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Article

Creating a Proactive Churn Retention Strategy in a Telecommunications Company Through the Application of Design for Lean Six Sigma

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Abstract

This study investigates the use of DFLSS to mitigate customer churn in a prominent telecommunications provider facing challenges from competitive pricing, regulatory changes, and evolving customer expectations. Employing the DMADV methodology, the research developed a proactive retention strategy using techniques such as propensity modeling, customer segmentation, and predictive analytics to identify churn drivers. Targeted interventions, which include future-dated loyalty discounts, outbound retention campaigns, and process optimization through DOEs were implemented and pilot-tested. The pilot involved approximately 5000 high-risk customers per month, resulting in a 6% increase in customers under contract, a 2% improvement in rates, and a 6% reduction in repeat call rates, equating to 2880 fewer calls annually. Financially, the strategy preserved an estimated 10% in revenue over 12 months, while operational enhancements delivered a 2% cost reduction annually through reduced repeat calls. These findings highlight the importance of proactive outreach and continuous improvement in managing churn. Limitations of this study include the narrow market scope and the need for broader validation. The research contributes to the limited literature on LSS in Western telecom markets and provides a replicable model for practitioners. Future work may explore integrating artificial intelligence to enhance churn prediction and retention strategies.

Keywords: customer churn; DFLSS; DMADV; telecommunication; customer retention

1. Introduction

The telecommunications sector operates in an intensely competitive environment where discount pricing, rising living costs, and regulatory changes have amplified customer churn. Rather than simply describing these pressures [1]. This study analyzes their combined effect on retention strategies, noting that regulatory measures such as telecommunication company's mandate for end-of-contract notifications and annual service statements have increased customer awareness of switching opportunities, thereby accelerating churn [2]. These dynamics create significant financial and operational challenges for providers, making churn management a strategic priority [3].

Retention in the telecommunication sector is not only critical for revenue stability but also for sustainability—a dimension often overlooked in churn research. High churn rates trigger repeated acquisition campaigns, hardware distribution, and marketing efforts, all of which increase environmental and financial costs. A proactive retention strategy can



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mitigate these impacts by reducing resource-intensive churn cycles and aligning operational efficiency with sustainability objective [4,5]. This analytical perspective positions retention as a dual lever for competitive advantage and environmental responsibility. Retention also stabilizes revenue streams, enabling long-term investment in service quality, while lowering the environmental footprint associated with onboarding new customers [6].

To address these challenges, this study employs Design for Lean Six Sigma (DFLSS) using the DMADV methodology (Define, Measure, Analyze, Design, Verify) rather than DMAIC (Define, Measure, Analyze, Improve, Control). DMADV is specifically chosen because the project involves designing a new proactive retention process, not merely improving an existing reactive framework. While DMAIC is ideal for incremental improvements to established processes, DMADV is better suited for creating innovative solutions from the ground up, ensuring that sustainability and customer-centric goals are embedded in the design phase [7]. This paper is structured as follows: Section 2 presents the literature review, Section 3 explains the research methodology, Section 4 summarizes the key study outcomes, Section 5 discusses the findings and their implications, and Section 6 concludes the study.

2. Literature Review

Methods for decreasing customer churn were identified by examining the effectiveness and applicability of LSS within the telecommunications sector [8]. Beyond tools, LSS embodies a conceptual framework grounded in goal theory and organizational design, where explicit improvement goals, role structures, and governance orchestrate cross-functional learning and disciplined problem solving [9]. This framing helps explain why DFLSS can design new service systems rather than merely apply isolated techniques in telecommunication [10].

It is widely acknowledged that General Electric (GE) was the pioneer in utilizing LSS. Following the successful adoption of Six Sigma in the 1990s, GE implemented Lean Management to maximize the benefits of deploying the integrated methodology [11]. The DMAIC process was initially emphasized as significant for quality enhancements in the telecommunications sector [12]. This is echoed by [13], who summarized the crucial role of DMAIC in achieving cost savings, boosting quality, and enhancing processes. Lean Management contributes a process theory of value—specify customer value, map the value stream, eliminate non-value work, establish flow and pull, and pursue perfection—thereby providing the logic that DFLSS uses to architect service processes end to end [14]. Empirically, Six Sigma's infrastructure (roles, metrics, governance) complements Lean Management's core practices to drive performance [10].

Numerous advantages of LSS in the telecommunications sector include the removal of non-value activities from processes, improved resource utilization, support in root cause analysis for customer calls, the minimization of repeat calls, and the solving of upstream issues in process flows to enhance customer service and support [15]. Challenges tied to implementing LSS have also been noted, such as the rapid pace of industry changes, particularly in contact centers, where gathering momentum can be challenging due to constant transitions, high employee turnover that complicates training in LSS practices, as employees often leave quickly, and the difficulty in allocating training time due to narrow margins, handling demands, and insufficient backing from upper management regarding LSS principles [16].

Successful LSS initiatives depend on a rigorous project selection process that places customer satisfaction at the forefront. Poorly chosen projects often fail to deliver improvements and, in some cases, lead to adverse outcomes, as highlighted by previous studies [17,18]. The project selection process is crucial for determining the appropriate

improvement methods, personnel, and tools before commencing a project [19]. Service organizations that employ LSS have reported that it has enhanced their ability to pinpoint the underlying causes of customer dissatisfaction and attrition [6]. Additionally, LSS has facilitated the creation of organizations that are quicker and more agile in responding to customer demands [20]. This aligns with goal-theoretic views of Six Sigma, where explicit, challenging, and measured goals regulate action and enable intentional learning—critical for designing retention processes around churn determinants and Customer Lifetime Value (CLV) impact [21].

From a strategy perspective, Lean Six Sigma (LSS) links process redesign to churn outcomes by shaping the conditions under which customers decide to stay or switch. Drawing on goal-theoretic governance, LSS enforces explicit, challenging, and measurable objectives that regulate organizational action and foster intentional learning, reducing variance at critical retention touchpoints [14]. Combined with Lean's process theory of value—specifying customer value, mapping value streams, and eliminating non-value work—this creates predictable, low-effort renewal experiences perceived as fair and reliable [22]. Such reliability aligns with expectancy–disconfirmation theory, where meeting or exceeding predictive expectations drives satisfaction and repurchase intentions [23]. LSS journey redesign also embeds choice architecture principles, using transparent defaults and friction reduction to make retention the salient, low-effort option; verification gates ensure harmful “sludge” is removed while constructive frictions that enhance perceived control are retained [24,25]. At contract boundaries, framing offers continuity and avoidance of price shocks leverages prospect theory's loss aversion, as telecom evidence shows losses weigh more heavily than equivalent gains in switching decisions [26]. In parallel, LSS operationalizes service-quality antecedents (reliability, assurance, empathy) and fair switching barriers, balancing affective experience with calculative lock-in; empirical studies confirm lock-in only works when experiential quality is weak, reinforcing LSS's emphasis on value co-creation over coercion [27,28]. By embedding analytics and structured gate reviews, LSS builds dynamic capabilities—sensing churn signals, seizing with personalized timing, and reconfiguring workflows—while retention research highlights that “who is at risk” and “who should be targeted” often diverge, validating LSS's focus on segmentation logic and verification metrics.

Traditional LSS continuous improvement initiatives typically utilize the Six Sigma DMAIC framework, which has become an established data-driven scientific approach to addressing complex business challenges since the 1980s [29]. The DMAIC framework relies on well-recognized scientific, engineering, and quality improvement methodologies that have developed over recent decades [30]. In contrast, a newer methodology called ‘Design for Six Sigma’ or DFSS emerged in the late 1990s to facilitate the creation of new products, processes, and services [31]. Understanding various DFSS strategies, including DMADV or DMAIC, and tailoring them to fit organizational requirements can enhance productivity and performance [32]. Conceptually, DMADV's ‘Design–Verify’ phases draw on robust design and Quality Functional Deployment (QFD) to translate the Voice Of the Customer (VOC) into Critical to Quality (CTQs) and engineer noise-insensitive service performance—providing the theoretical basis for designing new retention workflows [33].

A DMADV framework that includes attitude-aware CTQs, uncertainty-reducing design, flow-based measurement, and near-term verification is known to provide a theoretically grounded pathway by which process redesign shifts customer decision formation toward retention and lowers churn. In Define–Measure, CTQs should reflect overall versus transaction satisfaction and affective versus calculative commitment. Loyalty is driven by cumulative evaluations and trust in relational customers, while calculative ties break when price fairness or switching costs shift. Uncertainty weakens satisfaction strength

and raises the defection risk even among the ‘satisfied’; so, the Voice of the Customer should capture uncertainty using behavioral proxies such as plan-change frequency [34]. Switching costs span procedural, financial, and relational components; managing these reduces calculative churn [35]. Perceived price unfairness also triggers exit and negative word-of-mouth; so, price-shock controls belong in CTQs [36]. In Analyze–Design, retention journeys are engineered to lower uncertainty and cognitive effort (transparent tariffs, default re-contracting, proactive timing) while managing calculative commitment (fair switching costs and price-shock controls) [37]. Retention design makes renewal the low-risk and low-effort option, and research shows churn increases when uncertainty and price perceptions remain unresolved despite short-term satisfaction [38]. In Measure—Verify, we use flow-based segmentation (loyal/sleeping/churn) with Markovian transitions and shock detection. Embedding inter-cluster flow coefficients improves the prediction by >10% and flags exogenous shocks that break stationarity [39]. Hidden-state models can further capture latent relationship dynamics and state shifts following firm–customer encounters [40]. Complementing this with CLV-aware iso-value analysis that links RFM to lifetime value enables better resource allocation [41]. Verification should be near-term. Weekly time-series models predict churn best one week ahead ($F1 = 79\%$) but drop sharply on longer horizons. SHapley Additive exPlanations (SHAP) shows churn-case dynamics as key drivers; so, rapid checks and uncertainty-reducing actions are essential [42]. For treatment decisions, it is important to add uplift modeling to target customers who respond because of the intervention, improving the campaign efficiency in B2B retention [40].

The existing literature on the application of LSS in managing customer churn within the telecommunications sector is scarce. However, businesses in this sector need to effectively manage customer churn, highlighting the significantly higher costs associated with acquiring new customers compared to retaining existing ones [12]. The authors outlined essential steps for managing customer churn, such as measuring the churn rates, identifying the reasons and causes behind churn, and determining which customers are more likely to churn and could therefore be managed more effectively. They also stressed the importance of understanding the financial implications of churn. Moreover, the authors reiterated that customer service and satisfaction are crucial for enhancing customer loyalty and decreasing churn rates. Methodological choices materially affect campaign profitability, and well-specified models exhibit performance ‘staying power’—a critical theoretical insight for designing retention programs that integrate analytics into process design [8]. Recent systematic reviews map core churn determinants (satisfaction, switching costs, service quality, demographics), reinforcing the need to design proactive interventions around contract milestones and service pain points [43].

As previously noted, there is limited research on implementing LSS methods to reduce customer churn in the telecommunications sector. However, numerous instances of LSS being applied in service industries have been documented [44]. Several case studies regarding LSS frameworks in telecommunications from Middle Eastern and African nations have been identified [45,46]. Conversely, there is a notable lack of case studies within the European telecommunications sector [47]. Furthermore, only a few examples of Lean Six Sigma applied to customer churn improvements within the telecommunications industry have been found, despite ample examples from other service sectors [48].

Beyond the geographical context, this study addresses a critical gap in the LSS and churn management literature by focusing on the design of new proactive retention processes rather than incremental improvements to existing workflows [7,49]. While most prior research emphasizes reactive strategies or applies DMAIC to optimize current operations [12,13], there is limited evidence on leveraging DMADV within Design for Lean Six Sigma to create entirely new frameworks for churn mitigation in service industries [50].

Furthermore, the integration of predictive analytics and customer segmentation into LSS methodologies remains underexplored, particularly in European telecommunications markets [47]. This research demonstrates how combining these elements can transform retention from a reactive to a proactive approach, offering a replicable model for other regulated contract-driven environments. Positioning DFLSS/DMADV within dynamic capabilities and Service-Dominant Logic (SDL) clarifies the conceptual novelty—designing a capability for proactive retention (sensing–seizing–reconfiguring) and co-creating value through low-effort, fair, and reliable service experiences [27,51].

The research gap lies in the limited evidence on designing proactive retention processes using LSS—particularly the DMADV framework. Additionally, various Design for LSS tools—such as the Voice of the Customer, check sheets, Pareto charts, Critical to Quality trees, process capability studies, control charts, and cause-and-effect analysis—are recognized as valuable resources within the DMADV framework [52]. While prior research predominantly applies DMAIC for incremental improvements to existing workflows, few studies explore creating entirely new retention architectures that integrate predictive analytics and customer segmentation into LSS methodologies.

This absence of design-oriented approaches in the literature underscores the novelty and necessity of the present research, which not only addresses this gap but also provides transferable insights for other regulated contract-driven industries. Specifically, it demonstrates how combining DMADV with predictive analytics and segmentation can transform retention from reactive to proactive, offering a replicable model that aligns operational efficiency with sustainability goals and enhances methodological rigor through robust verification metrics. This leads to the formulation of the following research questions (RQs):

- RQ1: How can the DMADV framework be effectively applied to reduce customer churn in the telecommunications sector?
- RQ2: What are the most impactful Lean Six Sigma tools and metrics for improving customer satisfaction and loyalty in this context?

Analytically, the research design also accounts for imbalanced churn signals and model lift at contract boundaries, ensuring the new process integrates robust metrics and verification consistent with DFSS theory [8,53].

3. Research Methodology

3.1. Overview

The research adopts a single-case study design with elements of action research. It focuses on Irish telecommunication company as the sole organizational context, applying the DMADV framework of Design for Lean Six Sigma to develop a new proactive retention process, addressing the increasing churn rates in a competitive and regulated market across several contact centers across the Middle East and Africa [46]. Table 1 provides an overview of the tools used in the DMADV framework [49,54].

Table 1. Breakdown of methodology.

Define	Measure	Analyze	Design	Verify
SIPOC	Check sheets	Ishikawa diagram	Pilot implementation plan	Pilot execution
Project charter	Pareto chart	5 Why's analysis	New process creation	Visual controls
Voice of the Customer	Capability study	Workshop brainstorming	Standard work script	Training plan
Stakeholder Analysis	Control charts	Process flows	New metrics	Statistical process controls
Gemba walk	Critical to quality tree		Design of experiments	Gemba follow ups

The study adhered to strict ethical standards and data governance protocols. Customer data used for churn analysis were anonymized and aggregated to prevent the identification of individuals. All data complied with GDPR requirements and telecommunication company's internal privacy policies. Access to sensitive information was restricted to authorized project team members, and the data were stored on secure servers with encryption. No personally identifiable information (PII) was disclosed or used beyond the scope of retention modeling, ensuring confidentiality and compliance with regulatory frameworks.

The study primarily relied on customer and agent survey data collected through telecommunication company's standard feedback mechanisms, including monthly Net Promoter Score (NPS) surveys and targeted retention feedback forms. Response rates for these surveys averaged 62% for customers and 71% for agents during the two-month data collection period. While these rates are considered acceptable for telecom service research, potential non-response bias was mitigated by triangulating survey insights with operational data (e.g., churn metrics, call logs) and validating findings through stakeholder workshops. This approach ensured that the retention strategies were not solely based on self-reported feedback but supported by objective performance indicators.

3.2. Define, Measure, Analyze, Design, Verify

3.2.1. Define

In the Define phase, the project team utilized data from ongoing business activities. The telecommunication company regularly conducts surveys of both agents and customers, including monthly Net Promoter Score (NPS) surveys. Table 2 shows that over 250 agent surveys and 250 customer surveys were collected over a two-month period. VOC, as a well-established method in service industries, helped to collect and prioritize customer needs by their importance and satisfaction [55]. Moreover, the team used a SIPOC diagram (Suppliers, Inputs, Process, Outputs, Customers) to outline the current inbound retention process, providing a high-level view of the current process and its components. A project charter was also developed to identify the key problems, set goals, and clarify dependencies.

Table 2. Overview of data sources.

Source	Description	Period	Volume	Purpose
Agent Surveys	Internal surveys on retention challenges and tools	2 months	250 surveys (5 agents)	VOE; identify pain points
Customer Surveys (NPS and VOC)	Feedback from exit journey customers	2 months	250 surveys (5% of 5000 churn base)	Identify CTQ factors
Operational Churn Data	Broadband churn and cancellations from CRM	Historical	~100,000 base customers live	Analyze churn trends and lifecycle
Retention Segment Volumes	Segmentation: reactive vs. proactive	Pilot and baseline	Reactive: 10 k/month; Proactive: 6 k/month	Targeting and evaluation
Process Performance Metrics	Save rate, tenure, cancellation rates	Historical and pilot	Population-level	Capability analysis and pilot verification
Workshops and Qualitative Inputs	Kaizen, Gemba walks, brainstorming	Project duration	Multiple agents and leaders	Root cause analysis and future-state design

According to [56], choosing the right project team members at this stage is essential for success. The researcher also applied Mendelow's stakeholder matrix to identify important stakeholders who would influence the project.

To evaluate churn and retention effectiveness, the study used four main metrics:

- Customer Churn Rate: the percentage of customers terminating service in each period, calculated monthly to track overall attrition and tenure-based patterns.
- Save Rate: the percentage of customers intending to cancel who were retained after intervention applied to inbound retention calls and proactive pilot cohorts as the primary success measure.
- Repeat Rate: the percentage of previously retained customers who re-contact or cancel again within 30–90 days, used to assess retention quality and sustainability.
- Contract Base: the total number of active customers under fixed-term contracts, excluding out-of-contract customers, used to segment churn by tenure and to identify high-risk windows (months 10–12).

3.2.2. Measure

In the Measure phase, tools like check sheets and Pareto charts were used to highlight key issues impacting agent performance, customer satisfaction, and overall churn rates. Collecting both internal and external feedback is important to understand critical quality factors [57]. To support this, check sheets were utilized to systematically collect data on recurring issues reported by customers, offering a structured way to capture both internal and external feedback. These data were then used to construct Pareto charts, which helped to identify the most significant contributors to churn by ranking them in order of impact. Histograms were also applied to visualize the distribution of churn across different customer segments or time periods, revealing patterns that might not be immediately apparent in the raw data.

Control charts, which build on the concept of line charts by incorporating control limits, were considered to assess the stability of the churn process and detect any abnormal variations. These charts are particularly useful in determining whether fluctuations in churn are due to common causes or special causes that require intervention. Capability studies were conducted to evaluate how well the current processes met performance expectations, using metrics such as the customer save rate and customer tenure to assess the effectiveness of the retention strategies.

Together, these tools provided a comprehensive picture of the churn landscape. The line chart in Figure 1, showing churn volumes and cancellation rates by tenure, offered valuable insight into customer behavior over time. This helped the team to identify critical points in the customer lifecycle, where churn was most likely to occur, thereby informing targeted interventions to improve retention and overall service quality.

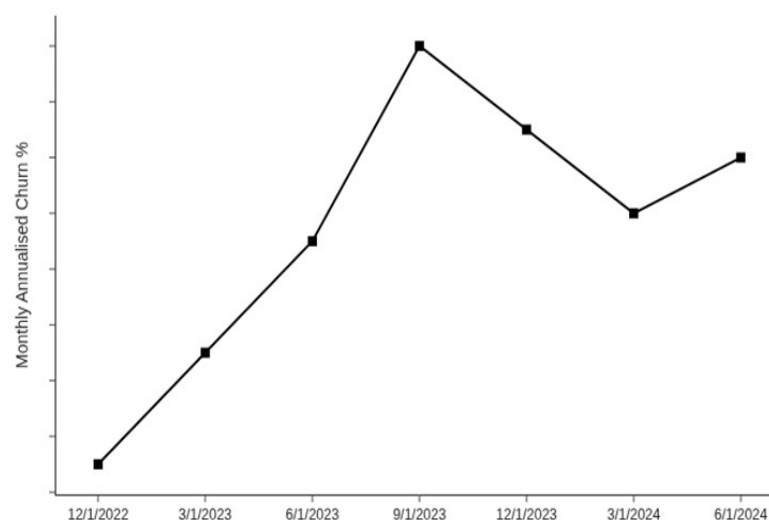


Figure 1. Monthly churn breakdown.

Continuing from the previous discussion, Figure 2 presents a bar chart depicting the customer termination percentages over a 24-month period. The x-axis spans from month 0 to month 24, while the y-axis measures the termination rates, peaking at 10%. A pronounced spike is observed at the 12-month mark. Terminations surge to approximately 7%, indicating a critical churn point, and coincide with the end of typical annual contracts. Additional elevated churn periods are noted around months 10 and 13–15, suggesting transitional phases where customer dissatisfaction or reevaluation of service may occur.

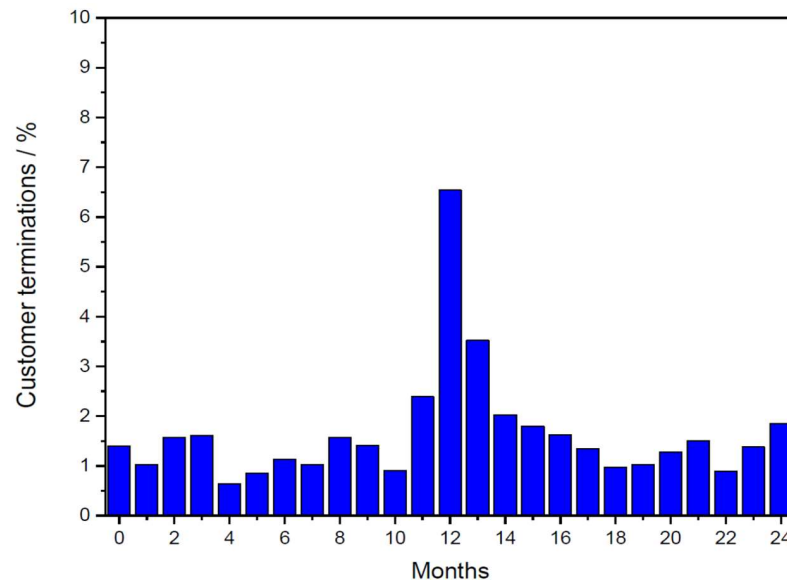


Figure 2. Churn tenure overview.

This visualization reinforces the findings from Figure 1 by pinpointing specific timeframes in the customer lifecycle where the churn risk is highest. These insights are instrumental in shaping targeted retention strategies, such as proactive engagement campaigns or loyalty incentives, particularly around the 12-month milestone. By aligning these findings with capability studies and control charts, the team can better anticipate churn behavior and implement timely interventions to improve customer tenure and satisfaction.

3.2.3. Analyze

During the Analyze phase, the team aimed to map the existing inbound retention process to identify gaps and opportunities. The Analyze phase is crucial for turning the CTQ into measurable parameters [58]. To achieve this, the researcher facilitated mini-Kaizen workshops that included frontline agents and team leaders, who had the most experience with the process. Their direct involvement was key to understanding the current process and gathering valuable insights.

The team used tools like Ishikawa diagrams and the 5 Whys technique to investigate the root causes of the issues. Gemba walks were also conducted, allowing the team to observe the process firsthand and identify inefficiencies. These simple tools helped to uncover hidden problems, ensuring a comprehensive understanding of the existing process.

3.2.4. Design

In the Design phase, the project team took a dual approach: improving existing processes and introducing new methods aimed at reducing churn and enhancing retention. Brainstorming sessions were integral to developing creative solutions to the identified challenges. Brainstorming is an approach where participants freely share ideas without judgment, encouraging innovation and diverse thinking [59]. The brainstorming

sessions included the core project team and key stakeholders who had participated in previous workshops.

In this phase, the team created a future-state process map to visualize potential improvements, as well as an idea charter to guide the development of tools and systems supporting the proposed solutions. Process mapping, while typically part of the Define phase, was also useful in the Design phase for fostering transparency and communication [60].

To design a proactive retention strategy, customers were segmented using predictive churn-risk models that ranked the active base by likelihood of cancellation (See Table 3). Two priority segments were created: Top 10% (very high risk) for intensive interventions and pilot testing and Top 40% (high risk) for scalable proactive actions. The remaining Bottom 60% received standard treatment. The model incorporated behavioral, contractual, and service-related predictors, including tenure and contract stage, billing changes, service quality indicators (fault history, repeat calls), interaction history (complaints, contact frequency), product attributes (speed tier, bundles), and demographic proxies. The variables were standardized, and multicollinearity checks ensured stability. This percentile-based segmentation focused retention resources on customers with the highest predicted risk, aligning with Lean principles of efficiency and waste reduction. A Design of Experiments (DOE) was also conducted to identify the critical factors influencing agent performance, ensuring that improvements were based on data-driven insights. The DOE focused on understanding the most important variables for supporting retention efforts and improving agent effectiveness.

Table 3. DOE/Gauge R&R overview.

Aspect	Design of Experiment (DOE)	Gauge R&R (Measurement Reliability)
Objective	Identify coaching factors impacting call quality and save rate %	Assess repeatability and reproducibility of call scoring
Factors	Agent tenure, coach tenure, feedback location, timing, frequency	Appraisers (3), calls (5), trials (2)
Levels	Each factor at 2 levels (e.g., low vs. high, in-office vs. online)	Same scorecard template across evaluators
Design	Resolution V fractional factorial, 16 runs, 2 blocks (location)	Randomized scoring of calls by multiple evaluators
Response Variables	Call quality score, save rate %	Call quality score consistency
Main Effects	Agent tenure (most significant), coach tenure, feedback location	Slight bias: Team Leader A scored lower consistently
Model Fit	Adjusted $R^2 > 70\%$, strong explanatory power	Variance components: 10.51% (acceptable)
Power Analysis	94% → high likelihood of detecting true effects	%Tolerance: 16.89% (within permissible limits)
Reliability Outcome	DOE robust, refined model focuses on top 3 factors	Measurement system acceptable but needs calibration
Recommendations	Optimize coaching onsite, refine hiring and scheduling	Regular calibration meetings, updated manuals, training

3.2.5. Verify

In the Verify phase, pilot testing was used to evaluate the proposed solutions and gather feedback on their effectiveness. Pilot testing allows for a controlled examination of a process's performance before full-scale implementation [61]. The pilot involved a

subset of customers who were identified as being at high risk of churn. Statistical process control charts were used to monitor and assess the pilot's performance. Control plans were developed to ensure that the changes were consistently implemented. This approach helped ensure that the proposed solutions were effective in addressing the root causes of churn and improving retention [62].

The evaluations of the retention strategy using pre–post comparisons have limitations in establishing causality. Because there was no randomization, the observed changes may reflect external factors such as competitor promotions or seasonal trends rather than the intervention itself. Temporal confounding is also a concern, as events during the post-intervention period—like price changes or new product launches—could influence churn independently. Additionally, regression to the mean may occur if churn was unusually high before the intervention, for example, the spike at month 12 due to contract renewals, which could naturally decline without any changes. Maturation effects further complicate interpretation, as customer behavior evolves over time regardless of the strategy.

To address these limitations, several steps were taken. Historical trend analysis was conducted to identify tenure-related churn patterns. Control variables such as customer tenure, product type, and pricing changes were included to isolate the intervention's impact. A quasi-control group was used to compare churn trends in similar segments not exposed to the strategy. Stakeholders' workshops and VOC analysis validated that the observed improvements were aligned with the implemented changes rather than external factors. Finally, the Design of Experiments (DOE) was integrated during the Design phase to identify critical factors influencing retention, reducing reliance on simple pre–post comparisons and strengthening causal inference.

4. Results

4.1. Define

Table 4 presents a synthesis of the customer comments gathered during phone interactions. The table includes a Customer Satisfaction Score (on a scale from 1 to 10), which quantifies the emotional impact of each experience.

Table 4. Customer surveys.

Pain Points When Contacting Telecommunication Company	Suggestions for Improvement	Satisfaction Score
I'm always asked to call back if I'm still in contact as I can get an offer today.	Allow me to renew my contract today.	6
Wait times can be high, and then I'm asked to call again, as I can't renew my contract today.	Give me an offer today, and don't lose my current offer.	4
Agents are friendly, but I was told I couldn't renew my contract despite receiving an email.	Renew my contract when I call, so I don't have to wait again.	8
Contract notification received too early; I can't renew without losing my offer.	Contact me when I can renew or allow renewal when I call.	6
As a loyal customer, I recontract every year but was asked to call back again. I missed it and got a full bill.	Allow me to recontract and enjoy the rest of my current offer.	7
Unable to recontract when I call.	Let me recontract with a new offer when the current one expires.	8
Told by agent to call back to take on a new contract.	Let me update today and reduce my waiting times.	7
The agent said they could apply for a discount but asked me to call back.	Allow the agent to apply for a new offer, so I don't have to call again.	6
I want to stay a customer but couldn't recontract last month.	I should have been able to renew my contract when I called.	5
Waited on the line only to be told I can't renew yet.	Reduce wait times and let me start a new contract when I call.	5

Using this feedback, the project team, in collaboration with internal team leaders and process owners, developed a SIPOC diagram to depict the current inbound retention process (See Table 5).

Table 5. Steps in SIPOC diagram.

Suppliers	Input	Processes	Outputs	Customers
			Orders entered	
	Customer inbound phone calls		Customer recontacted	
			Customer terminated	
External Customers	Agent outbound phone calls	Customer contacts and indicates decisions to terminate contract with retention agent	KPI Overview: Inbound Save Rate, Outbound Save Volume of customers saved, cancelled orders	Customers
Inbound Agents	Customer emails			Inbound Agents
IT			Agent Interactions on System re outcome of their discussion	
Customer Value Management Planning Team	Tiered Offer Management—Spend Management	The agent handles queries, asks customer details and gathers further information		Customer Value Management Planning Team
			Customer Rights Directive if a new contract has been agreed	
Operations Leadership Group	System Updates—Next Best Offer Updates	Customer indicates reason for leaving and agent attempts to save the customer using retention offer toolkit. If the customer agrees, the order is entered into the system. If not, the process continues to step 4.		Operations Leadership Group
			Customer in contract/out of contract details sent back later	
Business Information Team	Headcount Planning and Management			Finance Team
			Customer receives email with details of termination if they decide to leave	
Training Team	Data for daily KPIs	Customer decides to be contacted for termination with Save Agent Team, and Agent processes this in the system to reflect the decision		Competitors—Customers Switching
Legal Team	Order data		In Contract Cancellation Fee applied if a customer terminates within their contract period	
Finance Team	Customer Propensity to Churn	Customer receives follow-up communication via email based on their decision	Revenue—Discount spend	Business Information Team
	Conversational Framework		Next Best Offer: through using the tool, it informs the system of how it can approve the offer it recommends for customer type	
			Revenue Lost—Customer churns and moves to competitor	

4.2. Measure

Equipped with this understanding, the project team utilized Pareto charts to help pinpoint and confirm the primary challenges identified from the agent and NPS surveys [63], as shown in Table 6. Two main themes emerged from this analysis: external customers expressed frustration regarding perceived lack of loyalty with rising prices, while internal customers (agents) were dissatisfied because they felt inadequately equipped with the tools or training to effectively resolve customer queries who were approaching the end of their contract.

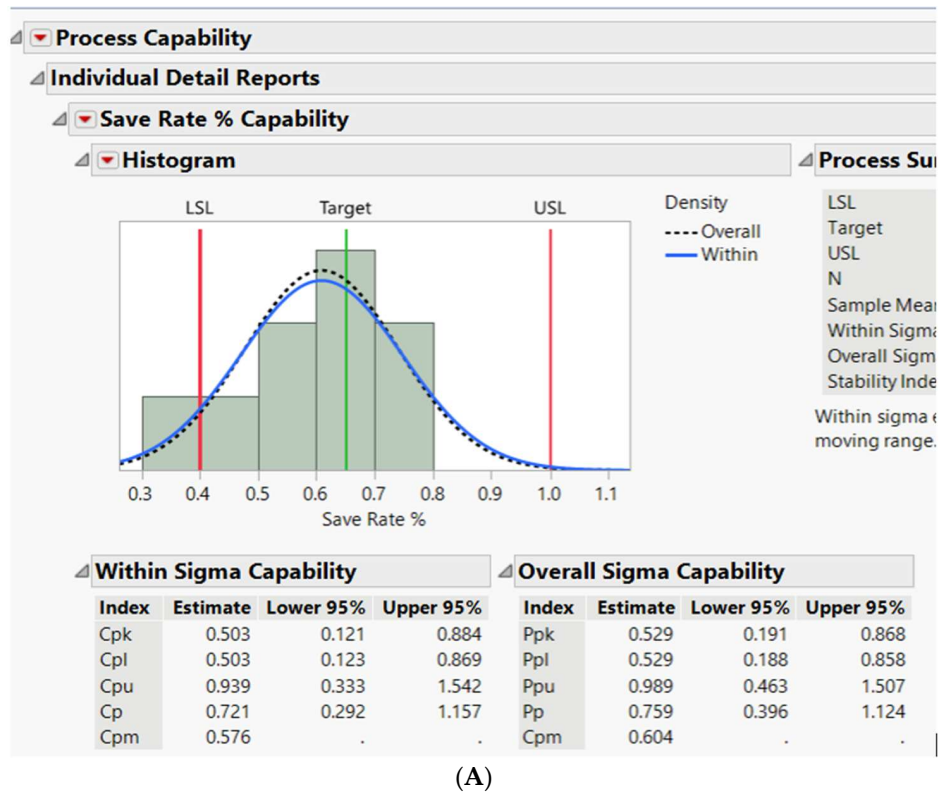
Table 6. Pareto analysis.

Causes		Cumulative Total	Cumulative %	80% (80/20 Rule)
Unhappy with overall price and loyalty shown	250	250	50%	80%
Coming to end of contract and looking to switch	100	350	70%	80%
Looking to move house	80	430	86%	80%
Technical issues	40	470	94%	80%
Billing issues	30	500	100%	80%

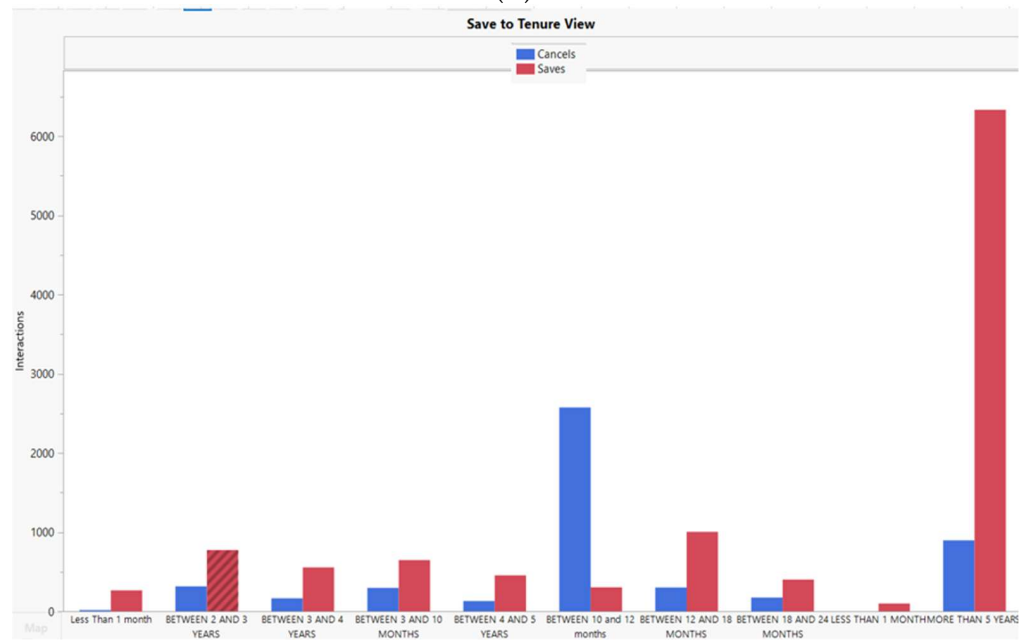
A CTQ tree was created to pinpoint the essential metrics necessary to address these needs. The CTQ framework is intended to capture the vital measurable attributes of a process or service that must meet performance standards to satisfy the service user [64]. These metrics aimed for faster resolutions for customers through a more proactive retention process, a reduction in the customer repeat rate (customers repeatedly calling into the retentions line) by 5%, lower pricing through more suitable loyalty discounts tailored to customer behavior, and increased options for customers concerning loyalty discounts with an emphasis on longer-term discounts (longer than 12 months).

During the measure phase, the project team gained a deeper understanding of how customer tenure and seasonality influence customer churn. It was overwhelmingly evident that most customers were leaving between months 11 and 13, typically when customers would exit their new acquisition contracts. Following the regulatory changes enacted in June 2023, a notable rise in the monthly churn volumes was observed, persisting into the first half of 2024, with year-on-year churn volumes increasing overall. A key factor for the change was the proactive communication with customers 45 days prior to contract termination, which was driving more customers to reach out to retention services, resulting in higher call volumes, and increased pressure on the inbound save rate (total number of customers who decided to stay with of the telecommunication company after the conversation), which is also evident in this analysis.

Figure 3A illustrates a capability perspective with the saving rates, which were fully meeting targets. This is particularly relevant for customers approaching the end of their contracts as shown (See Figure 3B), suggesting that the process was inadequate in achieving the desired results.



(A)



(B)

Figure 3. Capability analysis that includes Figure 3A,B. (A) Process capability visualization. (B) Distribution of Workload and Capacity by Category.

4.3. Analyze

Mini Kaizen workshops played a crucial role in the analysis phase of the project. Kaizen, which translates from Japanese as ‘change for good,’ is an improvement methodology centered on processes and should involve individuals from all organizational levels. Several sessions, which invited both project members and broader operations team members, including team leaders and agents, collaboratively outlined the current retention process, pinpointed performance pain points, and identified existing gaps in the activities.

Throughout the workshops, the team utilized Ishikawa diagrams (Figure 4) and the 5 Whys (Figure 5), to uncover the primary root causes of the problems.

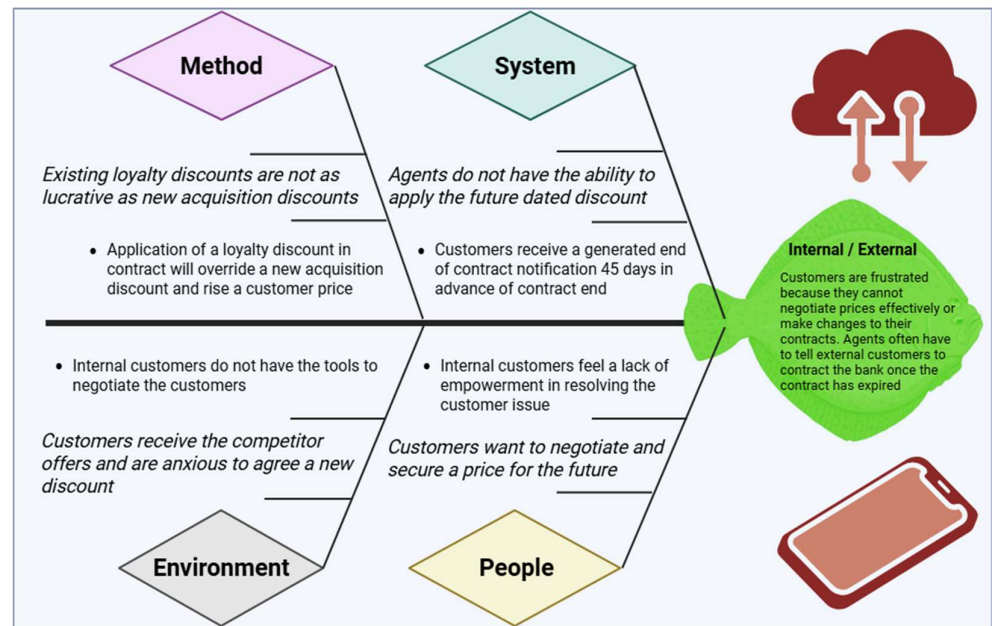


Figure 4. Ishikawa Diagram.

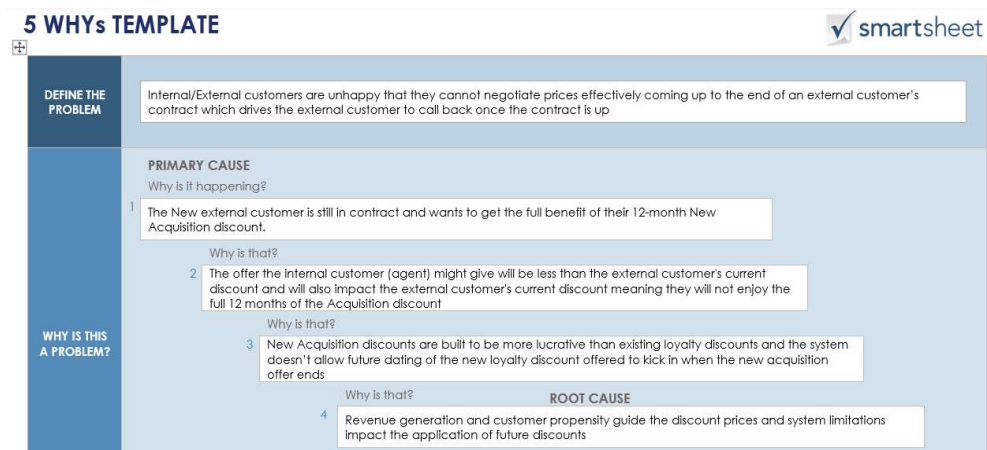


Figure 5. 5 Whys.

The Fishbone (Ishikawa) diagram revealed a core issue affecting both internal and external customers: the dissatisfaction caused by ineffective price negotiations as external customer contracts approached expiration.

The 5 Whys analysis shows that customers often call back once the contract expires. This issue arises because customers want to retain the full benefit of their 12-month New Acquisition discount. However, any new offer from the internal agent would reduce or override the current discount, preventing customers from enjoying the full term. This happens, because New Acquisition discounts are designed to be more attractive than loyalty discounts, and the system does not support scheduling a loyalty discount to begin after the current one ends. Ultimately, this limitation stems from the way discount pricing is driven by revenue goals and customer behavior, combined with system constraints that prevent the future application of discounts. Therefore, the root cause lies in the revenue-driven discount structure and system limitations.

4.4. Design

During this phase, the project team focused on developing a new proactive retention treatment process, which is illustrated. To facilitate the treatment of each customer group, various activities were established, which included forming an outbound calling team consisting of 10 agents and one team leader, launching a customer mailing campaign aimed at recontracts for in-life customers (with tenure exceeding 14 months) through discounts and offers, and introducing an inbound propensity team (also comprising 10 agents and one team leader) dedicated to addressing calls from customers identified via a propensity model as having a higher churn risk. This team was equipped with the best tools and incentives to retain these customers.

Brainstorming is a group ideation process where numerous ideas are generated, judgment is set aside, and innovation is fostered [65]. Through brainstorming, the team conceived solutions for the challenges identified in the current process, which involved introducing future-dated loyalty discounts, enabling frontline agents to negotiate with new acquisition customers nearing the end of their contracts during their 11th month. This solution enhanced immediate performance, decreased customer repeat rates, and increased overall satisfaction.

A further solution identified was to enhance agent performance through improvements in coaching and the work environment. A team was assembled to conduct a DOE focused on how various coaching elements affected the call quality and agent performance, both of which were directly linked to customer save rates and overall customer experience.

A Gauge R&R analysis was also performed, as shown in Figure 6, to evaluate the Repeatability and Reproducibility (R&R) of call quality scores (for instance, assessing agent performance in a contact center), aiming to assess the dependability of the measurement system. This included investigating how consistently call scores were evaluated by the same assessor (repeatability) and among different evaluators (reproducibility). The study pointed out areas requiring enhancement in measurement reliability, with recommendations for calibration meetings and updated scorecard manuals put forward to improve evaluator consistency within the contact center.

	Appraiser	Call	Trial	Quality Score
1	Team Leader A	1	1	0.77
2	Team Leader A	2	1	0.81
3	Team Leader A	3	1	0.82
4	Team Leader A	4	1	0.8
5	Team Leader A	5	1	0.78
6	Team Leader A	1	2	0.77
7	Team Leader A	2	2	0.8
8	Team Leader A	3	2	0.82
9	Team Leader A	4	2	0.79
10	Team Leader A	5	2	0.77
11	Team Leader B	1	1	0.78
12	Team Leader B	2	1	0.81
13	Team Leader B	3	1	0.81
14	Team Leader B	4	1	0.8
15	Team Leader B	5	1	0.77
16	Team Leader B	1	2	0.78
17	Team Leader B	2	2	0.81
18	Team Leader B	3	2	0.83
19	Team Leader B	4	2	0.8
20	Team Leader B	5	2	0.77
21	Performance Enhancement Specialist	1	1	0.78
22	Performance Enhancement Specialist	2	1	0.81
23	Performance Enhancement Specialist	3	1	0.82
24	Performance Enhancement Specialist	4	1	0.81
25	Performance Enhancement Specialist	5	1	0.77
26	Performance Enhancement Specialist	1	2	0.78
27	Performance Enhancement Specialist	2	2	0.8
28	Performance Enhancement Specialist	3	2	0.82
29	Performance Enhancement Specialist	4	2	0.81
30	Performance Enhancement Specialist	5	2	0.77

Figure 6. Gauge R&R study.

To prepare for the implementation of these changes, the group established timelines for piloting these initiatives. Key Performance Indicators (KPIs) were also defined for each action to measure the success rates of the pilot programs. Figure 7 provides a detailed overview of these metrics for the pilot. This encompassed the establishment of new KPIs within the business, including the percentage of the customer base under contract and the percentage of customer recontract rates. Additionally, the project group aimed to develop work instructions for each of the new procedures established. For instance, a structured set of offers was defined for the outbound team to be utilized per customer segment.

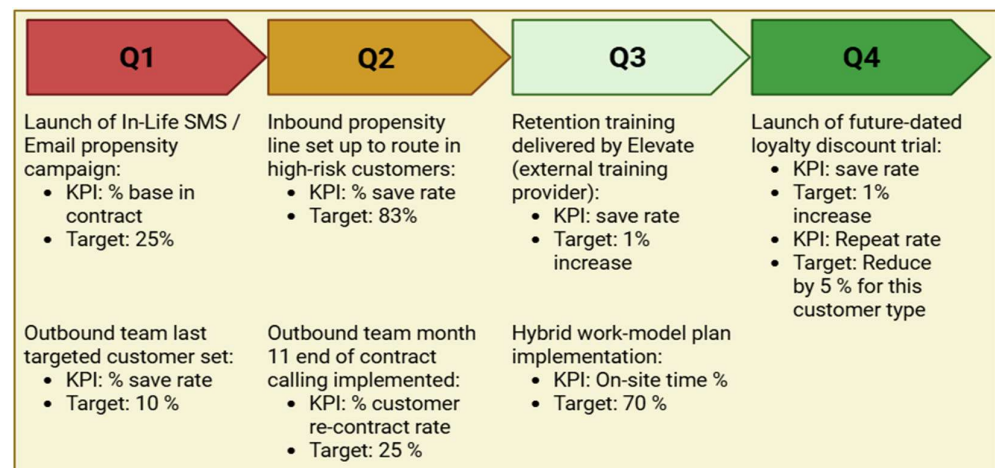


Figure 7. Pilot KPIs.

4.5. Verify

During the verify phase, the execution of the pilot was crucial for a test-and-learn approach for each of the proposed solutions. These pilots were underpinned by training plans, rollout timelines, and control strategies. The first pilot executed was the establishment of the outbound sales team, who were recruited in February 2024. The team concentrated on making outbound calls to customers who were in their 11th month of contracting and those in the termination process, aiming to retain these customers prior to their exit from the business. In the process of forming the team, new KPIs were established, including the customer recontract percentage rate. A significant aspect of the new proactive retention strategy was the launch of the proactive retention mailing campaign in January. The current propensity model (analytical model that used algorithms to segment the customer base) played a crucial role in this campaign, alongside outbound initiatives, targeting existing customers who were identified as likely to churn.

Figure 8 presents a summary of the outbound calling and mail campaign's performance over several months. The targeted customer retention effort, which targeted customers who were within their 30-day termination period, resulted in a revenue preservation of 10% over a 12-month span. Initially, during the first three months of in-life mailing, the campaign saw slow progress, with many customers uninterested in renewing, due to the value of the offer. In response, the business reassessed the offer tier, raising it to a higher tier 3 offer, which resulted in noticeable improvements beginning in July. As is customary with all pilot projects, a comprehensive review was conducted in May, leading to the decision to incorporate the proactive retention campaign into the broader strategy. The monthly volume of recontracts from the outbound team and in-life mailing campaigns significantly contributed to a 6% increase in the number of customers currently contracted.

Proactive offers, future-dated discounts, and outbound calls reduce churn because they intervene before customers reach the critical decision point to leave. Proactive offers anticipate contract-end behavior, presenting attractive options early and preventing cus-

tomers from switching. Future-dated discounts remove friction by allowing customers to keep current benefits while securing new deals, making retention offers more appealing. Outbound calls create direct engagement with high-risk customers, enabling personalized solutions and building trust, which passive communication cannot achieve. Together, these actions shift retention from reactive to proactive, improve perceived value, and strengthen customer relationships - key drivers of loyalty and reduced churn.

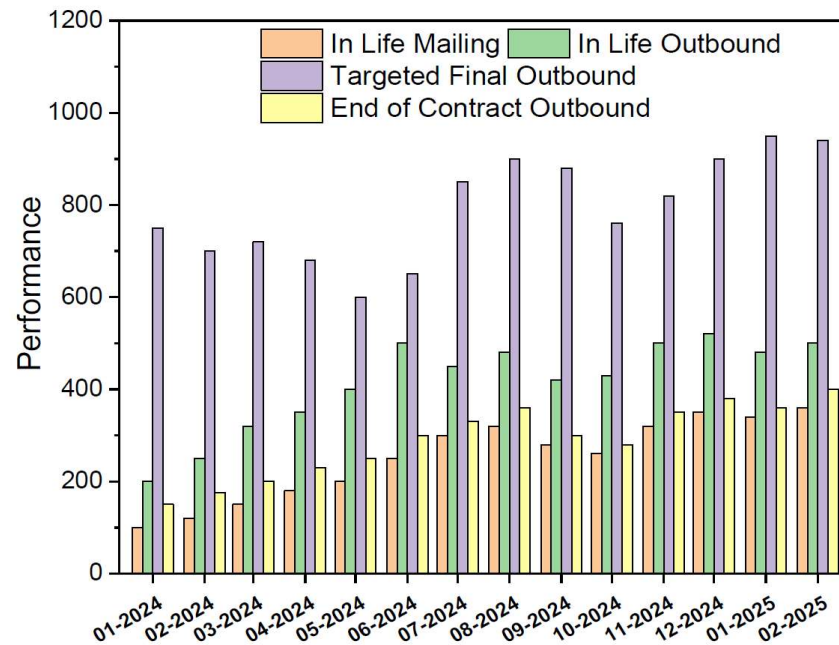


Figure 8. Customer base contract % results.

To enhance agent performance, elevate customer satisfaction, and minimize repeat customer calls, a process for future-dated loyalty discounts was implemented. This new solution equipped agents with improved tools, including options for discounts to be applied on a future date, allowing them to better meet customer needs during the initial call. This innovation, which was industry leading, enabled new acquisition customers to keep their existing 12-month discounts before moving on to new offers. Key targets included achieving a 1% increase in the saving rate and a 5% reduction on repeat calls. The tool was initially introduced to the inbound propensity team in October 2024, conducted as a pilot phase, and was fully implemented by December 2024. The overall saving rate for the team has increased by an average of 2%, translating to an additional 200 customers per month annually. There has also been a notable decline in call volumes directed at the propensity team, with an average 6% drop in repeat call rates, amounting to a reduction of 2880 calls per year, generating an annual saving cost of 2%. During the pilot phase, different visual control tools were utilized to monitor metrics such as the recontract percentage, save rate percentage, repeat rate percentage, and a quality assessment scorecard. Following the Design of Experiment and Gauge R&R, the business established a control plan to ensure the implementation of the identified changes. Table 7 provides a summary of the actions taken, their assigned owners, and confirmation of their status as the months progressed.

These actions were vital in enhancing the coaching standards and performance within the contact center, leading to a notable improvement in agent performance over the first 12 weeks of 2025, as illustrated in Figure 9.

Table 7. Guage R&R control plan.

Action No	Action	Owner	Timeline
1	Block schedule coaching sessions for each agent weekly into the last hour of the agent shifts.	Planning Manager	30-Nov
2	Review hiring plan of team leaders to attract team leaders of higher tenure into the business.	Recruitment/Training Manager	15-Dec
3	Change model for agents with tenure < 6 months to be onsite full time for the first 6 months.	Recruitment/Training Manager	01-Jan
4	For agents >6 months tenure, move to a model with >75% of time spent onsite.	Senior Operations Managers	01-Feb
5	Plan 2 coaching sessions per week with agents < 6 months tenure, using high-tenure coaches.	Planning Manager	01-Jan
6	Offer regular training updates to reinforce standards and address new criteria or process changes.	Recruitment/Training Manager	Ongoing
7	Organize weekly calibration meetings, where evaluators review and score the same calls together.	Senior Operations Managers	Ongoing
8	Develop a scoring manual with best practices, common pitfalls, and feedback tips.	Recruitment/Training Manager	20-Dec
9	Create a distraction-free space in the contact center for evaluators.	Site Director	01-Mar
10	Provide training on common biases affecting scoring (e.g., halo effect, leniency, central tendency).	Not specified	Not specified

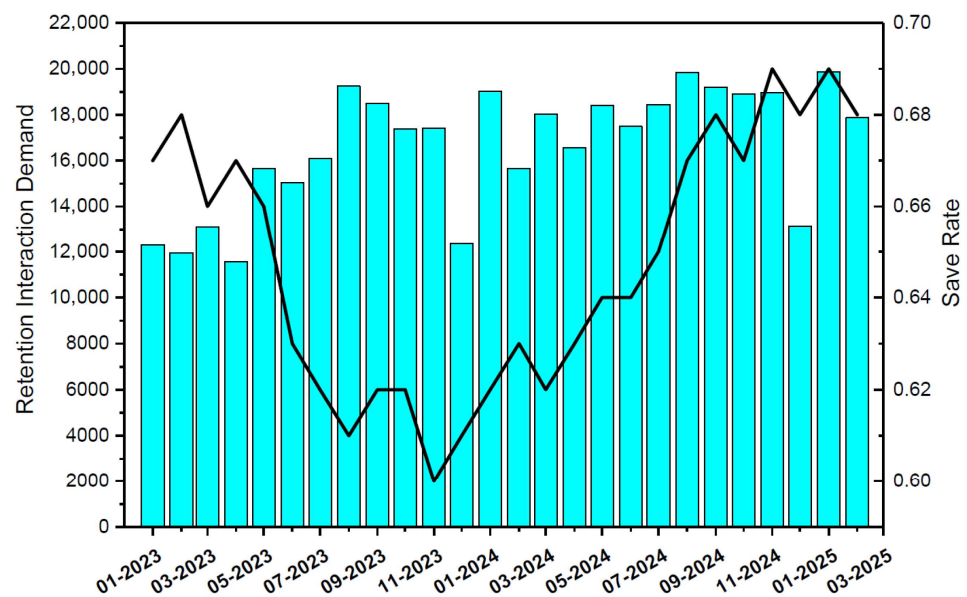


Figure 9. Retention demand and save rate results.

The Verify phase plays a vital role in DMADV, as it confirms that a process aligns with its specific requirements and achieves its intended goals. This phase includes several stages such as assessing customer complaints, evaluating cost efficiency, verifying tangible benefits, and assessing intangible benefits. For each proposed solution mentioned earlier, the project team conducted an analysis within each of these phases to ensure the pilot test’s effectiveness and the transition of each activity into the live production environment.

5. Discussion

The results from this case study offer significant insights into how DFLSS can be utilized to combat customer turnover in a competitive and regulated telecommunications environment. The telecommunication company is dealing with rising customer attrition due to pricing models, industry regulations, and evolving consumer expectations [66]. This research aimed to establish a proactive retention management process to tackle these issues, implementing LSS principles via the DMADV framework. In line with relationship-marketing theory, DMADV can encode attitude-aware CTQs (overall vs. transaction satisfaction; affective vs. calculative commitment) and uncertainty-reducing designs so that renewal becomes the low-risk and low-effort choice; this is important because weak satisfaction strength and perceived price unfairness can elevate churn even among short-term 'satisfied' customers [35].

The literature review highlighted the success of LSS in enhancing processes and customer satisfaction by pointing out a deficiency in its utilization for reducing churn in the telecommunications field [47]. This study adds to the current body of literature by showing how DFLSS can be successfully tailored to telecommunication services sectors, especially in Western markets where there is a scarcity of research [55]. The design also complements flow-based customer analytics: Markovian transitions and early-warning "shock" detection offer a structure for Verify, and CLV-aware iso-value analysis links RFM patterns to forward-looking value for resource allocation [67].

Two major themes surfaced during this study, which were expressions of frustration by customers overperceived unfair pricing and by internal agents who experienced dissatisfaction due to insufficient tools and training to handle customer inquiries. Repeated discounts can foster customer expectations for ongoing concessions, eroding perceived value and increasing dependency on promotional pricing. This observation corresponds with the previous findings, which stress the necessity for organizations to address both internal and external customer needs to improve service delivery [6]. These themes are theoretically consistent with price-fairness research and switching-cost typologies: perceptions of unfair price changes trigger exit and negative word-of-mouth, while high procedural/financial/relational switching costs stabilize calculative commitment - thus transparent tariffs and fair predictable renewal charges are critical [68].

The study reaffirmed that aligning operational processes with customer expectations is essential and that relying solely on reactive retention tactics is inadequate in a marketplace where customers frequently switch providers. Table 2 (Section 3.2.1) through a synthesis of customer comments from phone interactions reported pain points such as long wait times, inability to renew during calls, and repeated callbacks, and they suggested improvements and satisfaction scores that quantified the emotional impact of each experience. Theory indicates that satisfaction converts to loyalty only when the satisfaction strength is high; therefore, designs that reduce the decision uncertainty and cognitive effort at renewal help translate the stated satisfaction into actual retention [69].

A critical aspect of this research was how data analytics and LSS tools could enhance retention strategies. The Measure phase utilized Pareto charts and Critical to Quality (CTQ) trees to prioritize the main issues impacting customer retention. A notable discovery was that customer churn rates were highest between the 11th and 13th months, aligning with the end of acquisition contracts and the introduction of regulatory end-of-contract notifications. Regulatory requirements in Ireland, such as mandatory end-of-contract notifications, create early churn triggers that make proactive outreach essential. The contract-based culture, where churn peaks at renewal points, means strategies like future-dated discounts are highly relevant; however, these may not apply in markets dominated by prepaid or flexible plans. Intense competition and aggressive pricing amplify the impact of loyalty discounts

and outbound engagement, whereas in less competitive markets, service quality might matter more than price incentives. These results are consistent with those in [12], which highlighted the significance of tracking churn trends to identify essential intervention opportunities. Short-horizon verification is also supported empirically in B2B telecom: one-week-ahead models outperform longer horizons, and SHAP interpretations emphasize support/churn-case dynamics—justifying rapid week-scale checks in Verify [67].

Moreover, capability studies revealed that the rate for customers approaching the contract end was below the desired target, indicating inefficiencies in the current retention approach. This finding supported the idea that while present reactive retention efforts had some effectiveness, they were not designed to adequately prevent churn. The research illustrated that combining propensity modeling with proactive outreach could substantially enhance the customer retention rates and satisfaction. Capability assessment of the monthly save and cancel–churn interactions indicated a save-rate pressure near contract end and reinforced the case for proactive interventions in months ten to twelve. Prescriptive analytics further strengthened this approach: uplift modeling targets customers who change behavior because of the intervention, improving the campaign efficiency; in parallel, AUC-optimized SVMs are robust under imbalanced noisy B2B data [70].

The study investigated whether a well-organized proactive retention strategy could complement conventional reactive methods. In the Design phase, customers were segmented into four risk-based retention categories, enabling targeted interventions based on the tier and likelihood of churn. Equity concerns may arise if high-risk segments receive preferential treatment, potentially diminishing satisfaction among loyal customers who do not benefit from similar offers. The literature indicated that customer segmentation can improve service personalization, leading to increased satisfaction and reduced churn [71]. Segmenting customers provided greater clarity on how these customers were to be treated using certain tools and discounts to support each one of these segments. The proactive retention treatment process operationalized this segmentation into four tenure-aligned buckets with tailored triggers and offers, focusing resources on the highest-risk months while retaining standard pathways for lower-risk customers. Dynamic segmentation can be extended with hidden Markov models that track latent relationship states and transitions after firm–customer encounters, supporting timely movement between proactive and fallback paths [72].

A significant development was the launch of future-dated loyalty discounts, which is an industry-leading tool, enabling agents to secure commitments from customers before their contracts lapse. This tackled a significant flaw in the earlier strategy, where customers frequently transitioned to competitors before retention teams had a chance to step in. Moreover, establishing an outbound retention team and a targeted mailing approach for at-risk customers showed that proactive outreach, as opposed to waiting for customers to start retention conversations, strongly boosted the contract renewal rates. Managing multiple retention pathways introduces operational complexity, increasing the risk of errors and inconsistent experiences. From a theoretical standpoint, early transparent commitments reduce uncertainty and stabilize calculative commitment, making renewal comparatively low-risk and low-friction [35].

The implementation of DOE further refined the retention process by evaluating elements that affected agent performance. The results revealed that the duration of coaching, the training framework, and feedback systems had a direct impact on the agent's success, supporting the existing research on how workforce development influences service quality. As a result, changes were made to coaching methodologies and remote work policies to improve agent performance. In the DOE, agent tenure, coach tenure, and feedback location were the most significant drivers of call quality and save-rate performance, and a Resolu-

tion V fractional factorial design with sixteen runs and an in-office versus online blocking factor enabled efficient estimation of main effects without excessive testing. Improved service quality has documented behavioral consequences, higher loyalty intentions and lower defection signals, which aligns with the observed uplift in save rates [37].

The Verify phase provided concrete evidence for the effectiveness of the proposed retention strategy. To mitigate these risks, it is important to establish clear eligibility criteria, communicate the broader value of loyalty programs beyond discounts, monitor financial impacts, and implement process controls to manage complexity. The outcomes illustrated the value of initially launching with a pilot group to achieve Design for Reliability, addressing any issues before a full-scale implementation, which empowered pilot users to lead the change. The previous work advocated the use of a pilot group to set benchmarks within the organization, educate everyone on the project's advantages, and hold leaders accountable for these outcomes [73]. The pilot initiatives for the outbound retention team and focused mailing campaigns showed quantifiable improvements, with a 6% increase in customers maintaining their contracts and a 2% uptick in save rates. The use of statistical process control tools guaranteed that these improvements were maintained and could be replicated throughout the organization. As part of sustaining these improvements, operations managers now conduct regular Gemba visits to gather feedback and observe coaching in the contact-center environment, and weekly calibration sessions support coach development and fairness in scoring. The short-cycle Verify rhythm is consistent with the performance profile of weekly time-series churn models, which favor near-term validation [67].

One of the most notable financial results stemmed from the targeted customer campaign, which led to an estimated retention of 10%. This corroborated the research conducted by [13], which emphasized the fiscal benefits of process improvements that are data driven. Furthermore, decreases in repeat call rates and operational lags were consistent with earlier findings on how LSS enhances service responsiveness [20]. Embedding CLV aware views (via iso-value curves) would further connect these operational gains to lifetime financial impact [74].

Despite the overall success of the program, several hurdles were faced. Seasonal fluctuations in customer acquisition and churn made forecasting more challenging, indicating a need for further enhancements in predictive modeling [54]. Furthermore, legal restrictions limit the timing of outbound contacts, necessitating careful compliance with regulatory guidelines. Cooperation with compliance teams was vital to ensure that proactive retention activities conformed to industry regulations. An unexpected revelation was the comparatively low engagement level from customers who received in-life mailing campaigns. The initial retention proposals did not yield the expected re-signing rate, which called for modifications to the discount offerings. This highlights the necessity of ongoing experimentation and iterative learning within LSS frameworks. Future work should compare uplift-guided targeting against propensity-only approaches to assess incremental retention with equity safeguards [69].

This case analysis presents a practical guide for telecommunications companies aiming to adopt proactive churn management techniques. The findings indicate that combining LSS approaches with predictive analytics can strongly improve churn and retention outcomes, as demonstrated in Figure 10.

For industry professionals, several critical insights can significantly enhance customer retention strategies. First, customer segmentation is essential, as a one-size-fits-all approach to retention is often ineffective. By identifying customers based on their risk of churn, businesses can implement personalized interventions that improve retention outcomes. Second, proactive engagement yields superior results; waiting for customers to initiate renewals can lead to missed opportunities, whereas structured outbound retention efforts

can pre-empt churn and boost satisfaction. Third, investing in agent support directly influences success. Providing agents with the right tools, training, and incentives has been shown, particularly in LSS workforce development studies, to positively impact retention performance. Finally, continuous improvement remains vital. Through pilot programs and ongoing testing, companies can ensure their retention strategies remain effective amid changing market dynamics. These practices align with the broader evidence base that combines service-quality improvements, fair pricing, and short-horizon verification to stabilize renewal decisions [41].

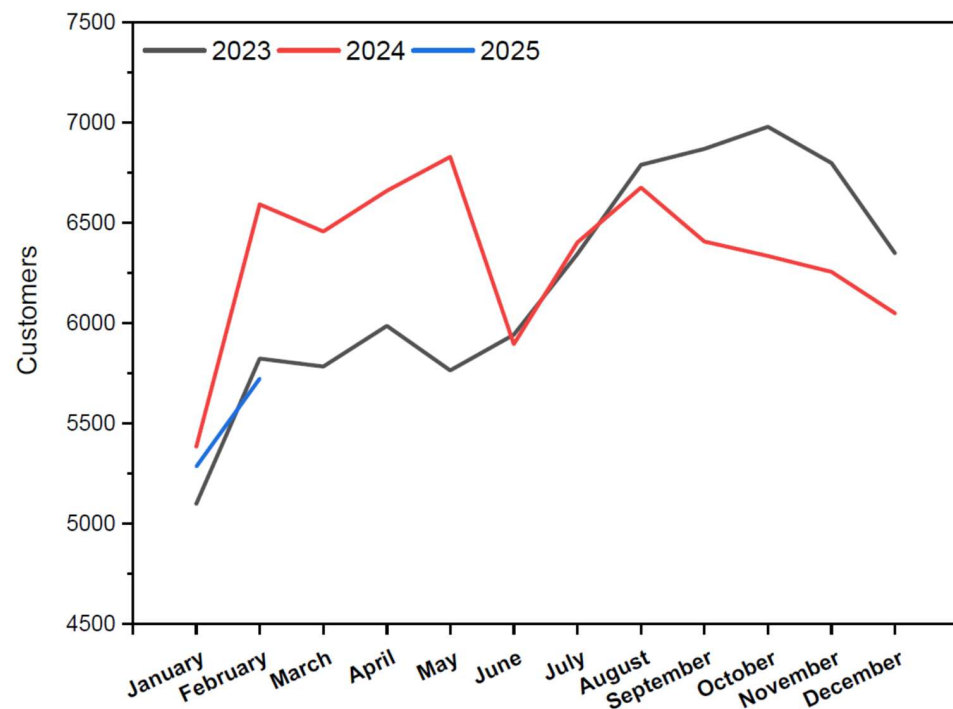


Figure 10. Customer churn results.

This research highlights the effectiveness of DFLSS in revolutionizing customer retention tactics within the telecommunications sector. By implementing the DMADV framework, the telecommunication company effectively tackled significant challenges in its retention approach, resulting in observable enhancements in churn reduction and customer satisfaction [75], as illustrated in Figures 10 and 11. The results contribute to the sparse research available on LSS applications in European communications markets, providing a replicable model for other service providers [48]. The research also challenges the finding of [62], as it incorporates both new process design and existing process improvement through DMADV methodology as a solution to the problem presented. Taken together, the pattern of Markovian churn flows, CLV-aware design choices, and uplift-guided targeting offers a theoretically grounded pathway for retention programs to balance effectiveness with fairness and financial impact [67].

This work emphasizes the significance of proactive data-informed decision-making in competitive customer-focused markets. Despite existing challenges, the findings affirm that when Lean Six Sigma principles are applied thoughtfully, they can yield substantial business enhancements. Future research could investigate the incorporation of machine learning algorithms to further boost churn prediction accuracy, ensuring that telecommunications providers maintain their adaptability in a changing marketplace. Investigation into the creation of an automated customer decision-making hub that supports proactive and reactive retentions activities will potentially further enhance churn performance as shown in the model (See Figure 12). Additional lines of inquiry include testing hidden-state

segmentation for early uncertainty signals and quantifying satisfaction-strength changes over renewal cycles [40].

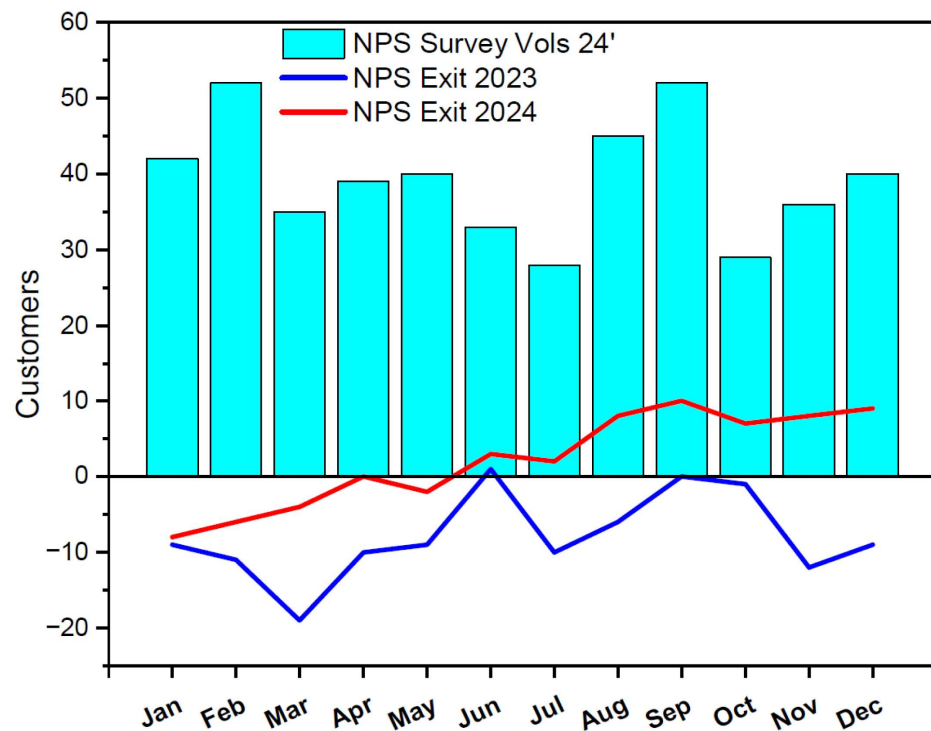


Figure 11. Customer satisfaction results.

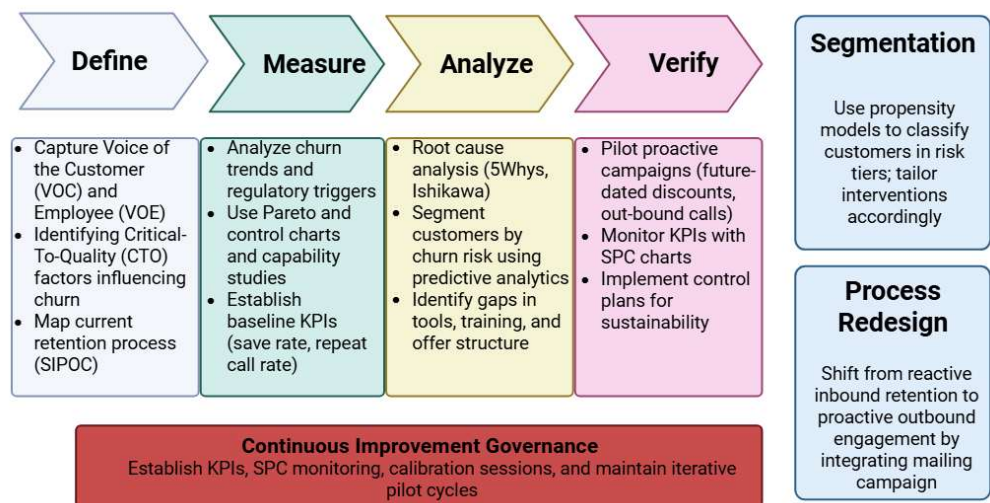


Figure 12. Churn management process model.

6. Conclusions

This project demonstrates the vital role of DFLSS in reducing customer churn and boosting satisfaction in the telecommunications sector. It highlights how call centers, as the first customer touchpoint, significantly influence retention. Lean Six Sigma tools, especially in the define and measure phases, helped to pinpoint churn drivers and customer needs.

Aligning the project scope with customer satisfaction goals proved essential. By focusing on retention, the research validated the importance of using the right methodologies, tools, and teams. The DMADV framework offered a proactive strategy for sustainable retention improvements, reflecting broader industry trends where service quality is a key differentiator. The study also revealed a strong link between internal and external customer

needs. Addressing frontline agents' requirements such as tools, training, and incentives, alongside customer expectations led to better service delivery. Redesigning strategies for customers nearing contract end significantly improved the save rates and reduced churn.

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Informed Consent Statement: Participant consent was waived due to the official waiver from the Science & Engineering Research Ethics Committee.

Data Availability Statement: The original contributions presented in the study are included in the article; further inquiries can be directed to the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

AI	Artificial Intelligence
AUC	Area Under the Curve
CTQ	Critical to Quality
CLV	Customer Lifetime Value
DFLSS	Design for Lean Six Sigma
DFSS	Design for Six Sigma
DMAIC	Define, Measure, Analyze, Improve, Control
DMADV	Define, Measure, Analyze, Design, Verify
DOE	Design of Experiments
GE	General Electric
PII	Personally Identifiable Information
KPI	Key Performance Indicator
LSS	Lean Six Sigma
NPS	Net Promoter Score
QFD	Quality Function Deployment
R&R	Repeatability & Reproducibility
SHAP	SHapley Additive exPlanations
SDL	Service-Dominant Logic
SIPOC	Suppliers, Inputs, Process, Outputs, Customers
SPC	Statistical Process Control
SVM	Support Vector Machine
VOC	Voice of the Customer
VOE	Voice of the Employee

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