TATA CONSULTANCY SERVICES

Building on belief

An integrated algorithmic enterprise is the future of retail

Introduction

It's not that retailers didn't envisage a fully, integrated business; after all, they have paid a price for long with costly tradeoffs and suboptimal business outcomes due to internal barriers. But, now, they are waking up with heightened urgency to the fact that their modus operandi of operating in walled silos—meant to serve a business landscape that was less complex as change was rare—can no longer continue.

The proliferation of stock keeping units (SKUs), brand expansions, the need to participate in a digital ecosystem, an ever-expanding network of supply chain partners, and mercurial customer behaviors are driving the need to pivot to a connected enterprise. An underlying algorithmic framework augmented with a machine-first approach is making this possible, helping retailers navigate and balance all the dynamics at play in making strategic decisions while responding to the speed of change.

Connecting the dots through complexities

Complexity 1: Interdependencies and tradeoffs

Let's assume a retailer plans to run a promotion on cheese. What seems like a simple retail strategy involves interdependencies between business functions such as replenishment planning, ordering, distribution, and store space planning, and several other decisions:

- Evaluation of key attributes (texture, flavor, type of milk, fat content, salinity, and origin) and latent attributes (age, wellness)
- Modeling of customer behaviors by factoring in cannibalization, affinity, seasonality, and trends
- Determining price elasticities across price zones and defining trade areas based on the category
- Tailoring of assortments to cater to localized preferences
- Determination of the optimal handling units and the fulfillment method

The entire process involves trade-offs between distribution, stockout, and shrink costs, and needs a nimble handshake between merchandising and overall supply chain processes.

If the merchandising team decides to increase the space allocated to the category from four-foot to eight-foot shelves based on the available planogram/shelf sizes, it will directly impact the supply chain. While there might have been some leeway for the supply chain to accommodate the stocking of a six-foot shelf, an eight-foot shelf would be uneconomical. Any proposal to remodel the store to accommodate shelves with additional two-foot length or procure six-foot shelves is unlikely to

be approved by finance. To summarize, eight-foot shelves are inconceivable from a supply chain perspective, while six-foot shelves won't help merchandising. Hence, the best decision in this case is to not increase the category space at all.

Complexity 2: Assumptions undermine decisions

While all business functions are aware of the company goals and devise strategies accordingly, a lot of decisions are made across multiple periods and with varying frequency. For instance, store floor space optimization is performed once a year, while assortment changes are done quarterly or monthly, and price changes are done daily or weekly. The impact of these space, mix, and price decisions varies by time. Often, each team makes assumptions about other processes and takes decisions on an ad hoc basis, resulting in sub-optimal outcomes across the value chain.

Let's take an example of replenishment. Typically, decisions based on forecasts have to be made daily, and quickly—in about 30 minutes—for millions of products at multiple nodes by factoring over 500 attributes. Retailers often proceed by making assumptions about the decisions of other departments and layer in buffers, resulting in inventory distortion.

A connected algorithmic enterprise is the future

Retailers have traditionally embraced point solutions, both third-party and homegrown, for business processes, making their technology landscape complex, mired with redundancies and cost inefficacies. The technology fabric and architecture are rigid, constraining retailers' ability to maximize the potential of their digital capabilities and data synergies. Although retailers have invested significantly in digitization, the rise in operations costs has made it difficult to bring those investments to fruition.

Building an integrated enterprise requires decoupled systems that allow deep collaboration between functions to achieve shared organizational goals. Tapping into internal and external data and concurrently optimizing key performance indicators (KPIs) across business functions with an algorithmic and machine-first approach will help retailers unlock exponential outcomes.

In an integrated algorithmic enterprise, strategic decisions can be made based on the current as well as future state by factoring the ripple effect of a decision on the value chain in real time. Artificial intelligence can self-learn and self-discover opportunities in real time, evaluate actions based on strategies created by different business functions, and implement the best actions—making the organization agile while minimizing operating costs at various levels.

For example, instead of revising assortments on a quarterly basis, they can be adjusted based on the current demand. Simultaneously, store space can be altered to accommodate the assortment changes and unified pricing implemented based on the impact on other items; the best fulfillment option that minimizes cost can also be identified, and the optimum inventory to minimize markdown can be determined. Optimizing decisions based on an integrated view of the value chain can offer 100-200 basis points (bps) increase in sales and profitability and reduce costs by 30%.

The following are the key components of a connected and integrated algorithmic enterprise (refer figure 1):

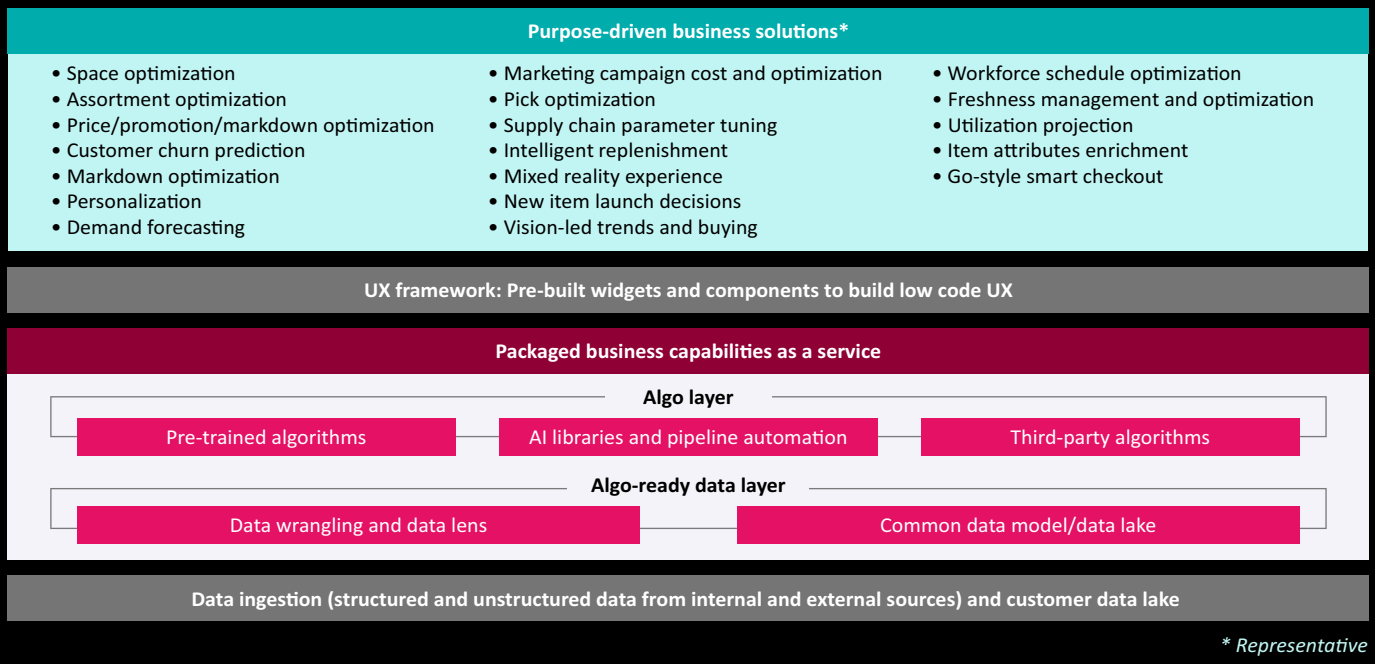

Figure 1: Building blocks of a composable algorithmic enterprise

- Algo-ready data layer: Different business functions aggregate data at different levels. For example, while the pricing team aggregates transactional data daily or weekly to determine price elasticity, the merchandising team correlates transaction data with planograms to arrive at the POG sales. It is, therefore, imperative to establish a common data model for the enterprise rather than optimizing data for each business function; it also reduces data redundancy and storage costs. To ensure good quality data, provisional sandboxes should be used to detect anomalies in both internal and external data, and data cleansing should be automated. The data lakes must be ingested with new data sources and irrelevant data discarded. Data models must allow quick tuning to accommodate any new data that will improve accuracy. For example, during the pandemic, when their forecasting models were unable to cope with the volatility, many supply chain teams resorted to leveraging Google mobility data to track volatile demand. This enabled them to draw insights and make more accurate forecasts.

- Algo layer: The algo layer must be designed to allow organizations to leverage pre-trained algorithms, including third-party algorithms, and best-in-class models to quickly assemble new models to cater to new business scenarios. For example, the clustering stores model AI algorithm is readily available and can be harnessed by customizing the dimensions used for clustering: productivity/performance-based for store space elasticity; price profile performance-based for pricing; demography and store attribute-based for assortment; capacity-based for forecasting and so on. Using reusable and standard building blocks for core AI tasks, automating feature extraction, customizing available AI models, and iterating will ensure best outcomes and scalable production.

- Packaged business capabilities (PBCs) as a service: Packaged business capabilities enable business users to compose new business functionalities by combining existing/third-party modular components exposed as APIs. By leveraging PBCs, new AI applications can be quickly deployed on cloud for optimal scale.

Solving increasingly complex mathematical problems with ready-to-run AI software eliminates tedious setup and testing processes, with capability of end-to-end AI experimentation and workflow. The cloud is the ideal platform for a proof of concept (POC) and rapid scaling of AI workflows. Trained AI models can be shared between different user personas within the organization, reducing testing and redundant efforts. Also, a composable algo platform is ideal for AI infrastructure sharing between data scientists with access to premium accelerated computing infrastructure.

- UX framework and purpose-driven business solutions: Business users prefer solutions that are contextualized, help drive simpler user journeys and experiences, and allow them to maximize their digital investments. By leveraging a composable business framework and low-code platforms, they can configure functional solutions and user experiences that are fit for purpose: processes, data, business needs, and user journeys.

Conclusion

Given the complexity of customers' buying process and the divergent paths through which they interact, it is imperative for retailers to move from silos to an integrated structure with a composable business solution that can make AI production-ready across the enterprise. Adoption of algorithmic retail requires organizations to develop a more integrated way of working across the enterprise, entailing a significant amount of cultural change. It requires executive support and a long-term vision. Measuring and tracking joint performance with strategic KPIs enables joint accountability that can lead to more optimized decisions and an improved customer experience across all channels. With a roadmap that includes enterprise-wide data management, identification of high potential use cases, and the ability to simulate the cross impacts of decisions on one another, retailers can be prepared to unlock exponential value.

About the authors

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Pushpita Saroj, Product Consultant - TCS Optumera™, has over seven years of experience in driving digital transformation initiatives with leading retailers across the globe. As part of TCS Optumera, she has driven multiple consulting assignments specializing in innovation with data science and business transformation processes.

Awards and accolades

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