today's dynamic pricing landscape, it is important to have a well-run supply chain, as demand can shift at any given moment. The efficiencies of this distribution model have taken cost savings that can only be realized with other resources. Supply chain efficiency and the ability to quickly determine the right price are at the heart of all these companies' aspirations for maximum profitability. By constantly setting new prices, retailers can respond to changing market trends in real time, improving cash flow and reducing the cost of effort during downturns in times of crisis. Bricks-and-mortar shops

have also recently digitized their business model, including the development of analytical dashboards that provide detailed information for promotion planning.

5. Maximizing Profitability through End-of-Life Decisions

Retailers seek to maximize profitability not just at products' introduction but throughout their lifecycles, often referred to as end of life in operations research or end-of-season in the retail industry. When a product is about to retire, the key issue is how to time when to liquidate or discontinue it. Retailers employing effective inventory management serve as de facto intermediaries who purchase products from suppliers and then liquidate them to consumers or, if necessary, disassemble unsold products for remanufacturing purposes. A primary consideration for a retailer is whether the liquidation should take the form of a sudden price markdown—perhaps in the form of a flash sale, where an item can sometimes be discounted by a significant percentage off its previously full price —or a more gradual discounting process. In the retail industry, in terms of discontinuation, the main decision is whether a product should be simply improved or entirely replaced. At least some insight on customer feedback regarding product quality is essential to take such a decision.

Ending a product's lifecycle is a key strategic choice for a product designer and/or supplier. If market trends are changing radically, then a product may suddenly become obsolete. However, in industries where trends are more stable, an EOL decision will be based at least in part on customer feedback concerning the existing product. EOL decisions—making judgment calls on when to discontinue products—differentiate between slow-mover products and fast-mover products, which have a much shorter lifecycle. In EOL decision making for slow-movers, it is also important to consider market trends; if the market circumstances change, a sluggish product can turn into a fast-mover. However, there can be significant value in effectively clearing out inventory and improving service levels, especially if there are a lot of complaints by customers due to stock-outs.

5.1. Inventory Management and Liquidation Strategies

Product lifecycle management is the process of managing products from their initial introduction into the retail channel to when they are discontinued and ultimately liquidated. Retailers aim to maximize the profitability of a product during this product lifecycle. Strategies and tactics that can be used to maximize product profitability,

however, depend on the stage of a product's life. This section provides an overview of the role that managing inventory, excess inventory in particular, through inventory management and liquidation strategies plays in maximizing product profitability.

Inventory management. Retailers must make decisions at every stage of a product's lifecycle relative to how much of a product they should order, both initially and at replenishment. In particular, to achieve the highest profit, retailers should consider the trade-off between selling more units of a product—revenue—and the clearance-demand effect—lost revenues from actual and potential markdowns and discarded products—and make an informed decision of when to discontinue selling the product. The reason why a retailer might benefit from discontinuing a product before the end of the selling period is precisely because they take the clearance-demand effect into account. Using more accurate forecasts of the product demand, the retailer is able to operate with significantly lower costs. For example, avoiding overstock and stockouts in warehouses can lead to significant warehouse savings, while avoiding stockouts in front stores can result in savings in investment in inventory as well as increased profits from less lost sales. Agile inventory management is key for modern retailers, who use multiple sales channels and tailor their assortment to local consumer trends. Inventory management can also have an effect on the whole product lifecycle of numerous stock keeping units; more direct approaches to product management impact a greater share of product categories earlier. Retailers have the ability to turn excess stock into revenue.

Liquidation strategies. An important element in it is to find customers for the remaining unsold items. Several strategies are used in the retail industry to find these liquidity-demand customers. The first and most commonly used approach is to offer the remaining items at a discount from the regular selling price. Another approach is to bundle the item with other traffic-building items. Yet another technique is to repackage the item so that it appears to be worth more. Other strategies include direct mailings, mass mailings, and solicitations. Experiments have been run on many of these strategies to determine their effectiveness. When other conditions remain constant, the computations in these techniques will also rely on the timing of a promotion. Integrating over the purchasing periods of consumers is important in determining the expected revenue from an item. The overall concept that we attempt to provide is a framework that encompasses inventory and the supply chain to use demand information and, in an

agile manner, adjusts both the inventory of an item and the policy used to liquidate the item when necessary. Technology is fairly advanced now with the use of barcodes and RFID. These can improve inventory visibility and provide some tracking capability. However, the increase in inventory accuracy lies in the use of people or sheer brute force through a cycle count. The use of technology to verify inventory accuracy is still new in practice, though it is a rapidly growing concept.

5.2. Customer Feedback Analysis for Product Improvement

For most products in retailing, performance is assessed along with customer satisfaction levels. Therefore, customer feedback analysis, though biased, is usually taken into account to improve products. In retail marketing, customer reviews, surveys, and other forms of consumer feedback are collected to give retailers substantial insights from the perspective of usage and customer satisfaction regarding their offerings. Traditionally, these forms of customer listening have mainly been used to identify areas of product dissatisfaction and pain points that need correction. However, they are increasingly being used to gain new directions in identifying opportunities for enhancement and expansion of prospective offerings. It is of fundamental importance to integrate feedback loops with the product lifecycle, i.e., the product development process. Although some users may hit a 'like' or email a compliment to the company and feature whims of the offerings, most will report their concerns and disappointment over flawed user experiences, suggested changes, and dislikes. These best capture the consumption value of the offer. As a result, smart retailers scan, gather, and analyze customer experience perceptions. Customers are intelligent and do notice the tiniest shortcomings and inadequacies, potential breakthroughs, and improvements lurking behind the scenes. A serious outlet should not ignore customers' suggestions for the improvement of its offerings. This is achieved through the application of opinion mining techniques.

Indeed, we propose an automatic method for obtaining a general conceptual classification of retail products based on customer feedback. Firstly, we make use of a word embedding approach to encode the names and descriptions given to a set of products. We then automatically find the word embeddings closest to each product's descriptions, grouping similar product embeddings in the same product classes. Moreover, we designed an algorithm to automatically retrieve those concepts best defining each class. These conceptual descriptions could represent, to a certain extent,

customers' opinions of products. As with evaluating a classification process, it is always difficult, especially in retail, where new products are continually appearing and changing customer tastes possibly drive old products into new categories. Additionally, for a successful store, there is another valuable part of the retail life journey. Retailers may also use feedback on what customers want to influence product development. These products can then, if they are really new and aligned with the needs of the customers, be expected to generate buzz more than clutter. Without their direct feedback, any new products would basically be the work of a hit-and-trial game. So far, the importance of customer feedback is in collecting inputs for new assortment initiatives, followed by improving their quality, avoiding or minimizing loss, and forming loyal customers. In this context, opinion mining of feedback helps in identifying negative word of mouth, boosting sales, and eWOM. Furthermore, feedback from retail executives indicates another importance of feedback: the comparison of the feedback about their products with the competition, or the benchmarking that it allows. Also, it helps forecast market demand and the required inventory changes.

6. Future Direction

This chapter explores how retail product lifecycle management (RPLCM) might morph as new technologies and attitudes become a dominant part of the retail landscape. In particular, we underscore those future trends that involve artificial intelligence (AI) as a strikingly innovative technology. Managers need to be adaptive in their product management practices in order to leverage several new technologies and social trends effectively. Overall, we contend RPLCM will only be further enhanced by AI and associated automated processes. As well, AI can rapidly influence organizational responsiveness to addressing lifecycle management for products. In addition, we will likely see data analytics and the Internet of Things become more integrated with product management, providing more efficient and effective product management recommendations. For instance, consumer expectations for products will evolve quickly or gradually, depending upon influencing factors. Managers will need a proactive and responsive approach to meeting these changing consumer needs, especially as sustainability and ethical dimensions become more commonplace in NPD.

7. Conclusion

Retailers around the world face several challenges in existing retail product lifecycle management processes. Leveraging customer data through data-driven product lifecycle management is coveted by retail corporations. Even though significant advances are witnessed in the artificial intelligence space, the retail sector still lags in fully incorporating these innovating advances in existing product movement processing and decision making. There exists a gap between predictive analytics and personalization, dynamic pricing, and market-basket solutions using prescriptive analytics. Existing RPLCM strategies also require more research in the end of life strategies which is currently not studied enough. This paper would pave the right path in addressing the issues identified through the use of AI in the EOL strategy. Retail product lifecycle management is garnering a lot of attention in current retail literature. With businesses already implementing advanced technologies and data-driven actions for creating personalized customer interfaces. Through adopting AI systems in product lifecycle management, retailers can be more responsive and make real-time decisions on a multitude of issues. Efficient end of life strategies are necessary to target the maximisation of the fabricated sales profit. However, EOL stocks and returns are not sufficiently studied in the research field. Therefore, by developing a seamless system of implementing advanced technological solutions into the retail and industrial sectors can bring value and competence. In the innovation-driven world, end-of-life developments and innovation proliferation are some of the most vital and deliberated vocations. Managing end of life challenging is the most inherently complicated firsthand corporation responsibility.