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Transforming Deductions Management:

A Deep Dive into AI-ML Solutions for Global CPG Companies

In an era where the velocity of business operations intersects with the complexity of global markets, Consumer-Packaged Goods (CPG) companies have to optimize every facet of their financial operations. At the heart of this challenge is the intricate and often underestimated process of deductions management.

Historically considered a back-office function, deductions management – spanning pricing discrepancies, promotional allowances, and invoice inaccuracies – has emerged as a critical battleground for operational efficiency, cash flow integrity, and competitive viability.

Traditionally, the deductions management process was a manual, labor-intensive practice that wasted valuable resources and presented the risk of errors, leading to financial losses and poor customer relations. Conventional deductions management also presents strategic challenges for CPG companies, such as delayed cash flows, eroded profit margins, and lower customer satisfaction.

Relying on outdated manual processes for handling deductions leads to a reactive, rather than proactive, approach to resolving disputes. This creates a vicious cycle of unresolved issues, prolonged resolution times, and loss of trust between CPG firms and their trade partners. Additionally, the slow, opaque nature of traditional deduction processes hampers decision-making agility, leaving companies less responsive to marketplace dynamics and, therefore, less competitive.

The emergence of Artificial Intelligence (AI) and Machine Learning (ML) provided an excellent opportunity to revolutionize deductions management. These technologies are poised to transform it from a cumbersome, risky task into a strategic asset.

This white paper explores how Generative AI and Advanced ML solutions are redefining the deductions management process within the order-to-cash cycle of global CPG enterprises.

AI-ML systems can unlock significant operational efficiencies by automating the classification and validation of deductions, providing insights through advanced analytics, and prioritizing actions on high-value deductions. These technologies have the potential to catalyze a paradigm shift, promising operational efficiency gains of 70%-90% and unveiling multi-million-dollar opportunities for value creation and competitive differentiation. The following sections describe a vision in which AI-ML automates and refines existing processes and creates a dynamic, intelligent ecosystem for deductions management. This ecosystem includes predictive analytics, real-time decision-making, and personalized stakeholder engagements, enabling a proactive, precise, and profitable approach.

We will highlight the strategic importance of CPG companies harnessing AI-ML capabilities to navigate the complexities of the modern business landscape with agility, foresight, and resilience.

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Deductions within organizations can be categorized into two distinct buckets based on their impact and strategic significance in the deduction management process:

High-value or significant deductions

These deductions are of substantial monetary value and impact the organization's bottom line. The deduction management team prioritizes them due to their impact on financial metrics and profitability.

High-value deductions require meticulous attention and dedicated resources for resolution and closure. The focus is addressing and resolving these deductions to minimize financial losses and optimize cash flow.

High-value deductions commonly include:
- Instances of pricing discrepancies
- Promotional allowances
- Large-scale invoicing errors

Organizations use advanced analytical tools and dedicated teams to manage and mitigate the impact of these deductions.

Low-value or under-tolerance deductions

Low-value deductions have a lower monetary impact and may not justify the resources and effort required for resolution. These deductions fall within the under-tolerance threshold, where the cost of processing them may outweigh the benefits derived from their resolution.

The threshold for defining deductions as under-tolerance varies across organizations and is influenced by technological capabilities, data maturity, and analytical competence. Additionally, the deduction team's geographical location may impact the cost-to-process threshold.

Under-tolerance deductions typically range from nominal amounts, such as $10, to higher thresholds exceeding $400. While these deductions may not individually pose significant financial risks, collectively, they can impact operational efficiency and contribute to a cluttered deductions management process. Therefore, organizations must adopt a pragmatic approach to under-tolerance deductions, accepting them as-is to avoid unnecessary costs and administrative burdens.

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Using ML to solve for high-value deductions – using auto classification for deductions

ML algorithms play a pivotal role in automating the classification of deduction types. Various models can be utilized for this task, including:

- **Natural language processing (NLP) models:** NLP models such as Bidirectional Encoder Representations from Transformers (BERT) or Robustly Optimized BERT Approach (RoBERTa) can process textual data from deduction documentation, invoices, and communication logs to categorize deductions accurately.
- **Supervised learning models:** Supervised learning algorithms like Random Forest or Gradient Boosting can be trained on historical deduction data to classify deductions such as pricing discrepancies, promotional allowances, and invoicing errors.
- **Deep learning models:** Deep learning architectures like Convolutional Neural Networks or Recurrent Neural Networks can analyze structured and unstructured data to identify patterns and classify deductions.

After categorizing deductions, the next step is identifying their validity using a second set of ML models.

Classification for validity/invalidity in deductions management involves using AI-ML models to make probabilistic predictions on whether a deduction is valid based on a set of input features.

Various ML algorithms can be used for this classification task, such as:

- Logistic regression
- Decision trees
- Random forests
- Support vector machines
- Neural networks

Ensemble learning methods, such as stacking or voting classifiers, are particularly effective in combining the predictions of multiple base models to improve accuracy.

Feature selection

The first step is to select relevant features (functional KPIs) that differentiate between valid and invalid deductions.

Detailed feature engineering will help drive model accuracy, with features including:

- Contractual terms and conditions
- Historical deduction trends
- Invoice accuracy metrics
- Customer payment history
- Product or service delivery confirmation
- Communication logs
- Correspondence with customers
- Seasonality

Rather than providing a binary classification, the model generates a probabilistic output indicating the likelihood (percentage probability) of a valid or invalid deduction.

This probabilistic approach provides more nuanced insights into the model's confidence level in its predictions. To enhance transparency and trust in the

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model's decisions, techniques like feature importance analysis and Shapley Additive Explanations (SHAP) values explain the factors driving the classification decision, helping stakeholders understand which features are most influential in determining deduction validity.

User consumption

Incorporating a dynamic deduction worklist into the deductions management process represents a transformative step forward for global CPG companies. This state-of-the-art tool, propelled by the integration of advanced ML algorithms, operates with sophistication, allowing data to flow in almost real-time. This ensures that the latest available information informs every action taken.

User access controls filter the information, ensuring users are only presented with data pertinent to their roles and actions. This enhances security and streamlines the decision-making process.

The interactive nature of the deduction worklist sets a new standard in user engagement and efficiency. Users can easily navigate through deductions and interact directly with the data by submitting information, providing feedback, and logging actions taken. The input from users is crucial for informing the prioritization process of the deduction worklist. The worklist dynamically updates based on this interaction, offering users a fresh set of deductions to address upon each login, thus replacing the outdated method of static worklists.

A vital feature of this innovative tool is its ability to allow users to validate or challenge the ML model's recommendations regarding deduction categorization and validity. Users can accept, reject, or partially accept recommendations, providing invaluable input for the ongoing training of the ML models. This enhances their accuracy and reliability over time. This feedback loop is essential for adapting the system to the nuanced and evolving nature of deduction management.

The worklist boasts an impressive capability to write back to source systems, such as ERP platforms like SAP and HFM, or specialized deduction management systems like HighRadius or ICM. This feature ensures that all systems remain in sync and positions the worklist as a consolidated hub for all deduction-related activities and information, streamlining workflows and enhancing productivity.

Complementing these functionalities is a GenAI feature that significantly augments the user experience by enabling users to query any selected deduction for additional insights, be it customer history, the appropriate point of contact, or the most effective outreach method. This immediate access to detailed information facilitates more informed decision-making and strategy formulation, furthering the efficiency and effectiveness of the deductions management process. Combined, these features depart from traditional, static approaches to deductions management. They offer a dynamic, interactive, intelligent solution that improves operational efficiency and promotes a more

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strategic and proactive approach to managing deductions. This marks a significant leap forward in how global CPG companies can leverage technology to protect their bottom line while maintaining strong customer relationships.

Automating email communications to enhance efficiency and customer satisfaction

GenAI-based custom emails for invalid deductions represent a sophisticated application of technology to refine the deductions management process for global CPG companies.

This innovative approach leverages GenAI technologies to automate the creation and dispatching of customized emails to clients concerning invalid deductions. Below, we explore how GenAI consolidates information from disparate systems and personalizes communication for enhanced efficiency and customer satisfaction.

Consolidation of information across systems

The GenAI system starts by gathering necessary data from various internal platforms, such as ERP systems (SAP, MS Dynamics, HFM, etc), deduction management software (ICM or Highradius, etc.), sales databases, and contract management tools.

In this data collection step, it is crucial to consider all relevant information before communicating with the customer. For example, the AI draws order details from

sales systems, matches them with corresponding invoices from the ERP system, and aligns them with delivery proofs and contractual agreements that might be stored in a dedicated contract management repository or within the deduction management system.

This cross-system information harmonization uses sophisticated data integration techniques and APIs to extract pertinent data seamlessly.

Customized email generation

After compiling all the relevant data, the GenAI uses NLP and ML algorithms to craft personalized emails for each invalid deduction case.

These emails are not generic. They are tailored to address the specifics of each deduction and the recipient. The customization goes beyond just embedding the customer's name or the deduction amount. It also involves adjusting the tone, language, and content based on the customer's profile, past interactions, and the nature of the invalid deduction.

In addition, the GenAI system can adjust the complexity and urgency of the message based on the follow-up sequence. The initial email may be informative and collaborative, focusing on presenting the facts and seeking clarification. If the issue remains unresolved, subsequent emails escalate in urgency, adapting their language and content to reflect the seriousness of the situation while maintaining professionalism and respect for customer relationships.

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Intelligent scheduling and recipient targeting

The system also incorporates an advanced feature that intelligently selects the best time to send these emails for maximum impact and response rate. This decision is based on historical email interaction data, which helps determine when recipients are most likely to open and engage with emails.
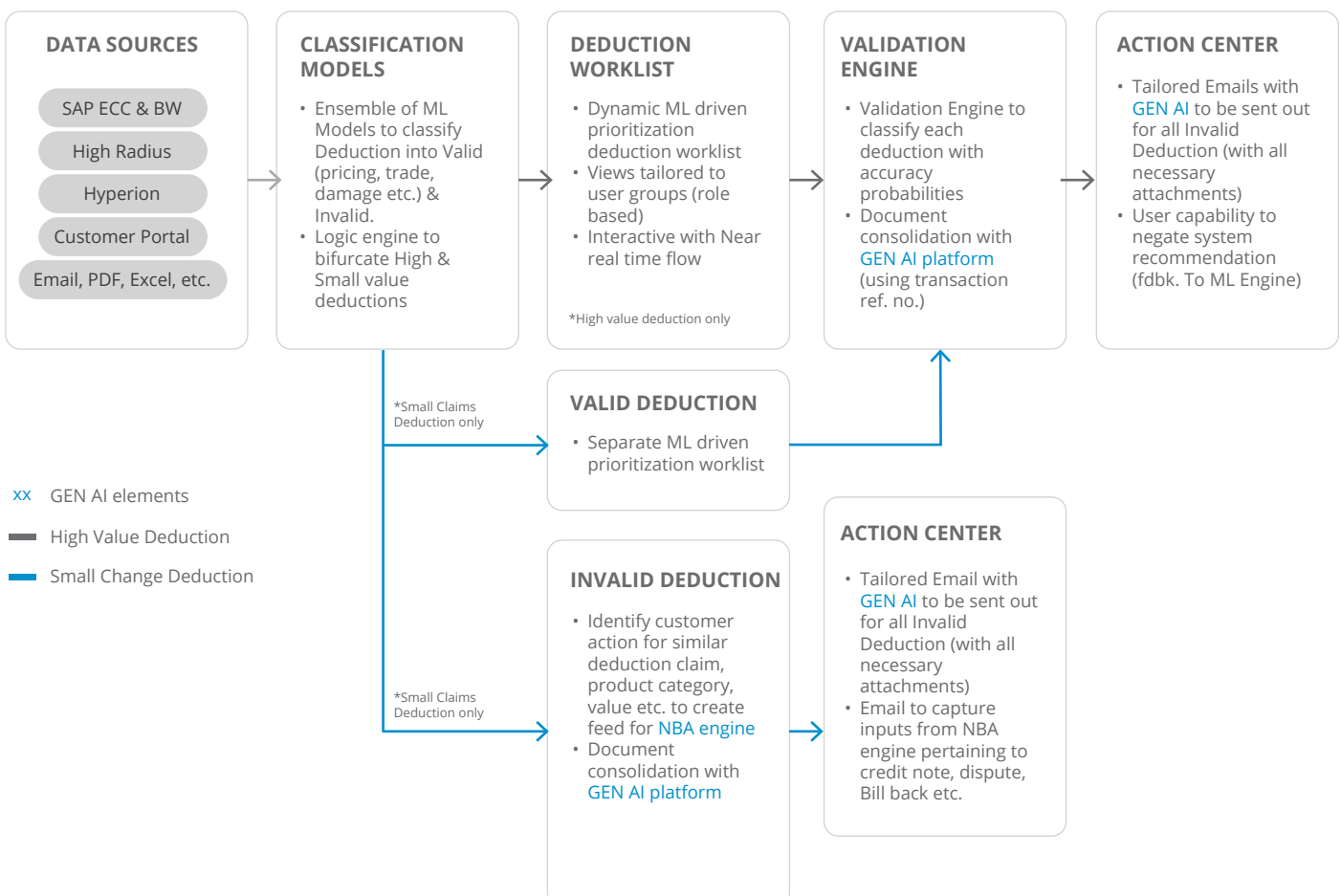
Additionally, the GenAI engine identifies the most suitable recipients for each email, including the primary contact and other stakeholders, and decides who should be cc'd on the communication. This ensures that all relevant parties are kept in the loop, fostering transparency and speeding up the resolution process.

Continuous learning for enhanced accuracy

The GenAI engine of the system is dynamic, constantly learning from each interaction and updating its models based on the outcomes of sent emails. This continuous learning process allows the system to refine its approach to email customization, timing, and recipient selection, leading to more effective communication attempts over time.

Illustrative solution diagram

Solution outlay for decision system

DATA SOURCES
- SAP ECC & BW
- High Radius
- Hyperion
- Customer Portal
- Email, PDF, Excel, etc.

CLASSIFICATION MODELS
- Ensemble of ML Models to classify Deduction into Valid (pricing, trade, damage etc.) & Invalid.
- Logic engine to bifurcate High & Small value deductions

DEDUCTION WORKLIST
- Dynamic ML driven prioritization deduction worklist
- Views tailored to user groups (role based)
- Interactive with Near real time flow

*High value deduction only

VALIDATION ENGINE
- Validation Engine to classify each deduction with accuracy probabilities
- Document consolidation with GEN AI platform (using transaction ref. no.)

ACTION CENTER
- Tailored Emails with GEN AI to be sent out for all Invalid Deduction (with all necessary attachments)
- User capability to negate system recommendation (fdbk. To ML Engine)

*Small Claims Deduction only

VALID DEDUCTION
- Separate ML driven prioritization worklist

xx GEN AI elements

━ High Value Deduction

━ Small Change Deduction

*Small Claims Deduction only

INVALID DEDUCTION
- Identify customer action for similar deduction claim, product category, value etc. to create feed for NBA engine
- Document consolidation with GEN AI platform

ACTION CENTER
- Tailored Email with GEN AI to be sent out for all Invalid Deduction (with all necessary attachments)
- Email to capture inputs from NBA engine pertaining to credit note, dispute, Bill back etc.

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Managing the low value or the under-tolerance deductions

Under-tolerance deductions present a distinct challenge in business, especially for industries like consumer packaged goods with high volumes of transactions. Despite their low value, processing these deductions often costs more than they are worth. This situation forces businesses to decide whether to invest resources in processing or writing them off.

AI-ML solutions provide a compelling solution by automating the classification and resolution of these deductions. This approach combines efficiency with accuracy, significantly reducing the operational costs associated with manual processing.

AI-ML automation in under-tolerance deductions

AI-ML models efficiently classify under-tolerance deductions as either valid or invalid. Unlike high-value deductions, which may have nuanced probabilistic outcomes requiring detailed analysis and potential human intervention, under-tolerance deductions are treated with a binary classification approach. This means each deduction is definitively marked as valid or invalid based on the model's learning without the ambiguity of probabilistic ranges. This binary output streamlines the decision-making process, allowing immediate and automatic actions without needing manual review.

Tracking and reporting accuracy

The accuracy of AI-ML models is crucial to ensure that valid deductions are not wrongfully dismissed and invalid ones appropriately challenged. Monitoring precision and recall metrics, alongside a confusion matrix, provides insights into the true positive, true negative, false positive, and false negative rates.

Regular reporting and analysis of these metrics help refine the model, improving its decision-making capabilities with additional data and feedback loops.

To validate the model's accuracy, businesses conduct periodic audits, including end-of-year reviews, and adjust parameters to align with changing business environments, regulations, and operational strategies.

Benefits of minimizing human intervention in managing low-value deductions

Removing human intervention from the process of managing under-tolerance deductions delivers multiple benefits:

- **Cost efficiency:** By automating the classification and handling of these deductions, companies can significantly lower the cost associated with manual processing, redirecting resources to more strategic initiatives.

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- **Operational efficiency:** Automation ensures that deductions are processed swiftly and consistently, eliminating bottlenecks and reducing the cycle time from deduction identification to resolution.
- **Error reduction:** AI-ML models, once finely tuned, have a lower propensity for error compared to manual processing, enhancing the overall accuracy of deduction classification.
- **Scalability:** The automated system can handle an increasing volume of deductions without a proportional increase in resource allocation, allowing companies to scale operations efficiently.
- **Improved financial health:** By promptly addressing under-tolerance deductions, businesses can improve their receivables and overall financial health, reducing write-offs and enhancing cash flow.

The strategic application of AI-ML in managing under-tolerance deductions represents a significant leap forward in financial operations efficiency. Automating the classification process with a binary output model streamlines operations, cuts costs, and maintains or improves deduction management accuracy.

This approach simplifies decision-making and reallocates human capital to areas requiring strategic and complex decision-making, which is crucial for boosting organizational effectiveness and financial performance.

At the forefront of these intelligent systems is a design-led user consumption layer that allows users to navigate the complexities of deductions in the order-to-cash process. Given the operational intricacies of deductions in CPGs, dynamic and detailed dashboards for deduction analytics are essential. These sophisticated platforms are tailored for different user roles, including analysts, business unit owners, and C-suite executives, providing them with tailored, actionable insights. This detailed approach to deduction analytics facilitates a more nuanced understanding of deductions, empowering organizations to drive significant improvements in their management processes and, ultimately, their bottom line.

Empowering success through deduction dashboards

A suite of deduction dashboards includes advanced user access control mechanisms to securely manage sensitive financial data, limiting access to authorized personnel. These highly personalized dashboards offer insights relevant to the specific roles and responsibilities of different user roles. For example, an analyst might need granular data on recent deduction trends for a specific product line or customer. At the same time, a CXO may require a high-level overview of deductions affecting the organization's financial health across regions or business units.

Real-time analytics and reporting

These dashboards depart from the traditional month-end reporting format by harnessing the power of AI-ML to provide near real-time analytics. This feature enables users to access up-to-the-minute

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data on deductions, facilitating timely decision-making that can proactively impact the organization's financial performance. This shift to real-time reporting marks a significant advancement in deductions management, enabling a more agile response to emerging trends and issues.

Comprehensive insights across dimensions

Deduction dashboards offer a multi-dimensional view of data, allowing users to slice through various layers, such as business units, regions, countries, and customers. This detailed perspective supports deep dives into specific areas of interest, aiding the identification of patterns, trends, and root causes of deductions.

By enabling users to drill down into the data, these dashboards empower organizations to pinpoint specific areas for improvement,

whether related to invoice accuracy, compliance with contractual agreements, or customer payment behaviors.

Strategic decision-making for bottom-line Impact

The ultimate goal of these dashboards is to enable strategic decision-making that positively impacts the organization's bottom line. Organizations can make informed decisions that drive value creation by providing a comprehensive view of deduction analytics and the ability to analyze data in near real-time.

Whether identifying opportunities for process optimization, enhancing customer satisfaction, or reducing financial leakage through more effective deductions management, these dashboards are critical in the financial strategist's toolkit.

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Conclusion

AI-ML technologies offer a transformative impact on deductions management for global CPG companies. By automating deduction classification, they provide clear, explainable insights and prioritize high-value deductions, unlocking multi-million-dollar impacts and achieving significant operational efficiencies. With interactive user interfaces, custom email generation, and comprehensive analytics dashboards, organizations can streamline deductions management processes, enhance decision-making, and drive sustainable growth in the competitive CPG sector.

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About Fractal

Fractal is one of the most prominent providers of Artificial Intelligence to Fortune 500® companies. Fractal's vision is to power every human decision in the enterprise, and bring AI, engineering, and design to help the world's most admired companies.

Fractal's businesses include Crux Intelligence (AI augmented analytics platform), Eugenie.ai (AI to identify, explore and leverage anomalies and patterns in maintenance data), Asper.ai (AI for enterprise revenue growth management), Senseforth.ai (AI for customer interactions) & Flyfish (generative AI for Digital Sales). Fractal incubated Qure.ai, to provide automated interpretation of radiology exams like X-rays and CT scans.

Fractal currently has 4000+ employees across 16 global locations, including the United States, UK, Ukraine, India, Singapore, and Australia. Fractal has been recognized as 'Great Workplace' and 'India's Best Workplaces for Women' in the top 100 (large) category by The Great Place to Work® Institute; featured as a leader in the Forester Wave: Customer Analytics Service Providers , Q3 2021 Report, the Forester Wave: Computer Vision Consultancies , Q4 2020 & the Forester Wave: Specialized Insights Service Providers, Q2 2020 by Forrester Research Inc., a leader in Analytics & AI Services Specialists Peak Matrix Assessment 2021 by Everest Group Inc. and recognized as an 'Honorable Service Provider' in 2022 in the Magic Quadrant™ for Data & Analytics Service Providers Report by Gartner Inc.
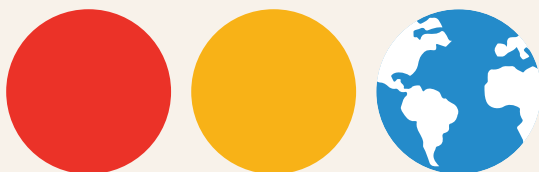
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